Revised Green Peak II Density Management
Environmental Assessment and
Finding of No Additional Significant Impact

Environmental Assessment Number OR-080-08-14

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 revised EA (Environmental Assessment) discloses the predicted environmental effects of one project on federal land located in Township 14 South, Range 6 West, Section 7, Willamette Meridian and within the Benton Foothills and South Fork Alsea Watershed Analysis Areas.

Revised Green Peak II Density Management is a proposal to increase structural diversity and implement the BLM (Bureau of Land Management) DMS (Density Management and Riparian Buffer Study). Forest stands on approximately 131 acres would undergo additional density management thinning treatments within the 248 acres study area.

The actions would occur within Late Successional Reserve (LSR) and Riparian Reserve (RR) 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/AE-10/018+1792

FINDING OF NO ADDITIONAL SIGNIFICANT IMPACT

Introduction

The Bureau of Land Management (BLM) published the *Green Peak II Density Management* (EA) (EA# OR080-08-14) in March of 2008). Comments received on the EA were reviewed and as a result, the BLM revised the *Green Peak II Density Management EA.* The *Revised Green Peak II Density Management EA* is attached to and incorporated by reference in this Finding of No Additional Significant Impact determination (FONASI). The analysis in this revised EA is site-specific and supplements analyses found in the *Salem District Proposed Resource Management Plan/Final Environmental Impact Statement,* September 1994 (RMP/FEIS).

The proposed density management thinning activities have been designed to conform to the *Salem District Record of Decision and Resource Management Plan,* May 1995 (RMP) and related documents which direct and provide the legal framework for management of BLM lands within the Salem District (*EA Section 1.3*). Consultation with the U.S. Fish and Wildlife Service and National Marine Fisheries Service is described in Section 7.1 of the revised EA.

This project is on BLM-managed lands in Township 14 South, Range 6, Section 7, Willamette Meridian in Benton County, Oregon. The proposed action is to implement density management thinning on approximately 131 acres of 70 year-old stands. The proposal would increase structural diversity and implement treatments for research purposes as part of the BLM DMS (Density Management and Riparian Buffer Study) in RR (Riparian Reserve) and LSR (Late Successional Reserve) LUA (Land Use Allocations).

The revised EA and FONASI will be made available for public review from February 17, 2010 to March 6, 2010. The notice for public comment will be published in a legal notice in the *Gazette Times* newspaper. Written comments should be addressed to Trish Wilson, Field Manager, Marys Peak Resource Area, 1717 Fabry Road S., Salem, Oregon 97306. Emailed comments may be sent to OR_Salem_Mail@blm.gov. Attention: Trish Wilson.

Finding of No Significant Impact

Based upon review of the Revised Green Peak II EA and supporting documents, I have determined 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 area. No site-specific environmental effects meet the definition of significance in context or intensity as defined in 40 CFR 1508.27. Therefore, supplemental or additional information to the analysis done in the RMP/FEIS through a new environmental impact statement is not needed. The finding is based on the following information:

Context: Potential effects resulting from the implementation of the proposed action was analyzed within the context of the Marys River and Upper Alsea River Watersheds and the project area boundaries. The proposed actions would occur on approximately 131 acres of BLM LSR and RR LUAs, encompassing less than 0.1 percent of the forest cover within the Upper Alsea River Watershed and less than 0.2 percent of the forest cover within the Marys River Watershed [40 CFR 1508.27(a)].

Intensity:

1. The resources potentially affected by the proposed density management 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, recreation, soils, threatened or endangered species – northern spotted owl, visual resources, water quality, and wildlife habitat components. The effects of density management thinning are unlikely to have significant adverse impacts on these resources [40 CFR 1508.27(b) (1)] for the following reasons:

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

- *Vegetation and Forest Stand Characteristics (EA section 3.2.1):* No special status vascular plant species or bryophytes 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 areas with ground disturbing activities would be grass seeded with Oregon Certified (blue tagged) red fescue (*Festuca rubra*) as a rate equal to 40 pounds per acre or sown/planted with other native species as approved by the resource area botanist. Sowing disturbed soil areas allows the sown seed to become established and dominant in areas that may otherwise be suitable for noxious weeds to become established thus reducing the physical space of the potential habitat for noxious weeds to become established.

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

- *Carbon Sequestration (Storage) and Climate Change-* The Green Peak II Density Management EA (EA OR-080-08-14) 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 CO2 levels. The following show quantities of carbon in forest ecosystem vegetation[1] worldwide, in the United States, and in the Green Peak II project area.
  - Total carbon, forest ecosystem vegetation, Worldwide (Matthews et al, 2000, p. 58) = 132-457 Gt[2]
  - Total carbon, forest ecosystem vegetation, United States (US EPA, 2009) = 27 Gt
  - Total carbon, forest ecosystem vegetation, Pacific northwest, Coast Range 1.8-2 Gt (Hudiburg, et al. 2009).

[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.
[2] A Giga-tonne (Gt) is one billion tonnes, or metric tons.

- Total carbon, forest ecosystem vegetation, Green Peak II Project Area = 21,000 tonnes or 0.000021 Gt. This represents .000001% of the United States total or .00001% of the Coast Range total.

The annual carbon accumulation from forest management in the United States is 191 million tonnes. Current management on BLM-managed lands in western Oregon would result in an average annual accumulation of 1.69 million tonnes over the next 100 years, or 0.9% of the current U.S. accumulation. (WOPR, p. 4-537).

Carbon emissions resulting from the proposed action would total 1,150 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 .00000004% of current global emissions and .0000002% of current U.S. emissions.

Tree growth following harvest would offset greenhouse gases and result in net storage of 390 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 the proposed action, over time, would be net storage of carbon.

- *Hydrology; Beneficial Uses, Fisheries and Aquatic Habitat; and Soils (EA sections 3.2.2 to 3.2.4)*:

  Measurable impacts on stream flow, channel conditions, and water quality due to this proposal are unlikely due to the heavy armoring of the channels by larger substrate of cobbles and boulders. Research presented in 2007 for all of the DMS study areas in western Oregon did not detect any effects to stream habitat parameters due to treatment activities based on the study period of 1998 through 2004.

  Increases in stream temperature as a result of this proposal are unlikely due to the implementation of the research stream buffers (25 to 220 feet of undisturbed forest) and adjacent density management thinning areas.

  Due to the generally gentle topography of the study area and the patchwork type of harvest activity which includes 49 acres of leave islands and riparian buffers, increases in mass wasting and alterations in the sediment regime would continue to have a low probability. Tree removal would not occur on steep, unstable slopes where the potential for mass wasting adjacent to streams is high. Therefore, increases in sediment delivery to streams due to compaction or mass wasting are unlikely to result from this action.

- *Soils*: *(EA section 3.2.2)*. There are no new roads planned for this entry into the study area. Existing landing areas would be re-used for this entry creating no additional disturbed area. The overall amount of soil disturbance and compaction from a shovel yarding operation on low soil moisture areas is generally less than 7 percent. The effect on overall project site productivity (from all proposed treatments) would be a 0.9 percent reduction in overall yield for the entire 248 acre project area. Ground-based yarding with crawler tractors on designated skid trails should at the most impact 2 percent of the harvest area. Existing haul road and skid trails would be used to minimize the need for new skid trails.

- *Special Status Species: (EA section 3.2.1).* The *Phaeocollybia sipei* site would be protected by reserving the adjacent conifers. This project would not affect any other bureau sensitive vascular plant, lichen, bryophyte or fungi species since there are no known sites within the project area or adjacent to the project. Although the implementation of this project would be detrimental to any bureau SS mycorrhizal fungal species occurring in the project area, the likelihood of any occurring in the stand is low because the majority of these species have no known sites within the Marys Peak Resource Area or the Northern Oregon Coast Range Mountains.

- *Wildlife* (*EA section 3.2.5*): The proposed action is a may affect, not likely to adversely affect marbled murrelet because treatment of the mid-seral habitat 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 northern spotted owl because it would modify the structure and composition of owl dispersal habitat at the stand level but would maintain the functionality of the habitat for owl dispersal since only seven acres are expected to fall below at least 40 percent crown closure. The long-term impact of density management thinning on owls would be positive since the existing habitat would develop into suitable nesting habitat sooner than if left untreated. The treatment would also have immediate and long-term positive impacts for foraging owls by improving prey habitat due to the creation of new snags and CWD in the stands.

- *Air Quality and Fire Hazard/Risk (EA section 3.2.6):* Fuel loading, risk of a fire start and the resistance to control a fire would all increase at the sites as a result of the proposed action. Risk of a fire start in the untreated slash would be greatest during the first season following cutting. Fire risk would continue to diminish as the area "greens up" with under story vegetation, and as the fine twigs and branches in the slash begin to break off and collect on the soil surface. Past experience, in the geographic area of this proposed action, has shown that, in approximately 15 years, untreated slash would generally decompose to the point where it no longer contributes significantly to increased fire risk.

  The total amount of slash debris expected to be piled for burning is estimated to be approximately 250 to 400 tons from the landings and treated areas along the roads. Burning 250 to 400 tons of dry, cured, piled fuels under favorable atmospheric conditions in the Oregon Coast Range is not expected to result in any long-term negative effects to air quality in the air shed. Burning of slash would be coordinated with Oregon Department of Forestry in accordance with the Oregon State Smoke Management Plan which serves to coordinate all forest burning activities on a regional scale to prevent cumulative negative impacts to local and regional air sheds.

  Public health or safety [40 CFR 1508.27(b)(2)]: The project's effects to public health and safety would not be significant . Public safety along haul routes would be minimally affected because log truck traffic on both private and public land is common and because project design features such as warning signs near logging activities would provide for public safety (EA section 2.2.2).

2. The proposed density management thinning activities:
   a. Would not affect
      (1) unique characteristics of the geographic area [40 CFR 1508.27(b)(3)] - There are no parklands, prime farmlands, wild and scenic rivers, wilderness, or ecologically critical areas located within the project area (*EA Section 3.1, Table 3);*
      (2) 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, Table 3).*
   b. *Are not unique or unusual.* The BLM has experience implementing similar actions in similar areas without highly controversial [40 CFR 1508.27(b) (4)], highly uncertain, or unique or unknown risks [40 CFR 1508.27(b) (5)].
   c. *Do 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)].

   Are not expected to adversely affect Endangered or Threatened Species listed 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 effects to federally listed wildlife species and potential degradation of critical habitats, the proposed action has been consulted upon with the U.S. Fish and Wildlife Service, as required under Section 7 of the ESA. Consultation for this proposed action was facilitated by its inclusion within a programmatic Biological Assessment (BA) that analyzes 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 resulting Letter of Concurrence (FWS Reference Number 13420-2008-I-0125, dated October 7, 2008) concurred with the BA, that this action was not likely to adversely affect spotted owl, marbled murrelets or their critical habitats. This proposed action has been designed to incorporate all appropriate design standards set forth in the BA which forms the basis for compliance with the Letter of Concurrence.

   National Marine Fisheries Service
   Protection of EFH (Essential Fish Habitat) as described by the Magnuson/Stevens Fisheries Conservation and Management Act and consultation with NMFS (National Marine Fisheries Service) is required for all projects that may adversely affect EFH of Chinook salmon and coho salmon. The proposed Green Peak II project would not affect EFH due to distance of all activities associated with the projects from occupied habitat.

   A determination has been made that this proposed project would have 'no effect' on UWR (Upper Willamette River) steelhead trout, UWR Chinook salmon, Oregon chub, and Oregon Coast coho salmon. Generally, the 'no effect' determination is based on the distance upstream of project activities (approximately 4 and 24 miles downstream) from ESA listed fish habitat and project design criteria that include no harvest activity within stream protection zones and post-project leave tree densities of 25-65 trees per acre.

2. The Proposed action 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: _____ _____
Trish Wilson, Field Manager Date
Marys Peak Resource Area

Glossary: Abbreviations, Acronyms, and Terms

ACEC	Area of Environmental Concern. Lands where special management attention is needed to protect and prevent irreparable damage to important values, resources or other natural systems or processes.
ACS	Aquatic Conservation Strategy. A set of objectives developed to restore and maintain the ecological health and aquatic habitat of watersheds.
ACS/FSEIS	Final Supplemental Environmental Impact Statement, Clarification of Language in the 1994 Record of Decision for the Northwest Forest Plan National Forests and Bureau of Land Management Districts Within the Range of the Northern Spotted Owl, October 2003.
Adaptive Management	The continuing process of implementing policy decisions as scientifically driven management experiments that test predictions and assumptions in management plans, and using the resulting information to improve the plans.
Alternative	Proposed project (plan, option, choice).
AMA	Adaptive Management Area. Landscape units designated for development and testing of technical and social approaches to achieving desired ecological, economic, and other social objectives.
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.
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	A fallen tree (or portion of a tree) at least 20 inches in diameter at the large end and at least 20 feet long.
DBHOB	Diameter at breast height outside bark and all.
Density management thinning	Reduction and composition of trees in a stand for purposes other than timber production.

DMS	The BLM's Western Oregon Density Management Study, a cooperative study of the effect of silvicultural practices on vegetation, microclimate and riparian systems.
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.
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).
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.
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 Coast Province – Southern Portion
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 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.
PCT	Precommercial thinning. Removing some of the trees less than merchantable size from a stand so that the remaining trees grow faster.
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 work that generally includes removal of culverts, re-establishment of natural drainage patterns, and blocking motorized access.
Road Reconstruction	Road work to restore a damaged or deteriorated road to a usable

	condition and possibly a new design standard.
Road Renovation	Road work that restores an existing road to its original design standard.
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.
S&M FSEIS	Final Supplemental Environmental Impact Statement for Amendment to the Survey and Manage, Protection Buffer, and Other Mitigation Measures Standards and Guidelines (2000).
S&M ROD	Record of Decision and Standards and Guidelines for Amendment to the Survey and Manage, Protection Buffer, and Other Mitigation Measures Standards and Guidelines (2001).
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 standing dead tree.
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.
SSSP ROD	Record of Decision to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines in Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl, 2004
SSSP/SEIS	Supplemental Environmental Impact Statement to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines, 2004

Standards and Guidelines	S&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	The cloudiness or haziness of a fluid caused by individual particles (suspended solids) that are generally invisible to the naked eye, similar to smoke in air. The measurement of turbidity is a key test of water quality. Turbidity can be influenced by multiple environmental sources.
USDI	United States Department of the Interior
USEPA	United States Environmental Protection Agency
Viewshed	The landscape that can be directly seen from a viewpoint or along a transportation corridor.
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 constructed to divert water drainage off the disturbed surface.
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.
Wind Throw	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.

REVISED GREEN PEAK II DENSITY MANAGEMENT ENVIRONMENTAL ASSESSMENT

Table of Contents

1.0 INTRODUCTION

1.1 Background

The Revised Green Peak II Density Management is a proposal to perform density management thinning on approximately 131 acres of 70-year-old stands within LSR (Late Successional Reserve) and RR (Riparian Reserve) LUAs (Land Use Allocations). The density management thinning would occur within the approximately 248 acre study area that is part of the DMS [The BLM (Bureau of Land Management) Western Oregon Density Management and Riparian Buffer Study] conducted in cooperation with OSU (Oregon State University) College of Forestry and USDA (United States Department of Agriculture) Forest Service PNW (Pacific Northwest Research Station).

The BLM, PNW, OSU and US Geological Survey (USGS) established the DMS in 1994 to demonstrate and test options for young stand management to meet Northwest Forest Plan objectives in Western Oregon. The primary objectives of the DMS are to:

- Evaluate the effects of alternative forest density management thinning treatments in young stands on the development of important late-successional forest habitat attributes, and
- To assess the combined effects of density management thinning and alternative riparian buffer widths on riparian and aquatic ecosystems.
- Determine treatment effects on selected plant and animal taxa.
- Use the DMS sites to develop new operational approaches and monitoring methods and to share results.

The DMS consists of three integrated studies: initial thinning, re-thinning, and riparian buffer. Green Peak is one of the initial thinning study sites, which was installed in 50 to 80-year-old stands that had never been commercially thinned. Four stand treatments of 30 to 60 acres each were established at each of seven study sites: 1) unthinned control, 2) high density retention [(120 trees per acre (TPA)], 3) moderate density retention (80 TPA), and 4) variable density retention (40 to 120 TPA). Small (1/4 to 1 acre in size) leave islands were included in all treatments except the control, and small patch cuts (1/4 to 1 acre in size) were included in the moderate and variable density treatments. The initial thinning study was designed to gain information about development of late-successional habitat not available from previous studies of even-aged Douglas-fir silviculture.

The riparian buffer study was nested within the moderate density retention treatment at each of the initial thinning study sites. The study focuses on the interactive effect of the upland density management thinning treatments and the riparian buffers, the effects of buffers on microclimate and on aquatic and riparian dependant species. Four alternative riparian buffer widths are studied: 1) streamside retention (one tree canopy width, or 20–25 ft; and retained all trees contributing to bank stability), 2) variable width (follows topographic and vegetative breaks, 50 ft slope distance minimum), 3) one full site-potential tree height (approximately 220 ft), and 4) two full tree heights (approximately 440 ft).

This EA covers the continuation of the Green Peak Density Management and Riparian Buffer Study research project. The current project includes re-thinning and coarse woody debris creation.

This Environmental Assessment (EA) is a revision of the Green Peak II Density Management EA (original EA) that was published and made available for public review from March 17, 2008 to April 15, 2008. The original Green Peak II Density Management EA is incorporated by reference.

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

This EA will analyze the impacts of proposed re-thinning and coarse woody debris creation operations and connected actions on the human environment in the Marys River and Upper Alsea fifth field watersheds. The EA will provide the decision-maker (the Marys Peak Resource Area Field Manager), with current information to aid in the decision-making process. It will also determine if there are significant impacts not already analyzed in the Environmental Impact Statement for the Salem District's Resource Management Plan and whether a supplement to that Environmental Impact Statement is needed or if a Finding of No Additional Significant Impact is appropriate.

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

This February 2010 revision of the EA addresses Carbon Sequestration (Storage) and Climate Change, and snags and down wood recruitment.

1.2 Project Covered in this Revised EA (Environmental Assessment)

One project will be analyzed in this EA. The Revised Green Peak II Density Management Project is a proposal to perform density management harvest on approximately 131 acres of 70 year old stands. The project is located within LSR (Late Successional Reserve) and RR (Riparian Reserve) LUAs (Land Use Allocations).

1.3 Project Area Location

The project area is located approximately 12 air miles southwest of Corvallis, Oregon, in Benton County on forested land managed by the Marys Peak RA (Resource Area), Salem District BLM. It is within Township 14 South, Range 6 West, Section 7, Willamette Meridian (see Map 1).

Map 1. Green Peak II location

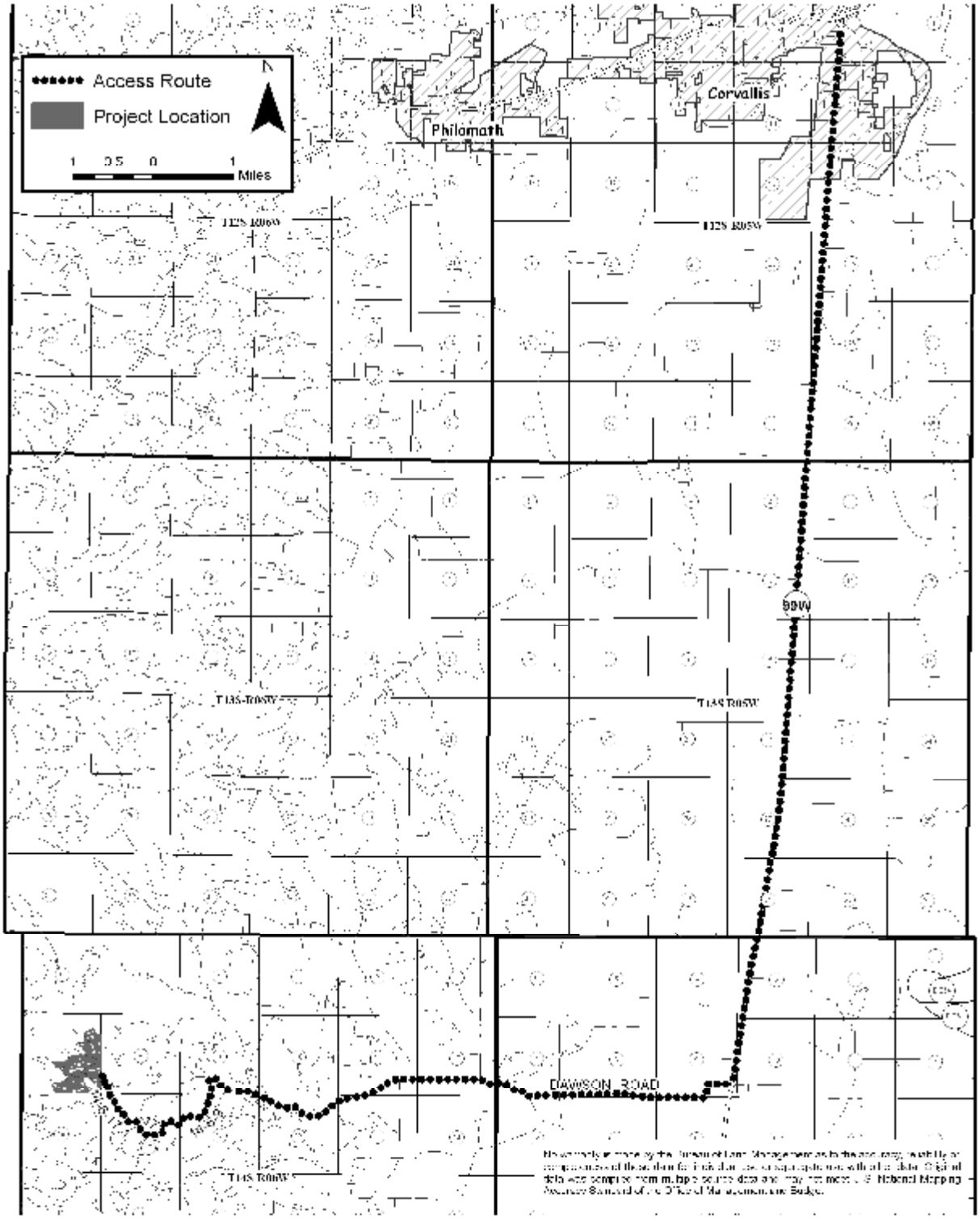
October 22, 2009

United States Department of the Interior
BUREAU OF LAND MANAGEMENT

REVISED

Green Peak II Location Map

T. 14 S., R. 6 W., Section 7, W.M. - SALEM DISTRICT - OREGON



1.4 Conformance with Land Use Plans, Policies, and Programs

On July 16, 2009 the U.S. Department of the Interior, withdrew the Records of Decision (2008 ROD) for the Western Oregon Plan Revision and directed the BLM to implement actions in conformance with the resource management plans for western Oregon that were in place prior to December 30, 2008.

Since project planning and preparation of National Environmental Policy Act documentation for this project began prior to the effective date of the 2008 ROD, this project had been designed to comply to the land use allocations, management direction, and objectives of the 1995 Salem District resource management plan (1995 RMP), as amended.

The proposed density management activities in the project area have been designed to conform to the following documents, which direct and provide the legal framework for management of BLM lands within the Salem District:

1. *Salem District Record of Decision and Resource Management Plan,* May 1995 as amended (RMP): The RMP has been reviewed and it has been determined that the proposed density management 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);
2. *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl,* April 1994 (the Northwest Forest Plan, or NWFP);

The analysis in the Green Peak II EA is site-specific, and supplements and tiers to analyses found in the *Salem District Proposed Resource Management Plan/Final Environmental Impact Statement,* September 1994 (RMP/FEIS). The RMP/FEIS includes the analysis from the *Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl,* February 1994 (NWFP/FSEIS).

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

The following documents provided additional direction in the development of the Revised Green Peak II Density Management project:

- IM OR-2005-083, dated August 12, 2005, that directs the Districts with established study sites to implement the next phase of the DMS. The Green Peak study site (see Map 2) is one of twelve sites referenced in the IM and scheduled for implementation in 2011.

- *Late-Successional Reserve Assessment Oregon Coast Province- Southern Portion* (LSRA, see USDA-FS and USDI-BLM 1997);

- *South Fork Alsea River Watershed Analysis* (SFAWA), USDI BLM, 1995 and *Benton Foothills Watershed Analysis* (BFWA), USDI BLM 1997.

The above documents, along with the Green Peak II IDT (interdisciplinary team) reports (EA section 7.1.1), are hereby incorporated by reference in the Green Peak II EA and available for review in the Salem District Office. Additional information about the proposed project is available in the NEPA file (Green Peak II Density Management NEPA/EA File), also available at the Salem District Office.

1.4.1 **Survey and Manage Review**

The Green Peak II Density Management 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 Green Peak II Density Management Project in consideration of both the December 17, 2009 and October 11, 2006 order. Because the Green Peak II Density Management project entails no regeneration harvest and entails thinning only in stands less than 80 years old, I have made the determination that this project meets Exemption A of the Pechman Exemptions (October 11, 2006 Order), and therefore may still proceed to be offered for sale even if the District Court sets aside or otherwise enjoins use of the 2007 Survey and Manage Record of Decision since the Pechman exemptions would remain valid in such case. In any case, Research areas are exempt from NWFP and S&G (Standards and Guidelines) as stated in the REO (Regional Ecosystem Office) memo on Assessment and Review of Proposed Research under the Northwest Forest Plan, dated May 12, 2003 (EA Appendix 4). The first notice for sale will appear in the newspaper on March 24, 2010.

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

"The following information was considered in the analysis of the Green Peak II 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).

1.4.3 **Compliance with the Aquatic Conservation Strategy**

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

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

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

Environmental Assessment Section 5 shows how the Revised Green Peak II Density Management project meets the Aquatic Conservation Strategy in the context of the PCFFA cases. In addition, project design features (p. 13) would provide protection measures to meet ACS objectives.

1.5 Decision Criteria/Project Objectives

The Marys Peak RA Field Manager would 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 proposed action (EA section 1.7).
- Implement the next phase of the DMS project as described in the *BLM Density Management and Riparian Buffer Study: Establishment Report and Study Plan, 2006* (DMS Study Plan);
- Would not have significant impact on the affected elements of the environment beyond those already anticipated and addressed in the Final EIS.

1.6 Results of Scoping

A scoping letter, dated September 16, 2008, was sent to thirty-one potentially affected and/or interested individuals, groups, and agencies. One response was received during the scoping period.

In addition, the original EA and FONSI document was made available for public review between March 17, 2008 and April 15, 2008. Eight (8) comment letters/emails were received during the original EA comment period. The scoping and EA comment letters/emails are available for review at the Salem District BLM Office, 1717 Fabry Rd SE, Salem, Oregon. This Revised Green Peak II EA includes additional information which addresses EA comments.

1.7 Purpose of and Need for Action

Purpose

The purpose of the proposed project is to continue the implementation of the DMS that began under the original Green Peak Density Management Project EA (#OR-080-97-25) dated December 8, 1997, according to the specific implementation schedule set forth in IM OR-2005-83. The first set of research treatments occurred in fall and winter of 1999. The next phase of treatments are scheduled to occur in 2011. The research project is designed to test critical assumptions of the Northwest Forest Plan's Standards and Guidelines, and produce results important for late-successional habitat development.

The purpose for the project is to accelerate the development of late-seral/old-growth forest conditions in order to enhance terrestrial wildlife and aquatic habitats, including mid-seral enhancement of forest stands to meet the future needs of marbled murrelet, northern spotted owl, and other species dependent upon late-seral/old-growth forest habitats; and for improvement to the watershed and road system.

- **Objectives of the Density Management Study include:**
  - Evaluate effects of alternative forest density management treatments on important stand and habitat attributes;
  - Determine treatment effects on selected plant and animal taxa;
  - Assess the combined effects of density management and alternative Stream Protection Zone (SPZ) widths on aquatic and riparian ecosystems;
  - Use DMS sites to share results of on-the-ground practices and findings with land managers, regulatory agencies, policy makers, and the public;
  - Use results from DMS research to conduct a long-term adaptive management process where management implications and policy changes are regularly evaluated and changed as needed.
  - Provide for research to support the management of lands and resources administered by the BLM in western Oregon (RMP p. 60).

- **Manage mid-seral stands in RR LUA (RMP pp. 9-15) to:**
  - 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).
  - Improve structural and spatial stand diversity on a site-specific and landscape level in the long-term (RMP p. 11, 26, D-6).

