

Keel Mountain Density Management and Riparian Buffer Study

Environmental Assessment and Finding of No Significant Impact

Environmental Assessment Number OR080-06-02

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

Township 12 South, Range 1 East, Section 13, Willamette Meridian
South Santiam River 5th field Watershed
Linn County, Oregon

Responsible Agency: USDI - Bureau of Land Management

Responsible Official: Rudy Hefter, Acting Field Manager
Cascades Resource Area
1717 Fabry Road SE
Salem, OR 97306
(503) 375-5969

For further information, contact: Charley Thompson
Cascades Resource Area
1717 Fabry Road SE
Salem, OR 97306
(503) 315-5966



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BLM/OR/WA/AE-07/030-1792

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FINDING OF NO SIGNIFICANT IMPACT

Introduction

The Bureau of Land Management (**BLM**) has conducted an environmental analysis (Environmental Assessment Number OR080-06-02) for the Keel Mountain Density Management and Riparian Buffer Study research project. This project is a proposal to **1/** thin approximately 155 acres of 56-year-old timber stands in the Matrix and Riparian Reserve Land Use Allocations (*EA sections 1.0, 2.0*); **2/** construct approximately 0.18 miles of new temporary road spurs and decommission the new construction after use; **3/** renovate and maintain approximately 4.12 miles of existing roads. **4/** remove a culvert near the end of Road No. 12-1E-14.02; **5/** hand pile, cover and burn logging slash and debris adjacent to landings; and **6/** fell two green trees per acre for coarse woody debris. The project is located on BLM lands within Township 12 South, Range 1 East, Section 13, Willamette Meridian (*EA Section 1.0*).

The *Keel Mountain Density Management and Riparian Buffer Study Environmental Assessment* (Keel Mountain DMS EA) documents the environmental analysis of the proposed project. The EA is attached to and incorporated by reference in this Finding of No Significant Impact determination (**FONSI**). The analysis in this EA is site-specific and supplements analyses found in the *Salem District Proposed Resource Management Plan/Final Environmental Impact Statement*, September 1994 (**RMP/FEIS**). Conformance with the *Salem District Record of Decision and Resource Management Plan*, May 1995 (**RMP**) and related documents which direct and provide the legal framework for this project is described in EA sections 1.1 and 1.4.

The EA and FONSI will be made available for public review **March 28, 2007** to **April 27, 2007**. The notice for public comment will be published in a legal notice by the *Albany Democrat Herald* newspaper. Comments received by the Cascades Resource Area of the Salem District Office, 1717 Fabry Road SE, Salem, Oregon 97306, on or before **April 27, 2007** will be considered in making the final decisions for this project.

Finding of No Significant Impact

Based upon review of the Keel Mountain EA and supporting documents, I have determined that the proposed project is not a major federal action and would not significantly affect the quality of the human environment, individually or cumulatively with other actions in the general area. No environmental effects meet the definition of significance in context or intensity as defined in 40 CFR 1508.27.

There are no significant impacts not already adequately analyzed, or no significant impacts beyond those already analyzed, in the *Salem District Proposed Resource Management Plan/Final Environmental Impact Statement*, September 1994 (RMP/FEIS) to which this environmental assessment is tiered. Therefore, supplemental or additional information to the analysis in the RMP/FEIS in the form of a new environmental impact statement (**EIS**) is not needed. This finding is based on the following discussion:

Context: Potential effects resulting from the implementation of the proposed project have been analyzed within the context of the South Santiam River 5th field watershed (*EA section 1.2*), and the project area boundaries. The proposed project would occur on approximately 155 acres of BLM land; encompassing approximately 0.1 % of this 5th field Watershed [40 CFR 1508.27(a)].

Intensity:

1. The resources potentially affected by the proposed project are: vegetation and forest stand characteristics, soils and site productivity, water and hydrology, fisheries and aquatic habitat, and wildlife. The effects of the proposed project 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 the effects described in the RMP/EIS.
 - *Vegetation and Forest Stand Characteristics (EA section 3.2)*: 1/ the recommended density management thinning treatments would accelerate the development of late-successional characteristics 1/ No special status plant species would be affected. 3/ Noxious Weeds - No significant increase in noxious weeds is expected to occur. Any increase that does occur should be short lived due to revegetation by native species in areas of high light and ground disturbing activities.
 - *Soils and Site Productivity (EA Section 3.3)*: The proposed action would leave the majority of the surface vegetation, root systems, and litter intact. Slash from thinned trees would also remain on site. Expected amounts of surface soil displacement, surface erosion, and dry ravel resulting from thinning would be minimal. The area of soil compacted from harvest would be less than 15 acres (< 10% of the project area) – within the District management direction (RMP p. C-1-2).
 - *Water and Hydrology (EA Section 3.4)*: Detectable, detrimental effects (beyond one year) to watershed hydrology, channel morphology, and water quality as a result of the proposed action are unlikely. This action is unlikely to permanently alter the aquatic system either by affecting its physical integrity, water quality, sediment regime or stream-flow. The long term effects of the proposal may be slightly beneficial for the aquatic system as a result of increased wood recruitment and species and structural diversity in the riparian zone. 1/ Temporary road construction and road repair at stream crossings would result in small (limited to the road right-of-way), short term (1 year or less) alteration of channels. 2/ While this proposal may slightly reduce effective shade in the primary shade zone adjacent to Scott Creek in Unit 4, it is unlikely to have any detectable effect on stream temperatures, pH, or dissolved oxygen. 3/ Sediment transport and turbidity in this watershed may increase over the short term yet these effects are unlikely to be detectable or visible beyond the first winter following disturbance or beyond a distance of approximately ¼ mile downstream from the disturbance. 4/ Over the long-term (beyond two years), current conditions and trends in turbidity and sediment yield would likely be maintained under the proposed action..
 - *Fisheries and Aquatic Habitat (EA Section 3.5)*: In the thinning units where full Riparian Reserve (RR) widths are maintained, no impacts to fisheries and aquatic species as a direct result of timber harvest are anticipated. In the thinning units with no RR, and those with variable RR widths, long-term anticipated impacts are likely to be positive. The project could have a long-term positive effect on fish and other aquatic species by increasing recruitment potential of large woody debris and nutrients to the aquatic system.
 - *Wildlife (EA section 3.6)*: 1/ Residual Old Growth Trees, Snags and Coarse Woody Debris (CWD): The proposed action alternatives would not result in significant effects to old-growth remnants, snags, and CWD because: a/These habitat elements would be retained (if present), with a minor degree of loss as a result of falling and yarding operations, and; b/ the development of additional snags and large woody material would be initiated.