- **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.
  - Provide for fire vehicle and other management access.
  - Reduce environmental effects associated with identified existing roads within the project area.

The project would be implemented through the sale of a timber sale (Green Peak II).

Need for Action

A second round of density management thinning is now planned for implementation beginning in 2010. Stem density would be reduced in the high, moderate, and variable density treatments. Remeasurement, data management, and analysis are ongoing for three long-term, core components of the DMS: vegetation, microclimate, and aquatic vertebrates. In addition, several short-term collaborative studies were completed and additional collaborative studies are likely.

The DMS Establishment Report (DMS study plan, 2006 – abstract) states that "the primary objectives of the DMS are to evaluate the effects of alternative forest density management treatments in young stands on the development of important late-successional forest habitat attributes and to assess the combined effects of density management and alternative riparian buffer widths on aquatic and riparian ecosystems."

The roads lack adequate rock to prevent environmental degradation during timber haul use. Existing roads within the project area need renovation work to assure all aspects of the roadway are functioning and in order to minimize impacts to the riparian zones and hydrologic flows. Renovation may include

road and ditch blading for proper drainage, brush cutting for visibility and enhanced drainage, cleaning culverts, and rock surface application to maintain water shedding capabilities during timber haul use.

There is a need to:

- Continue implementation of the research projects under research project guidelines such as using the same yarding methods in the study areas as in the past;
- Implement density management to meet the schedule of the DMS (IM OR-2005-83). Harvest would be implemented within an 18-month period commencing in October 2010.
- Renovate roads.

2.0 Alternative Development

Pursuant to Section 102 (2) (E) of NEPA (National Environmental Policy Act of 1969, as amended), federal agencies shall "Study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." No unresolved conflicts were identified. No alternatives were identified that would meet the purpose and need of the project and have meaningful differences in environmental effects from the Proposed Action. Therefore, this EA will analyze the effects of Alternative 1 (No Action) and Alternative 2 (Proposed Action).

2.1 Alternative 1 (No Action)

This alternative serves to set the environmental baseline for comparing effects to the proposed action. Consideration of this alternative also answers the question: "What would it mean for the objectives to not be achieved?" The "No Action Alternative" means that no timber management actions or connected actions would occur. If this alternative were to be selected, the following items would not be done in the project area at this time:

- Continued implementation of the DMS would not occur in Green Peak.
- Silviculture treatments
- Timber harvest
- Road reconstruction and renovation
- Fuel reduction treatments

Only normal administrative activities and other uses (e.g. road use, programmed road maintenance, harvest of special forest products on public land) would continue on BLM managed lands within the project area. On private lands adjacent to the project area, forest management and related activities would continue to occur. Selection of the No Action Alternative would not constitute a decision to change the land use allocations of these lands nor would not set a precedent for consideration of future action proposals.

2.2 Alternative 2 (Proposed Action)

The proposed action is to implement a suite of treatments developed by scientists from OSU and the USDA Forest Service PNW, in consultation with BLM managers and resource specialists. This project consists of density management on approximately 131 acres of 70-year-old stands within LSR and RR LUAs, and maintaining an unharvested "no-treatment/control area" to be kept intact indefinitely to determine the effectiveness of the density management thinning treatments.

The same 131 acres initially thinned in 1999-2000, of now 70-year-old mixed-conifer stands would now be re-thinned with a proportional density management thinning design (trees retained from all

diameter classes). Target residual density would be of 20 to 60 TPA (see table 1 below). Seven additional TPA would be left for creation of CWD (2 TPA) immediately following density management and for creation of snags (5 TPA) 10 years later. The existing leave islands, riparian buffers and patch cuts would be unchanged.

The treatments would be implemented through a timber sale to be offered in 2010 (Green Peak II, Map 2). Trees would be skyline yarded on approximately 115 acres and ground-based yarded on approximately 16 acres. Road renovation and CWD creation are also a part of the Proposed Action. Component studies initiated prior to the 1999-2000 harvest would continue, including data collection prior to and following treatment and periodic intervals set forth in the DMS Study Plan. The component studies include vegetation response, aquatic habitats and vertebrate diversity, microclimates and microhabitats of riparian and adjacent upland areas. In addition, collaborative studies on a range of species and ecosystem functions would be continued or initiated.

Previous Treatment The project area received an initial density management thinning treatment in 1999-2000, divided into high, moderate and variable density treatments. Nested within these treatment areas were unharvested leave islands (1/4 to 1 acre in size) and riparian buffers (SPZ) testing three separate design widths for comparison (riparian buffer study component of DMS). Cleared patch openings (1/4 to 1 acre in size) were created in the moderate and variable density treatments.

Table : Summary of Proposed Action

<table>
<tr><th colspan="2">Parameter</th><th colspan="2">Quantity (Approx.)</th></tr>
<tr><td colspan="2" rowspan="6">Study Area (Acres)</td><td colspan="2">Control area: 57 acres</td></tr>
<tr><td colspan="2">Density management: 131 acres</td></tr>
<tr><td colspan="2">Patch openings: 12 acres</td></tr>
<tr><td colspan="2">Leave islands: 17 acres</td></tr>
<tr><td colspan="2">Riparian buffers: 31 acres</td></tr>
<tr><td colspan="2">TOTAL: 248 acres</td></tr>
<tr><td colspan="2">Stand Age in 2010 (years)</td><td colspan="2">70</td></tr>
<tr><td colspan="2" rowspan="4">Tree Species Composition (%)</td><td colspan="2">Douglas-fir: 94%</td></tr>
<tr><td colspan="2">Western hemlock 2.5%</td></tr>
<tr><td colspan="2">Western red cedar: less than 1%</td></tr>
<tr><td colspan="2">Hardwood: 2.5%
(alder, maple, chinquapin)</td></tr>
<tr><td colspan="2">Total Acres Density Management</td><td colspan="2">131 acres</td></tr>
<tr><td colspan="2">CWD enhancement (2 TPA)</td><td colspan="2">131 acres</td></tr>
<tr><td colspan="2">Potential snag enhancement (5 per acre) by 2022</td><td colspan="2">131 acres</td></tr>
<tr><td colspan="2">Road Renovation (miles)</td><td colspan="2">3.5</td></tr>
<tr><th colspan="2">Study Area (Treatment Residual Density)</th><th>Previous Treatment</th><th>Proposed Action *</th></tr>
<tr><td rowspan="5">Trees per Acre (TPA)

(Does not include: hardwood trees and trees less than 9” DBH reserved, nor 5 TPA for snags and 2 TPA for coarse wood in Proposed Action).</td><td>High Density Area (approx. 27 acres)</td><td>120 TPA</td><td>60 TPA</td></tr>
<tr><td>Moderate Density Area (approx. 70 acres)</td><td>80 TPA</td><td>30 TPA</td></tr>
<tr><td rowspan="3">Variable Density Area (Combination of 3 densities, total approx. 34 acres)</td><td>High density (approx. 13 ac.) 120 TPA</td><td>60 TPA</td></tr>
<tr><td>Mod. density (approx. 14 ac) 80 TPA</td><td>30 TPA</td></tr>
<tr><td>Low density (approx. 7 ac) 40 TPA</td><td>20 TPA</td></tr>
</table>

*See BLM Density Management and Riparian Buffer Study: Establishment Report and Study Plan, 2006 (DMS Study Plan) for treatment design rationale.

2.2.1 **Connected Actions**

1. **Road Work**: Road renovation of approximately 3.5 miles would occur. Drain dips would be installed where cross drainage is necessary. Within existing roads spot rock application may occur. Roads R1 and R2 constructed and decommissioned in the first treatment (completed 2000) would be reconstructed.

2.2.2 **Project Design Features**

The following is a summary of the design features that reduce the risk of effects to the affected elements of the environment described in EA Section 3.1. These design features would be achieved thru enforcement of a timber sale contract.

General

Table 2: Season of Operation/ Operating Conditions

Season of Operation or Operating Conditions	Applies to Operation	Objective
During periods of low precipitation, generally May 1 to October 31	Road Reconstruction/Renovation	Minimize soil erosion
During periods of low soil moisture, generally June 15 to October 31	Ground-based yarding (Harvester/Forwarder and hydraulic loader)	Minimize soil erosion/compaction
During periods of low soil moisture, generally July 15 to October 15	Ground-based yarding (Tractor)	Minimize soil erosion/compaction
During periods of low tree sap flow, generally July 15 to April 15	Yarding outside of road right of ways (Skyline)	Protecting the bark and cambium of residual trees
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	Minimize soil erosion
Time period beginning two hours after sunrise and ending two hours before sunset (April 1 through September 15)	Operation of power equipment	Minimize noise disturbance (marbled murrelet)

Project Design Features by 1995 RMP Objectives

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

All logging activities would utilize the Best Management Practices (BMPs) required by the Federal Clean Water Act (as amended by the Water Quality Act of 1987) (2008, FEIS, Appendix I) . The BMP's listed below would be applied to this project.

- Implement erosion control measures such as waterbars, slash placement and seeding in cable yarding corridors and skid trails where the potential for erosion and delivery to waterbodies, floodplains and wetlands exists. Construct waterbars on skid trails using guidelines in Table I-21, page 289, Appendix I.
- Scatter treatment debris on disturbed soils and water bar any yarding trails that could erode and deposit sediment in water bodies, floodplains, and wetlands.
- Plan use on existing and new skid trails to be less than 10 percentof the harvest area.
- Limit width of skid trails to what is operationally necessary for the equipment.
- Ensure one-end suspension of logs during ground based skidding.
- Limit conventional ground based equipment to slopes less than 35 percent.
- Skid and harvest roads would be blocked where they access main vehicular roads following completion of ground-based yarding.
- Other ground based yarding equipment could be utilized as long as it meets best management practices and results in equivalent or less than the level of impacts analyzed for the project.
- Fell harvested trees away from stream channels when possible
- In the skyline yarding area, one end suspension of logs would be required over as much of the area as possible to minimize soil compaction, damage to reserve trees, and disturbance. Lateral yarding using an energized locking carriage would be required.
- Where workable, require full suspension over flowing streams, non-flowing streams with erodible bed and bank.
- During periods of rainfall when water is flowing off road surfaces, the contract administrator may restrict log hauling to minimize water quality impacts, and/or require the purchaser to install silt fences, bark bags, or apply additional road surface rock.
- Repair damaged culvert inlets and downspouts to maintain drainage design capacity.
- All large areas of exposed mineral soil (roads to be renovated, cat/skid trails, 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.
- Landings should be kept to the minimum size needed to accomplish the job and use existing road surfaces as much as possible.
- Place additional boulders and increase ditch angles (steepened) to prevent access around the existing gate at the origin of the 14-6-7.1 road from OHV.

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

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

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

- Streamside Protection Zones (SPZs) would be applied at the same width as the initial harvest that was completed in 2000. The widths established under the riparian buffer study are one site-potential tree height (approximately 220 feet, both sides), "variable" width (about 50 feet, both sides), and "streamside retention" (about 20 feet, both sides), see map 2.
- To protect water quality, all trees within one tree height of all SPZs would be felled away from streams. Where a cut tree does fall within a SPZ, the portion of the tree within the SPZ would remain in place. No skyline or ground-based yarding would be permitted in or through SPZs.

To protect and enhance stand diversity and wildlife habitat components:

- Tree selection for removal would be based on Marking Guidelines (Appendix 2). Tree selection would be designed to leave a full range of diameter distribution, maintain or increase the proportion of minor species, and retain legacy and wildlife tree structure while meeting target densities. Residual tree densities range from 25 to 65 TPA.
- Density management thinning would occur primarily to Douglas-fir trees. Minor conifer species would be retained to maintain species diversity (except where they form dense patches, occur in yarding corridors, or skid trails). All hardwoods would be retained except where they occur in yarding corridors or skid trails.
- Any tree found to have a stick or ball nest would be left.
- Retain plus tree (selected conifer for the genetics program) #13-31-5 found in the variable density treatment area and study plot center trees.
- All existing snags and CWD would be reserved. Additional trees would be reserved around snags to protect them from logging operations and reduce the likelihood of their removal for worker safety reasons. Any snags felled or logs moved for these purposes would remain on site as close to the origin area as possible within the project area.
- Understory conifers less than 9.0 inches diameter breast height outside bark (DBHOB) would be excluded from harvest.
- The post-harvest prescribed minimum level of CWD is two dominant or co-dominant trees per acre across all treatment units. Existing down trees of decay Class 1 or 2 quality can be used to satisfy this requirement. New inputs of CWD would occur from the incidental felling of reserve trees during the density management thinning operations. Post-harvest CWD would be inventoried to assure that there are at least two trees (decay Class 1or 2) per acre across all treatment units. The silvicultural prescription provides for two green trees per acre to be reserved from the residual stands and felled under the timber sale contract if the existing post-harvest CWD levels are not sufficient to meet the desired quantity and quality of trees. Trees to be utilized for CWD creation would be stand average DBHOB or larger. In order to facilitate adequate spacing across the landscape any post-harvest clump of CWD that contains more than 10 quality trees would only be credited with 10 trees (five-acre maximum size per clump).
- To reduce damage to trees in leave islands (areas reserved from harvest), trees within one tree height would be felled away from reserve areas. Any logging debris resulting from felling operations would be pulled back into the harvest area.
- Ground-based yarding would be excluded from patch cuts and leave islands. Avoid cable yarding through patch cuts and leave islands, but if required to complete the project, maintain corridor widths to the minimum possible.
- Snag levels would be monitored for 10 years post harvest to determine if levels are less than 5 stand average DBHOB or larger snags per acre. If found to be deficient, snags would then be created to meet that level. Snag creation methods would include any or all viable and economically feasible methods to create full or partial snags from living trees.

To reduce fire hazard risk and protect air quality:

- If waste recycling is chosen in lieu of burning slash, only logging slash and debris readily available from existing roads and landings would be recycled. Additional yarding separate from the commercial timber harvesting would not be allowed for the sole purpose of obtaining additional material to recycle. Existing roads and landings should not be enlarged to accommodate chipping on site.
- Fuel reduction would be accomplished by burning of slash piles, by machine processing of slash on-site, or by a combination of these techniques.
- Whenever possible, alternative waste recycling of slash material would be encouraged. This may be accomplished by: setting aside firewood to the public, chipping for co-gen power production, chipping for soil amendments, soil protection, etc.
- Debris accumulations would be machine and/or hand piled and/or chipped. For all areas to be piled or chipped, at least 75 percent of the slash in the ¼ inch to 6 inch diameter range would be piled for burning or chipped with the chips being spread out on the site or removed from the site.
- Light accumulations of debris cleared during renovation of roads that would remain in drivable condition following the completion of the project would be scattered along the length of rights-of-way.
- Heavy accumulations of debris on landings and within 30 feet of existing roads that would remain in drivable condition would be either machine or hand piled and burned as directed by the contract administrator.
- All piles would be located in areas suitable for burning at least ten feet away from reserve trees, snags, or unit boundaries. Piles should not be located on top of large logs or stumps. Larger piles would be preferable over small piles. Windrows would be avoided unless approved in advance by the contract administrator.
- Wherever applicable and practical, logs larger than 12" in diameter shall be left scattered on site to help meet the down log requirement.
- During the late summer, before the onset of fall rains, all piles to be burned would be covered at least 80 percent with 4-millimeter (minimum thickness) black polyethylene plastic.
- All burning would occur under favorable smoke dispersal conditions in the fall, in compliance with the Oregon Smoke Management Plan (RMP pp. 42).
- Logging debris would be cleared from within 4 feet each side of a primitive trail that lies within the moderate density and control area.
- All fuels treatments utilizing hydraulic loader equipment and/or hand piling methods would be located at least 50 feet from any stream channel.

To protect Bureau Special Status Plants and Animals:

- Site management of any bureau special status (SS) botanical and fungal and animal species found as a result of additional inventories would be accomplished in accordance with, BLM Manual 6840- *Special Status Species Management* and the *Record of Decision To Remove the Survey and Manage Mitigation Measure Standards and Guidelines from Bureau of Land Management Resource Management Plans Within the Range of the Northern Spotted Owl (*July, 2007*).*
- The RA biologist and/or botanist would be notified if any bureau SS plant and animal species were found occupying stands proposed for treatment during project activities. Research areas are exempt from NWFP and S&G (Standards and Guidelines) as stated in the REO (Regional Ecosystem Office) memo on Assessment and Review of Proposed Research under the Northwest Forest Plan, dated May 12, 2003 (Appendix 4).

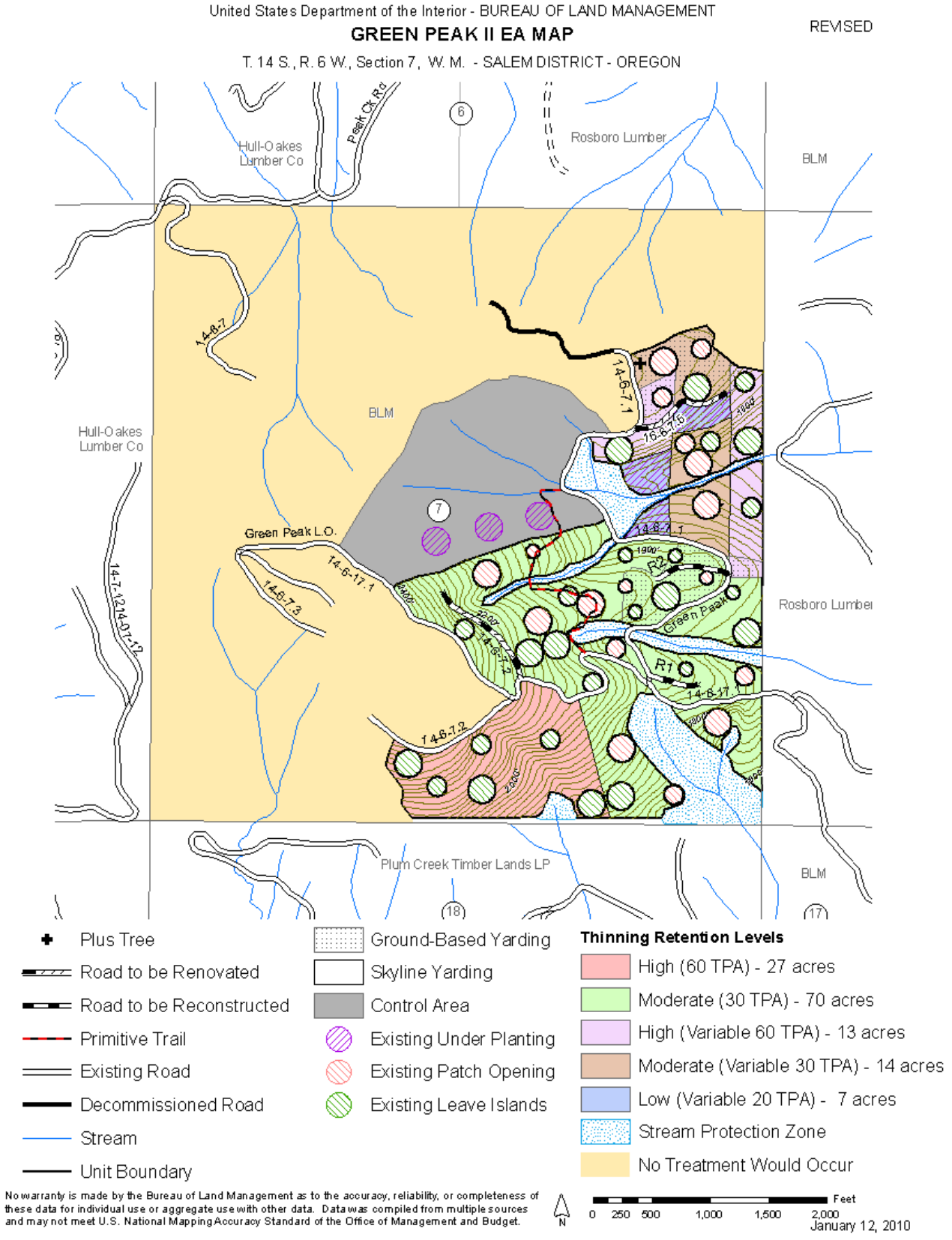
To protect Cultural Resources:
The project area occurs in the Oregon Coast Range. Survey techniques are based on those described in Appendix D of the *Protocol for Managing Cultural Resource on Lands Administered by the Bureau of Land Management in Oregon*. Post-project survey would be conducted according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

2.3 Project 1: Comparison of Alternatives With Regard To Purpose and Need

Table 3: Comparison of Alternatives by Purpose and Need

Purpose and Need (EA section 1.7)	Alternative 1 (No Action)	Alternative 2 (Proposed Action)
Continue implementation of the DMS by implementing Phase 2 of the experiment.	Does not meet this purpose and need. Research collected to date would have limited value without additional treatments and continued research.	Continues the original purpose of the DMS with additional research and monitoring.
Late-successional forest conditions, which serve as habitat for late-successional forest species, can be developed, accelerated, and enhanced.	Does not meet this purpose and need. Stand structure would remain relatively uniform, except for gaps created by disturbance. The main input of CWD would come from density mortality, disturbance events and endemic levels of insects and disease.	Creates patch openings with adjacent clumps of trees. Retains existing limbs on open grown trees through selective cutting of trees. Larger diameter trees felled for safety or operational reasons would be retained for CWD. Increases the quality and value of wildlife habitat.
Offer a marketable density management thinning timber sale.	Does not meet this purpose and need. No timber would be offered for sale.	Offers approximately 131 acres of timber for sale.
Provides appropriate access for timber harvest and Silvicultural practices used to meet the objectives above, while minimizing increases in road densities.	No change. Maintain existing road densities in current maintained state.	Renovates approximately 3.5 miles of road.
	Delay maintenance on feeder roads, main routes would be maintained.	Would implement maintenance on feeder roads, allowing for continued access.

Map 2: Map of Alternative 2 (Proposed Action)



3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS COMMON TO ALL PROJECT AREAS

3.1 Identification of Affected Elements of the Environment

The interdisciplinary team reviewed the elements of the human environment, required by law, regulation, Executive Order, and policy, to determine if they would be affected by the proposed actions (formerly BLM H-1790-1, Appendix 5, BLM Handbook H-1790-1: p. 137), [40 CFR 1508.27(b)(3)], [40 CFR 1508.27(b)(8)].. Table 4 summarizes the results of that review. Affected elements are **bold**. All entries apply to the action alternative, unless otherwise noted.

Table 4: Review of the Elements of the Environment

Elements Of The Environment [Statute/Authority/CFR]	***Status***[3]	***Cumulative Effects***[4]	***Remarks***
Air Quality [Clean Air Act as amended (42 USC 7401 et seq.)]	**Affected**	**Addressed in text EA section 4.6**	**Addressed in text (EA section 3.2.6 and Green Peak II Fuels Report)**Addressed in Text (*EA section 3.3.6*)
Cultural Resources [National Historic Preservation Act (NHPA), as amended (16 USC 470), 40 CFR 1508.27(b)(3)], 40 CFR 1508.27 (b)(8)]	Not Affected	No	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 will 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 will be based on percent slope and topographic features.
Ecologically critical areas [40 CFR 1508.27(b)(3)])	Not Present	No	
Energy Policy [Executive Order (E.O.) 13212]	Not Affected	No	There are no known energy resources located in the project areas. The proposed action would have no effect on energy development, production, supply, and/or distribution.
Environmental Justice [E.O. 12898, 2/ 11/1994]	Not Affected	No	The proposed action is not anticipated to have disproportionately high and adverse human health or environmental effects on minority populations and low income populations.
Fire Hazard/Risk Healthy Forests Restoration Act of 2003 (P.L. 108-148)	**Affected**	**Addressed in text EA section 4.6**	**Addressed in text (EA section 3.2.6 and Green Peak II Fuels Report)**
Essential Fish Habitat [Magnuson-Stevens Act Provision: Essential Fish Habitat (EFH): Final Rule (50 CFR Part 600; 67 FR 2376, 2/17/ 2002]	**Affected**	**Addressed in text EA section 4.4**	**Addressed in text (EA section 3.2.4 and Green Peak Thinning Project Environmental Assessment Fisheries Report)**

[3] *Not present* = not present within the project area, *Not affected* = not affected by the project, *Affected* = affected by the project yet in compliance with listed authority

[4] Do the action alternatives contribute to cumulative effects to this element? Yes/No

Elements Of The Environment [Statute/Authority/CFR]		*Status*[3]	*Cumulative Effects*[4]	*Remarks*
Fish Species/Habitat (except Endangered Species Act (ESA) listed species/habitat)		**Affected**	**Addressed in text EA section 4.4**	**Addressed in text (EA section 3.2.4 and Green Peak Thinning Project Environmental Assessment Fisheries Report)**
Floodplains [E.O. 11988, as amended, 5/24/1977)		Not Affected	No	The proposed action does not involve occupancy or modification of floodplains, and would not increase the risk of flood loss.
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)]		Not Present	No	
Invasive, Nonnative Species (plants) (Federal Noxious Weed Control Act and E.O. 13112)		**Affected**	**Addressed in text EA Section 4.1**	**Addressed in text (EA section 3.2.1 and Green Peak II Botanical & Fungal Special Status and Noxious Weed Report)**
Land Uses (right-of-ways, permits, etc)		Not present	No	
Late Successional and Old Growth Stands		Not Present	No	
Migratory Birds [Migratory Bird Treaty Act of 1918, as amended (16 USC 703 et seq.), E.O. 131186]		**Affected**	**Addressed in text EA Section 4.5**	**Addressed in text (EA section 3.2.5 and Biological Evaluation for Green Peak II Density Management Timber Sale)**
Native American Religious Concerns [American Indian Religious Freedom Act of 1978 (AIRFA) (42 USC 1996)]		Not Affected	No	No Native American religious concerns were identified during the public scoping period.
Public Health and Safety [40 CFR 1508.27(b)(2)]		Not Affected	No	Oregon Occupational Safety and Health Administration (OR OSHA) rules would be enforced through contract administration.
Recreation		Not Affected	No	Dispersed recreation in the area may include hunting, camping and target shooting and would continue upon completion of the proposed projects therefore recreational activities would not be affected.
Rural Interface Areas		Not Present	No	
Soils		**Affected**	**Addressed in text EA section 4.2**	**Addressed in text (EA sections 3.2.2 Green Peak II Soils/Hydrology Report)**
Other Special Status Species / Habitat	**Plants**	**Affected**	**Addressed in text EA section 3.2.1.3**	**Addressed in text (EA section 3.2.1 and Green Peak II Botanical & Fungal Special Status and Noxious Weed Report)**
	Wildlife	**Affected**	**Addressed in text EA section 4.5**	**Addressed in text (EA section 3.2.5 and Biological Evaluation for Green Peak II Density Management Timber Sale)**

Elements Of The Environment [Statute/Authority/CFR]		*Status*[3]	*Cumulative Effects*[4]	*Remarks*
Threatened or Endangered (T/E) Species or Habitat [Endangered Species Act of 1983, as amended (16 USC 1531) (ESA)]	**Fish**	**Affected**	**Addressed in text EA Section 4.4**	**Addressed in text (EA section 3.2.4 and Green Peak IIThinning Project Environmental Assessment Fisheries Report)**
	Plant	Not Present	No	
	Wildlife	**Affected**	**Addressed in text EA Section 4.5**	**Addressed in text (EA section 3.2.5 and Biological Evaluation for Green Peak II Density Management Timber Sale)**
Visual Resources		Not Affected	No	The project is located within VRM 4 designations. Changes to the landscape character is expected to comply with these guidelines..
Water Quality [Clean Water Act of 1977 (33 USC 1251 et seq.) (CWA)]		**Affected**	**Addressed in text EA section 4.3**	**Addressed in text (EA Section 3.2.3 and Green Peak II Soils/Hydrology Report)**
Water Resources – Other		**Affected**	**Addressed in text EA section 4.3**	**Addressed in text (EA section 3.2.3 and Green Peak II Soils/Hydrology Report)**
Wetlands (E.O. 11990 , 5/24/1977), 40 CFR 1508.27(b)(3)]		Not Affected	No	No effects to wetlands are expected because all proposed activities would occur outside of known wetlands.
Wild and Scenic Rivers [Wild and Scenic Rivers Act, as amended (16 USC 1271), 40 CFR 1508.27(b)(3)]		Not Present	No	
Wildlife Habitat Components (snags, CWD, remnant old growth trees)		**Affected**	**Addressed in text EA section 4.5**	**Addressed in text (EA section 3.2.5 and Biological Evaluation for Green Peak II Density Management Timber Sale)**
Wilderness (Federal Land Policy and Management Act of 1976 (43 USC 1701 et seq.); Wilderness Act of 1964 (16 USC 1131 et seq.)		Not Present	No	

3.2 Affected Environment and Environmental Effects

Those elements of the human environment that were determined to be affected 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, threatened or endangered species – northern spotted owl, water quality, and wildlife habitat components and carbon sequestration (storage) and climate change. This section describes the current condition and trend of those affected elements, and the environmental effects of the alternatives on those elements.

3.2.1 **Vegetation**

(IDT Reports incorporated by reference: Silviculture Prescription Green Peak II Project, pp. 1-17(and Appendices 1-4) and Green Peak II Botanical and Fungal Special Status and Noxious Weed Report pp 1-7)

Affected Environment

Site Conditions

The project is in the eastern edge of the Oregon Coast Range at elevations of 1,550 to 2,510 feet. The average site index (King, 50-year) is 123 (site class 2).

The stands in the Green Peak II area are dominated by the western hemlock/ dwarf Oregon-grape – oxalis plant association, typically moist and shaded sites with soils that average 50 inches depth and are very productive. These plant associations are relatively cool (mean annual temperature of 50 degrees Fahrenheit) and moist (about 109 inches annual precipitation) for the Oregon Coast Range climate, and are found at elevations of 1,050 to 2,510 feet. The plant association predominates in the Green Peak II area largely due to the northwest aspect of the project area.

Present Stand Condition and History

The proposed treatment area consists of one forest stand totaling 238 acres. It was clearcut harvested in the 1930's, and cattle grazing occurred there in the 1930's and 1940's. The area was burned in 1943, and the current stand established shortly after that from natural regeneration. Very little management of any kind occurred, though approximately 5 acres are known to have been precommercially thinned (date unknown). The stand is dominated by Douglas-fir with a minor component of western hemlock and western red cedar. Red alder is found in moist areas, and golden chinquapin is found in drier uplands on south slopes.

Four stand treatments of 30 to 60 acres each were established at each of seven initial density management thinning study sites: 1) unthinned control, 2) high density retention (120 trees per acre (TPA), 3) moderate density retention (80 TPA), and 4) variable density retention (40, 80 and 120 TPA). Small (1/4 to 1 acre in size) leave islands were included in all treatments except the control, and small patch cuts (1/4 to 1 acre in size) were included in the moderate and variable density treatments (See Map). Phase one of the study treatments were implemented in the Green Peak timber sale sold in October 1999, and harvest was completed by June, 2000. Underplanting (2-0 bare-root Douglas-fir, western hemlock and western red cedar) of 1-acre patches within the control, high and moderate density treatments was completed in March, 2000.

The riparian buffer study was nested within the moderate density treatment at each of the initial density management thinning study sites. Alternative riparian buffer widths included: 1) streamside retention (one tree canopy width, or 20 to 25 ft; and retained all trees contributing to bank stability), 2) variable width (follows topographic and vegetative breaks, 50 ft slope distance minimum), 3) one full site-

potential tree height (approximately 220 ft), the fourth buffer width, two full tree heights (approximately 440 ft) does not occur at Green Peak, but does at some other DMS sites.

Stand Structure and Forest Health

The current condition of stands in the Green Peak II project is summarized in Table 5. The data is from research plots established in 1998 and re-measured in 2002 and 2005, including over 1,400 trees. Table 5 summarizes data collected in 2005, with growth and mortality modeled for 5 years to 2010 using Organon (v.8.2, Hann, et al, 2006).

Currently, the phase one treatment has resulted in stand densities ranging from untreated control (160 trees per acre) to relatively low density in the moderate density 80 TPA and (variable density) low retention 40 TPA. In general, treatments have resulted in slightly greater species diversity by reducing density of Douglas-fir only, greater horizontal and vertical diversity, and increased growth rates.

In 2004, an ice storm caused breakage in trees in an area of approximately 5 acres in the moderate retention treatment area, near the end of Road 14-6-7.3. An estimated 15 trees per acre were affected.

The stand is aged approximately 70 years (2010). In the previous treatment, only Douglas-fir trees were removed, increasing the proportion of hardwood and less common conifer species. Douglas-fir currently makes up about 94 percent of the trees per acre.

Inter-tree competition can be described by the concept of relative density. Relative density is the current density of trees, relative to a maximum density of 1.0. Currently the treatments in Green Peak II project range from .28 in the variable density (40 trees per acre), to .66 in the high density retention (120 trees per acre), and the untreated controls are .76 to .95 relative density index.

Canopy cover represents the proportion of the forest floor covered by the vertical projection of tree crowns, and was calculated (Organon v. 8.2) from the crown widths of trees sampled in 2005. Canopy cover currently ranges from 55 percent to 78 percent in the treatments, and 82 percent to 86 percent in the untreated controls.

Table 5. Current stand attributes for Green Peak II Project (trees greater than 7" DBH).

Treatment (Unit)	***Species***	***Tmt. Acres[1]***	***Total age[2]***	***Trees per acre***	***Basal area/ac (ft^2)***	***QMD (in.)[3]***	***RDI[4]***	***Canopy Cover[5]***	***Site Index (DF)***
Control	Douglas-fir			152	269	18.0			
	W. Hemlock			5	1	7.0			
	Red Alder			1	1	13.5			
	Total	57	70	158	271	17.7	.76	82%	123
Riparian Control[6]	Douglas-fir			142	357	21.5			
	Red Alder			6	7	14.6			
	Total	32	70	148	364	21.3	.95	86%	123
High 120 TPA	Douglas-fir			116	239	19.4			
	Red Alder			1	1	13.5			
	Bigleaf maple			2	2	13.5			
	Total	28.3	70	119	242	19.3	.66	78%	123
Mod. 80 TPA	Douglas-fir			84	188	20.3			
	Total	76.5	70	84	188	20.3	.50	67%	123

Treatment (Unit)	*Species*	*Tmt. Acres*[1]	*Total age*[2]	*Trees per acre*	*Basal area/ac (ft^2)*	*QMD (in.)*[3]	*RDI*[4]	*Canopy Cover*[5]	*Site Index (DF)*
Variable 120 TPA	Douglas-fir			121	215	18.0			
	W. Hemlock			1	3.4	21.9			
	Hardwood			2	1.4	10.8			
	Total	14.4	70	124	220	18.0	.61	76%	123
Variable 80 TPA	Douglas-fir			91	196	19.8			
	W. Hemlock			3	3	13.7			
	Total	14.3	70	94	199	19.7	.54	70%	123
Variable 40 TPA	Douglas-fir			40	96	21.0			
	W. Hemlock			8	6	11.3			
	Chinquapin			3	3	13.5			
	Total	7.3	70	51	105	19.3	.28	55%	123

[1] Acres include density management thinning area only; riparian buffers, leave islands, and patch cuts are not represented in this data.
[2] Stand age in 2010. Data was collected in 2005, and grown forward in Organon (v. 8.2) to simulate growth to 2010.
[3] Quadratic mean diameter - the diameter at breast height (4.5 feet) of the tree of average basal area.
[4]Relative Density Index, the density of trees per acre relative to the maximum density possible (Reineke, 1933).
[5] Canopy cover from stand data analyzed in Organon, SMC v. 8.2 growth model, corrected for crown overlap. Correction factor reduced for Variable 40 TPA, because overlap is minimal.
[6] Data is from within untreated one-site-potential tree buffer, southeast portion of project.

There are no known threats to forest health except the following endemic processes in the project area. Laminated root rot, caused by the fungus *Phellinus weirii*, is a native root pathogen that spreads from root to root contact between live, susceptible trees, including Douglas-fir, and grand fir. It is a natural part of many forest ecosystems (Thies and Sturrock 1995), and contributes snag and downed wood habitat to affected stands over time. *P.weirii* affects less than 5 percent of the Green Peak II area, mostly in the control area, creating small (.1 to .25 acre), and scattered openings.

Douglas-fir bark beetles are endemic in the project area. 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.

The risk of breakage and windthrow from severe winter storms always exists, and the upper lee slopes of major ridges oriented southeast to northwest generally experience the highest degree of windthrow in the Oregon Coast Range.

Density Management Research

Collection of data in 2002 and 2005 on overstory trees, understory vegetation, snags, and CWD provides a basis for monitoring changes due to treatment. An additional measurement at Green Peak II would occur in 2010 prior to treatment, and in 2011 or 2012 after phase two treatment, and then 5 years later in approximately 2016.

Early study findings were summarized in Chan et al., 2004:

- Terrestrial floor of headwaters riparian zones are hotspots of arthropod (insect), diversity.
- Moderate density management thinning increases species richness of arthropods, and heavy density management thinning and large gaps increase species richness of both forest and introduced species.
- Forest riparian buffers 30m wide serve as refuge for both forest-upland and forest-riparian arthropod species.
- Density management thinning has minimal effects on most species of aquatic vertebrates (salamanders).
- Diversity and abundance of lichen and bryophyte species are associated with canopy gaps, hardwood trees and shrubs, and remnant large trees. Dense stands with little understory make poor habitat.
- Upland vascular plant diversity increased with lower stand densities and larger gaps.
- Canopy expansion and closure were evident five years following density management thinning.
- Even heavy density management thinning (low retention in variable density treatment) resulted in light levels less than 40 percent full sunlight.

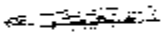
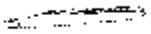
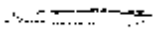
Coarse Woody Debris

Coarse wood, which includes downed wood, snags, and live trees with dead or broken tops or decay, is scarce in the project area, likely due to past fire. Table 6 displays the volume of downed wood and snags per acre, and the count of snags in the project area. Approximately 65 percent of the snags are decay class 1 and 2. There is a weighted average of 7.5 conifer snags per acre of 17.6" DBHOB in the project area including the control area, and a weighted average of 2.6 snags per acre of 12.7" DBHOB within the treatment areas only.

Table 6. Project Area CWD

Unit	Acres	Down wood volume (cu ft/ac)	Snag Volume (greater than 5"DBH) (cu ft/ac)	Total volume (cu ft/ac)	Snags per acre	Snag QMD
Control	57	1104	315	1419	13	12.6
Rip. Con.	32	131	241	372	13	12.6
High 120 TPA	28	1445	296	1741	3	38.0
Mod. 80 TPA	76	743	123	866	4	14.4
Var. 120 TPA	14	500	119	619	3	13.3
Var. 80 TPA	14	852	351	1203	6	28.9
Var. 40 TPA	**7**	1308	249	1557	7	22.0
Weighted Average	**228**	**843**	**226**	**1069**	**7.5**	**17.6**

Figure 1: Down Tree and Down Woody Material Decay Class Condition Codes

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

Bureau SS Botanical and Fungal Species

Inventory of the project area for bureau sensitive vascular plant, lichen, bryophyte and fungal species was accomplished through review of; 1) existing survey records and spatial data, 2) habitat evaluation and evaluation of species-habitat associations and presence of suitable or potential habitat, and 3) field clearances, field reconnaissance and inventories utilizing intuitive controlled surveys, in accordance with survey protocols for the specific groups of species, and 4) expertise on the habitat needs of special status species and those found within the project area.

There are no "known sites" of any bureau sensitive vascular plant, lichen or bryophyte species within the project area nor were any found during field surveys. A bureau sensitive fungal species, *Phaeocollybia sipei* is known from within the variable density study area. It may be considered as "locally abundant" in the Green Peak vicinity.

Non-native plants and noxious weeds:

The following noxious weeds occur in small infestations along or adjacent the right-of-ways from within or adjacent the project area: bull and Canadian thistles, false brome, Armenian Himalayan blackberry, herb Robert, Scot's broom, St. John's wort, and Tansy ragwort.

Environmental Effects

3.2.1.1 *Alternative 1 (No Action)*

Stand Structure

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

Stand structural conditions would remain on the current trajectory of increasing density and decreasing individual tree growth rates, however due to the phase one treatment in 2000, current densities are below the zone of density mortality, except in the high retention treatment and the untreated controls. Stand growth projections were made using the Organon growth and yield computer simulation model, v. 8.2. In 30 years without treatment, the relative density of the areas treated in phase one in 2000

would increase to an average of .66. Above relative density of .55 individual tree growth slows and density-induced tree mortality occurs.

Without treatment, stand structure would remain relatively uniform, except for gaps created by disturbance. The low retention portion of the variable density treatment would likely have considerable understory development. The main input of CWD would come from density mortality, disturbance events and endemic levels of insects and disease and resulting in more snags and downed logs than with treatment. On average, density mortality is predicted (Organon) to average 3.3 trees per acre of about 12" DBH in the next 30 years without treatment.

Crown ratio, the proportion of the tree crown length to the total tree height, 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 for stands treated in phase one, of 31 percent to an estimated 24 percent in 30 years. Wind firmness and individual tree stability would also decrease.

This alternative does not meet the objective of providing treatments on which to base phase two of the Density Management and Riparian Buffer Studies.

Characteristics for the Green Peak II stands for 30 years from present with treatment and without treatment as projected by Organon are compared in Table 7.

Table 7. Stand Characteristics with **Treatment vs. No Treatment** 30 years in the future (year 2040)[1]

Unit/ Phase 1 Treatment	**Tmt.** (Residual TPA)	**Age**[1] (yrs)	**TPA**[2]	**% DF** (TPA)	**BA**[3] (Sq.Ft.)	**QMD** (in.)[4]	**RDI**[5]	**Density Mortality**		
								TPA	BA	QMD
	n/a									
Control	No Tmt.	100	137	97	314	20.5	0.83	21.2	13	10.6
Riparian Control	n/a									
	No Tmt.	100	119	95	380	24.2	0.94	29	28.1	13.3
High Retention	60 TPA	100	59	95	174	23.3	0.44	6	13.2	20.1
	No Tmt.	100	112	97	295	22	0.76	7.7	5.4	11.3
Moderate Retention	30 TPA	100	30	98	117	26.7	0.28	5.1	14.8	23.1
	No Tmt.	100	81	100	251	23.8	0.63	1.3	1.5	14.5
Variable Density-High	60 TPA	100	61	95	163	22.1	0.42	5.4	10.5	18.9
	No Tmt.	100	118	97	274	20.6	0.72	6.6	4.8	11.5
Variable Density-Moderate	30 TPA	100	30	89	105	25.2	0.26	4.9	13.4	22.4
	No Tmt.	100	92	96	254	22.5	0.65	3.4	2.5	11.6
Variable Density-Low	20 TPA	100	27	60	86	24	0.21	5.4	15.8	23.2
	No Tmt.	100	50	79	154	23.4	0.39	1.3	1.1	12.4
Weighted Average (excludes controls)	**Tmt.**	**100.0**	**39**	**94%**	**130.0**	**25.3**	**0.32**	**5.3**	**13.9**	**22.0**
	No Tmt.	**100.0**	**90.5**	**98%**	**258.0**	**23.0**	**0.66**	**3.3**	**2.7**	**12.2**

[1] Stand age in 2040. Data collected in 2005, treatment modeled in 2010, and grown forward in Organon (v. 8.2) to simulate growth to 2040.

[2]Trees per acre greater than 7" DBH.
[3] Basal area in square feet: cross-sectional area occupied by tree boles on each acre, a measure of density
[4] QMD=quadratic mean diameter, the DBH of tree of mean basal area.
[5] Relative Density Index, the density of trees per acre relative to the maximum density possible (Reineke,1933).

Table 8. Average pre-treatment and post-treatment stand characteristics (Organon projections) immediately after density management thinning stands in the Green Peak II Project (trees greater than 7" DBH only).

Unit / Treatment	Age[1] (yrs)	Pre-treatment					Immediately After Treatment				
		TPA[2]	% DF TPA	BA[3] (sq ft)	QMD (in)[4]	RDI[5]	TPA[2]	% DF TPA	BA[3] (sq ft)	QMD (in)[4]	RDI[5]
Control	70	158	96%	271	17.7	0.76	n/a				
RiparianControl	70	148	96%	364	21.3	0.95	n/a				
120 TPA	70	119	97%	242	19.3	0.66	66	94%	131	19.1	0.36
80 TPA	70	84	99%	188	20.3	0.5	35	98%	78	20.2	0.21
Var 120	70	124	97%	220	18	0.61	67	95%	119	18	0.33
Var 80	70	94	96%	199	19.7	0.54	35	91%	72	19.4	0.2
Var 40	70	51	77%	105	19.3	0.28	33	65%	61	18.4	0.17
Average	**70.0**	**111**	**94%**	**227**	**19.4**	**0.61**	**47**	**89%**	**92**	**19.0**	**0.25**

[1]Total stand age in 2010.
[2]Number of trees per acre. [3]Basal area per acre.
[4] Diameter at breast height (4.5 feet) of tree of average basal area (quadratic mean diameter).
[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 increase in the risk of bark beetle infestation that could result from harvest, but risk of significant windthrow that could trigger bark beetle infestation would remain. Laminated root rot infection would remain and would continue to slowly spread.

Bureau Sensitive Botanical and Fungal Species
The *Phaeocollybia sipei* site would not be impacted by additional density management thinning operations. Additional studies on logging impacts to this species would not be implemented and additional information gained.

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

Invasive (Noxious Weeds, Invasive Non-native Species)
The established noxious weed populations would remain at or near the current level, with the exception of false brome.

Exposed mineral soil creates favorable environments for the establishment of non-native plant species. Any activity that exposes mineral soil in this proposed action would create an opportunity for non-native plant species to become established. Any future road maintenance activities not included in this

proposed action could provide additional habitat for noxious weeds that currently are established in the project area.

With the exception of false brome, the risk rating for adverse affects from these species would remain low because the known noxious weeds which occur in the project areas are widespread and this project area is localized within the watershed.

Without any type of treatment, false brome would continue to spread along the right-of-way systems and into forested areas. The risk rating for the establishment of false brome without the implementation of this project would be low-medium.

3.2.1.2 ***Alternative 2 (Proposed Action)***

Stand Development

Stand development for 30 years growth after density management thinning under the proposed action and without treatment is compared in Table 9. Density Management Study phase two treatments to the recommended densities are expected to put the stands on a trajectory toward development of stand structure and individual tree characteristics desirable for attainment of composition and structural diversity objectives in the LSRA in the following ways:

Restored structural complexity of the stands

Tappeiner, et al (1997) concluded that thinning 40 to 100 year-old Douglas-fir stands in western Oregon promotes tree regeneration, shrub growth, and multi-storied stand development, and thinning that incorporates retention of large remnant trees, snags, and down wood, and hardwoods accelerate the development of old-growth characteristics. Treatment includes proportional density management thinning and retention of gaps and clumps, increasing the spatial and structural diversity of the stand.

Accelerated development of desired tree characteristics

Residual trees would increase in diameter and crown size. Limb diameter and crown depth would be maintained because trees would be released from competition that causes growth decrease and loss of shaded lower limbs. The long-term results of density management thinning would be larger average diameters and deeper crowns (higher crown ratios) at any given age. After treatment and 30 years of growth, QMD would increase from 19.0" (immediately after treatment) to 25.3", an increase of 6.3". Without density management thinning, the average increase in QMD is predicted to be 3.7 inches (from 19.3 inches to 23.0 inches QMD). Density management thinning would result in an additional 2.6 inch of diameter growth in 30 years, a 70 percent increase from no treatment.

Increased species diversity

Species diversity would be increased since density management thinning would target Douglas-fir, the predominant species, increasing the relative proportion of the other tree species. The proportion of hardwood and less common conifer species would increase from the current average of 6 percent to 11 percent (by trees per acre) in the treatment areas. Furthermore, density management thinning is very likely to allow establishment of seedlings, including hardwood, western hemlock and western red cedar species.

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 ratios (calculated from the quadratic mean diameter and the height of the 40 largest trees per acre) of 69, would remain at 69 after 30 years of growth indicating maintenance of favorable tree stability over time. Currently crown ratios for stands treated in phase

one are 31 percent. Without treatment, they are predicted to decrease to an average of 23 percent in 30 years, and with treatment to decrease only slightly to 29 percent.

Coarse Woody Debris Management

Thinning short-circuits the snag recruitment that results from inter-tree competition (Carey, 1999), and very little density mortality (0.3 trees per acre) is expected to occur for 30 years after treatment. Proposed action treatments to create downed logs and snags would result in increases in large diameter, decay class 1 snags and downed logs, of approximately 170 cubic feet of logs and 450 cubic feet of snags. Inputs resulting from harvest consist 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. This would bring post-treatment coarse wood levels to 1,889 cubic feet per acre, which is in the mid-range of levels prescribed in the Late Successional Reserve Assessment for Oregon Coast Province, Southern Portion (pp. 66-68). In the long-term, due to increased diameter growth resulting from density management thinning, larger trees would be available for recruitment for CWD.

Approximately 53 acres (41 percent) of the proposed treatment area in the density management thinning project is within RR LUA boundaries. However, the habitat conditions within the RR (outside the SPZ) are essentially identical to habitat conditions within the uplands (outside of RR LUA). From the SPZ to the upper edge of the RR LUA, stand density would be reduced using the same prescription used on the upland forest. Habitat for aquatic and riparian dependent species would be maintained or enhanced in RR LUA in the following ways:

Long-term increase in quality instream LWD recruitment

In the long-term, trees would reach large diameters earlier than without treatment, creating opportunities for high quality LWD recruitment. Smaller wood would continue to fall from within the untreated , and larger wood would begin to be recruited from farther up the slopes as the treated stands reach heights of 200 feet. Thus, wood with a larger range of sizes would potentially be recruited into streams over the long-term in treated stands.

Maintenance of stream temperature through shading

Stream shading would potentially be affected by the proposed treatments, and is one of the variables studied in the Riparian Buffer Study. According to the Stream Shading Sufficiency Analysis (USDA, USFS et. al., 2004) for the proposed treatment, SPZs need to be 55 feet wide to provide shade in the primary shade zone, based on topography and average tree height (Appendix 4). Additional criteria required for shade sufficient to maintain stream temperatures are that vegetation density is high and would benefit from density management thinning and that vegetation treatment in the secondary shade zone (from the primary shade zone to approximately one tree height from the stream) would not result in canopy reduction of more than 50 percent (See Appendix 4).

Shade can be described by two separate and different parameters: canopy cover and canopy closure. Canopy cover is the vertical projection of tree crowns on the forest floor. It can be modeled in Organon based on tree crown widths. Based on Organon modeling, current canopy cover is 55-82 percent (Table 5), and canopy cover would drop to about 40 percent in the moderate retention treatment (to 30 TPA) and to 35 percent in the low retention of the variable density treatment (20 TPA) after treatment.

Canopy closure is the proportion of the sky hemisphere obscured by vegetation when viewed from a single point, and is generally a much higher value in the same stand than canopy cover. Measurements of canopy closure (spherical “fish eye” lens photograpy, computer analyzed) after the initial treatment

show that stream shade was maintained above the Oregon DEQ standard of 80 percent in all treatments, including 40 trees per acre. Based on those data it is very likely to remain above 50 percent in both the off-stream, moderate retention treatment (to 30 TPA) and the low retention of the variable density treatment (20 TPA) areas after treatment as well. *(Anderson, Larson, and Chan, 2007, Riparian Buffer and Density Management Influences on Microclimate of Young Headwater Forests of Western Oregon., Forest Science 53(2): 254-269).* Researchers have estimated that shade levels, as measured by a "fish eye" camera would not drop below 50 percent until relative density drops below 0.10. Projected relative density, post-treatment would be 0.17 to 0.36 (Sam S. Chan, USDA Forest Service PNW pers comm. e-mail, February 10, 2004).

Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands.

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

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

Research at the DMS sites, including Green Peak, found that the treatments generally maintained habitat for native plant, invertebrate and invertebrate riparian-dependant species. Similar effects are expected in the proposed action as the previous treatment measured in the research. However, no additional patch cuts are included in the proposed action. Specifically, thinning was found to increase species richness of arthropods, and forest riparian buffers thirty meters wide serve as refuge for both forest-upland and forest-riparian arthropod species. Thinning was found to have minimal effects on most species of aquatic vertebrates (salamanders). Native plants were found to persist and increase in coverage after density management. Patch openings and low (retention) thinning drastically reduced the diversity of epigeous ectomycorrhizal fungal species, but medium and high retention thinning showed little change in fungal diversity. Buffers of widths defined by the transition from riparian to upland vegetation or topographic slope breaks appear sufficient to mitigate the impacts of upslope thinning on the microclimate above headwater streams. Because the microclimate, as well as the structure and composition of the forest stand and understory vegetation are protected within the untreated buffer, habitat elements seem to be protected.

Table 9. Stand Characteristics with Treatment vs. No Treatment 30 years in the future (year 2040)[1]

Unit/ Phase 1 Treatment	Tmt. (Residual TPA)	Age[1] (yrs)	TPA[2]	% DF (TPA)	BA[3] (Sq.Ft.)	QMD (in.)[4]	RDI[5]	Density Mortality		
								TPA	BA	QMD
	n/a									
Control	No Tmt.	100	137	97	314	20.5	0.83	21.2	13	10.6
	n/a									
Riparian Control	No Tmt.	100	119	95	380	24.2	0.94	29	28.1	13.3
High Retention	60 TPA	100	59	95	174	23.3	0.44	6	13.2	20.1
	No Tmt.	100	112	97	295	22	0.76	7.7	5.4	11.3
Moderate Retention	30 TPA	100	30	98	117	26.7	0.28	5.1	14.8	23.1
	No Tmt.	100	81	100	251	23.8	0.63	1.3	1.5	14.5
Variable Density-High	60 TPA	100	61	95	163	22.1	0.42	5.4	10.5	18.9
	No Tmt.	100	118	97	274	20.6	0.72	6.6	4.8	11.5
Variable Density-Moderate	30 TPA	100	30	89	105	25.2	0.26	4.9	13.4	22.4
	No Tmt.	100	92	96	254	22.5	0.65	3.4	2.5	11.6
Variable Density-Low	20 TPA	100	27	60	86	24	0.21	5.4	15.8	23.2
	No Tmt.	100	50	79	154	23.4	0.39	1.3	1.1	12.4
	Tmt.	**100.0**	**44.3**	**87.0**	**135.0**	**24.0**	**0.34**	**5.5**	**13.6**	**21.3**
Average	**No Tmt.**	**100.0**	**102.8**	**94.2**	**278.0**	**22.4**	**0.71**	**11.2**	**9.0**	**12.3**

[1] Stand age in 2040. Data collected in 2005, treatment modeled in 2010, and grown forward in Organon (v. 8.2) to simulate growth to 2040.
[2] Trees per acre >7" dbh.
[3] Basal area in square feet: cross-sectional area occupied by tree boles on each acre, a measure of density
[4] QMD=quadratic mean diameter, the DBH of tree of mean basal area.
[5] Relative Density Index, the density of trees per acre relative to the maximum density possible (Reineke,1933).

Forest Health

There would be a short-term (one to three years post-harvest) elevated risk of a bark beetle infestation from the input of downed wood resulting from both the logging operation and creation of two TPA of downed wood, and (10 years later) creation of snags. Additional mortality is very unlikely to reduce tree stocking below desired levels.

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, and reducing root-to-root contact between trees, reducing the spread of disease.

The potential for windthrow from winter storms would be higher for the first decade following density management thinning, especially in the the moderate retention and variable retention treatments. Offsetting this is the increased tree stability that has resulted from the previous treatment that created more open stand conditions ten years ago. Windthrow risk would be reduced by selecting leave trees with deep, healthy crowns. Risk is greater near created openings (clearcuts on adjacent private lands

and existing patch openings), and where aspect (the lee side of ridges from prevailing winds), topography, and shallow soils increase risk. Windthrow is not expected to reduce tree stocking by more than 20 percent for the first decade after treatment over the treated area (Busby, Adler, Warren and Swanson, 2006). A two-year study of wind damage following variable density thinning (Roberts, et al., 2007), showed a loss of 1.3 percent of stems, concentrated in topographically vulnerable conditions. The study showed overall level of wind damage resulting from variable density thinning is not statistically greater than unthinned stands, nor uniform thinning.

Damage to Residual Trees

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. Restrictions to yarding during the sap-flow period in the spring would reduce damage.

Bureau SS Botanical and Fungal Species

The ***Phaeocollybia sipei*** site would be protected by reserving the adjacent conifers which are suspected to be mycorrhizal with the species. This species known site has been incorporated into a part of the fungal study at Green Peak which monitors species response to density management thinning. This site would continue to be monitored and any findings incorporated with other fungal studies the Marys Peak Resource Area. If this species does not persist on site after treatments, it would not lead to the need to list the species as the species is fairly common in Benton County along the crest of the Oregon Coast Range Mountains.