Accelerated growth from thinning would ensure that larger trees would be available in the future for snag and CWD recruitment or creation. **2/** Survey and Manage and BLM Special Status Species: The proposed action would not result in significant effects to Survey and Manage or BLM Special Status Species because no suitable habitat for any species known or likely to be present would be eliminated, habitat connectivity would not be changed, habitat alteration would have only short-term negative effects, and long-term effects would be beneficial. Therefore, the project would not contribute to the need to list any BLM Special Status Species. **3/** Migratory and Resident Birds: Thinning would not result in significant effects to migratory and resident birds because it would not result in a major change in the species mix of the bird community in the thinned stands, and it would not result in the permanent loss of habitat (or potential habitat) for any bird species at the stand level. **4/** Northern Spotted Owl: Effects to northern spotted owl are described in the next section.

2. The proposed project:

- Would not affect 1/public health or safety [40 CFR 1508.27(b)(2)]; 2/unique characteristics of the geographic area [40 CFR 1508.27(b)(3)] - There are no historic or cultural resources, parklands, prime farmlands, wild and scenic rivers, wilderness, or ecologically critical areas located within the project area (*EA Section 3.1, Table 4*); 3/ 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 4*).
- Is not unique or unusual. The BLM has experience implementing similar actions in similar areas without highly controversial [40 CFR 1508.27(b) (4)], highly uncertain, or unique or unknown risks [40 CFR 1508.27(b) (5)].
- Does not set a precedent for future actions that may have significant effects, nor does it represent a decision in principle about a future consideration [40 CFR 1508.27(b)(6)].
- Is not expected to adversely affect Endangered or Threatened Species listed under the Endangered Species Act (ESA) of 1973 [40 CFR 1508.27(b) (9)].
 - *Northern spotted owl:* Effects to spotted owls are not significant because: all stands proposed for thinning would be maintained as dispersal habitat after harvest; habitat conditions are expected to improve as thinned stands mature (>20 years); residual trees would increase in size and be available for recruitment or creation of snags, culls and CWD for prey species and nesting opportunities, and; where applied, topping, falling, and base-girdling to create snags and CWD would further increase stand structure and diversity for future spotted owl habitat (*EA section 3.6*).
 - *Fish:* A determination has been made that this project would have no effect on Upper Willamette River (UWR) steelhead trout or UWR Chinook salmon (*EA section 3.5.1, 5.1*). The project would also have no effect on Critical Habitat for the species listed above, or on Essential Fish Habitat (EFH) as designated under the Magnuson-Stevens Fishery Conservation Act. The determinations of “no effect” are based primarily on the location of the project relative to ESA listed species distributions: all of the proposed project units are greater than four miles upstream of habitat that may be occupied by ESA listed fish species, as shown in *EA Table 7*.
- Do not violate any known Federal, State, or local law or requirement imposed for the protection of the environment [40 CFR 1508.27(b) (10)] (*EA Section 1.4*).

3. The Interdisciplinary Team (IDT) evaluated the project areas in context of past, present and reasonably foreseeable actions [40 CFR 1508.27(b) (7)]. This project could contribute cumulatively to accelerated sediment loads observed in the watershed. In a similar manner, road repair, yarding and hauling would likely contribute to a short term increase in turbidity levels directly below road/stream intersections. These effects are not expected to be significant because:
- The turbidity would be very difficult to detect (Hydrology report pp. 26-27, *EA section 3.4*). Sediment yields from forest harvest decrease over time. The quantity of surface erosion with delivery of sediment during large storm events would likely drop back to current levels within three to five years as the remaining forest stand fills out and skid roads recover.
 - The limited magnitude and duration of this effect would likely be insignificant for water quality on the scale of the sixth field watershed and would be unlikely to have any effect on any designated beneficial uses. The contribution to watershed sediment yields would be short-lived (primarily in the first winter following road repairs).
 - Over the long term, the incremental improvement of forest stand characteristics (larger conifer trees with longer, deeper crowns, increased species diversity, and wood recruitment) in the riparian zone would support the cumulative improvement in these conditions that is anticipated throughout these watersheds in response to the forest plan. This would add cumulatively to the improvement in the condition of stream channels and wetlands in the watershed.

Prepared by: Charley Thompson
Charley Thompson

3/27/07
Date

Reviewed by: Carolyn Sands
Carolyn Sands, NEPA

3/27/07
Date

Approved by: Rudy Hefter
Rudy Hefter, Acting Field Manager
Cascades Resource Area

3/27/07
Date

ENVIRONMENTAL ASSESSMENT

1.0 Introduction

1.1 Background

The Bureau of Land Management (BLM), Pacific Northwest Research Station (PNW), US Geological Survey (USGS), and Oregon State University (OSU) established the BLM Density Management and Riparian Buffer Study (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 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 DMS consists of three integrated studies: initial thinning, re-thinning, and riparian buffer widths. The initial thinning study was installed in 50–80-year-old stands that had never been commercially thinned. Four stand treatments of 30–60 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 (40-120 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. An eighth site, Callahan Creek, contains a partial implementation of the study design. The re-thinning study was installed in four 70–90-year-old stands that previously had been commercial thinned. Each study stand was split into two parts: one part as an untreated control and the other part as a re-thinning (30-60 TPA).