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

However, density management thinning dense stands would provide older forest characteristics to the reserved trees at an earlier age when compared to the no action alternative. This action would create habitat for late forest and/or SS species by increasing the secondary growth of the reserved conifers. In addition, it would provide for a higher diversity to the shrub and forb layers by allowing an increase in sunlight to the forest floor.

Invasive (Noxious Weeds, Invasive Non-native Species)

Exposed mineral soil often creates environments favorable for the establishment of noxious listed plant species. All road reconstruction 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 area post treatment. These populations generally persist until the native vegetation out competes them in approximately 5-10 years or until the conifers reach the sapling stage.

All of the known noxious weed species that occur near the project area 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.

With the exception of false brome, all of the noxious weeds species that are known to occur near the project area are more than regionally abundant and are widespread throughout all of western Washington and Oregon and a fully integrated Oregon statewide management plan has not been implemented. False brome is becoming increasingly common in the southwestern portion of Benton County with the population center near the city of Corvallis. The infestation of false brome have mostly been reported from along the right-of-ways on Green Peak. The MPRA began treating these sites in 2008 and are actively targeting false brome populations using herbicides which has reduced the density of these false brome infestations substantially. The Marys Peak Resource Area has an integrated non-native plant management plan in place for the control of non-native plant species.

Design features incorporated into this project such as vehicle cleaning and sowing seed on exposed soil areas, as well as the implementation of the Marys Peak Resource Areas weed program tends to reduce the risk for the establishment of noxious weeds.

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

- the amount of exposed mineral soil would be minimized,
- these early successional species persist for several years after becoming established but soon decline as native vegetation increases within the project areas,
- all false brome sites within the project areas, including haul routes are being targeted by the Marys Peak Resource Area for treatments beginning in the summer of 2008 and
- this area was previously thinned with no adverse affects from any noxious weed species.. In addition, all project areas would be monitored to detect for any "new invader" noxious weed infestations and targeted for removal. All non-native species would be eradicated as funding allows.

3.2.2 **Soils**

(IDT Reports incorporated by reference: Revised Green Peak II Density Management Soils/Hydrology Report, pp. 1-13) and Revised Cumulative Effects Analysis for the Green Peak II Timber Sale

Affected Environment

The predominant soil types in the proposed area are Marty gravelly loam and Klickitat gravelly clay-loam. The major management concerns with these soils are their sensitivity to compaction when moist or wet, and the subsequent reduction in infiltration rate and site productivity if compacted. On steeper sites (greater than 25 percent slopes), run-off rates and hazard of erosion can be high for bare, compacted soils. Another concern, particularly with the Klickitat soil, is depth of the surface horizon.

The existing rocked road surfaces within the proposed project area are stable. A few sections of natural surfaced roads show signs of limited surface erosion where vehicle traffic occurs during wet weather and/or where surface water accumulates and runs down the compacted road surface. No areas were found that had a high risk of contributing large amounts of sediment to streams through surface erosion or mass failure.

Slopes on most of the skyline yarding areas vary from 30 percent to 50 percent; a few included areas have slopes up to 60 percent for short distances. Slopes on the ground based yarding areas vary from 5 to 35 percent.

Environmental Effects

3.2.2.1 ***Alternative 1 (No Action)***

If no action is taken, the existing soil compaction from past logging activities in the project area would continue to recover slowly through time. Overall, no additional substantial soil compaction or top soil displacement would occur in the project area above natural rates.

There are no apparent impending road failures or surface erosion issues that would cause serious impacts to streams in the proposed project area.

3.2.2.2 ***Alternative 2 (Proposed Action)***

Compaction and disturbance/displacement of soil

Roads and Landings

Permanent roads and landings make up 3.5 percent of the project area. There are no new roads planned for this entry into the study area.

A limited amount of road brushing, drainage improvements, and spot rocking would occur if needed to improve the road surface for hauling activities. Based on previous project work, the spot road renovation and improvement of existing roads would not change the existing amount of current non-forest land. The renovation and improvement work is expected to result in some minor short term roadside erosion where established vegetation in the ditch areas are removed.

Existing landing areas would be re-used for this entry creating no additional disturbed area.

Ground-based Yarding

Approximately 20 acres would be harvested with ground-based equipment. A study on the effects of compaction on soil bulk densities (Page-Dumroese 1993) found that intensive timber removal activities using ground based equipment resulted in a 25 percent increase in compaction and was considered "heavy or intense" compaction. Moderate levels of timber removal activities using forwarder-type equipment resulted in an 18 percent increase in bulk density and skyline based timber removal activities resulted in an 11 percent increase in bulk density of the yarding corridors.

Of the area to be ground base yarded, up to 15 acres may be yarded using a track-mounted shovel. Use of the shovel would result in less impact than if yarded using a conventional crawler tractor. Soil impacts observed on these sites during the first phase of this research project were minimal. Soil disturbance was less than expected from crawler tractor yarding. Soil compaction was minimal in areas where equipment was operated on top of a slash layer during periods of low soil moisture and the number of equipment passes was low. Repeated passes began to increase soil compaction, particularly when the slash layer was broken down or displaced. The overall amount of soil disturbance and compaction from a shovel yarding operation on low soil moisture areas is generally less than 7 percent. This is slightly higher than the level of compaction seen using a cable yarding system.

Significant soil compaction can be expected if repeated passes of the equipment take place when soils are wet. A small but acceptable amount of compaction would likely occur under moist soil conditions if shovel yarding is conducted according to the criteria listed under the project BMP's (EA p. 12). The compaction would be limited to the area under the tracks and would be discontinuous or interrupted where heavy slash areas support the weight of the machine. The compacted layer would vary between 0 and 5 inches deep, and generally not exceed 2 feet in width for each track.

Ground-based yarding with crawler tractors on designated skid trails would at the most impact 2 percent of the harvest area. Existing skid trails would be used to minimize the need for new skid trails. Meeting these criteria would restrict the area of compaction from tractor yarding to less than 2 percent of the unit area, like in the previous harvest of the study area.

Skyline Yarding

In the density management thinning areas, the average log size is less than 20 inches and the volume removed per yarding corridor is relatively low. Cable yarding would result in minor disturbance and shallow compaction of the surface soil in the yarding corridors. Ground disturbance from cable yarding would be approximately 6.6 acres (4 percent of the harvest area). All of the proposed timber removal activities are planned and designed to remain below the cumulative level of 10 percent aerial extent of soil disturbance from the RMP (Timber harvest BMP's, Appendix I).

Site Productivity

The affect on overall project site productivity (from all proposed treatments) would be a 0.9 percent reduction in overall yield for the entire 131 acre treatment area. In a recent paper, Miller et al. (2007) found that the growth of mature Douglas-fir trees near equipment trails used for commercial thinning in the Oregon Coast Range actually had a greater growth rate than those areas within the treatment stand. They concluded that compacted soils on only one side of residual trees did not reduce the growth rate of nearby trees. (*Miller et al., 2007, Growth of Douglas-fir Near Equipment Trails Used for Commercial Thinning in the Oregon Coast Range. PNW-RP-574, 33pp.)*

Pile Burning:

Observations over 3 decades of burning piled slash in this area of the Oregon 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 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. A slight mineralization of nitrogen under the burned piles could occur, which would enhance plant growth at the spot.

Skyline Yarding:

For cable yarding systems, the effect on overall site productivity from light compaction on approximately 4 percent of the total area is expected to be low (no measurable reduction in overall yield for the project area). Because the trees in the project area have ample crowns, there should be adequate slash on the ground to yard over thus lowering the amount of compaction. 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 area because of the design features.

Ground-Based Yarding:

For shovel or tractor harvest systems, soil impacts in skid trails are expected to result in moderate compaction in two discontinuous, narrow strips less than 3 feet in width. The effect on overall site productivity from light to moderate compaction on less than 2 percent of the treatment area is expected to be low (no expected measurable reduction in overall yield for the project area). Effects from top soil loss or displacement may have more long term significance than the associated compaction.

In order to avoid damage to existing tree roots, we would not plan on ripping skid roads to mitigate compaction. Mitigation would only be in the form of limiting soil disturbance and compaction by skidding on top of slash as much as possible and doing ground based skidding during periods of low

soil moisture (less than 25 percent) with a minimum of skid trails (less than 10 percent of the treatment area) (Timber harvest BMP's, Appendix I).

Soil Erosion
No measurable amounts of surface erosion are expected from the forested lands treated under this proposed alternative. To minimize water quality impacts, timber hauling may be restricted during periods of rainfall when water is flowing off road surfaces. In addition, the contract administrator may require the purchaser to install silt fences, bark bags, or apply additional road surface rock. There would be no measurable cumulative impact to the soils resource outside the project area.

Placement of water bars in 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.

3.2.3 **Water**

(IDT Reports incorporated by reference: Green Peak II Density Management Soils/Hydrology Report, pp. 1-11)

Affected Environment

There are two stream systems draining the Green Peak II project area: tributaries to Peak Creek, which flows into the South Fork Alsea in the Upper Alsea River 5th field watershed and tributaries to Oliver Creek, which flow into Muddy Creek in the Mary's River 5th field watershed. Neither the Upper Alsea River nor the Mary's River Watersheds are identified as either municipal or key watersheds.

The project area receives approximately 65 inches of rain annually and has a mean 2-year precipitation event of 4.25 inches in a 24-hour period. Most runoff is associated with winter storm events that result from low pressure fronts moving inland from the southwest off the Pacific Ocean. Peak stream flow events are concentrated in the months of November through March when Pacific Storm fronts are strongest. As a result of little or no snowpack accumulation and infrequent summer rainfall, stream flow in the summer is typically a fraction of winter levels and many headwater channels retreat to subsurface flow.

Terrain in the project area catchments is generally hilly with elevations ranging from approximately 1,500 to 2,200 feet. Only a small portion (19 percent) of the project area lies in the "transitional hydro region" (above 2,000 feet in elevation), where snowpack can accumulate each winter. There is only one small section of stream channel (200 feet) that drains this portion of the harvest area. The watersheds are classified as rain-dominated watersheds and therefore, the project area is not at a high risk for peak stream flow events based on rain rapidly melting a snowpack.

Project Area Streams
The stream channels in the project area are high gradient, large gravel streams that are source areas for fine sediment but are also stable. These channels are ephemeral or intermittent, becoming perennial near the BLM property line. Data collected by Olson and Rugger (2007) showed that all of the five surveyed stream reaches in the Green Peak II study area were dry for approximately 50 percent of their length. Those portions of the riparian/channel systems on BLM managed lands in the project area are

functioning properly. Stream flow primarily originates from winter precipitation, with rare extreme events supplemented by rain-on-snow conditions. Summer stream flows are derived from groundwater inputs.

Forest management has occurred throughout this area, and all of the channels and riparian areas were heavily disturbed in the past by grazing and logging, road construction, inputs of logging debris and sediment and removal of LWD. The boulder-cobble substrate of the channels has allowed the streams to remain very stable through these past actions and their current condition is also considered to be stable.

Project Area Water Quality

Stream Temperature

Stream temperature data for Oliver Creek collected as a portion of the research project has shown that between August 2006 and September 2007 the stream temperature of the tributary coming out of the control area was well below the State of Oregon standard of 17.8° C. This stream went dry for a portion of the study period. No other site specific stream temperature data has been collected in the streams of the harvest area. Stream temperatures in lower Peak Creek exceeded the State of Oregon's standard in the summer of 1995 and 1996. Temperatures at the two sites were tested again in 1997 and found to be below the standard at that time.

The majority of tributaries in or near the project area do not flow on the surface during most summers. Therefore, these channels are not at risk to heating by exposure to direct solar radiation. The one perennial stream has very low to intermittent flow during the summer. Most of these channels are sufficiently shaded by streamside vegetation to meet summer temperature standards. Watershed analyses identified project area streams as having a "low" risk of increases to stream temperature due to inadequate shading (USDI, 1995 & 1997).

Other Water Quality Parameters

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

Oregon Department of Environmental Quality (DEQ) Standards

The Oregon Department of Environmental Quality's (DEQ) 1998 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 Alsea River and Muddy Creek watersheds was completed for this report. Muddy Creek is 303d-listed for exceeding summer temperature standards from river mile 0 to 33, approximately 7 stream miles downstream of the proposed project. The South Fork Alsea River is also 303d-listed for exceeding summer temperature standards from river mile 0 to 17.2, approximately 3 stream miles downstream of the proposed project.

The DEQ also published an assessment, the 319 Report, which identifies streams with potential non-point source water pollution problems (1988 Oregon Statewide Assessment of Nonpoint Sources of Water Pollution). Muddy Creek is not listed in the 319 Report. The lower South Fork Alsea River is listed for having moderate water quality conditions affecting fish and aquatic habitat.

Beneficial Uses

There are no known municipal or domestic water users in the project area. There are no water rights listed for Peak Creek. Oliver Creek has rights for irrigation, fire protection, an industrial log deck and a right for manufacturing approximately 3 miles downstream from the project area near Dawson. There is an instream water right along the South Fork Alsea River for anadromous and resident fish

rearing approximately 3 stream miles downstream of the project area. Irrigation and livestock watering occur in the Alsea valley and in the Muddy Creek valley, several miles downstream from the project area. Additional recognized beneficial uses of the stream-flow in the project area include anadromous fish, resident fish, recreation, and esthetic value.

Environmental Effects

3.2.3.1 ***Alternative 1 (No Action)***

The watersheds would continue to experience logging, road construction, and recreational use. The large majority of development would occur on private lands. These activities would continue to contribute fine sediments into the stream system. No change, other than natural fluctuations, in stream temperatures or flows would occur, unless large areas are cleared of vegetation or substantial portions of riparian vegetation is removed.

3.2.3.2 ***Alternative 2 (Proposed Action)***

Measurable impacts on stream flow, channel conditions, and water quality due to this proposal are unlikely due to the heavy armoring of the channels by larger substrate of cobbles and boulders. Research presented in 2007 for all of the DMS study areas in western Oregon did not detect any effects to stream habitat parameters due to treatment activities based on the study period of 1998 through 2004. The site specific Green Peak data surveys showed no statical change in pool depth, pool amounts, riffle amounts or substrate shifts. *(Olson and Rugger, 2007, Preliminary Study of the Effects of Headwater Riparian Reserves with Upslope Thinning on Stream Habitats and Amphibians in Western Oregon. Forest Science; 53(2): 331-342)*

Stream Flows

Mechanically removing trees and removing stand densities can alter the capture, infiltration and routing (both surface and subsurface) of precipitation. Numerous studies have documented increases in mean annual water yield and increases in summer base flow following the removal of watershed vegetation; presumably vegetation intercepts and evapotranspires precipitation that might otherwise become runoff (Bosch et al. 1982). By removing vegetation, surface runoff is increased and more water reaches streams.

This action is unlikely to measurably alter the current condition of the aquatic system with respect to its physical integrity, water quality, sediment regime or in-stream flows. Some short term, variable increases in stream turbidity may result (discussed below). Alterations in the capture, infiltration and routing (both surface and subsurface) of precipitation may occur as a consequence of the mechanical removal of trees and reductions in stand density. This effect would be difficult to measure and unlikely to substantially alter stream flow or water quality.

The compaction of skid trails and roads would also increase surface runoff in the project area. Thus, it can be assumed that this project would likely result in some small increase in water yield. However, this effect from the proposed action would be difficult to measure and unlikely to substantially alter stream flow or water quality because the increase would be undetectable by common field techniques. Other than increased peak flows, an increase in fall and winter discharge from forest activities is unlikely to have biological or physical significance (U.S.E.P.A. 1991).

As the majority of the project area lies below the elevation where rain on snow events are likely to occur, measurable increases to peak flows from the proposed project area are also unlikely. 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.

Water Quality
Fine sediment and Temperature
Due to the topography of the study area and the patchwork type of harvest activity which includes 49 acres of leave islands and riparian buffers, increases in mass wasting and alterations in the sediment regime would continue to have a low probability. There has been no evidence of any mass wasting resulting from the last entry.

There would be no new road construction with this phase of the project, although any needed road renovation work would be completed to keep the existing roads in good shape. The road work would be completed in periods of low rainfall. The largest potential impact would be from the ability to haul timber during periods of wet weather when water is flowing on roads and into ditches. To minimize water quality impacts, timber hauling may be restricted during periods of rainfall when water is flowing off road surfaces. In addition, the contract administrator may require the purchaser to install silt fences, bark bags, or apply additional road surface rock.

Compacted surfaces would occur (see soils section) around areas where ground-based equipment is utilized, landing areas, and yarding corridors. If sufficiently compacted, these areas may route surface water and sediment towards streams. Project BMP's (EA p.12) would reduce these impacts along with the existing undisturbed stream buffers in the harvest area. Tree removal would not occur on steep, unstable slopes where the potential for mass wasting adjacent to streams is high. Therefore, increases in sediment delivery to streams due to mass wasting are unlikely to result from this action.

Roads and skid trails would be far enough from stream channels (greater than 200 feet) as to not cause direct sedimentation from displaced top soil or increased surface runoff and no new stream crossing would be constructed. In addition, stream protection zones have high surface roughness, which function to trap any overland flow and sediment before reaching streams. Ground-based yarding would occur during periods of low soil moisture with little or no rainfall, in order to minimize soil compaction and erosion.

Due to logging constraints, a full suspension skyline corridor could be placed through the stream protection zone of the southeastern most stream in the project area. This corridor would require full-suspension of logs, so as to not disturb the stream channel, its banks, or riparian area. In the event that any vegetation would need to be removed for this corridor, it would be left on-site to preserve riparian biomass and limit soil disturbance. Due to the small size of this stream and the resiliency of local vegetation, if a small opening were to be created during yarding operations, it would not likely increase water temperature in the stream (and brush would be expected to fill in any gaps before the summer months).

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 area. These zones were determined in the field by BLM personnel following the protocol outlined in the *Northwest Forest Plan Temperature Implementation Strategies* (2005). Stream buffers extend a minimum of 25 feet from stream channels and to the extent of the riparian vegetation around “wet areas”.

This second entry into the harvest areas would bring 64 percent of the stand area towards a more open condition (less than 40 trees per acre). This number does not include the 49 acres of leave islands and

riparian buffers spread through the unit. These undisturbed areas and the patchwork-type harvest pattern would help to reduce any changes in the capture and routing of precipitation in the near term and allow a quicker vegetative recovery towards pre-treatment conditions as the remaining forest continues to grow.

The results of a recent study for this research project have shown that even the minimum buffer width implemented for this study maintained the near stream micro-climate in treated areas the same as untreated areas. Stream shade was maintained above the Oregon DEQ standard of 80 percent coverage in all treatment scenarios. While stream water temperature was not collected in this study, streambed substrate temperature was collected, and all the treatment sites remained well below the State of Oregon standard of 17.8° C. *(Anderson, Larson, and Chan, 2007, Riparian Buffer and Density Management Influences on Microclimate of Young Headwater Forests of Western Oregon., Forest Science 53(2): 254-269).*

Based on the above cited study results in the Project Area Water Quality section, increases in stream temperature as a result of this proposal are unlikely due to the implementation of the research stream buffers (25 to 220 feet of undisturbed forest) and adjacent density management areas. This phase of timber harvest would decrease tree density outside the uncut buffer areas towards a more open condition but in combination with the remaining stream buffers and untreated areas in the stand, would still provide adequate shading.

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

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 25-foot SPZ. Due to logging constraints, a full suspension skyline corridor would be placed through the SPZ of the southeastern most stream in the project area. This corridor would not disturb the stream channel, its banks, or riparian area. In the event that any vegetation would need to be removed for this corridor, it would be left on-site to preserve riparian biomass and limit soil disturbance. In addition, density management is proposed to produce larger trees over time that would fall into the streams adding additional structure and complexity to the channels.

3.2.4 Fisheries/Aquatic Habitat

(IDT Reports incorporated by reference: Revised Green Peak Thinning Project Environmental Assessment Fisheries Report, pp. 1-8)

Affected Environment

Upper Alsea Watershed

Watershed Description - The proposed project in the Upper Alsea River is located in the headwater of one 6th field subwatershed, Upper South Fork Alsea River . Timber harvest would be limited to one section; Township 14 South, Range 6 West, Section 7. The primary drainage of the western half of the project area are tributaries of Peak Creek, tributary to the South Fork Alsea River. The proposed density management thinning project would treat up to 48 acres limited to one 7th field drainage; East Fork Peak Creek. The proposed haul route is limited to the same 7th field drainage.

Fish Passage and Access - Green Peak Falls located to the southwest of the project area on Peak Creek is approximately 4 miles downstream. Green Peak Falls is a near vertical falls over 75 feet high and is the upper extent of anadromous fish distribution in Peak Creek. Oregon Coast coho salmon, Chinook salmon, and steelhead trout are known to be present up to Green Peak Falls. No man made barriers to migration are known to occur within the project area streams.

Fish Distribution - Streams in the project area are considered too steep to support fish presence. Cutthroat trout and sculpin inhabit the tributary to Peak Creek approximately ¾ mile downstream from treatment units. The life history patterns of western brook lamprey suggest this species may reside above Green Peak Falls including portions of the tributary in the project area; however their presence has not been documented.

Aquatic Habitat - There are no known aquatic habitat surveys of project area streams. The tributary to Peak Creek nearest the project area, draining the southeast quarter, was surveyed using Oregon Department of Fish and Wildlife (ODFW) protocols in 1995 (ODFW 1995). Reach 2 includes the northern portion of the tributary in the project area of Section 17. The reach extends 4,431 feet in length upstream of the Hull Oaks access road. Due to the steeper channel gradient pools were incorporated as part of other more complex habitat types (riffles/rapids/cascades). Based on ODFW benchmarks (Foster et al 2001) shade and channel dimension (width to depth ratio) are at desirable levels and large woody debris accumulation was below desirable levels at 11 key pieces.

Marys River Watershed

Watershed Description - The proposed project in the Marys River is located in the headwater of one 6th field subwatershed, Oliver Creek. Timber harvest would be limited to one section; Township 14 South, Range 6 West, Section 7. The primary fish bearing drainage to the eastern half of the project area is Miller Creek, tributary to Oliver Creek. The proposed density management thinning project would treat up to 92 acres limited to one 7th field drainage; Upper Oliver Creek. The proposed haul route is limited to the same 7th field drainage in the Marys River.

Fish Passage and Access - Oregon Department of Fish and Wildlife has documented multiple potential barriers to fish migration associated with existing culverts and dams in the Marys River watershed (Streamnet 2007). The magnitude of effect fish barriers has had on fish production in the project area is unknown. Hull Oaks Lumber Company maintains a small dam to create a log pond on or adjacent to Miller Creek in Section 16 (Streamnet 2007). Fish passage facilities were provided; however, the effectiveness of these facilities is unknown. Use of the Marys River for timber drives also lead to impacts on habitat and fish passage (BLM 1997; Farnell 1979). No other historical barriers to fish passage are known to exist on Miller Creek or Oliver Creek. No anadromous fish are thought to enter Oliver Creek or it's tributaries (BLM 1997).

Fish Distribution - Streams in the project area are considered too steep to support fish presence. Oliver Creek is tributary to Muddy Creek in the Marys River Watershed. Chinook salmon reside over 26 miles downstream from project activities in Muddy Creek (Streamnet 2007). Presence of steelhead/rainbow trout was noted in Benton Foothills WA (BLM 1997) and Marys River Preliminary Watershed Assessment (Mattson et al 1999). These analyses noted the occurrence of hatchery introduction of steelhead and rainbow trout in the Marys River. Historically Upper Willamette River winter steelhead were assumed to migrate no further upstream than the Calapooia River (Kostow 2003), approximately 58 miles downstream from the project area. Hence, the exact ancestry and current distribution of native steelhead in the Marys River Watershed is uncertain. For purposes of this analysis steelhead were assumed to coincide with other anadromous salmonid distribution in the watershed.

Cutthroat trout were documented over 1.25 miles downstream of tributaries draining the southeast half of the project area in the Marys River Watershed, in Township 14 Range 6 Section 9. No physical features were identified and upper limits appear to occur on private lands in the eastern half of Section 8. Review of topographic maps of the project area streams indicate steep channel gradient (greater than 20 percent) and low stream flows most likely are the limiting factors to distribution more than ¾ mile below the project area.

Aquatic Habitat - No aquatic habitat surveys have been conducted in Miller Creek or downstream from the project area. The ODFW protocol surveys of Oliver Creek (BLM 1996) are located upstream of the Miller Creek junction, thus would not receive transported material from Miller Creek and would not to be affected by the proposed actions.

Endangered Species

The Upper Willamette River (UWR) spring Chinook salmon Evolutionarily Significant Unit (ESU) are listed as threatened under the Endangered Species Act. Oregon chub is listed as endangered under the Endangered Species Act. The UWR Steelhead ESU is listed as threatened under the Endangered Species Act. Due to the distance to the known populations of UWR Chinook, UWR steelhead, and Oregon Chub in the Willamette Basin, the distances to historic habitats, and the lack of any connected effects of proposed actions to any known populations or habitat a No Effect determination has been made. No consultation with the National Marine Fisheries Service (NMFS) would be necessary for these species.

The Oregon Coastal (OC) coho salmon is listed as threatened under the Endangered Species Act. Due to the distance to anadromous habitat and the distance to known populations of OC coho salmon in the Alsea Basin and the lack of any connected effects of proposed actions to any known coho populations or habitat a No Effect determination has been made. No consultation with NMFS would be necessary for this species.

Pursuant to the Magnuson-Stevens Fishery Conservation and Management Act, as amended, an assessment of proposed actions effects to Essential Fish Habitat (EFH) and consultation with NMFS is necessary for projects which may adversely affect EFH. For purposes of this analysis stream reaches with known populations of Chinook and/or coho salmon present, or considered highly likely to be present, are considered EFH. The nearest stream reach with Chinook or coho salmon is 4 miles downstream of the project in Peak Creek of the Upper Alsea Watershed, and over 26 miles downstream in Beaver Creek of the Marys River Watershed. The proposed haul route extends the area of potential effects beyond the immediate project area, and follows rocked and paved roads out the east side of the project area in the Marys River Watershed. The nearest unpaved road stream crossings where sediment could enter the stream channel is over 24 miles from EFH habitat in the Marys River. There are no stream crossings connected to EFH in the Upper Alsea Watershed. No adverse affects are anticipated from the proposed action due to the distance of EFH habitat from the project area and the lack of any connected effects of proposed actions to EFH. Since a No Adverse Affects determination was made on EFH no consultation with NMFS would be necessary for EFH.

Environmental Effects

No effects are anticipated to spring Chinook salmon, coho salmon, and steelhead due to distance to occupied habitat, and project effects to these species shall not be assessed further in the environmental consequences. No project actions are anticipated to cause effects to chub due to the distance of proposed actions from chub habitat and this species shall not be assessed further in the environmental consequences. Other native species (sculpins, lamprey, etc…) may be present concurrent with native salmonids in the affected drainages, analysis of potential affects to native cutthroats were assumed to be sufficient to address impacts to these other species.

3.2.4.1 *Alternative 1 (No Action)*

Current timber stand conditions would be maintained. Expected benefits of density management thinning riparian stands under proposed, increased growth rate achieving large diameters trees earlier which would improve the quality and retention of future LWD, would not be realized. The existing road network would remain unchanged. Impacts to aquatic habitat would be unlikely with the implementation of the no-action alternative.

3.2.4.2 *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 affect less than 0.01 percent of the forest cover in the Upper Alsea River Watershed, and 0.02 percent of the cover in the Marys River Watershed. Due to the small percentage of forest cover affected, all located below the transient snow zone, alterations in stream flows would be unlikely (Wegner, 2010). Undetectable changes in peak and base stream flows are unlikely to affect fish habitat within the treatment area, and are even less likely to affect fish habitat downstream.

Temperature effects -

Removing trees which provide shade to the stream channel can negatively affect water temperatures. The hydrology analysis indicated that the no-entry buffers would maintain stream shading greater than 80 percent and unlikely to increase stream temperature (Wegner 2010). Site specific monitoring of air temperatures over the stream channel suggests stream temperatures were unaffected by past research thinning treatments (Anderson et al 2007). Based on the hydrology report and temperature analysis for project area streams, the proposed actions are unlikely to alter fish habitat downstream.

CWD and LWD -

Loss of coarse woody debris (CWD) and large woody debris (LWD) due to harvest can affect the stability and quality of aquatic habitat. The existing mean diameter of trees in the treatment area is 19.4 inches (Snook 2009), which is less than 24 inches considered minimum threshold to meet LWD criteria. Prescription would select trees to maintain the existing size class distribution (Snook 2009 appendix 3).

Proposed density management treatments in the southeast of the project area would generally occur 65 feet, or more from stream channels and proposed treatment in the northeast of the project area are 25 feet, or more from stream channels. Studies have shown that approximately 70 percent of wood recruitment occurs within 65 feet of the stream edge (McDade et al 1990, Van Sickle and Gregory 1990, May and Greswell 2003). Treatment of the riparian reserves of the southeast units, leaving at least 65 foot buffers, would be expected to leave at least 70 percent of the short-term woody debris recruitment area unaffected at the site. The majority of coarse woody debris would continue to fall from within the untreated SPZ, and short-term recruitment of the existing woody debris is expected to be largely maintained. Therefore, the proposed actions are not expected to cause any short term effects to aquatic habitat at the site or downstream where fish reside.

Proposed density management in the northeastern part of the project area would generally occur at least 25 feet of the stream edge . Treatment between 25 and 200 feet of the stream channel may reduce the total number of pieces available for wood recruitment (McDade et al 1990, Sickle and Gregory 1990, May and Greswell 2003). Results from McDade (1990) indicate approximately 30 percent of the woody debris sources area would be protected within the 25 foot untreated buffer. Proposed

actions may reduce the amount of wood which may be recruited as CWD/LWD on up to 19 acres in the northeast project area. The 19 acres is estimated based on GIS calculation of affected treatment areas between the proposed buffer boundary and 200 feet recruitment zone of stream channels. Total reduction in wood recruitment potential would approximate the change in trees per acre (TPA) in each treatment area based on pre- to post-treatment stocking levels (see EA table 1). Weighted average reduction in TPA of treatments from the 19 affected riparian acres is estimated at approximately 54 percent. However, fish habitat is approximately 0.75 mile downstream from the treatment area. The BFWA (BLM 1997) assessed mass movement risk in the watershed, including the project area. This analysis indicted the risk of movement in the project area was low (BLM 1997 see Map #19). The low risk of movement indicates that changes in CWD/LWD recruitment at the site would highly unlikely to impact downstream habitat where fish reside.

The proposed action would increase the average stand diameter by 42 percent over no treatment over the next 30 years (Snook 2009). In the long-term beneficial growth in the size of trees within one site potential tree height of streams could enhance LWD recruitment to the stream channel, thus potentially improving the quality/complexity available for future recruitment downstream. Fish habitat is approximately 0.75 mile downstream from the treatment area and beneficial effects to fish habitat from wood growth could be realized in the event of wood movement. However, the BFWA (BLM 1997) assessed mass movement risk in the watershed, including the project area. This analysis indicted the risk of movement was low (BLM 1997 see Map #19). Therefore, transport of large wood more than ½ mile downstream where fish reside would be considered highly unlikely, and effects to fish habitat would be highly unlikely.

Sediment effects-
Skidding can compact soil and displace soil thus allowing sediment to be transported down slope and potentially to the stream channel. Skyline corridors can also displace soil thus allowing sediment to be transported down slope and potentially to the stream channel negatively impacting stream channel bedload. The proposed project is unlikely to result in any measurable changes in sediment delivery to the surrounding stream network which could alter the turbidity, substrate composition, or the sediment transport regimes (Wegner 2010). Buffers, residual slash, and use of existing skid trails should keep sediment movement to a minimum. The proposed project is unlikely to measurably alter dissolved oxygen or nutrient levels. As the proposed actions are not likely to measurably alter water quality characteristics at the treatment sites, it would be highly unlikely to impair aquatic habitat downstream from the project area.

<u>Road Reconstruction/Renovation</u>
No new road construction is proposed with this project. No effects to fish and aquatic habitat would occur.

The proposed road renovation work is located on ridge tops. All renovation work is intended to improve drainage and road surface conditions, resulting in less erosion into the surrounding area over time. All road reconstruction and renovation work would be seasonally restricted to occur during the dry season, typically May thru October. No stream channels would be effected by the proposed road reconstruction/renovation. No effects to fish and aquatic habitat would occur.

<u>Hauling</u>
Hauling can increase the risk of sediment reaching stream channels and negatively affect aquatic habitat. The majority of the haul route is located near the ridge top between Marys River and the Upper Alsea Watersheds, with few stream crossings. There are no known stream crossings on the rocked haul route in the Upper Alsea Watershed and no effects to fish would occur in the Peak Creek drainage from proposed hauling.

Cutthroat trout occupy habitat along Miller Creek which parallels a portion of the haul route in the Marys River Watershed. Approximately 11 stream crossings are associated with the haul route over rocked surfaces in the Marys River Watershed, with ten intermittent crossings at least 200 feet from fish bearing stream channels. One crossing is over a perennial unnamed tributary to Miller Creek which is known to be fish bearing.

The proposed year round hauling on rocked and paved roads is not expected to result in measurable quantities of sedimentation reaching streams, due to the limited number of crossings on relatively gentle road gradients. Most sediment that would reach the intermittent streams from the haul route crossings would likely be assimilated into the intermittent channels before reaching fish habitat (Duncan et al, 1987). The crossing over the sole fish bearing stream may have direct short-term connections of road surface flows with stream channels. Minor site specific affects to short reaches of fish habitat downstream of the stream crossing could to occur due to sediment generated from hauling. Fish would be expected to move away from elevated turbidities while hauling was occurring and would reoccupy habitat following cessation of sediment recruitment. With application of sediment control PDFs (mulching, grass seeding, etc…) and cessation of haul during heavy rainfall, the magnitude of sediment reaching streams would be reduced and direct impacts to fish and aquatic habitat would be minimized. The duration of sediment and turbidity changes would be short-term episodic nature, primarily occurring during the initial winter freshets and may occur over three winter seasons.

Pile Burning

Pile burning may occur associated with accumulations of slash, generally at landing sites adjacent to the existing road network. Short-term changes on soil infiltration is possible at the site of the burn pile resulting in elevated surface runoff (Wegner 2010). 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 project design features would prohibit pile burning within 50 feet from stream channels. The 50 foot buffer would be expected to provide sufficient distance from the streams to capture most surface erosion from pile burning treatments. Any sediment that may reach the intermittent streams would likely be assimilated into the channel bedload over short reaches of stream (300-400 ft) (Duncan et al, 1987). With the incorporation of PDFs sediment would not be expected to reach fish habitat more than ¾ mile downstream. Therefore, pile burning is not expected to result in short-term or long-term effects to fish or fish habitat downstream.

3.2.5 **Wildlife**

(IDT Report incorporated by reference: Biological Evaluation for Green Peak II Density Management Timber Sale, pp. 1-14 and Appendices A and B)

Affected Environment

The proposed rethinning treatments, undisturbed patch-openings and leave-islands, along with new inputs of snags and CWD, are all designed to accelerate the structural development of late-successsional/old growth (LSOG) characteristics, in a research environment.

The ownership pattern at the landscape-scale (Upper South Fork Alsea River and Oliver Creek sixth-field watersheds) is a checkerboard of BLM and private forestlands in the Upper South Fork Alsea River watershed, with a great majority of the land being under private control in the Oliver Creek watershed. A checkerboard ownership pattern severely limits the ability to manage the landscape using a large-scale ecosystem approach.

Wildlife habitat on private lands can be characterized as a patchwork of intensely managed conifer forest stands in the early-seral (0-39 years old) and mid-seral (40-79 years old) types, with stands seldom older than 50 years. These private forests provide a continuous source of early and mid-seral habitat that is very simple in composition and structure when compared to unmanaged stands their age. Habitat conditions on BLM managed lands in the watersheds are dominated by managed mid-seral stands that average approximately 60 years old.

Special Habitats & Special Habitat Components

Special habitats in the conifer forests of the Oregon Coast Range are usually associated with the following environments; old-growth, permanent shrub patches, oak woodlands, cliffs, caves, talus, wet/dry meadows, ponds/lakes, and other lentic wetland types. There are no known special habitats in the project area.

Special habitat components most important to wildlife in the Oregon Coast Range are remnant live and dead LSOG trees found in early and mid-seral stands. Biotic (density-dependent suppression mortality, disease, insects, and animal damage) and abiotic [(fire, wind, ice glazing, snow loading, flooding, landslides, debris torrents, and crushing (large trees falling on smaller trees)] natural disturbances in LSOG forests produce early-seral conditions with a substantial component LSOG live and dead trees, thus providing a continuity of complex large structure throughout the early and mid-seral stages. This continuity of large structure is lacking in forests managed for sustained timber products.

Of greatest concern is the lack of remnant and smaller dead wood in managed early and mid-seral stands. Rose et al. (2001) identify 93 vertebrate wildlife species in Oregon and Washington that use (nesting, foraging, roosting, courtship, drumming, hibernating) snags, and 86 species that use (nesting, foraging, denning/hibernation, hiding cover, thermal cover, travel corridor, lookout) CWD. Most of the 93 species associated with snags use trees greater than 15 inches in diameter, while about one third of these species prefer snags greater than 30 inches in diameter. Larger diameter hard snags and hard CWD (Decay Class 1 and 2) will, over time, provide for more wildlife species than smaller and softer snags and CWD. When compared to unmanaged mid-seral stands (Mellen-McLean et al., 2009) the project stands are lacking in desirable amounts of coarse and LSOG hard snags and woody debris.

In Oregon Coast Range forests, suppression mortality, being density-dependent, is the most common type of mortality in early (0-39 years) and mid-seral (40-79 years) stands, slowly killing the smallest and least vigorous hardwoods and conifers.

In a study of early-seral conifer stands (14-38 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). Over the last 10 years, since the first thinning occurred at the Green Peak site, survey data shows that an average 7.5 new snags per acre, averaging 17.6 inches in diameter, have been produced; this includes both abiotic and suppression mortality in the control area, leave-islands, and high density treatment units, and abiotic mortality in the remaining treatment units. New impulses of CWD have also been recorded and observed during field visits, approximately 1.96 trees per acre 15+ inches in diameter have been added to the forest floor. 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

In addition to dead wood and remnant live structure, the following types of trees also function as

special habitat components: 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 (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. Many of these components are present in and adjacent to the project area.

LANDSCAPE-LEVEL HABITAT CONDITIONS

Wildlife habitats on private lands (60% of 32,994 total acres at this landscape-level scale) can be characterized as a patchwork of two intensely managed conifer forest types; the early-seral (0-39 year old stands; approximately 70%), and mid-seral (40-79 year old stands; 30%) - with stands seldom older than 50 years. These private forests provide a continuous source of early and mid-seral habitats that are simple in composition and structure when compared to unmanaged stands their age.

Conditions on BLM managed lands (40% of total) are dominated by matrix (landscape ecology designation, not land-use allocation) habitat (46%), which is defined by managed mid-seral stands that average 60 years old. Patch habitat (40%), is composed of early-seral (14% of total BLM acres), late-seral (80-199 years; 13%), old-growth (200+ years; 11%), and hardwood-stands/nonforest-openings (1%). Connectivity habitat (14%), in the form of a Stream Protection Zone provides a safety corridor for dispersal throughout the landscape. Table 10 below summarizes habitat types at the landscape-level by acres and land management.

Managed mid-seral forests, the landscape matrix in the central Coast Range of Oregon, are currently dominated by Douglas-fir with some scattered and clumped western hemlock and various hardwoods. These second and third-growth forests typically have stands characterized by a single-layered, dense, overstory canopy with little to no coarse woody debris (CWD-fallen trees or pieces of fallen trees on the forest floor at least 20 feet long and at least 20 inches in diameter at the larger end), or large wood, live or dead, remaining from the original stands. The quantity and quality of any future LSOG interior-forest habitat would be substantially reduced, being surrounded by private timber stands no older than 50 years.

Table 10
Current acres of terrestrial wildlife habitat types at the landscape-level (2 sixth-field watersheds)

Watershed Management	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[4]	Totals
USFAR[1] BLM	1,639	4,972	1,004	1,355	130	1,443	10,543
USFAR Private[3]	4193	1,797	0	0	0	0	5,990
OC[2] BLM	205	1,179	770	141	54	368	2,717
OC Private	9621	4,123	0	0	0	0	13,744
Totals: BLM(%) Private(%) All(%)	1844(12) 13,814(88) 15,658(47)	6,151(51) 5,920(49) 12,071(37)	1774(100) 0 1774(5)	1496(100) 0 1496(5)	184(100) 0 184(1)	1811(100) 0 1811(5)	13,260(40) 19,734(60) 32,994

[1]Upper South Fork Alsea River; total acres minus 2,415 acres in Lane County (Eugene District, BLM)
[2]Oliver Creek
[3]Early-seral acres represent 70%, and mid-seral acres 30%, of total private lands in the watersheds-this estimate is 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 impossible to estimate and are not significant to this analysis
[4]Represents the acres within a no-entry buffer on both sides of perennial streams; includes all habitat types

3.2 STAND-LEVEL HABITAT CONDITIONS

Habitats on private lands (68% of 8,443 acres at this stand-level scale) are similar to the conditions at the landscape-level scale (early-seral type approximately 70% and mid-seral type 30% - with stands seldom older than 50 years). These lands provide a continuous source of early and mid-seral habitat that is simple in composition and structure when compared to unmanaged stands their age.

Conditions on BLM managed lands (32% of total) are dominated by matrix habitat (51%), which is defined by managed mid-seral stands that average 60 years old. Patch habitat (33%), is composed of early-seral (5% of total BLM acres), late-seral (21%), old-growth (5%), and hardwood-stands/nonforest-openings (3%). Connectivity habitat (16%), in the form of a SPZ, provides a safety corridor for dispersal throughout the landscape. Table 11 below summarizes habitat types at the stand-level by acres and land management.

Managed mid-seral forests (the landscape matrix) in the action area are currently dominated by Douglas-fir with some scattered and clumped western hemlock and various hardwoods. These second and third-growth forests typically have stands characterized by a single-layered, dense, overstory canopy with little to no CWD or large wood, live or dead, remaining from the original stands.

Table 11
Current acres of terrestrial wildlife habitat types at the stand-level (2 seventh-field watersheds)

Watershed Management	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[4]	Totals
EFPC[1] BLM	56	482	4	1	18	102	663
EFPC Private[3]	634	271	0	0	0	0	905
UOC[2] BLM	76	903	574	141	51	291	2,036
UOC Private	3387	1452	0	0	0	0	4,839
Totals: BLM(%) Private(%) All(%)	132(12) 4,021(88) 4,153(47)	1,385(45) 1723(55) 3,108(37)	578(100) 0 578(7)	142(100) 0 142(2)	69(100) 0 69(1)	393(100) 0 393(5)	2699(32) 5,744(68) 8,443

[1]East Fork Peak Creek
[2]Upper Oliver Creek
[3]Early-seral acres represent 70%, and mid-seral acres 30%, of total private lands in the watersheds-this estimate is 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 impossible to estimate and are not significant to this analysis
[4]Represents the acres within a no-entry buffer on both sides of perennial streams; includes all habitat types

Special Status Species

Northern Spotted Owl:
There are no known owl nests/sites in or adjacent to the proposed action. The action area is in LSR and therefore is in designated northern spotted owl critical habitat. The project area is located between Oregon Managed Owl Conservation Area-36 and OMOCA-39 and may provide some low quality (due to its location on the eastern edge of the corridor) connectivity potential. The mid-seral stands function as owl dispersal habitat and may also function as foraging and roosting habitat. Over the past 25 years owl activity has been documented to the south, west, and north of the Green Peak summit. The closest known active owl site is over two miles north of the proposed action area.

Marbled Murrelet:
The research project site is located approximately 32 miles from the ocean. There are no known murrelet nests/sites in or adjacent to the proposed action. The action area is not within designated marbled murrelet critical habitat. The mid-seral stands currently do not provide suitable nesting structure for the murrelet. The closest known murrelet detection is over three miles to the southwest and the closest known occupied marbled murrelet site is over six miles to the southwest.

Mollusks:
There are no known mollusk sites in or adjacent to the proposed action. The action area falls within the designated range of four Bureau Sensitive mollusks, three slugs and one snail. Mollusk surveys were done before the initial thinning treatments in 1999-2000 and no listed mollusks were found.

Red Tree Vole

There are no known red tree vole nests/sites in or adjacent to the proposed action. Stands in the project area are not yet suitable habitat for the tree vole. Pre-project surveys are not required for the tree vole in this part of the Oregon Coast Range .

Riparian Reserve Species

One of the many functions of the Riparian Reserve land use allocation, as designated in the Northwest Forest Plan, is to provide habitat for riparian-dependent and associated species, and specifically for the following native wildlife species; all mollusks, all amphibians, all bats, marbled murrelet, northern spotted owl (dispersal habitat function), red tree vole, and the American marten. Current conditions for the owl, murrelet, and red tree vole have been described above. Several mollusk, amphibian, and bat species are expected to occur within the RR of the proposed action area. The American marten is rare in the northern Oregon Coast Range and is not expected to occur in the action area. Townsend's big-eared bat is also not expected to occur in the action area due to the lack of any caves or cave-like structures which are necessary for their roost sites.

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; 23 have a high likelihood of breeding in the mid-seral stands of the proposed rethinning project, 33 have a moderate likelihood, 23 have a low likelihood, and 9 are not expected to breed within the project area. There are 34 Bird Species of Conservation Concern that can occur in the MPRA; 9 have a high likelihood of breeding in the treatment area, 15 have a moderate likelihood, 7 have a low likelihood, and 3 are not expected to breed in the project area.

Environmental Effects

3.2.5.1 *Alternative 1 (No Action)*

The ongoing, long-term DMS would be compromised, which would have a substantial negative impact on the adaptive management process. There are very few research studies that document the long-term impacts of forest management on plant and animal associations at the scale of this DMS. Eliminating the Green Peak replication would reduce the precision and accuracy of the results.

At the watershed scale, forests on private lands would continue to provide early and mid-seral habitat; as mid-seral stands reach 40 to 50 years they would be harvested. These privately owned stands would lack structural complexity and any legacy or remnant live or dead wood typical of unmanaged early and mid-seral stands in the Oregon Coast Range.

On BLM-managed lands in the Oliver Creek watershed approximately 480 acres of mid-seral habitat would be thinned in the next five years, while approximately 200 acres would be thinned in the South Fork Alsea River watershed. Under the no-action alternative the mid-seral stands in section 7 would continue to grow and develop into mature structure at a much slower rate than if released through rethinning. A new impulse of snags and CWD would not occur without a large-scale 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.

3.2.5.2 *Alternative 2 (Proposed Action)*

Landscape and Stand Level Effects

The rethinning treatments (131 acres) are expected to maintain (short-term neutral impacts) the wildlife habitat functionality of the larger mid-seral stand (334 acres) in which they occur, especially at the subwatershed (Oliver Creek and Upper South Fork Alsea River sixth-fields) landscape level. These treatments would have long-term (10+ years) positive impacts for species dependent on, or associated with LSOG forest habitat in the subwatersheds by accelerating the development of large tree structure, by creating snags and CWD and by protecting the patch-openings and leave-islands.

The rethinning prescriptions for the research stands would be a proportional thinning, removing Douglas-firs from all diameter classes. The post-treatment crown canopy is expected to be 40 percent or greater on all units except the seven acre Variable-40 unit. Species dependent on a closed or dense overstory conifer canopy and/or shaded understory may move into the adjacent undisturbed mid-seral stand 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 site in the short-term.

Special Habitats and Habitat Components

The mid-seral stands to be treated are lacking in numbers of standing and down large, hard, dead trees when compared to other unmanaged stands their age. The proposed action would have a positive impact on live and dead structure; first by protecting the best existing live structure, and next by creating at least five new snags per acre (within five years post-treatment) and two new down trees per acre during the rethin. Dead wood creation is expected to have no known negative impacts to stand composition or function, while both immediate and long-term positive impacts are anticipated for species which require complex dead wood structure associated with natural disturbance in unmanaged stands in the Oregon Coast Range.

Landscape-Level Habitat

The 131 acres of mid-seral habitat proposed to be rethinned represents 1% of existing mid-seral habitat and 0.004% of the total forest habitat at this landscape-level scale. Since only 10% of the landscape currently functions as LSOG habitat, these treatments would have long-term (10+ years) positive impacts for species dependent on, or associated with LSOG forest habitat by accelerating the development of large tree structure, by creating snags and CWD, and by protecting the patch-openings and leave-islands. The short-term (less than 10 years) negative impacts to species using mid-seral habitat would be insignificant due to the small size of the action and the large amount of mid-seral habitat in the landscape.

Stand-Level Habitat

The mid-seral habitat proposed to be rethinned is part of a 330 acre block of contiguous mid-seral stands in section 7. The 131 acres to be treated represent 5 percent of existing mid-seral habitat and 2 percent of total forest habitat at this stand-level scale.

The rethinning prescriptions for the research stands would be a proportional thinning, removing Douglas-firs from all diameter classes. Although the stands' overstory tree diversity would remain the same, its composition would better reflect late-seral conditions, with a decrease of Douglas-fir and increased proportions of western hemlock and hardwoods. 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 on all units except the seven acre Variable-40 unit (see Table 12 below). The thinning treatments, undisturbed patch-openings and leave-islands, along with new inputs of snags and CWD, would accelerate the structural development of LSOG characteristics.

At the stand-level scale only 8.5 percent of the forest currently functions as LSOG habitat. The proposed action would have long-term (10+ years) positive impacts for species dependent on, or associated with LSOG forest habitat by the following:

- accelerating the development of large tree structure,
- creating snags and CWD, and
- protecting the patch-openings and leave-islands.

The most noticeable short-term impacts, (lasting about ten years), would be a simplification of live structure, primarily in the overstory, due to the removal of green trees, and an increase in structural complexity and species diversity in the understory due to an increase in light penetration and available water.

Species dependent on a more closed or dense overstory conifer canopy and/or shaded understory may move into the adjacent undisturbed 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 site 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 action and the large amount of mid-seral habitat in section 7 and the surrounding stands.

Table 12
Green Peak II Density Management Project - Unit pre- and post-treatment summary

Treatment Unit	Habitat Type (2009 Age)	Approx. Acres	Percent Douglas-fir	Pre-Treatment Trees/Acre	Post-Treatment Trees/Acre
High-120	**Mid-seral 69 yrs**	**28**	**97**	**119**	**66**
Variable–120	**Mid-seral 69 yrs**	**14**	**97**	**124**	**67**
Moderate–80	**Mid-seral 69 yrs**	**77**	**99**	**84**	**35**
Variable–80	**Mid-seral 69 yrs**	**14**	**96**	**94**	**35**
Variable-40	**Mid-seral 69 yrs**	**7**	**78**	**51**	**33**

Special Habitat Components

All known special habitat components would be left undisturbed unless they pose a recognized safety risk, in which case they would remain on site but rendered safe for operational purposes. The proposed action of removing green trees would result in the loss of an unknown quantity (inability to predict stochastic events) of future dead wood, bypassing the natural processes of most biotic, and all abiotic damage and mortality. Without treatment density-dependent suppression mortality (the most common cause of mortality in early and mid-seral stands) is predicted to produce about 2.9 snags per acre over the next 30 years. The trees to be cut and removed are all 15+ inches in diameter; trees this size, once damaged or dead, would provide habitat for many of the wildlife species associated with dead wood. The short-term loss of this potential dead wood is not significant because it is mitigated by the following conditions (see Tables 1 and 2 above) and processes:

- The small size of the action area (140 acres); which represents 2% and 0.004% of the available

habitat at the described stand and landscape levels respectively

- Density-dependent suppression most often kills the smallest trees in a stand, producing lots of dead stems but little biomass; if no action was taken in the stands to be thinned over the next 30 years computer growth modeling (Organon) shows that suppression mortality would result in about 2.9 trees per acre averaging 12.6 inches in diameter – if the stands are thinned, with 5 snags per acre are created over the next ten years, at 30 years there would be 5.5 snags per acre averaging 21 inches in diameter
- The existing dead wood 15+ inches in diameter in the mid-seral stands at the stand-level (2,968 acres) and landscape-level (11,931 acres)
- The total mass of dead wood created by abiotic agents 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, the leave-islands, and the surrounding acres of mid-seral habitat at the stand-level (2,968 acres) and landscape-level (11,931 acres) are all susceptible to the ongoing abiotic/biotic processes of damage and mortality
- Snags (5 per acre within 10 years post-treatment) and CWD (2 trees per acre post-treatment) would be created in the thinned stands as one of the proposed treatments; immediate and long-term positive impacts are anticipated for species which require more complex dead wood structure associated with mid-seral stands
- Existing LSOG large dead wood (of highest quality due to its size and abundance) at the stand-level (720 acres), and landscape-level (3,270 acres)
- Existing and potential dead wood 15+ inches in diameter in the no-entry Stream Protection Zones, at the stand-level (393 acres), and landscape-level (1,811acres)

Special Status Species

Northern Spotted Owl

The proposed action is a may affect, not likely to adversely affect northern spotted owl because it would modify the structure and composition of owl dispersal habitat at the stand level but would maintain the functionality of the habitat for owl dispersal since only seven acres are expected to fall below at least 40 percent crown closure.

The proposed action would result in a may affect not likely to adversely affect northern spotted owl because the long-term impact of density management thinning on owls would be positive since the existing habitat 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 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 habitat would have long-term positive affects by accelerating the time it would take for these stands to develop into suitable nesting habitat.

Mollusks

The action would have a long-term positive impact on listed mollusks, since the proposed treatments would accelerate the development of LSOG conditions within the selected stands. The undisturbed leave-islands, riparian buffers, and existing CWD would provide refugia for some on-site mollusks.

Red Tree Vole

The project would have a positive impact on red tree voles since the vole prefers late-seral habitat and the proposed treatments would accelerate the development of these conditions within the selected

stands. If any active red tree vole nests are found during the rethinning process then the nest tree and those trees immediately adjacent to it would be protected.

Bird Species of Conservation Concern

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

The Green Peak II Density Management Thinning treatment is not expected to modify bird nesting and foraging habitats to the point that some species are no longer able to occupy the site. Research shows that bird species respond differently to changes in their nesting and/or foraging habitats; some populations seem to be unaffected by density management thinning (for example, Stellar's Jay, Black-headed Grosbeak), some decrease in numbers (for example, Golden-crowned Kinglet, Hermit Warbler, Pacific-slope Flycatcher, Varied Thrush), and others increase (for example, American Robin, Hairy Woodpecker, Dark-eyed Junco, Western Tanager). Responses to density management thinning can occur immediately and then change slowly over time. In some cases short-term (0-5 years) decreases can lead to mid-term (6-10 years) and/or long-term (10+ years) increases (for example, Hermit Warbler, Varied Thrush); in other cases just the opposite response can occur (for example Olive-sided Flycatcher, Evening Grosbeak, Townsend's Solitaire).

In general, species that nest and/or forage in closed canopies would show declines commensurate with the intensity of the density management 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 density management thinning. The proposed action includes the creation of snags and CWD which would improve habitat conditions in the selected stands for those species which nest or roost in, and/or forage on, dead wood (for example, Hairy Woodpecker, Northern Flicker, Pileated Woodpecker, Red-breasted Sapsucker, Winter Wren).

3.2.6 **Fuels/Air Quality**

(IDT Reports incorporated by reference: Green Peak II Density Management Fuels and Soils Report, pp. 1-6)

Affected Environment

Fuels

The estimated total dead fuel loading for this stand ranges from 10 up to 30 tons per acre. Much of the existing down material is rotten or only partially sound.

In the treated timber stands, there is a moderate to heavy accumulation of small and medium diameter dead woody material and leaf litter on the ground, much of it being logging slash from the previous density management thinning treatment. The large diameter down wood component is higher in the treated stands by design and there are scattered wind thrown trees as well. Large snags are scarce. Small snags less than 12 inches DBHOB are less common in the treated verses the untreated stand. Patch cut areas in both the thinned and un-thinned stands have the highest accumulation of slash.

The estimated total dead fuel loading for this stand ranges from 15 up to 35 tons per acre. Approximately 50 percent of the existing down material is rotten or only partially sound.

Air Quality
Air quality in the vicinity of this proposed project is generally very high. Occasional stagnant air conditions do develop during the burning season and may result in accumulation of particulate mater but generally these are short lived lasting less than 1 week.

Environmental Effects

3.2.6.1 ***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.

3.2.6.2 ***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.