The riparian buffer study was nested within the moderate density retention treatment at each of the eight initial thinning study sites and two re-thinning sites. Alternative riparian buffer widths included: 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).

A second round of density management manipulations are now being planned for implementation beginning in 2009. Stem density would be reduced in the high, moderate, and variable density treatments; and along the stream reaches proposed for the “thin-through” riparian treatment. 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 have been completed on these sites including leave island effectiveness as refugia, treatment response of terrestrial and aquatic arthropods, and smaller-scale studies of fungal, lichen, and bryophyte community response. Additional collaborative studies are encouraged on DMS sites.

This EA covers the continuation of the Keel Mountain Density Management and Riparian Buffer Study research project. The current project includes re-thinning, initial thinning, coarse woody debris creation, data collection, and monitoring.

This study site is one of twelve referenced in Instruction Memorandum No. OR-2005-083, dated 8/12/05, that directs the BLM Districts with established study sites to implement the next phase of the DMS.

1.2 Summary of the Proposed Action

The Keel Mountain Density Management and Riparian Buffer Study (DMS project) is a proposal to thin approximately 155 acres of 56 year old timber stands in the Matrix and Riparian Reserve Land Use Allocations (see map, EA section 2.5). The thinning would be implemented through a timber sale. Connected actions include 1/ constructing up to 0.18 mile of new road spurs and decommission the new construction after use; 2/ renovating and maintaining about 4.12 miles of existing roads; 4/ removing a culvert to facilitate fish passage; and 5/ falling two green conifer trees per acre (TPA) from the overstory to provide a pulse of coarse woody debris (EA section 2.2).

1.2.1 Project Area Location

The Keel Mountain project is located on BLM-managed lands in Section 13, Township 12 South, Range 1 East, Willamette Meridian. The project area is approximately thirteen miles east of Lebanon, Oregon in Linn County, Oregon, on Upper Hamilton Creek Road. The project area is shown on the Keel Mountain Vicinity Map (see page 10).

1.3 Purpose of and Need for Action

The purpose of this project is to continue implementation of the Keel Mountain Density Management and Riparian Buffer Study project that was initiated under the original Keel Mountain EA dated July 22, 1996.

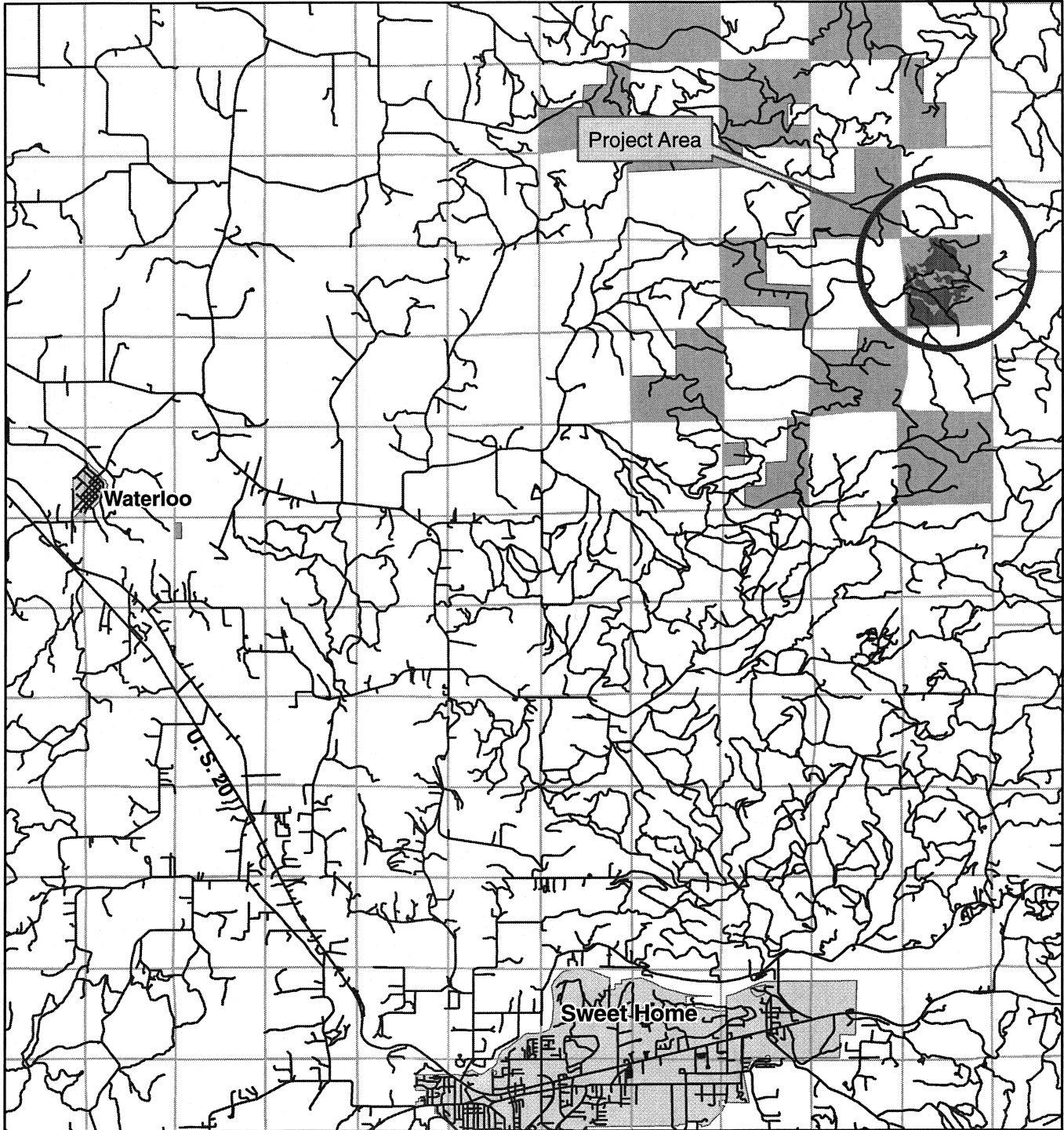
Researchers at Oregon State University (OSU) and the Pacific Northwest Research Station (PNW) have identified the next series of treatments to meet the research objectives that have been established for the Keel Mountain Density Management Studies (DMS) Project. The DMS Establishment Report (DMS study 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 following describe the purpose of and the need for action:

- **Research Support:** To continue implementation of the Keel Mountain DMS research project, which is designed to test critical assumptions of the Northwest Forest Plan’s Standards and Guidelines, and produce results important for late-successional habitat development.
- **Roads:** To maintain and develop a safe, efficient and environmentally sound road system (RMP p. 62)] in order to:
 - Provide appropriate access for managing the study;
 - Reduce environmental effects associated with identified existing roads within the project areas (RMP p. 11).

Keel Mountain Density Management and Riparian Buffer Study
Location Map

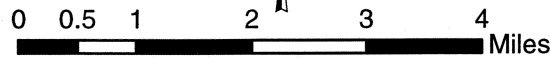
Project is located in Section 13, T. 12 S., R. 1 E., W. M.



— Roads

■ BLM Lands

■ Keel Mtn Units



3/12/2007 Cascades GIS

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1.3.1 Decision Criteria/Project Objectives/ Decision to be Made

The Cascades Resource Area Field Manager will use the following criteria/objectives in making a decision as to which alternative would be implemented. The field manager would select the alternative that would best meet these criteria. The selected action would:

- Meet the purpose and need of the project (EA section 1.3);
- 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)*;
- Not have significant impact on the affected elements of the environment beyond those already anticipated and addressed in the RMP EIS; and
- Further the development of the Keel Mountain study site as a place to share results of on-the-ground practices and study findings with land managers, regulatory agencies, policy-makers, and the general public.

1.4 Conformance with Land Use Plans, Regulations, and other Guidance

The following documents direct and provide the legal framework for the Keel Mountain DMS project:

1. *Salem District Record of Decision and Resource Management Plan*, May 1995 (RMP) Approximately 95% of the project area to be treated is within the Riparian Reserve land use allocation (LUA) as defined in the RMP (RMP p. 8);
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) ;
3. *Record of Decision for Amendments to the Survey and Manage, Protection Buffer, and Other Mitigation Measures Standards and Guidelines* January, 2001(**SM/ROD**); including any amendments or modifications in effect as of March 21, 2004;
4. *Record of Decision Amending Resource Management Plans for Seven Bureau of Land Management Districts and Land and Resource Management Plans for Nineteen National Forests within the Range of the Northern Spotted Owl, Decision to Clarify Provisions Relating to the Aquatic Conservation Strategy*, March 2004 (ACSROD). The decision clarifies the proper spatial and temporal scale for evaluating progress toward attainment of ACS objectives and clarifies that no project-level finding of consistency with the ACS objectives is required (ACS/ROD p. 1). Compliance with the four components of the Aquatic Conservation Strategy (ACS/ROD pp. 4, 7) is described in EA section 3.7.

Additional Guidance specific to this research project include:

5. *Regional Ecosystem Office Memorandum to the Regional Interagency Executive Committee* (5/12/2003). Clarifies implementation of certain NWFP provisions regarding research assessments and reviews;
6. *BLM OR/WA Instruction Memorandum No. OR-2005-083*, 8/16/2005. Provides direction for the next phase of the DMS project to the western Oregon Districts with DMS project areas;

7. *USDI/USGS Scientific Investigations Report (No. 2006-5087), BLM Density Management and Riparian Buffer Study: Establishment Report and Study Plan, 2006 (DMS Study Plan)*: This report contains the several study plans that provide the rationale for implementing this suite of density management thinning treatments and alternative riparian buffer widths;
8. *BLM Oregon State Office memo to the State of Oregon Department of Environmental Quality (ODEQ): Bureau of Land Management Density Management and Riparian Buffer Study Effectiveness Monitoring, 9/8/2006*. Describes the contributions of the DMS project to understanding the effects of active management in the attainment of Riparian Reserve restoration objectives, and the BLM's commitment to continue working with ODEQ regarding the assumptions and technical basis for the NWFP and RMP standards and guidelines regarding Total Maximum Daily Loads (TMDLs);

The analysis in the Keel Mountain DMS EA is site-specific and supplements analyses found in the *Salem District Proposed Resource Management Plan/Final Environmental Impact Statement*, September 1994 (RMP/FEIS) and in the *Keel Mtn. Thinning Timber Sale and Density Study Environmental Assessment* (1996). The RMP/FEIS includes the analysis from the *Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl*, February 1994 (NWFP/FSEIS).

The RMP/FEIS is amended by the *Final Supplemental Environmental Impact Statement for Survey and Manage, Protection Buffers, and Other Mitigation Measures in the Northwest Forest Plan*, November 2000 (SM/FSEIS); and the *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 (ACS/FSEIS).

Survey and Manage Species Review

The Bureau of Land Management (BLM) is aware of the August 1, 2005, U.S. District Court order in *Northwest Ecosystem Alliance et al. v. Rey et al.* which found portions of the *Final Supplemental Environmental Impact Statement to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines* (January, 2004) (EIS) inadequate. Subsequently in that case, on January 9, 2006, the Court ordered:

- set aside the 2004 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* (March, 2004) (2004 ROD) and
- reinstate the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measure Standards and Guidelines* (January, 2001) (2001 ROD), including any amendments or modifications in effect as of March 21, 2004.

The BLM is also aware of the November 6, 2006, Ninth Circuit Court opinion in *Klamath-Siskiyou Wildlands Center et al. v. Boody et al.*, No. 06-35214 (CV 03-3124, District of Oregon). In *Northwest Ecosystem Alliance et al. v. Rey et al* the U.S. District Court modified its order on October 11, 2006, amending paragraph three of the January 9, 2006 injunction. This most recent order directs:

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

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

The Keel Mountain DMS meets **Criterion A** above: Thinning projects in stands younger than 80 years old.

Northern Spotted Owl (NSO) Status Review:

The following information was considered in the analysis of the Keel Mountain project: 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). To summarize these reports, 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*).

The following documents provided additional direction in the development of the project: 1/ Hamilton Creek Watershed Analysis, (March 1995)

All of the above documents are available for review in the Salem District Office. Additional information about the proposed activities is available in the Keel Mountain EA Analysis File (KMAF), also available at the Salem District Office.

2.0 Alternatives, Including the Proposed Action

2.1 Alternative Development

Pursuant to Section 102 (2) (E) of the National Environmental Policy Act of 1969, as amended (NEPA), 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 concerning alternative uses of available resources (section 102(2) (E) of NEPA) were identified in the original Keel Mountain thinning project or in this proposed subsequent round of treatments. 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 the "Proposed Action" and the "No Action Alternative."

2.2 Proposed Action

The Proposed Action would implement the treatments designed by the involved researchers, thus advancing the development of the project, as defined in the DMS study plan. The thinnings would be implemented through a timber sale. The affected lands are in both the General Forest Management Area (GFMA) and Riparian Reserve (RR) LUAs.

The project area received an initial thinning treatment in 1997-98 (EA sections 1.1, 3.2). These same 124 acres of now 56-year-old mixed-conifer stands would be re-thinned with a proportional thinning design that would thin equal amounts from all diameter classes. An additional 31 acres would receive an initial thinning treatment, with similar leave tree marking guidelines. The initial thinning treatments created a range of overstory stand conditions. The following is a description of each unit and the proposed thinning treatments.

- The High Density treatment (Unit 1) represents a "traditional" commercial thinning. It was thinned to 120 trees per acre (TPA), and has about 15% of its area in leave islands ranging from 0.25-1.0 acres in size. This treatment produced some vertical stand development with this light thinning, and minimal horizontal development with the addition of the unthinned leave islands. This unit would be thinned to 65 TPA in this entry, with 5 of these TPA dedicated to producing the future snag component of the stand. Another piece of PNW's Riparian Buffer Study calls for the initial thinning of about half of the previously unthinned riparian reserves in Unit 1. All of the streams in Unit 1 had a "variable-width" riparian reserve buffer as part of the initial thinning treatment: 50-foot minimum width, extended upslope to a topographic or vegetation change. This "thin-through" riparian treatment of Unit 1 would amount to approximately 12 acres, and there would not be a no harvest buffer on the stream reaches.
- The Variable Density treatment (Unit 2) produced the greatest amounts of both vertical and horizontal stand structure. It was sub-divided into nine pieces, with three pieces thinned to each of three different densities - 120, 80, and 40 TPA. These nine pieces were located to maximize post-treatment stand heterogeneity.

Like the moderate treatment, this treatment has about 15% of its area in leave islands ranging from 0.25-1.0 acres in size; and another 10% of the stand area consists of patch openings ranging from 0.25-1.0 acres in size. The different pieces of this unit would be thinned from 120 to 65 TPA, from 80 to 35 TPA, and from 40 to 25 TPA, respectively.

- The Moderate Density treatment (Unit 3) was thinned to 80 TPA. It also has about 15% of its area in leave islands ranging from 0.25-1.0 acres in size; and another 10% of the stand area consists of patch openings ranging from 0.25-1.0 acres in size. This treatment provides more vertical and horizontal diversity when compared to the High Density treatment, since it was thinned heavier and has the patch openings as an additional component. This unit would be thinned to 35 TPA in this entry, with 5 of these TPA dedicated to producing the future snag component of the stand.

Riparian Buffer Case Study treatment (Unit 4): The only previous treatment here was a 14 X 14 pre-commercial thinning in 1971, so most of it has approximately 222 TPA. This unit is designed as a case study for PNW to evaluate the effects of an unusually heavy thinning treatment (from 222 to 65 TPA). The area within Unit 4 is approximately 480 feet wide on each side of the stream; and totals about 19 acres. A “thin-through” riparian treatment to the primary stream which bisects the area would be applied in this unit. The stream reaches receiving this treatment would have no buffer. Felled trees would be removed with the exception of an area, less than one acre, where the felled trees would be left in place to reduce the risk of stream bank erosion. In addition, the thin band of red alder along the stream would be left intact.

- Control Unit: No treatments are proposed. The control unit would be kept intact indefinitely to determine the effectiveness of the thinning treatments.

Table 1: Proposed Thinning Treatment Acres

Unit Number	Unit Acres	Proposed Logging Systems (Acres)	
		Skyline	Ground Based
Unit 1	64	64	
Unit 2	37	25	12
Unit 3	35		35
Unit 4	19	19	
Total Acres	155	108	47

In addition:

- The silvicultural prescriptions would remove primarily intermediate, co-dominant, and occasional dominant trees.
- The average overall canopy closure after treatment would be approximately 40 percent.
- All trees less than 9 inches dbh would be reserved.
- All leave islands and patch openings, plus the control unit would be left intact in this second round of treatments.
- Approximately 30 percent of the project areas would be harvested using conventional ground-based logging equipment, and approximately 70 percent would be harvested using skyline yarding systems.