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 significantly 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 through out the site ranging from 5 to 30 tons per acre. It is expected that about half of the dead fuel tonnage to be left on site following treatment would be in the form of down logs and pieces in the 8 inch and larger size class.

The effect of decommissioning and blocking the reconstructed 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

The total amount of slash debris expected to be piled for burning is estimated to be approximately 250 to 400 tons from the landings and treated areas along the roads. Burning 250 to 400 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. Locally within ¼ to ½ mile of the piles there may be some very short-term smoke impacts after piles are ignited resulting from drift smoke. Depending on size, arrangement, type and moisture content of the 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.

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.

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

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

Following is a summary of the conclusions from the FEIS and the basis for these conclusions:

Resource Specific Methodology

Greenhouse Gases, Climate Change and the Spatial Scale for Analysis Forster et. al. 2007 (pp. 129-234), which is incorporated here by reference, concluded that human-caused increases in greenhouse gases are extremely likely to have exerted a substantial effect on global climate. The U.S. Geological Survey, in a May 14, 2008 memorandum to the U.S. Fish and Wildlife Service, concluded that it is currently beyond the scope of existing science to identify a specific source of greenhouse gas emissions or sequestration and designate it as the cause of specific climate impacts at a specific

location. This defines the spatial scale for analysis as global, not local, regional or continental. That memorandum is incorporated here by reference.

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

Context – Temporal Scale for Analysis

The BLM has selected fifty years as the analysis period of carbon storage for this project, because it encompasses the duration of the direct and indirect effects on carbon storage.

Context – Calculations of Carbon Storage, Project Area Scale

The purpose of the calculation of carbon storage is to provide a basis for determining significance of carbon storage relative to the temporal and spatial scale. The BLM used site specific data from stand exams as input to the ORGANON (v. 8.2, 2006) to determine stand growth to calculate carbon flow on the project area and the direct effects of the alternatives. Calculations from Smith et. al, 2006 were used to calculate carbon in other than live trees.

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 analysis of carbon stored in harvested wood in the 2008 FEIS used a factor for converting board feet of harvest wood to mass of carbon from Smith et al. 2006, p. 35. Based on information developed after the 2008 FEIS, this factor has been refined to better account for regionally-specific conditions and the fraction 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. Of this total amount of carbon in harvested wood, 63.8% of harvest volume is considered as sawlogs and 36.2% as pulpwood (GTR RM-199, Table B-6), for evaluation using the storage rates over time from Smith et al. 2006, p. 27. The improved conversion factor is used in this analysis to evaluate the amount of carbon stored in harvested wood. Information on the development of this conversion factor is on file in the BLM office and is available for review upon request and is incorporated here by reference (R. Hardt, personal communication, 11/6/09, on file in the Salem BLM Office). 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. Overall, this reanalysis revealed 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) and is incorporated here by reference. That description concluded that the regional climate has become warmer and wetter with reduced snowpack, and continued change is likely. That description also concluded that changes in resource impacts as a result of climate change would be highly sensitive to specific changes in the amount and timing of precipitation, but specific changes in the amount and timing of precipitation are too uncertain to predict at this time. Because of this uncertainty about changes in precipitation, it is not possible to predict changes in vegetation types and condition, wildfire frequency and intensity, streamflow, and wildlife habitat.

The proposed action is to conduct density management thinning harvest on approximately 131 acres of trees aged about 70 years old.

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

Carbon Storage

The following show quantities of carbon in forest ecosystem vegetation[5] worldwide, in the United States, and in the Green Peak II project area.

- Total carbon, forest ecosystem vegetation, Worldwide (Matthews et al, 2000, p. 58) = 132-457 Gt[6]
- Total carbon, forest ecosystem vegetation, United States (US EPA, 2009) = 27 Gt
- Total carbon, forest ecosystem vegetation, Pacific northwest, Coast Range 1.8-2 Gt (Hudiburg, et al. 2009).
- Total carbon, forest ecosystem vegetation, Green Peak Project Area = 21,000 tonnes or 0.000021 Gt. This represents .000001% of the United States total or .00001% of the Coast Range total.
- The annual carbon accumulation from forest management in the United States is 191 million tonnes. Current management on BLM-managed lands in western Oregon would result in an average annual accumulation of 1.69 million tonnes over the next 100 years, or 0.9% of the current U.S. accumulation. (WOPR, p. 4-537).

Carbon in forest ecosystem vegetation can be divided into three pools, and form the basis of the analysis for carbon storage and emissions for the Green Peak II 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.

Environmental Effects

3.2.7.1 *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 50 years of growth, live tree carbon would increase to 29,500 tonnes, an increase of 13,990 tonnes from the current level of 15,510 tonnes.

The no action alternative would result in greater net carbon storage over the 50 year analysis period than the proposed action by approximately 13,700 tonnes.

3.2.7.2 *Alternative 2 (Proposed Action)*

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

[5] 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.

[6] A Giga-tonne (Gt) is one billion tonnes, or metric tons.

Harvest Operations
Harvest operations would emit greenhouse gases. Equipment use necessary to harvest and transport the timber to the nearest mill (Philomath, Oregon) would require fuel consumption estimated at 6,700 gallons, or total emissions of 20 tonnes of carbon.

Live Trees
Live trees would be removed, decreasing live tree carbon from 15,510 to 6,430 tonnes, and transferring 9,080 tonnes of live tree carbon storage to other pools.

Forest Carbon Other Than Live Trees
Some 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. *E*missions from decay of dead material are not quantified in this analysis. Burning of landing *pile*s *(*approximately 118 tons of fuel*) after harvest would result in* 60 *tonnes of carbon emitted.*

Harvested wood
Some of the carbon in harvested wood is stored in products (lumber, etc.); some is emitted to provide energy; and some is emitted without energy capture. Harvested saw log gross volume at Green Peak II of 2,551 Mbf would contain 3,380 tonnes of carbon. Much of the emissions from harvested wood occur shortly after harvest. In the first 10 years after harvest, approximately 770 tonnes would be emitted.

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

Live Trees
Following harvest and coarse wood and snag creation, an average of 40 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 50 years of growth, carbon stored in live trees would be 14,650 tonnes, still 860 less than the current (pre-harvest) level of 15,510 tonnes.

Harvested wood
Harvested wood at Green Peak II would contain 3,380 tonnes of carbon. From 11-50 years after harvest approximately 300 tonnes of carbon would be emitted from harvested wood, totaling 1,070 tonnes (31%) emitted without energy capture in the full 50 year analysis period. The balance, approximately 2,320 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 1,150 tonnes and include the following:

Short-term emissions (0 to 10 years post-harvest)
- Harvest operations emissions totaling about 20 tonnes

- Fuel treatment (burning) emissions totaling 60 tonnes
- Emissions from harvested wood 0-10 years after harvest of 770 tonnes

Long-term emissions(11 to 50 years post-harvest)
- Emissions from harvested wood, 11 to 50 years after harvest of 300 tonnes.

Long-term Storage (50 year analysis period)
- 2,320 tonnes of storage in harvested wood
- -860 tonnes net storage in live trees after 50 years of growth

Greenhouse gas emissions and carbon storage over the 50 year analysis period resulting from the proposed action are displayed in Table 1, below.

Table 11. Carbon Emissions and Storage, Comparison of Action and No Action Alternatives

Source	Proposed Action (Tonnes)	No Action Alternative (Tonnes)	Notes
Emissions, 2010-2060	1,150	0	Logging, fuel treatments (burning), and emissions from harvested wood.
Live tree storage, 2060	14,650	29,500	50 years of stand growth
Live tree storage, 2009 (current conditions)	15,510	15,510	70 year old stand, 2009
Net change, live trees	-860	+13,990	Live tree carbon from growth 2010 - 2060
Harvested wood storage, 2090	2,320	0	69% of harvested wood carbon, 50 years
Total storage increase	**1,460**	**13,990**	**Storage: live trees and harvested wood**
Net Carbon Storage, Proposed Action	**310**	**13,990**	**Storage minus emissions, 2010-2060**

4.0 CUMULATIVE EFFECTS

4.1 Vegetation

Age Class:
Due to ecological succession and forest management (mostly private land harvests), the amount of habitat in each seral stage within this watershed is not stagnant, but rather it is in constant transition. Ecological succession would advance early seral forest plantations toward mid seral conditions, just as current and expected future harvests of mid seral stands would return these patches to early seral conditions. The prevailing management regime on private lands which dominate this watershed will likely involve alternating between mid seral and early seral habitat conditions over time without retaining any late seral forests patches for the foreseeable future.

BLM has conducted regeneration harvest over the past 25 years, totaling 11 percent of BLM-managed land in the Marys River 5th Field Watershed and 5 percent of the BLM-managed land in the Upper Alsea 5th Field Watershed. The proposed action contains a stand that is about 70 years old (mid seral).

The mid-seral age class comprises about 50 percent of both the Marys River and Upper Alsea Watersheds. Density management in this stand would not change the age class distribution within either watershed, as the stand would remain intact. Late seral (stands age 80 to approximately 160

years) comprise 35 percent BLM-managed land in the Marys River 5th Field Watershed and 39 percent of the BLM-managed land in the Upper Alsea 5th Field Watershed. The stands in the Green Peak II project area would join that category within a decade under the proposed action.

Stands aged approximately 160 years or more comprise about 5 percent of both the Marys River and Upper Alsea Watersheds.

Native vegetation:
The proposed action consists of density management of 131 acres located on the eastern slopes of the Oregon Coast Range mountains. The common perennial vascular plant species would persist on site post-treatment and their coverage would increase. As stand canopy increases over time, conditions would become more similar to current or pre-treatment conditions.

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

Invasive/Non-native Plant Species (including Noxious Weeds):
Examples of forest management activities and natural events within the Green Peak and Benton Foothills Watershed areas that would create soil disturbance, increase available light, and increase soil temperatures, all of which would influence the spread of non-native plants (NNP) are:

- commercial and pre-commercial timber density management projects;
- young stand maintenance; road construction, maintenance, renovation, de-commissioning, and culvert replacements;
- landslides, 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 dehiscence and air movement. Many past and present management and non-management activities tend to open dense forest settings and disturb soils therefore providing opportunities for widespread NNP infestations to occur. Most NNP's are not shade tolerant and would not persist in a forest setting as they become out-competed for light as tree and/or shrub canopies close and light to the understory is reduced. In addition many NNP's are early successional species and are replaced by more dense growing shrubs and forbs that are common in western Oregon.

The implementation of this project would likely increase the number of common and widespread non-native plant species that are known to occur within the Green Peak or Benton Foothills Watershed area. The amount of disrupted mineral soil for his project is restricted mainly to paths and trails used to dispose of slash. Because the areas impacted are expected to be minimal (ground-based yarding would impact 2 percent of the harvest area and cable yarding would impact 4 percent of the harvest area), the risk rating for any adverse cumulative effects to the Oregon Coast Range physiographical province through the implementation of this project would remain low. However, as discussed above the risk rating for any adverse cumulative affects to the Green Peak or Benton Foothills Watershed areas or any adjacent watersheds due to a localized, short-term increase in the density of NNP's would remain low

4.2 Soils

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

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

4.3 Water

Current and likely future management actions on public lands in the two major watersheds include:

- stand density management through timber sales,
- road construction and maintenance (drainage improvements, renovations, decommissioning)
- riparian treatments,
- and stream restoration projects.

Likely future private actions include: timber management and associated road construction, Christmas tree farming, limited grazing and small-scale agriculture.

As the proposed project is unlikely to affect stream temperatures or nutrient levels at the site scale, it would not contribute to cumulative effects on these parameters in the Upper South Fork of the Alsea River and Oliver Creek Watersheds.

The proposed project combined with similar operations on private lands in the watersheds could potentially raise the amount of fine sediment in the lower stream system. As more skid trails, corridors, and roads are constructed and used, the risk of fine sediment entering creeks increases. Though the proposed project would not be likely to directly contribute fines into project area streams, sediment levels are already high in the lower watersheds and additional ground-disturbing activities would increase the potential for these to appear at the larger watershed scale.

Road maintenance activities (brushing, blading, spot rocking) are unlikely to measurably impact channel morphology or water quality 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 diverting any drainage to areas where it could infilterate out before reaching streams.

Increasing the amount of compacted ground in the watersheds (therefore increasing surface runoff) could also potentially augment stream base flows and contribute to increases in stormflow volume and earlier, higher peak flows. In almost all cases, removal of more than 20 percent of the vegetative cover over an entire watershed (5^{th}-field) would result in increases in mean annual water yield. Removal of less than 20 percent of vegetative cover has resulted in negligible changes, where it was not possible to detect any effect (i.e. the error in measurements was greater than the change) (Bosch

1982). In addition, alterations in the timing and/or quantity of peak flow events as a result of forest harvest and road construction have been studied for several decades (Jones and Grant 1996).

Using information based on a recent report by Grant (2008), an analysis was completed that totaled up the existing amount of harvested lands in the 6th field watersheds (Oliver Creek and Upper South Fork of the Alsea River Watershed) in the project area. That analysis found that approximately 18.2 percent of the Oliver Creek Watershed was in a "open" condition, meaning that the lands were either harvested and currently had less than 30 percent crown cover or were naturally open (meadows, rock slopes, etc).

The analysis also found that approximately 11.7 percent of the Upper South Fork of the Alsea River Watershed was in a "open" condition, meaning that the lands were either harvested and currently had less than 30 percent crown cover or were naturally open (meadows, rock slopes, etc).

The Grant paper set the peakflow detection level at 10 percent based on measurement error in natural stream systems and natural variability in stream systems. Adding in the proposed Green Peak II harvest acres (125 acres in the Oliver Creek Watershed and 59 acres in the Upper South Fork of the Alsea River Watershed), the projected percent of the watersheds in an open condition increases to 18.9 percent in the Oliver Creek Watershed which would roughly relate to a mean predicted increase of 2 percent in peak flows. The range does extend up to 6 percent based on the regression line data shown in the envelope curve developed by Grant. For the Upper South Fork of the Alsea River Watershed, the percent of the watershed in an open condition increases to 11.7 percent which would roughly relate to a mean predicted increase of 0.0 percent in peakflows. The range does extend up to 4 percent based on the regression line data shown in the envelope curve developed by Grant.

The analysis assumes no recovery of past harvest stands, (proposed Rickard Creek harvest activity in the Oliver Creek Watershed), and that the current level of harvest activity on private lands remains the same and that all the acres in the sale are resulting in less than 30 percent crown cover when completed. Based on these side boards, it is still expected that the addition of the Green Peak II harvest activities in both watersheds would still fall into the unmeasurable level for peak flow increases based on the Grant envelope curve and the peakflow detection level.

Taking into account the forseeable future BLM harvest activity in the Oliver Creek Watershed (Upper Oliver and Twisted Oliver Timber Sales) the additional 410 acres would increase the open condition to 20.9 percent which would roughly relate to a mean predicted increase of 3 percent in peakflows.

Looking at forseeable future BLM harvest activity in the Upper South Fork of the Alsea River Watershed (Buck Roberts Timber Sale) the additional 135 acres would increase the open condition to 14.3 percent which would roughly relate to a mean predicted increase of 0 to 4 percent in peak flows. Even with the addition of the potential future sale activity, both watersheds would still fall into the unmeasurable level for peak flow increases based on the Grant envelope curve and the peakflow detection level.

Because the risk of increases to stream flows from the proposed project would be unmeasurable at both the fifth-field and sixth-field scales, the proposed project was also evaluated at the 7th-field watershed scale in order to capture local impacts. A level 1 analysis was performed to determine the risk of increasing peak flows in the project area 7th-field watersheds, through density management for Upper Oliver Creek and East Fork Peak Creek.

The watersheds were analyzed for land ownership, vegetation type, age class, and extent of the transitional hydro region. Using the methodology of the Oregon Watershed Assessment Manual (1999) the percent of the watersheds' rain-on-snow zone with less than 30 percent conifer crown

closure and the percentage of the watershed lying above the rain-on-snow zone were determined. The analysis determined a low risk of peak flow enhancement in both watersheds (due to adequate crown closure and low elevations).

4.4 Fisheries/Aquatic Habitat

Yarding/Falling

In general, the proposed stand treatments actions are not expected to alter stream bank stability, and sediment supply to channels at the 5th field watershed scale in the short-term or long-term with the implementation of stream-side no entry zones. Localized impacts to LWD recruitment, as a result of treatments associated with the 20 foot no cut buffers, are located on areas considered low risk for mass movement, and unlikely to contribute LWD downstream. Therefore site level impacts are unlikely to result in any cumulative alteration of wood supply at the 5th field level.

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 East Fork Peak Creek and Upper Oliver Creek were considered low risk for changes in peak flows and are unlikely to contribute to cumulative effects (Wegner 2010), subsequently no cumulative effects are anticipated on aquatic resources.

The Hydrology report indicated that the proposed project was unlikely to alter stream temperatures, nor were any cumulative effects anticipated (Wegner 2010). No cumulative effects are anticipated for peak flows, streambanks, and instream structure which could also change temperature. As no cumulative effects were anticipated for temperature, streambank conditions, and peak flows these issues would not result in cumulative effects for fisheries resources.

Road Construction/Renovation/Maintenance

No new construction is proposed, no effects were anticipated and no cumulative effects would occur. Road renovation and maintenance would occur on ridgetop road away from aquatic habitat. No impacts were anticipated therefore no cumulative effects would occur.

Hauling

Proposed timber hauling over or adjacent to fish bearing stream channels may contribute a minor amount of sediment to the streams. The small magnitude of sediment reaching fish bearing streams combined with the short-term episodic nature of these events suggests any sediment reaching fish habitat is expected to be unmeasurable against background turbidity. Total suspended solids were noted as being “moderately high” in Oliver Creek (BLM 1997), the main stream to which Miller Creek is tributary. No point source locations were identified in the watershed analysis as sediment problems. The watershed analysis report did note that high use roads, such as the Mainline Road, which are adjacent to streams were likely the single largest contributor of fine sediment. However, the small scale local impacts which may occur due to proposed hauling is not anticipated to contribute to cumulative effects at either fifth field level as these impacts are not anticipated to result in increase sediment transport rates downstream which could combine with other sediment source areas and create additive impacts.

Pile Burning

Impacts were anticipated to be limited to local effects and not anticipated to reach fish habitat downstream. As impacts to fish habitat were considered unlikely no cumulative effects to fish habitat would be anticipated.

4.5 Wildlife

The parameters for this cumulative impact analysis are as follows:

- rethinning approximately 131 acres of 69 year old conifer forest; resource of concern – mid-seral (40 to 79 years old) conifer forest wildlife habitat;
- spatial scale for past, present and reasonably foreseeable future actions - Oliver Creek and Upper South Fork Alsea River subwatersheds; temporal scale for reasonably foreseeable future actions – five years;
- current conditions – see Affected Environment above; trend without proposed action– see No-Action Alternative above.

In relation to the no-action alternative, there would be a positive cumulative impact in the Oliver Creek and Upper South Fork Alsea River subwatersheds to wildlife habitat from this action and future mid-seral thinning. Since the density management thinnings are designed to enhance the conditions of the existing habitat by increasing structural diversity, accelerating the development of late-seral habitat, and creating new snags and CWD. The private timberlands in the watersheds would only provide simple structured early and mid-seral forest habitat in the reasonably foreseeable future. If these private lands cannot provide late-seral forest habitat conditions, then any treatments which enhance diversity and the development of late-seral characteristics would have a positive effect on species, systems, and functions across the landscape.

Knowledge gained from the long-term Density Management Study would also have a positive cumulative effect on the management of all forestlands in western Oregon and the Pacific Northwest.

4.6 Fuels/Air Quality

Fuels

In the treated areas along the access road, there would be a moderate increase in fuel loading and resultant fire hazard in the short-term, but that would diminish within a few years. When looked at from a watershed scale and in terms of the other dispersed units in the 5 year sale plan, the selected harvest on approximately 131 acres of forest habitat would result in a very minor increase during the first 10 years following treatment, in risk of a fire start and resistance to control a fire overall for the watershed. Longer term (10 to 50+ years) there would be a reduction in the potential of the treated stands to carry a crown fire. If fuels are removed from the site by burning, for cogen power production, or for other uses, fire risk would diminish immediately by a substantial margin.

Air Quality

There would be few cumulative effects to the resources, as the effects from the project would be local and / or short lived, and there would be no other uses affecting this resource. Since the effects of burning on air quality only last a few days at most there would be no cumulative impacts resulting as burning is implemented for other units planned in the 5 year sale plan. Burning of all slash would be guided by the Oregon State Smoke Management Plan which serves to coordinate all forest burning activities on a regional scale to protect local and regional air sheds. Based on past experience with pile burning in this and other similar areas there are no expected cumulative effects on air quality from the planned fuels treatment under this proposal.

4.7 Carbon Sequestration (Storage) and Climate Change

Alternative 1 (No Action)

Incremental Effects of Project Related Greenhouse Gases and Carbon Storage**:**
This increase of 13,700 tonnes of live tree carbon would contribute to an annual average of 274 tonnes, or .0000014% 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% higher than average historic conditions (576 million tonnes, WOPR, 3-224).

Greenhouse gas emissions and carbon storage over the 50 year analysis period resulting from the No Action are displayed in Table 12, below.

Table 12. Carbon Emissions and Storage, Comparison of Action and No Action Alternatives

Source	Proposed Action (Tonnes)	No Action Alternative (Tonnes)	Notes
Emissions, 2010-2060	1,150	0	Logging, fuel treatments (burning), and emissions from harvested wood.
Live tree storage, 2060	14,650	29,500	50 years of stand growth
Live tree storage, 2009 (current condtions)	15,510	15,510	70 year old stand, 2009
Net change, live trees	-860	+13,990	Live tree carbon from growth 2010 - 2060
Harvested wood storage, 2090	2,320	0	69% of harvested wood carbon, 50 years
Total storage increase	**1,460**	**13,990**	**Storage: live trees and harvested wood**
Net Carbon Storage, Proposed Action	**310**	**13,990**	**Storage minus emissions, 2010-2060**

4.7.1.1 *Alternative 2 (Proposed Action)*

Incremental Effects of Project Related Greenhouse Gases and Carbon Storage:
Carbon emissions resulting from the proposed action would total 1,150 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 .00000004% of current global emissions and .0000002% of current U.S. emissions.

Tree growth following harvest would offset greenhouse gases and result in net storage of 390 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 the proposed action, over time, would be net storage of carbon.

5.0 COMPLIANCE WITH THE AQUATIC CONSERVATION STRATEGY

Existing Watershed Condition

The Revised Green Peak II Density Management Project area is in the Upper Alsea River 5th-field Watershed which drains into the Alsea River and the Marys River 5th-field Watersheds which drain into the Willamette River. Fifty-two percent of the Upper Alsea River Watershed is managed by the BLM, 47 percent is private and one percent is managed by the U. S. Forest Service. Approximately 37 percent of the total BLM managed lands consist of stands greater than 80 years old; and approximately 27 percent of BLM-managed lands are located in riparian areas (within 100 feet of a stream). Ninety-two percent of the Marys River Watershed is managed by private, five percent is managed by the U. S. Forest Service, and three percent is managed by the BLM. Approximately 37 percent of the total BLM managed lands consist of stands greater than 80 years old.

Review of Aquatic Conservation Strategy Compliance:

The following is an update of how this project complies with the four components of the Aquatic Conservation Strategy. The project would comply as follows:

Component 1 – Riparian Reserves: The project would comply by maintaining canopy cover along all streams and wetlands which protect stream bank stability and water temperature. Stream protection zones (SPZ) would protect streams from direct disturbance from logging. Riparian Reserve boundaries would be established consistent with direction from the RMP. No new road construction would occur within Riparian Reserves.

Component 2 – Key Watershed: The Revised Green Peak II density management thinning project is not within a key watershed.

Component 3 –Watershed Analysis:

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

- Density management opportunities in LSRs should focus at improving the corridor of dispersal habitat in the Middle South Fork Alsea River, Upper South Fork Alsea River, and Peak Creek subwatersheds, since existing Late Successional/Old Growth habitat in this area is highly fragmented. The Revised Green Peak II Density Management Project is located within the Peak Creek subwatershed (p. 44).

The *Benton Foothills Watershed Analysis* (1997) describes the events that contributed to the current condition such as early hunting/gathering by aboriginal inhabitants, road building, agriculture, wildfire, and timber harvest. The following are watershed analysis findings that apply to or are components of this project.

- BLM RRs in the analysis area lack older forest characteristics. Approximately 1,636 acres (78 percent) of the RRs are in early and mid seral age stands. Many of these stands tend to be overstocked, and lack vertical structure. Density management through the creation of gaps would benefit structural diversity (p.7).

- Management activities in the RRs can be used to promote older forest characteristics, attain ACS objectives and move the RRs on a trajectory toward older forest characteristics. Desired riparian characteristics include: Diverse vegetation appropriate to the water table, diverse age classes (multi-layered canopy); mature conifers where they have occurred in the past; and dead standing/down wood (p.9).

Component 4 – Watershed Restoration:

The project would restore watershed conditions by providing a gradual transition in structural characteristics of the treated stands that would more closely resemble late-seral forest. This project would also promote stand diversity, provide more light to accelerate growth of selected conifers and promote species diversity.

Table 13: Consistency with the Nine Aquatic Conservation Strategy Objectives

Aquatic Conservation Strategy Objectives (ACSOs)	**Density Management Actions**
1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted..	Does not prevent the attainment of ***ACSO 1***. Addressed in Text (*EA section 3.2.1*). In summary: **No Action Alternative:** The No Action alternative would maintain the development of the existing vegetation and associated stand structure at its present rate. The current distribution, diversity and complexity of watershed and landscape-scale features would be maintained. Faster restoration of distribution, diversity, and complexity of watershed and landscape features would not occur. **Proposed Action Alternative:** Research presented in 2007 for all of the DMS study areas in western Oregon did not detect any effects to stream habitat parameters due to treatment activities based on the study period of 1998 through 2004. The site specific Green Peak data surveys showed no statical change in pool depth, pool amounts, riffle amounts or substrate shifts (EA p.38).
2. Maintain and restore spatial and temporal connectivity within and between watersheds.	Does not prevent the attainment of ***ACSO 2***. Addressed in Text (*EA sections 3.2.1 and 3.2.3*). In summary: **No Action Alternative:** The No Action alternative would have little effect on connectivity except in the long term within the affected watershed. **Proposed Action Alternative:** Long term connectivity of terrestrial watershed features would be improved by enhancing conditions for stand structure development. In time, the Riparian Reserve LUA would improve in functioning as refugia for late successional, aquatic and riparian associated and dependent species. Both terrestrial and aquatic connectivity would be maintained, and over the long-term, as the Riparian Reserve LUA develops late successional characteristics, lateral, longitudinal and drainage connectivity would be restored.. No stream crossing culverts would be used that would potentially hinder movement of aquatic species; therefore no aquatic barriers would be created. Both terrestrial and aquatic connectivity would be maintained, and over the long-term, as Riparian Reserves develop late successional characteristics, lateral, longitudinal and drainage connectivity would be restored. Renovation of the transportation system would not affect spatial connectivity.

Aquatic Conservation Strategy Objectives (ACSOs)	Density Management Actions
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 3.2.3*). In summary: **No Action Alternative:** It is assumed that the current condition of physical integrity would be maintained. **Proposed Action Alternative:** Measurable impacts on stream flow, channel conditions, and water quality due to this proposal are unlikely due to the heavy armoring of the channels by larger substrate of cobbles and boulders. This action is unlikely to alter the current condition of the aquatic system with respect to its physical integrity, water quality, sediment regime or in-stream flows (EA p. 38). The SPZ of the southeastern most stream in the project area would require full-suspension of logs, so as to not disturb the stream channel, its banks, or riparian area. In the event that any vegetation would need to be removed for this corridor, it would be left on-site to preserve riparian biomass and limit soil disturbance. Due to the small size of this stream and the resiliency of local vegetation, if a small opening were to be created during yarding operations, it would not likely increase water temperature in the creek [(and brush would be expected to fill in any gaps before the summer months) (EA p. 39)].
4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems.	Does not prevent the attainment of ***ACSO 4***. Addressed in Text (*EA section 3.2.3*). In summary **No Action Alternative:** It is assumed that the current condition of the water quality would be maintained. **Proposed Action Alternative** Stream temperature: Increases in stream temperature as a result of this proposal are unlikely due to the implementation of the research stream buffers (25 to 220 feet of undisturbed forest) and adjacent density management areas. This phase of timber harvest would decrease tree density outside the uncut buffer areas more towards a more open condition but in combination with the stream buffers should still provide adequate shading. (EA pp. 39, 40) The results of a recent study for this research project have shown that even the minimum buffer width implemented for this study maintained the near stream micro-climate in treated areas the same as untreated areas. Primary stream shade was maintained above the Oregon DEQ standard of 80 percent in all treatment scenarios. While stream water temperature was not collected in this study, streambed substrate temperature was collected, and all the treatment sites remained well below the State of Oregon standard of 17.8° (EA pg. 39). Sedimentation and stream turbidity: see No. 5 below

Aquatic Conservation Strategy Objectives (ACSOs)	Density Management Actions
5. Maintain and restore the sediment regime under which aquatic ecosystems evolved.	Does not prevent the attainment of ***ACSO 5***. Addressed in Text (*EA section 3.2.3*). In summary **No Action Alternative:** It is assumed that the current levels of sediment into streams would be maintained. **Proposed Action Alternative:** Roads and skid trails would be far enough from stream channels (greater than 200 feet) as to not cause direct sedimentation from displaced top soil or increased surface runoff and no new stream crossing would be constructed. In addition, SPZ have high surface roughness, which function to trap any overland flow and sediment before reaching streams (EA pg. 39). Compacted surfaces would occur around areas where ground-based equipment is utilized, landing areas, and yarding corridors. If sufficiently compacted, these areas may route surface water and sediment towards streams. Project design features would reduce these impacts along with the existing undisturbed stream buffers in the harvest area (EA pg. 39). Tree removal would not occur on steep, unstable slopes where the potential for mass wasting adjacent to streams is high. Therefore, increases in sediment delivery to streams due to compaction or mass wasting are unlikely to result from this action. (EA pg. 39). Due to the topography of the study area and the patchwork type of harvest activity which includes 49 acres of leave islands and riparian buffers, increases in mass wasting and alterations in the sediment regime would continue to have a low probability. There has been no evidence of any mass wasting resulting from the last entry (EA pg. 39). There would be no new road construction with this phase of the project, although any needed road renovation work would be completed to keep the existing roads in good shape. The road work would be completed in periods of low rainfall. The largest potential impact would be from the ability to haul timber during periods of wet weather when water is flowing on roads and into ditches. This could lead to an increase in turbidity if flows from ditches are large enough to enter streams. Additional rock surfacing would be added to those sections of road where it is needed to limit this impact (EA pp. 38 and 39).

Aquatic Conservation Strategy Objectives (ACSOs)	Density Management Actions
6. Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing.	Does not prevent the attainment of ***ACSO 6***. Addressed in Text (*EA section 3.2.3*). In summary **No Action Alternative:** No change in in-streams flows would be anticipated. **Proposed Action Alternative** Mechanically removing trees and removing stand densities can alter the capture, infiltration and routing (both surface and subsurface) of precipitation. By removing vegetation, surface runoff is increased and more water reaches streams. The compaction of skid trails and roads would also increase surface runoff in the project area. Thus, it can be assumed that this project would likely result in some small increase in water yield. However, this effect from the proposed action would be difficult to measure and unlikely to substantially alter stream flow or water quality because the increase would be undetectable by common field techniques. Other than increased peak flows, an increase in fall and winter discharge from forest activities is unlikely to have biological or physical significance (U.S.E.P.A. 1991). As the majority of the project area lies below the elevation where rain on snow events are likely to occur, measurable increases to peak flows from the proposed project area are also unlikely (EA p. 38). Using information based on a recent report by Grant (2008), an analysis was completed that totaled up the existing amount of harvested lands in the 6th field watersheds (Oliver Creek and Upper South Fork of the Alsea River Watershed) in the project area. That analysis found that approximately 18.2 percent of the Oliver Creek Watershed was in a "open" condition. The analysis also found that approximately 11.7 percent of the Upper South Fork of the Alsea River Watershed was in a "open" condition. The Grant paper set the peakflow detection level at 10 percent based on measurement error in natural stream systems and natural variability in stream systems. Adding in the proposed Green Peak II harvest acres, the projected percent of the watersheds in an open condition increases to 18.9 percent in the Oliver Creek Watershed which would roughly relate to a mean predicted increase of 2 percent in peak flows. The range does extend up to 6 percent based on the regression line data shown in the envelope curve developed by Grant. For the Upper South Fork of the Alsea River Watershed, the percent of the watershed in an open condition increases to 11.7 percent which would roughly relate to a mean predicted increase of 0.0 percent in peakflows. The range does extend up to 4 percent based on the regression line data shown in the envelope curve developed by Grant. Based on these side boards, it is still expected that the addition of the Green Peak II harvest activities in both watersheds would still fall into the unmeasurable level for peak flow increases based on the Grant envelope curve and the peakflow detection level. (EA pg. 61 and 62)
7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.	Does not prevent the attainment of ***ACSO 7***. Addressed in Text (*EA section 3.2.3*). In summary **No Action Alternative:** No change in in-streams flows would be anticipated. **Proposed Action Alternative** Design features for the project, such as SPZs, coupled with the relatively small percent of vegetation proposed to be removed, would maintain groundwater levels and floodplain inundation rates. Detectable direct or indirect effects to stream flow as a result of this action are unlikely. The proposed action would not alter existing patterns of floodplain inundation or water table elevation as it would have no effects on existing flow patterns and stream channel conditions. Proper drainage of roads would maintain water tables and flood plain functions.

Aquatic Conservation Strategy Objectives (ACSOs)	Density Management 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 3.2.1*). In summary **No Action Alternative:** The current species composition and structural diversity of plant communities would continue along the current trajectory. Diversification would occur over a longer period of time. **Proposed Action Alternative:** Species diversity would be increased since density management would target Douglas-fir, the predominant species, increasing the relative proportion of the other tree species. The proportion of hardwood and less common conifer species would increase from the current average of 6 percent to 11 percent (by trees per acre) in the treatment areas. Furthermore, density management is very likely to allow establishment of seedlings, including hardwood, western hemlock and western red cedar species (EA p. 28). As noted in DMS regarding vegetation, thinning affected vegetation structure by increasing cover of grasses and forbs and increasing species richness, a measure of diversity. Richness increased because forest floor herb species typically found under forest canopies remained and flourished, and were joined by open-site herbs and grasses not typically found under forest canopies. In the six year period following treatment, plant communities transitioned from an increased cover of species associated with open sites and early seral stages, to a greater proportion of shade-tolerant forest floor species. For example, cover of grasses and early seral forbs was greatest one year following treatment, and were decreased six years after treatment. Since thinning occurred in riparian reserves within 20 to 50 feet from streams in the sampled areas, these results are applicable to riparian areas and would support thinning to maintain species composition and structural diversity of plant communities (EA pp. 30-31).
9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.	Does not prevent the attainment of ***ACSO 9***. Addressed in Text (*EA section 3.2.1 and EA section 3.2.5).* In summary **No Action Alternative:** Habitats would be maintained over the short-term and continue to develop over the long-term with no known impacts on species currently present. **Proposed Action Alternative:** Research at the DMS sites, including Green Peak, found that the 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 (salamanders). Native plants were found to persist and increase in coverage after density management. Patch openings and low (retention) thinning drastically reduced the diversity of epigeous ectomycorrhizal fungal species, but medium and high retention thinning showed little change in fungal diversity. Buffers of widths defined by the transition from riparian to upland vegetation or topographic slope breaks appear sufficient to mitigate the impacts of upslope thinning on the microclimate above headwater streams. Because the microclimate, as well as the structure and composition of the forest stand and understory vegetation are protected within the untreated buffer, habitat elements seem to be protected (EA p. 31).

6.0 LIST OF PREPARERS

Table 14: List of Preparers

Resource	Name	Initial	Date
Cultural Resources	Dave Calver	DFC	Feb 16 2010
Botany TES and Special Status Plant Species	Ron Exeter	RE	Feb 16, 2010
Fisheries/Aquatic Habitat	Scott Snedaker	SS	2/16/2010
Fuels/Air Quality	Tom Tomczyk		
Hydrology/Water Quality/Soils	Steve Wegner	SJW	2/16/10
NEPA	Gary Humbard	GLH	2/12/10
Silviculture/Riparian Ecology	Hugh Snook	HWS	2/16/10
Wildlife TES and Special Status Animal Species	Gary Licata	GAL	2/16/10
Road Work	Russ Buswell		
Harvest Plan	Cory Geisler		

7.0 CONTACTS AND CONSULTATION

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

United States Fish and Wildlife Service (USFWS)
To address concerns for effects to federally listed wildlife species and potential degradation of critical habitats, the proposed action has been consulted upon with the U.S. Fish and Wildlife Service, as required under Section 7 of the ESA. Consultation for this proposed action was facilitated by its inclusion within a programmatic Biological Assessment (BA) that analyzes 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 resulting Letter of Concurrence (FWS Reference Number 13420-2008-I-0125, dated October 7, 2008) concurred with the BA, that this action was not likely to adversely affect spotted owl, marbled murrelets or their critical habitats. This proposed action has been designed to incorporate all appropriate design standards set forth in the BA which forms the basis for compliance with the Letter of Concurrence.

National Marine Fisheries Service (NMFS)
Consultation with NMFS is required for projects that 'may affect' listed 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 coho or Chinook salmon. The proposed Green Peak II project is not expected to affect EFH due to distance of all activities associated with the Green Peak II project from occupied habitat.

The proposed actions associated with the Green Peak II Project is not expected to cause any effects to the listed fish or listed critical habitat in the Upper Alsea River or Marys River Watersheds. A determination has been made that the proposed project would have 'no effect' on UWR Chinook Salmon and/or OC Coho salmon. This 'no effect' determination is based on the distance upstream of the project area from ESA listed fish habitat (approximately 4 miles downstream). Due to the "no effect" determination the project was not consulted upon with the NMFS.

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

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

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

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

The revised EA and FONASI will be made available for public review from February 8, 2010 to February 22, 2010 and posted at the Salem District website at http://www.blm.gov/or/districts/salem/plans/index.php. The notice for public comment will be published in a legal notice in the *Gazette-Times* newspaper. Written comments should be addressed to Trish Wilson, Field Manager, Marys Peak Resource Area, 1717 Fabry Road S., Salem, Oregon 97306. Emailed comments may be sent to OR_Salem_Mail@blm.gov

8.0 MAJOR SOURCES AND APPENDIXES

8.1 Major Sources

8.1.1 Interdisciplinary Team Reports

Exeter, R. 2010. Revised Botanical & Fungal Special Status and Noxious Weed Report. Marys Peak Resource Area, Salem District, Bureau of Land Management. Salem, OR.

Licata, G. 2010. Revised Biological Evaluation for Green Peak II Density Management Timber Sale. Marys Peak Resource Area, Salem District, Bureau of Land Management. Salem, OR.

Meredith, T. 2010. Revised Recreation/VRM/Rural Interface Evaluation for Green Peak II Density Management Timber Sale. Marys Peak Resource Area, Salem District, Bureau of Land Management. Salem, OR.

Snedaker, S. 2010. Revised Green Peak Thinning Project Environmental Assessment Timber Sale Fisheries Report. Marys Peak Resource Area, Salem District, Bureau of Land Management. Salem, OR.

Snook, H. 2010. Revised Green Peak II Density Management Project EA Abstract. Marys Peak Resource Area, Salem District, Bureau of Land Management. Salem, OR.

Tomczyk, T. 2010. Revised Green Peak II Density Management Fuels/Air Quality Report. Marys Peak Resource Area, Salem District, Bureau of Land Management. Salem, OR.

Wegner, S. 2010. Revised Green Peak II Soils/Hydrology 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. Final Supplemental Environmental Impact Statement Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl. Portland, OR.

USDA Forest Service, USDI Bureau of Land Management. 1994. Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl. Portland, OR. **Note:** The ROD and S&G are collectively referred to herein as the Northwest Forest Plan (NWFP)

USDA Forest Service, USDI Bureau of Land Management. 1998. Late-Successional Reserve Assessment Oregon Coast Province-Southern Portion- (Late-Successional Reserve RO267, RO268). Salem, OR.

USDA Forest Service and USDI Bureau of Land Management. 2008. Biological Assessment, Fiscal years 2009/2010 Habitat Modification Activities in the North Coast Province Which Might Affect Bald Eagles, Northern Spotted Owls or Marble Murrelets.

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

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

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

USDI Bureau of Land Management. 1995. South Fork Alsea Watershed Analysis. Salem, OR.

USDI Bureau of Land Management. 1997. Benton Foothills Watershed Analysis. Salem, OR.

USDI Fish and Wildlife Service. 2009. Biological Opinion for Effects to Northern Spotted Owls and Marbled Murrelets from the North Coast Province Fiscal Year 2009-2010 activities that have the potential to adversely affect, due to habitat modification and disturbance, U.S. Department of the Interior; Bureau of Land Management, Eugene District and Salem District, and the U.S. Department of Agriculture; Siuslaw National Forest. Oregon Fish and Wildlife Office, Portland, Oregon. Tracking Number: 13420-2008-1-0125 (dated 10/07/2008), Unpublished Document.

USDI Bureau of Land Management. 2008. Final Environmental Impact Statement for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management. Salem, OR.

Crookston, Nicholas L. 1997. Suppose: An Interface to the Forest Vegetation Simulator. In: Teck, Richard; Moeur, Melinda; Adams, Judy. 1997. Proceedings: Forest Vegetation Simulator Conference. 1997. February 3-7, Fort Collins, CO. Gen. Tech. Rep. INT-GTR-373. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station.

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

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

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

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

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

8.2 Appendix A – Response to Scoping Comments

A scoping letter, dated September 16, 2008, was sent to 31 potentially affected and/or interested individuals, groups, and agencies. One response was received during the scoping period.

8.2.1 Summary of comments and BLM responses

The following addresses comments raised in one letter from the public received as a result of scoping (40 CFR Part 1501.7). Additional supporting information can be found in Specialists' Reports in the NEPA file.

8.2.1.1 *Oregon Wild (October 23, 2008)*

1. **Comment:** *"We are interested in a detailed description of the research project, its intended outcomes, and its environmental impacts."*

   Response: A detailed description of the project is located in Chapter 1 of the EA.

2. **Comment:** *"We would like to see some results and analysis from that included in the Green Peak II EA to help inform the public about the study"*

   Response: A detailed description of the project is located in Chapter 1of the EA. The DMS study plan, site data and research papers can be found at **http://ocid.nacse.org/nbii/density/index.html**. Data collection for the Density Management

Study has occurred pre-treatment and twice since treatment to measure vegetation, trees, coarse wood, snags, microclimate, aquatic habitats and vertebrate diversity. Pre-treatment measurements for the phase 2 treatment at Green Peak are scheduled for 2010. A complete list of the variables measured in both the component studies and collaborative studies can be found in the DMS study plan. After treatment, data collection will occur one year later, encompassing over a decade of measurement and data collection. Additional data collection is possible beyond 2012.

3. **Comment:** *"Although this area is part of a study and so you may be pursuing different goals than usual, we still believe that LSR and RR objectives must be met for this area. Please describe how the thinning study in these LUAs still meet objectives for wildlife habitat, canopy closure, and other natural resource guidelines."*

   Response: The objectives of the study are listed in Section 1.1 Background, of the EA. The objectives of the research are centered on attainment of LSR and RR objectives through alternative management. The study plan for the DMS and Riparian Buffer Study (USDI, USGS, 2006) details the desired future condition of the study site stands at age 120-150 years, and it is essentially a description of old growth characteristics from Spies and Franklin (1991). Carefully testing the results of stand treatments through the study may expand our knowledge of how to meet LSR and RR objectives. Short-term attainment of LSR and RR objectives resulting from the proposed action (phase 2 treatment in the study) are described in the EA in Chapter 3.0 Existing Condition and Environmental Effects.

4. **Comment:** *"The project analysis should separately discuss each of the Aquatic Conservation Strategy objectives, and describe how the proposed action is consistent with these objectives."*

   Response: Each ACS objective was addressed separately in the EA (Section 4 Table 13).

5. **Comment:** *"The agency must consider and disclose cumulative impacts from the proposed action."*

   Response: Cumulative impacts were considered and discussed in the specialist reports in Chapter 4, see Tables 4 and 5 in Chapter 3.

6. **Comment:** *"The Alsea Stewardship Group – would certainly be interested in learning about this project."*

   Response: The Marys Peak Field Manager participates in the Alsea Stewardship Group and maintains lines of communication with them. Some of their members receive the scoping and decision documents on our projects, including Green Peak II. The relevancy of the Green Peak II project to the Alsea Stewardship Group may be limited by the fact that only a small portion of the project area is in the Alsea watershed, and the project has not been planned as a stewardship project. Marys Peak Resource Area staff look forward for the opportunity to work with an interest-based local group in developing stewardship projects that meet the mutual goals of the Stewardship Group and the BLM.

8.3 Appendix B: Response to Public Comments Received on the Green Peak II Density Management EA

Two letters were received commenting on the Green Peak II Density Management Environmental Assessment. Although the letters communicated a number of issues and opinions on forest management in general, the response to comments below only discusses those specifically directed to the Environmental Analysis which was made available for public review from July 14, 2009 to August 13, 2009. Comments are in *italics.* The BLM response follows each comment.

Oregon Wild, Doug Heiken
Received July 28, 2009

Density management study plan

1. **Comment:** *The NEPA analysis does not adequately disclose the adverse effects of thinning mid-to-late-seral stands like these. These stands are at an age when they should be experiencing suppression mortality and accumulating large amounts of snags and dead wood. Thinning will deprive these stands of valuable structural elements that would (if retained) enhance instream and near-stream woody structure, complex woody structure favored by spotted owl prey species, as well as species more closely associated with dead wood such as woodpeckers.*

   Response: As stated in the EA (p. 10) the following design features would enhance wildlife habitat components:

   - Any tree found to have a stick or ball nest would be left.
   - All existing snags and CWD would be reserved. Additional trees would be reserved around snags to protect them from logging operations and reduce the likelihood of their removal for worker safety reasons. Any snags felled or logs moved for these purposes would remain on site as close to the origin area as possible within the project area.
   - The post-harvest prescribed minimum level of CWD is two dominant or co-dominant trees per acre across all treatment units. Existing down trees of decay Class 1 or 2 quality can be used to satisfy this requirement. New inputs of CWD would occur from the incidental felling of reserve trees during the density management operations. Post-harvest CWD would be inventoried to assure that there are at least two trees (decay Class 1or 2) per acre across all treatment units. The silvicultural prescription provides for two green trees per acre to be reserved from the residual stands and felled under the timber sale contract if the existing post-harvest CWD levels are not sufficient to meet the desired quantity and quality of trees. Trees to be utilized for CWD creation would be stand average DBHOB or larger. In order to facilitate adequate spacing across the landscape any post-harvest clump of CWD that contains more than 10 quality trees would only be credited with 10 trees (five-acre maximum size per clump).

   Snag levels would be monitored for 10 years post harvest to determine if levels are less than 5 stand average DBHOB or larger snags per acre. If found to be deficient, snags would then be created to meet that level. Snag creation methods would include any or all

viable and economically feasible methods to create full or partial snags from living trees. From Organon growth modeling, under the No Action alternative, density mortality would average 3.3 trees per acre with an average DBH of 12.2 inches. Under the Proposed Action, only .3 trees per acre of density mortality would occur, but with snag creation, of five large trees per acre, they would total 5.3 trees per acre of 22.0 inches average diameter. The volume of snags would be over 50 percent greater than the No Action alternative, and the large diameter of the snags would be of greater utility to wildlife and would persist longer in the stand than smaller snags.

As stated in the EA (p. 27) Density management short-circuits the snag recruitment that results from inter-tree competition (Carey, 1999), and very little density mortality (0.3 trees per acre) is expected to occur for 30 years after treatment. Proposed action treatments to create downed logs and snags would result in increases in large diameter, decay class 1 snags and downed logs, of approximately 170 cubic feet of logs and 450 cubic feet of snags. Inputs resulting from harvest consist 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. This would bring post-treatment coarse wood levels to 1,889 cubic feet per acre, which is in the mid-range of levels prescribed in the Late Successional Reserve Assessment for Oregon Coast Province, Southern Portion (Page 66-68). In the long-term, due to increased diameter growth resulting from density management, larger trees would be available for recruitment for CWD.

At the landscape level BLM stands adjacent to the proposed treatment unit in sections 7 are also expected to provide snags continuously from suppression mortality and other natural causes in the short and long term. Those stands include late-seral stands which were thinned only once thirty years ago (59 acres), never thinned late-seral stands (340 acres) and old-growth stands (200 acres).

Reductions in stand density involves tradeoffs between high individual growth rates of retention trees for future live overstory and dead structures (snags and down wood) while promoting understory growth to develop a multi-story stand structure. The reduction in stand density is necessary to meet those multiple objectives and conform to the design criteria of the Density Management Study.

2. **Comment:** *BLM needs to commit to a multi-decade monitoring effort, because that is the time period during which snag habitat is adversely affected according to the models.*

Response:
One element of the desired future stand condition (BLM Density Management and Riparian Buffer Study: Establishment Report and Study Plan, 2006, p. 4) is "When treated stands reach 120-150 years of age, the desired future stand conditions are as follows:…Snags: 8-12 snags per acre, 50 percent diameter 10-25 in., 50 percent diameter > 25 in. " The BLM will monitor progress or trajectory toward this condition as part of the study in the near term and use that information to inform our management actions.

It is understood that the effect of density management at preventing suppression mortality is long-lasting. However, stands are dynamic and future snag recruitment may occur over time within thinned stands from a wide range of causes, and from suppression mortality of new trees under thinned canopies. In the decade since the initial treatment at Green Peak,

approximately five snags per acre were recruited, mostly from causes unrelated to density mortality. Modeling shows that within 30 years, the higher density treatment (60 trees per acre) area of Green Peak II would be approaching the threshold of density mortality again, even without recruitment of new understory trees.

Plantation thinning recommendations

3. **Comment:** When conducting commercial thinning projects take the opportunity to implement other critical aspects of watershed restoration especially pre-commercial thinning, restoring fish passage, reducing the impacts of the road system, and treating invasive weeds.

Response: The BLM has completed NEPA documents that provide for pre-commercial thinning, fish passage restoration, road decommissioning and the management of non-native plant species within the Marys Peak Resource Area.

4. **Comment:** Focus on treating the youngest stands that are most "plastic" and amenable to restoration. Generally retain all the largest trees, then “free thin from below” retaining some smaller trees in all age-size classes.

Response: Although we are primarily density management thinning from below, the marking guide calls for leaving healthy intermediate trees in place of dominant ones, recognizing that there would be few of them.

As stated in the EA (pg. 12) “Tree selection would be designed to leave a full range of diameter distribution, maintain or increase the proportion of minor species, and retain legacy and wildlife tree structure while meeting target densities. Residual tree densities range from 25 to 65 TPA.

5. **Comment:** Retain and protect under-represented conifer and non-conifer trees and shrubs. Strive for a variable density outcome. Use skips and gaps within units to help achieve diversity. Gaps should be small, while skips should be a little larger, but even small clumps and patches of trees are desirable. Gaps should not be clearcut but rather should retain some residual structure in the form of live or dead trees.

Response: As stated in the EA (pg.12) “Density management thinning would occur primarily to Douglas-fir trees. Minor conifer species would be retained to maintain species diversity (except where they form dense patches, occur in yarding corridors, or skid trails). All hardwoods would be retained except where they occur in yarding corridors or skid trails”.

As stated in the EA (pg. 9) The existing leave islands, riparian buffers and patch cuts would be unchanged.

6. **Comment:** Retain abundant snags and coarse wood both distributed and in clumps so that thinning mimics natural disturbance. Retention of dead wood should generally be proportional to the intensity of the thinning, e.g., heavy thinning should leave behind more snags not less. Retain wildlife trees such as hollows, forked tops, broken tops, leaning trees, etc.

Response: See Response #1

7. **Comment:** Thin heavy enough to stimulate development of understory vegetation, but don't thin too heavy. Recognize that thinning captures mortality and that plantation stands are already lacking critical values from dead wood due to the unnatural stand history of all clearcut and planted stands.

Response: See Response #1

8. **Comment:** If using whole tree yarding or yarding with tops attached to control fuels, the agency should top a portion of the trees and leave the greens in the forest in order to retain nutrients on site.

Response: There is no requirement to utilize whole tree yarding or yarding with tops attached within the EA. Historically, the majority of BLM timber sale purchasers have chosen not to utilize whole tree yarding when using skyline and ground based yarding systems within density management thinning treatments (which Green Peak Density Management entails).

On a typical Marys Peak density management thinning timber sale, tail and lift trees are needed to obtain one-end suspension during skyline yarding. These trees are topped with the top of the tree left in the forest that provides terrestrial habitat along with a variety of other uses with the remaining standing stem providing future snag habitat.

9. **Comment:** Avoid impacts to raptor nests and enhance habitat for diverse prey species.

Response: As stated in the EA (pg. 12) "Any tree found to have a stick or ball nest, regardless of size (tree or nest) would be protected". As stated in the EA (p. 42) The proposed action would result in a may affect not likely to adversely affect northern spotted owl because the long-term impact of density management thinning on owls would be positive since the existing habitat 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 new snags and CWD in the stands.

10. . **Comment:** Take proactive steps to avoid the spread of weeds. Use canopy cover to suppress weeds.

Response: Exposed mineral soil often creates environments favorable for the establishment of noxious listed plant species. All road reconstruction 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.

Design features incorporated into this project such as vehicle cleaning and sowing seed on exposed soil areas, as well as the implementation of the Marys Peak Resource Areas weed program tends to reduce the risk for the establishment of noxious weeds.

- Any adverse effects from the establishment of Canadian and bull thistles, false brome, Armenian blackberry, herb Robert, St. John's wort, Scot's broom and tansy ragwort within or near the project area are not anticipated. The risk rating for the long-term establishment of these species and consequences of adverse effects on this project area is low because;
- the amount of exposed mineral soil would be minimized,
- these early successional species persist for several years after becoming established but soon decline as native vegetation increases within the project areas,
- all false brome sites within the project areas, including haul routes are being targeted by the

Marys Peak Resource Area for treatments beginning in the summer of 2008 and

- this area was previously thinned with no adverse affects from any noxious weed species.. In addition, all project areas would be monitored to detect for any "new invader" noxious weed infestations and targeted for removal. All non-native species would be eradicated as funding allows.

11. **Comment:** Buffer streams from the effects of heavy equipment and loss of bank trees and trees that shade streams. Mitigate for the loss of LWD input by retaining extra snags and wood in riparian areas. Recognize that thinning captures mortality that is not necessarily compensated by future growth.

Response: The EA (pg. 12) includes design features that would protect streams from the effects of equipment or loss of bank trees by implementing **s**tream protection zones (SPZs) where no cutting would be permitted along all streams and identified wet areas within the harvest area. Streamside Protection Zones (SPZs) would be applied at the same width as the initial harvest that was completed in 2000. The widths established under the riparian buffer study are one site-potential tree height (approximately 220 feet, both sides), "variable" width (about 50 feet, both sides), and "streamside retention" (about 20 feet, both sides). To protect water quality, all trees within one tree height of all SPZs would be felled away from streams. Where a cut tree does fall within a SPZ, the portion of the tree within the SPZ would remain in place. No skyline or ground-based yarding would be permitted in or through SPZs.

As noted in response # 1, all existing snags and CWD would be reserved, except where they pose a safety risk or affect access and operability. Any snags or logs felled or moved for these purposes would remain on site within the project area. We believe the design features for the protection of existing down logs and snags as stated in the EA provides the necessary protection for these resources and removes any incentive for needlessly felling or removing them. In addition, two trees per acre, of average stand diameter or larger would be felled as part of the proposed action and would remain on site as coarse woody debris. It is likely that some of these will be felled into riparian areas and may function as LWD.

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

Response: No new road construction would occur.

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

Response: An alternative to defer harvest of a 70 year old stand to store carbon and thin younger stands to increase diversity would not meet the purpose and need of the Green Peak Density Management Project. The proposed action area was chosen for density management thinning of forest stands to continue the implementation of the DMS that began under the original Green Peak Density Management Project EA (#OR-080-97-25) dated December 8, 1997, according to the specific implementation schedule set forth in IM OR-2005-83. The first set of research treatments occurred in fall and winter of 1999. The next phase of

treatments is scheduled to occur in 2011. The research project is designed to test critical assumptions of the Northwest Forest Plan's Standards and Guidelines, and produce results important for late-successional habitat development.