2.2.1 Connected Actions

1. Road Work

New Road Construction: 0.10 mile on Weyerhaeuser and 0.08 mile on BLM, the two spurs would be of minimum standard with a natural surface. Spurs would be winterized with water bars upon completion of hauling.

Road Renovation and Maintenance: 4.12 miles of BLM roads would be renovated to the minimum standard necessary for hauling, including minimal spot-rocking, ditch cleaning, culvert cleaning, blading, brushing and replacement of any depleted culverts. A culvert close to the end of the 12-1E-14.02 road would be removed upon completion of hauling.

Table 2: Summary of Proposed Road Work

Road Work	Distance in miles
New road construction	0.18
Renovation and Maintenance	4.12
Culvert removal at the end of Road 12-1E-14.02	

2. Fuels Treatments: any slash accumulations at the landings would be piled and burned.
3. Coarse Woody Debris creation: Two green conifer trees per acre would be felled to provide a pulse of coarse woody debris.

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 3.0. Design features are organized by resource management objective.

To limit soil productivity loss to within RMP S&Gs (RMP Appendix C p. C-2):

- All logging operations and road work would utilize currently available equipment and practices that can achieve the objectives of the Best Management Practices (RMP Appendix C) (BMPs) required by the Federal Clean Water Act (as amended by the Water Quality Act of 1987).
- Skid trail patterns would be designed to avoid concentrating runoff water flows or directing runoff water into streams.
- Tractor skidding trails and other ground-based logging equipment use, skyline yarding systems, road construction and landings would be designed to confine soil compaction and displacement to no more than 10 percent of each unit's area.
- Road and Landing Construction: Road and landing construction, maintenance, and use requirements would be designed to keep soil compaction and displacement within the minimum surface area needed for safe operations. Newly disturbed soil associated with road and landing construction would be seeded (with a locally adapted mix of native species seed) to stabilize the soil and prevent erosion.

- Ground-based logging operations: Tractor skidding operations would not be allowed when soil moisture is high (generally November through May) (RMP p. 23, 24, C-2). Slash, organic debris, and limited passes by equipment would be used on skid trails. Slash piles would be located to reduce the amount of soil surface area subject to heat damage. Ground-based log skidding equipment utilizing one-end suspension would be allowed to skid logs on slopes up to 35 percent. Full suspension log transport equipment (forwarders) and harvesters may operate on slopes up to 45 percent. Existing skid trails would be used whenever possible.
- Skyline logging operations: Yarding with one end suspension of logs and equipment with lateral yarding capabilities would be required. Lift trees and tail holds to optimize log suspension, including multi-span skyline systems may be located outside of harvest unit boundaries.
- All yarding operations: All stems to be yarded would have their tops and limbs removed at the point of felling, so that all of this material would be left in place on the forest floor.

To Protect Hydrologic Functions (E.G. Channels, Flows, Water Quality):

- Design features which limit soil erosion also reduce potential stream sediment.
- Unit 4 would include an area on the Exhibit A where some trees near Scott Creek are to be felled and left in place as Large Woody Debris (LWD).
- All logging operations and road work would utilize currently available equipment and practices that can achieve the objectives of the Best Management Practices (RMP Appendix C) (BMPs) required by the Federal Clean Water Act (as amended by the Water Quality Act of 1987).
- Road work would be conducted during dry conditions. Some natural surface roads needed to complete operations would be left open over the winter. Such roads would require erosion control measures that may include; erosion matting, drainage modification, seeding or other appropriate techniques to prevent soil loss. Waterbars would be constructed on roads as needed to minimize surface runoff and potential soil erosion. Where practical, vegetation in ditches within 200 feet above all stream crossings would be maintained.
- Skidding and Yarding: Skid trail patterns would be designed to avoid concentrating runoff water flows or directing runoff water into streams. Waterbars would be installed on yarding corridors or skid roads as needed to prevent excessive erosion, gulying and sedimentation (see soils section, above).
- Hauling would be restricted to conditions that would not contribute to erosion or sedimentation of streams. In general this would mean no hauling on unpaved roads during wet weather.

To Protect And Enhance Stand Diversity And Wildlife Habitat Components:

- Coarse woody debris (CWD) already on the ground that is of a size suitable for Special Status Species terrestrial mollusk and amphibian habitat and that would provide a renewable supply of large down logs (generally 20” and larger, RMP p. 21) would be retained and protected to the greatest extent possible from disturbance during treatment (NWFP S&G p. C-40, RMP 21, p. D-2). If CWD needs to be moved, a section of the log would be cut to allow access, instead of moving the entire log. Some destructive sampling of CWD may occur along previously established amphibian monitoring transects.

- Larger snags (generally >15 inches diameter) of all decay classes would be left standing to the greatest extent feasible under standard contract requirements for logging, BMPs and Occupational Safety and Health Administration (OSHA) requirements (RMP D-2). Smaller snags would be left standing wherever practical.
- Approved skid trail locations would avoid impacting snags.
- Any snags which are cut or knocked down during logging operations would remain on site as CWD.
- Minor conifer tree species and hardwoods would generally be left standing where they are uncommon.
- A sufficient number of trees with unique structural characteristics such as wolf trees, broken-top trees, forked trees, and trees with deep crowns would be retained to ensure their continued representation in the stand.

To Protect Against Expansion Of Invasive And Non-Native Plant Species:

- Prior to entering BLM lands, ground disturbing and off-road machinery would be washed so that it is free of noxious weed/invasive plants seed and plant parts (RMP p. 64).

To Protect The Residual Stand:

- Operations would be restricted during the spring growing season, when bark is easily damaged (typically May 01-June 30).
- Falling, skidding and yarding techniques designed to minimize damage to residual trees would be required.
- Landing slash piles to be burned would be located and constructed to minimize heat damage to tree crowns or tree boles.

To Protect Special Status, NWFP/FSEIS Special Attention, Or Uncommon Plants And Animals:

- Coarse woody debris (CWD) already on the ground that is of a size suitable for Special Status Species terrestrial mollusk and amphibian habitat and that would provide a renewable supply of large down logs (generally 20" and larger, RMP p. 21) would be retained and protected to the greatest extent possible from disturbance during treatment (NWFP S&G p. C-40, RMP 21, p. D-2). If CWD needs to be moved, a section of the log would be cut to allow access, instead of moving the entire log. Some destructive sampling of CWD may occur on previously established amphibian monitoring transects.
- General: Operations may be shut down or restricted at any time if plant or animal populations that need protection (RMP p.29) are found.
- Northern Spotted Owl: A seasonal restriction would be in place for spotted owls from March 1 through July 15 on habitat modification activities (felling, yarding, and road building) during the critical nesting season. The seasonal restriction could be waived if surveys indicate no presence of nesting spotted owls within disturbance range (0.25 to 0.5 miles) of the units.

To Protect Cultural Resources:

- Operations would be shut down or restricted at any time if cultural resources that need protection (RMP p. 36) are found.

Summary of seasonal restrictions and permitted operational periods:

Table 3: Typical Seasonal Restrictions Calendar

Restriction	Reason	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Most Logging Operations and Road Work	Owl Nesting ¹												
Falling And Yarding	Bark Slippage												
Tractor Operations	Soil Damage												
Road Construction	Erosion Control,												
Timber Hauling	Water Quality												
In-Water Work, Roads ²	Protect Fish Species												
Key	Operations generally allowed.	Operations typically dependent on conditions.					Operations generally not allowed.						

¹ Can be waived if “no nesting” is determined

² Includes stream culvert replacements on intermittent streams see Section 2.2.2 for in-water work period for specific watersheds.

2.3 No Action Alternative

The Proposed Action would not be implemented. Management activities and other uses (e.g. road use, harvest of special forest products on public land) would continue on BLM and non-federal lands within and adjacent to the project area according to plans for those areas. Data collection and monitoring by PNW and/or OSU would likely continue in the project area for an indefinite period. This alternative also serves to set the environmental baseline for comparing effects to the Proposed Action.

2.4 Alternatives Considered Yet Not Analyzed in Detail

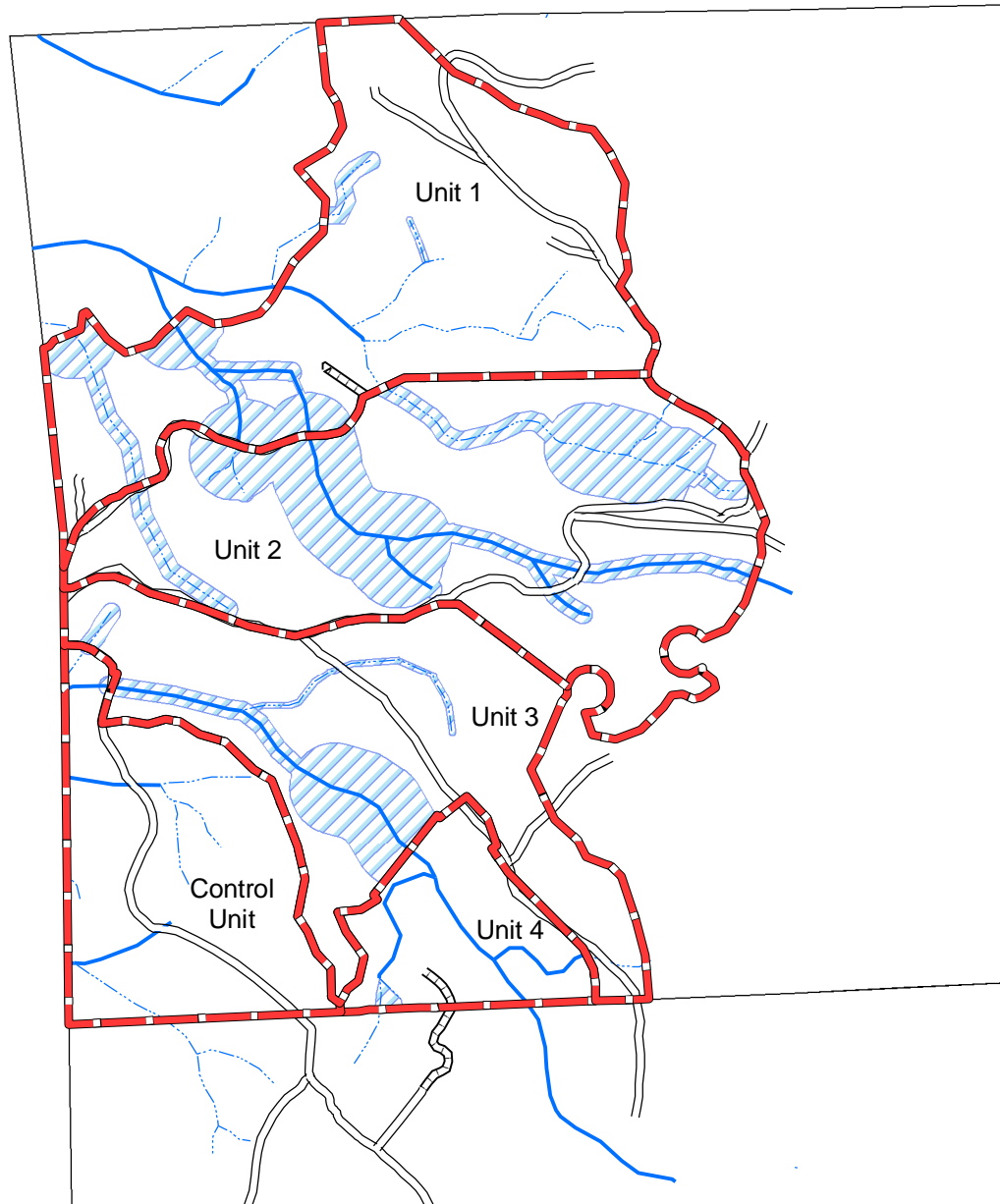
No other alternatives were considered because the nature of this proposal is to further implement an ongoing research project. This precluded consideration of other action alternatives.