Thinning in Riparian Reserves

14. Comment: Thinning captures mortality and actually delays recruitment of large wood. Second, the agencies often misinterpret the Northwest Forest Plan ROD by confusing accelerated attainment of ACS objectives with ACS compliance.

Response*:* In regards to thinning capturing mortality see response #1. Using prescribed fire to create a pulse of dead trees would not meet the purpose and need of the project. No new road would be constructed. Variable density thinning would occur including some areas of light thinning. Skips would be incorporated into the marking guidelines in the form of leave islands. The 1995 RMP incorporates a network of LSR and RR LUAs where unthinned areas would remain in perpetuity.

As stated in the EA (Appendix 2) "Retain "unique" trees - wolf, remnant/legacy trees, broken-top, forked, have wildlife use, full crowns, etc; all remnants from the previous stand and all snags are reserved under the timber sale contract. Protect high-value snags by leaving adjacent trees".

15. **Comment:** Thinning in riparian reserves does in fact raise ambient air temperatures that the microclimate effects must be accounted for.

Response*:* As stated in the EA (p. 40) The results of a recent study for this research project have shown that even the minimum buffer width implemented for this study maintained the near stream micro-climate in treated areas the same as untreated areas. Stream shade was maintained above the Oregon DEQ standard of 80 percent coverage in all treatment scenarios. While stream water temperature was not collected in this study, streambed substrate temperature was collected, and all the treatment sites remained well below the State of Oregon standard of 17.8° C. *(Anderson, Larson, and Chan, 2007, Riparian Buffer and Density Management Influences on Microclimate of Young Headwater Forests of Western Oregon., Forest Science 53(2): 254-269).*

Based on the above cited study results in the Project Area Water Quality section, increases in stream temperature as a result of this proposal are unlikely due to the implementation of the research stream buffers (25 to 220 feet of undisturbed forest) and adjacent density management areas. This phase of timber harvest would decrease tree density outside the uncut buffer areas towards a more open condition but in combination with the remaining stream buffers and untreated areas in the stand, would still provide adequate shading.

As stated in the EA (p. 42) Stream shading would potentially be affected by the proposed treatments, and is one of the variables studied in the Riparian Buffer Study. According to the Stream Shading Sufficiency Analysis (USDA, USFS et. al., 2004) for the proposed treatment, SPZs need to be 55 feet wide to provide shade in the primary shade zone, based on topography and average tree height (Appendix 4).

Based on Organon modeling, current canopy cover is 55-82 percent (Table 5), and canopy cover would drop to about 40 percent in the moderate retention treatment (to 30 TPA) and to 35 percent in the low retention of the variable density treatment (20 TPA) after

treatment. Canopy closure is the proportion of the sky hemisphere obscured by vegetation when viewed from a single point, and is generally a much higher value in the same stand than canopy cover. Measurements of canopy closure (spherical "fish eye" lens photograpy, computer analyzed) after the initial treatment show that stream shade was maintained above the Oregon DEQ standard of 80 percent in all treatments, including 40 trees per acre. Based on those data it is very likely to remain above 50 percent in both the off-stream, moderate retention treatment (to 30 TPA) and the low retention of the variable density treatment (20 TPA) areas after treatment as well.

16. **Comment:** The final spotted owl recovery plan (FRP) (p 50) describes spotted owl habitat as including "a high incidence of large trees with various deformities (large cavities, broken tops, mistletoe infections, and other evidence of decadence); large snags; large accumulations of fallen trees and other woody debris on the ground; …" These features, especially the large accumulations of down wood, cannot develop under an aggressive thinning regime.

Respons*e:* As stated in the EA (p.61) 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.

Residual trees would increase in diameter and crown depth/width. Limb diameter and crown depth would be maintained because trees would be released from competition that causes growth decrease and loss of shaded lower limbs. The predicted average increase in quadratic mean diameter (QMD) for overstory trees as a result of density management thinning would result in an additional 1.9 inch of diameter growth in 30 years, 47 percent more diameter growth than without treatment.

Density management thinning short-circuits the snag recruitment that results from inter-tree competition (Carey, 1999), and very little density mortality (2.1 trees per acre) is expected to occur for 30 years after treatment, and most of that would be smaller (11 inches DBHOB average) hardwood trees remaining after density management thinning that are in an overtopped position and are lost from the stand as density increases again following density management thinning.

Measures to protect existing large snags are likely to be effective, but many of the smaller snags would likely be felled for safety reasons. 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.

As stated in the EA(p.69) the gradual transition in structural characteristics of the treated stands to 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).

17. **Comment:** *Short-term recruitment of LWD would be maintained and in the long-term thinning would beneficially affect LWD recruitment in riparian reserves; (Thinning trees of pool-forming size might capture and remove the mortality that should end up in the stream (OW comment pg 5). Wood that is harvested does not regrow for decades (OW*

comment pg 6). If a disturbance event comes along during that time, the absolute volume of wood recruited to streams will be adversely affected. Heavy thinning "captures mortality" and increases retained tree vigor thereby delaying recruitment of snags and delaying development of critical components of old growth forests (OW comment pg 12). This is especially critical in riparian reserves where recruitment of large wood is important.)

Response: The project area streams are primarily small first and second order streams. Channels widths are typically small for these stream types. The project area channels would be buffered with at least 20 foot, 50 foot, and 220 foot no-treatment zones where the existing stand would remain untreated. The referenced paper Roni et al 2002 is supported by reference to Beechie, T., S. Bolton, G. Pess, R. Bilby, and P. Kennard. 2000. Modeling Recovery Rates and Pathways for Woody Debris Recruitment in Northwestern Washington Streams. North American Journal of Fisheries Management. 20:436–452. The modeling and analysis conducted in Beechie (2000) excluded no-treatment buffers in its analysis of pool forming wood. The modeling assumes that treatment would include the full stand complement up to and including trees adjacent to the stream channel. For the Green Peak II project the small pool forming size pieces of wood of concern would largely be unaffected by proposed actions as the trees of sufficient height to span the stream would necessarily be small trees adjacent to the small streams. With the incorporation of no-entry buffers these small pool forming trees would largely be protected. Larger pieces of coarse wood located further away from the stream (greater than 20 feet) that may be impacted due to harvest were addressed in the EA and are further discussed below.

For clarification coarse wood debris, noted in ACS Objective 8, was most likely meant to cover the breadth of wood recruitment that may occur from the riparian area. ACS objective 8 states " Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosions, bank erosion, and channel migrations and to supply amounts and distribution of coarse woody debris sufficient to sustain physical complexity and stability." From pg B-10 of the NWFP ROD it states " Complying with ACS objectives means that an agency must manage the riparian dependent resources to maintain the existing conditions or implement actions to restore conditions. The baseline to assess maintain or restoring the condition is developed thru a watershed analysis. Improvement relates to restoring biological and physical process within their range of natural variability." However, for purposes of applying the Standards and Guidelines of the ROD the glossary definition on pg F-4 defines CWD as follows "Portion of the tree that has fallen or been cut and left in the woods. Usually refers to pieces at least 20 inches in diameter (FEMAT)."

In regards to impacts to coarse wood, the EA analyzed coarse wood recruitment (pp. 42 and 43) and found that proposed density management treatments in the southeast of the project area would generally occur 65 feet or more from stream channels and proposed treatment in the northeast of the project area are 25 feet, or more, from streams. Studies have shown that approximately 70 percent of wood recruitment occurs within 65 feet of the stream edge (McDade et al 1990, Van Sickle and Gregory 1990, May and Greswell 2003). Treatment of the riparian reserves of the southeast units, leaving at least 65 foot buffers, would be expected to leave at least 70 percent of the short-term woody debris recruitment area unaffected at the site. Using the relative fractions of source wood distances noted in McDade (1990), Van Sickle and Gregory (1990), May and Greswell (2003) compared to proposed stand treatment approximately 84 percent of the potential recruitment wood would be retained in the wood recruitment zone following harvest. The majority of coarse woody debris would continue to

fall from within the untreated SPZ, and short-term recruitment of the existing woody debris is expected to be largely maintained with proposed treatments.

The EA analyzed proposed density management in the northeastern part of the project area would generally occur at least 25 feet of the stream edge. Treatment between 25 and 200 feet of the stream channel may reduce the total number of pieces available for wood recruitment. Results from McDade (1990) indicate approximately 30 percent of the woody debris source areas would be protected within the 25 foot untreated buffer. Proposed actions may reduce the amount of recruitable CWD wood on up to 19 acres in the northeast project area. The BFWA (BLM 1997) assessed mass movement risk in the watershed, including the project area. This analysis indicted the risk of movement in the project area was low (BLM 1997 see Map #19). The low risk of movement indicates that changes in CWD recruitment are limited to site effects only, and would be highly unlikely to impact downstream habitat. The site level effect to the 19 acres may include some loss of recruitable wood; however, 46 percent of the stand in the affected zone between 25-200 feet would be retained. Using the relative fractions of source wood distances noted in McDade (1990), Van Sickle and Gregory (1990), May and Greswell (2003) approximately 62 percent of the future recruitment would be retained in the wood recruitment zone following harvest. The majority of coarse woody debris is protected under the proposed action and CWD would continue to fall from the untreated SPZ and treated stand following treatment; therefore, short-term recruitment of the existing woody debris is expected to be largely maintained with proposed treatments.

As stated in the EA (pp. 42 and 43) the existing mean diameter of trees in the treatment area is 19.4 inches (Snook 2009). Prescription would select trees to maintain the existing size class distribution (Snook 2009 appendix 3). Based on Organon growth modeling the proposed action would increase the average stand diameter by 42 percent over no treatment over the next 30 years (Snook 2009). As the Beechie (2000) study noted that "changing to a larger target diameter, such as the average diameter of LWD in old growth streams (e.g., Bilby and Ward 1989), will cause the neutral line to shift upward and to the left and a greater proportion of stands will show accelerated LWD recruitment after thinning." The proposed action is intended to address development of stands that emulate late-seral characteristics. "Thinning study was designed to gain information about development of late-successional habitat not available from previous studies of even-aged Douglas-fir silviculture."(EA page 1). Therefore targeting stands for mature CWD recruitment patterns would be appropriate. In the long-term, beneficial growth in the size of trees within one site potential tree height of streams could enhance LWD recruitment to the stream channel, thus potentially improving the quality/complexity available for future recruitment downstream.

Cascadia Wildlands
Received July 21, 2009

1. Comment: *"We are concerned about rocking the roads in LSR LUA." The BLM should consider using native surfaces on the roads and refrain from rocking them.*

Response: The only roads that would receive rock already have exiting rock on them. Roads R1 and R2 would remain native surface roads.

2. **Comment:** *We recommend the use of variable density thinning of younger managed stands. Within the gaps some structure (snags and green trees) should be left behind.*

Response: We concur. The Density Management Study uses variable density thinning including leave islands, gaps and a wide array of leave tree densities.

3. Comment: *We would like to be informed of any future monitoring and conclusions from the study. We are particularly interested in knowing the effects of various thinning techniques in terms of forest complexity development and species response.*

Response: The BLM would provide Cascadia Wildlands with future monitoring information in regards to the Density Management Study as it becomes available.

8.4 Appendix C – Green Peak II Marking Guides

8.4.1 Marking Guidelines for Revised Green Peak II Density Management Project

(T. 14 S., R. 6 W., Section 7)

Table 1. Prescription Summary - Orange (Leave Tree) Mark to Target TPA

Unit / Treatment	Age (yrs)	Pre-treatment			Marking Guide				
		TPA All Trees	BA[1] (sq ft)	QMD (in)[4]	TPA[2] Conifer greater than 9" DBH	Leave Spacing (feet)	% of Overstory Trees to leave	Est. Leave BA (sq ft)	QMD[3] (in)
High Retention	70	119	242	19.3	**67**	26	56%	131	19.1
Moderate Retention	70	84	188	20.3	**37**	34	44%	78	20.2
Variable - High	70	124	220	18	**67**	26	54%	119	18
Variable- Mod.	70	94	199	19.7	**37**	34	40%	72	19.4
Variable- Low	70	51	105	19.3	**27**	40	65%	61	18.4
Avg	**70.0**	**111**	**227**	**19.4**	**47**			**92**	**19.0**

[1] Basal area in square feet: cross-sectional area occupied by tree boles on each acre
[2] **Leave Trees Per Acre**: remaining overstory conifer trees after thinning.
[3] [4] QMD=quadratic mean diameter, the DBH of tree of mean basal area.

Boundaries
Exterior unit boundaries are marked by orange paint and Boundary Timber Reserve posters. Boundaries between marking units would be designated with orange flagging.

Goals
Increase the diversity of stand structure and composition while reducing density:

- Maintain the full range of diameter distribution
- Retain a range of tree structures, crown sizes, and damaged or deformed trees
- Increase the proportion of minor species: focus the removal on Douglas-fir

Hierarchy (Priorities)

1. Meet target number of **trees per acre** greater than 9" DBH, selecting for best crown ratios.
2. Retain **"unique"** trees - wolf, remnant/legacy trees, broken-top, forked, have wildlife use, full crowns, etc.
3. Retain **minor species**: All hardwoods retained and do NOT count toward TPA targets. All western hemlock retained and count toward TPA targets.

4. Retain existing **diameter distribution** by keeping trees in all size classes. Harvest trees would be primarily co-dominants.
5. Meet residual tree **spacing**. Small gaps/clumps OK. Do NOT adjust marking near existing patch cuts.
6. **Remove unstable roadside conifer.** Remove conifers on or above road cut slope that are unstable (pistol-butted or with excessive lean toward the road).

Required leave trees for all units

- All snags are reserved under the timber sale contract. Protect high-value snags by leaving adjacent trees.
- All Trees less than 9" are reserved under the timber sale contract (not marked and not counted toward TPA or BA).
- All remnants from the previous stand.
- All tree improvement parent trees (marked with orange "T" and metal signs).
- All trees marking the center of research plots (overstory trees with red blazes).

8.5 Appendix D – Instruction Memorandum OR-2005-083 Dated August 12, 2005

United States Department of the Interior
BUREAU OF LAND MANAGEMENT
Oregon State Office
P.O. Box 2965
Portland, Oregon 97208

TAKE PRIDE IN AMERICA

In Reply Refer to:
5610 (OR-933) P

August 12, 2005

EMS TRANSMISSION 08/16/2005
Instruction Memorandum No. OR-2005-083
Expires: 9/30/2006

To: District Managers: Coos Bay, Eugene, Roseburg, Salem

From: State Director, Oregon/Washington

Subject: Density Management Studies

Purpose: This Instruction Memorandum provides direction for the next phase of the Density Management and Riparian Buffer Study (DMS).

Policy/Action: To begin out-year planning to implement the next phase of the DMS according to the revised DMS Study Plan. The DMS Site Coordinator for each site should work with the local field manager and employees responsible for the necessary contract work to ensure that this schedule can be met and to resolve difficulties. The DMS Study Coordinator should be kept informed and involved as necessary to help keep necessary actions on schedule.

Timeframe: The schedule for on-the-ground treatment implementation is as follows:

Site Name	District	Implementation Year	Site Coordinator
Bottomline	Eugene	2009	Peter O'Toole/Shami Premdas
OM Hubbard	Roseburg	2009	Craig Kintop
Keel Mountain	Salem	2009	Charley Thompson
Sand Creek	Salem	2009	Hugh Snook
Callahan Creek	Salem	2009	Hugh Snook
North Soup	Coos Bay	2010	Frank Price
Little Wolf	Roseburg	2010	Craig Kintop
Blue Retro	Coos Bay	2010	Frank Price
Green Peak	Salem	2011	Hugh Snook
Ten High	Eugene	2011	Peter O'Toole/Shami Premdas
Delph Creek	Salem	2011	Charley Thompson
Perkins Creek	Eugene	2011	Peter O'Toole/Shami Premdas

NOTE: Implementation year means the year that the activity happens on the ground. Every effort should be made to ensure the DMS units are treated in the one-year window assigned above.

Budget Impact: Funding to support contract development and implementation for the next round of treatments will come out of normal operating budgets, and achievements will contribute to normal accomplishment reporting. The Study Coordinator and other individuals in the State Office are evaluating the feasibility of funding post-treatment monitoring through contract receipts, either through stewardship contracting and/or use of the 5900 forest health funds. Additional funding of post-treatment monitoring may be needed and will be funded out of 6320, 6334, and/or 6310 subactivities, as has been the case for the last 10 years. Total funding needs for post-treatment monitoring will range from $100,000 to $300,000 annually depending on scheduling and partner funding contributions. Partner contributions have exceeded Bureau of Land Management (BLM) study funding to date.

Background: Initial direction to implement the DMS was provided through two State Office directives (Instruction Memorandum OR-93-145, Information Bulletin OR-94-317) over ten years ago. Since then, treatments implementing the study have been completed, over a thousand plots have been established, measurements for a wide variety of responses have been conducted, initial results have been reported, and a wide range of outreach and education activities have been conducted on DMS sites or with DMS information. Several manuscripts officially reporting five-year post-treatment results are scheduled for publication within the year. A strong partnership among Pacific Northwest Research Station, Oregon State University, US Geological Survey, and the BLM has supported these accomplishments.

An extensive effort was made over the past year to develop a revised DMS Study Plan (Cissel et al. in review) to address key information needs of the BLM. Proposal development steps included:

- DMS scientists and site coordinators developed initial ideas for the revised study plan and reviewed proposals in the field
- Revised study plan was reviewed and discussed with a wide range of field practitioners and managers at the DMS Workshop and Field Trips in June, 2004
- The DMS Study Coordinator reviewed the proposal with affected field managers
- Revised study plan proposal was distributed to westside field units for review
- Revised proposal was reviewed and approved by the interagency DMS Steering Committee (includes BLM district manager and branch chief)

The BLM State Office leadership and Pacific Northwest Research Station Leadership Team were briefed and concurred on study plans and direction.

Manual/Handbook Sections Affected: None

Coordination: Development of these instructions was coordinated with District Management, DMS Coordinators, and OR-930 Management and staff.

Contact: Contact the DMS Study Coordinator John Cissel, at (541) 683-6410 with questions, or for a copy of the revised study plan.

Districts with Unions are reminded to notify their unions of this Instruction Memorandum and satisfy any bargaining obligations before implementation. Your servicing Human Resources Office or Labor Relations Specialist can provide you assistance in this matter.

Signed by
Kathy Eaton
Acting Associate Director

Authenticated by
Mary O'Leary
Management Assistant

8.6 Appendix E – Regional Ecosystem Office Memorandum Dated May 12, 2003

Regional Ecosystem Office
333 SW 1st P.O. Box 3623
Portland, Oregon 97208-3623
Website: www.reo.gov E-Mail: REOmail@or.blm.gov
Phone: 503-808-2165 FAX: 503-808-2163

Memorandum

Date: **May 12, 2003**

To: Regional Interagency Executive Committee (See Attached Distribution List)

From: Anne Badgley, Executive Director /s/Anne Badgley

Subject: Assessment and Review of Proposed Research under the Northwest Forest Plan

Purpose: The purpose of this memorandum is to clarify implementation of certain Northwest Forest Plan (NWFP) provisions regarding research assessments and reviews.

Background: In 2001, the Regional Ecosystem Office (REO) received questions from field offices asking whether REO review of new proposed research is required. The REO prepared findings to clarify two aspects of the research questions:

1. Reviews. When is REO review of research required?
2. Assessments. Who assesses new research proposals and what factors should be considered?

This memorandum is based on interagency discussions (which included participation by research agency representatives) and review of NWFP provisions. Key NWFP provisions are attached and referenced below.

Findings: Reviews. The NWFP Standards and Guidelines (S&Gs) distinguish between ongoing and proposed research (S&Gs, pp. C-4, 18, 19 & 38). Project summaries of ongoing research, i.e., current, funded, agency approved research, were to be submitted to REO for review within 180 days after the date the NWFP Record of Decision (ROD) was signed (April 13, 1994). New research, i.e., research proposed after the NWFP was signed, does not require REO, Research and Monitoring Group (RMG), or Regional Interagency Executive Committee (RIEC) review. However, agencies may request REO or RMG assistance in conducting science reviews of new proposed research, particularly where independent, regional-scale, or interagency analysis is indicated. Requests should be submitted through the agency's RIEC executive to the REO Executive Director.

Assessments. The S&Gs (pp. C-4, 18 & 38) require that research be assessed to determine if it is consistent with the objectives of the standards and guidelines. The appropriate land manager is responsible for assessing proposed research and has discretion regarding how to conduct the assessment and documentation process. For example, the assessment and documentation may be completed in conjunction with the NEPA process.

The ROD states that, where appropriate, some research activities may be exempted from the standards and guidelines (ROD, p.15). The S&Gs further provide for this by indicating that some activities not otherwise consistent with the objectives of the standards and guidelines may be appropriate (S&Gs, pp. C-4, 18 & 38), particularly if the activities:

- Will test critical assumptions of these standards and guidelines;
- Will produce results important for habitat development; or
- If the activities represent continuation of long-term research.

In addition, the S&Gs (p. C-4) state that every effort should be made to locate non-conforming activities in land allocations where they would have the least effect upon the objectives of the standards and guidelines. (Language specific to Late-Successional Reserves (LSRs) and Riparian Reserves (RRs) is provided in the S&Gs (pp. C-18 & 38)). This factor should be considered and documented during the assessment.

The land manager is responsible for identifying any proposed research activities that are inconsistent with the objectives of the standards and guidelines, for assessing whether the activities are appropriate, and for ensuring that appropriate efforts have been made to locate non-conforming activities in land allocations where they would have the least effect upon the objectives of the standards and guidelines. The land manager may then exempt research activities from the standards and guidelines where appropriate. All research activities must meet the requirements of applicable federal laws (ROD, p.15), including the Endangered Species Act, NEPA, etc.

Related Considerations: The REO identified other factors that may be helpful to ensure scientific credibility of proposed research (a basic principle of the NWFP). These factors are not specified in the NWFP, however, land managers may consider them if appropriate during design and assessment of new research proposals, particularly proposals which include activities inconsistent with the objectives of the standards and guidelines. Optional factors that may be appropriate to consider include:

1. The extent to which the proposed research represents credible science. The following questions may be helpful in evaluating whether the proposed research represents credible science:
    - What hypotheses would be tested by the proposed research, and how are they linked to assumptions or uncertainties in the S&Gs?
    - Is the proposed study design adequate to test the stated hypotheses?
    - What are the temporal and spatial zones of inference for the proposed research?
    - Has the proposal been the subject of an independent science review? If so, what are the results?
2. The potential of the research to contribute to scientific knowledge of importance beyond the local area.
3. The potential to modify the research proposal to make it more consistent with the objectives of the standards and guidelines.
4. The extent to which the desired results could be obtained if the research was modified to conform to the standards and guidelines.

This memorandum is intended for use as the basis for responding to future inquiries regarding research assessments and reviews. All RIEC executives are encouraged to distribute this memorandum to appropriate individuals in their agency. If you have comments or need additional information, please contact me at 503-808-2165, or your REO representative.

cc: REO/RMG reps
Ken Denton (FS)
John Cissel (BLM)

1819final.doc/kc

Attachment: NWFP Excerpts Related to Research Assessments and Reviews (2 pp.)

NWFP Excerpts Related to Research Assessments and Reviews

This enclosure provides excerpts from the Northwest Forest Plan Record of Decision (ROD) and Standards and Guidelines (S&Gs) which are referenced in the accompanying memorandum on research assessments and reviews.

ROD, p. 15:
"An important component of this decision is the facilitation of research activities to gather information and test hypotheses in a range of environmental conditions. Although research activities are among the primary purposes of adaptive management areas and experimental forests, this decision does not intend to limit research activities to these land allocations. Where appropriate, some research activities may be exempted from the standards and guidelines of this decision. However, every effort should be made to locate non-conforming activities in land allocations where they would have the least adverse effect upon the objectives of the applicable standards and guidelines. All research activities must meet the requirements of applicable federal laws, including the Endangered Species Act."

S&Gs, p. C-4:
"A variety of wildlife and other research activities may be ongoing and proposed in all land allocations. These activities must be assessed to determine if they are consistent with the objectives of these standards and guidelines. Some activities (including those within experimental forests) not otherwise consistent with the objectives may be appropriate, particularly if the activities would test critical assumptions of these standards and guidelines, would produce results important for habitat development, or if the activities represent continuation of long-term research. Every effort should be made to locate non-conforming activities in land allocations where they would have the least adverse effect upon the objectives of these standards and guidelines.

Current, funded, agency-approved research that meets the above criteria, is assumed to continue if analysis ensures that a significant risk to Aquatic Conservation Strategy objectives does not exist. Research Stations and other Forest Service and BLM units would, within 180 days of the signing of the Record of Decision, submit a brief project summary to the Regional Ecosystem Office of ongoing research projects that are potentially inconsistent with other standards and guidelines in this document but are expected to continue under the above research exception. The Regional Ecosystem Office may choose to more formally review specific projects, and may recommend to the Regional Interagency Executive Committee modification, up to and including cancellation, of those projects that have an unacceptable risk [to] the objectives of these standards and guidelines."

S&Gs, pp. C-18,19:
"A variety of wildlife and other research activities may be ongoing and proposed in late-successional habitat. These activities must be assessed to determine if they are consistent with Late-Successional Reserve objectives. Some activities (including those within experimental forests) not otherwise consistent with the objectives may be appropriate, particularly if the activities would test critical assumptions of these standards and guidelines, would produce results important for habitat development, or if the activities represent continuation of long-term research. These activities should only be considered if there are no equivalent opportunities outside Late-Successional Reserves.

Current, funded, agency-approved research that meets the above criteria is assumed to continue if analysis ensures that a significant risk to Aquatic Conservation Strategy objectives does not exist. Research Stations and other Forest Service and BLM units would, within 180 days of the signing of the Record of Decision for these standards and guidelines, submit a brief project summary to the Regional Ecosystem Office of ongoing research projects that are potentially inconsistent with other standards and guidelines of this document, but are expected to continue under the above research exception. The Regional Ecosystem Office may choose to more formally review specific projects, and may recommend to the Regional Interagency Executive Committee modification, up to and including cancellation, of those projects having an unacceptable risk to Late-Successional Reserve objectives."

S&Gs, p. C-38:
RS-1. A variety of research activities may be ongoing and proposed in Key Watersheds and Riparian Reserves. These activities must be analyzed to ensure that significant risk to the watershed values does not exist. If significant risk is present and cannot be mitigated, study sites must be relocated. Some activities not otherwise consistent with the objectives may be appropriate, particularly if the activities would test critical assumptions of these standards and guidelines; would produce results important for establishing or accelerating vegetation and structural characteristics for maintaining or restoring aquatic and riparian ecosystems; or the activities represent continuation of long-term research. These activities should be considered only if there are no equivalent opportunities outside of Key Watersheds and Riparian Reserves.

RS-2. Current, funded, agency-approved research, which meets the above criteria, is assumed to continue if analysis ensures that a significant risk to Aquatic Conservation Strategy objectives does not exist. Research Stations and other Forest Service and BLM units would, within 180 days of the signing of the Record of Decision adopting these standards and guidelines, submit a brief project summary to the Regional Ecosystem Office of ongoing research projects that are potentially inconsistent with other standards and guidelines but are expected to continue under the above research exception. The Regional Ecosystem Office may choose to more formally review specific projects, and may recommend to the Regional Interagency Executive Committee modification, up to and including cancellation, of those projects having an unacceptable risk to Key Watersheds and Riparian Reserves. Risk would be considered within the context of the Aquatic Conservation Strategy objectives."

S&Gs, pp. D-7, 8:
"Monitoring and research, with careful experimental design, would be conducted in Adaptive Management Areas. Research in forest ecology and management as well as social, biological, and earth sciences may be conducted. Each Adaptive Management Area would have an interdisciplinary technical advisory panel that would provide advice to managers and the local communities involved with this effort. The technical advisory panels would provide advice and information on the appropriateness of the project.

Direction and review are provided by the Regional Interagency Executive Committee, through the Regional Ecosystem Office. This review would help assure that plans and projects developed for the various Adaptive Management Areas would be both scientifically and ecologically credible. It would assure that new, innovative approaches are used, that the laws and the goals of the plan are met, and that validation monitoring is incorporated."

S&Gs pp. E-17, 18:
"The Research and Monitoring Committee would review and evaluate ongoing research; develop a research plan to address critical natural resource issues; address biological, social, economic, and adaptive management research topics; and develop and review scientifically credible, cost efficient monitoring plans; and facilitate scientific review of proposed changes to the standards and guidelines."