2.5 Maps of the Proposed Action

U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
Section 13, T. 12 S., R. 1 E., W.M. - SALEM DISTRICT

Keel Mountain Density Management & Riparian Buffer Study

FY 2007 - EA No. **OR 080-06-02**



Treatment Area Boundary



Unit No.

- Unit 1 - High Density**
- Unit 2 - Variable Density**
- Unit 3 - Moderate Density**
- Unit 4 - Riparian Buffer**
- Case Study**
- Control Unit - no treatment**



Stream Buffer

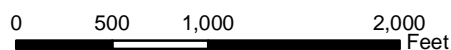


Existing road



New road construction

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.



3.0 Affected Environment and Environmental Effects

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 Action. Table 4 (Critical Elements of the Environment) and Table 5 (Other Elements of the Environment) summarize the results of that review. Affected elements are **bold**. All entries apply to the Proposed Action, unless otherwise noted.

Table 4: Review of Critical Elements of the Environment (BLM H-1790-1, Appendix 5)

Critical Elements Of The Environment	Status: (I.E., Not Present , Not Affected, Or Affected)	Does this project contribute to cumulative effects? Yes/No	Remarks	
Air Quality (Clean Air Act)	Not Affected	No		
Areas of Critical Environmental Concern	Not Present	No		
Cultural Resources	Not Affected	No	All of the proposed units have been surveyed for cultural resources. No cultural resources were found.	
Energy (Executive Order 13212), Adverse Impacts	Not Affected	No	There are no known energy resources located in the project area. The Proposed Action would have no effect on energy development, production, supply and/or distribution.	
Environmental Justice (Executive Order 12898)	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.	
Prime or Unique Farm Lands	Not Present	No		
Flood Plains (Executive Order 11988)	Not Present	No		
Hazardous or Solid Wastes	Not Present	No		
Invasive, Nonnative Species (plants) (Executive Order 13112)	Affected	Yes	Addressed in Text, EA section 3.2.	
Native American Religious Concerns	Not Affected	No	None were identified during the scoping process	
Threatened or Endangered (T/E) Species or Habitat	Fish	Not Affected	No	Addressed in Text, EA section 3.5.
	Plant	Not Present	No	
	Wildlife - Northern spotted owl (NSO)	Critical Habitat – Not Present; Owl Core Areas – Not Affected	No	No designated critical habitat is present in this project area. Addressed in Text, EA section 3.6.
Other NSO Habitat - Affected		No	Addressed in Text, EA section 3.6.	
Water Quality (Surface and Ground)	Affected	Yes	Addressed in Text, EA section 3.4	
Wetlands (Executive Order 11990)	Not Present	No		
Wild and Scenic Rivers	Not Present	No		
Wilderness	Not Present	No		

Table 5: Review of Other Elements of the Environment

Other Elements of the Environment	Status: (I.E., Not Present , Not Affected, Or Affected)	Does this project contribute to cumulative effects? Yes/No	Remarks
Fire Risk	Not Affected	No	No fuels treatments are anticipated to be needed for this action. The tops of the trees would be left in place where they have been felled, resulting in no substantial slash accumulations at landings or along roads. A Weyerhaeuser Company gate on Hamilton Creek road prevents public access.
Other Fish Species with Bureau Status	Not Present	No	No fish species with Bureau Status are present in or near the project area.
Essential Fish Habitat	Not Present	No	
Land Uses (right-of-ways, permits, etc)	Not Affected	No	
Late Successional and Old Growth Habitat	Not Present	No	
Mineral Resources	Not Present	No	
Public Access and Use	Not Affected	No	
Recreation	Not Affected	No	
Rural Interface Areas	Not Present	No	
Soils	Affected	No	Addressed in Text, EA section 3.3.
Special Areas outside ACECs (Within or Adjacent) (RMP pp. 33-35)	Not Present	No	
Other Special Status Species / Habitat	Plants	Not Affected	Addressed in Text, EA section 3.1
	Wildlife	Affected	Addressed in Text, EA section 3.6
Visual Resources	Not Affected	No	
Water Resources – Other (303d listed streams, DEQ 319 assessment, Downstream Beneficial Uses; water quantity, Key watershed, Municipal and Domestic)	Not Affected	No	Addressed in Text, EA section 3.4.
Wildlife Structural or Habitat Components - Other (Snags/CWD/ Special Habitats)	Snags/Cwd Affected	Yes, Beneficial Effect	Addressed in Text, EA sections 3.6.

The affected elements of the environment will be discussed by the following resources in EA sections 3.2 – 3.6: Vegetation and Forest Stand Characteristics, Soils and Site Productivity, Water and Hydrology, Fisheries and Aquatic Habitat, and Wildlife.

3.2 Vegetation and Forest Stand Characteristics

Affected Environment – Section 3.2

Stand History:

The entire project area was clearcut in 1949-1953. Most of the area was re-stocked with conifers via natural regeneration, although about 12 acres in the easternmost portions of Units 2 and 3 was planted about 1958. There is no record or evidence of broadcast burning for site preparation. The area was extensively “snagged” about 1960 – all standing dead trees were felled as part of an area-wide fire prevention effort. As a result, there are areas with large concentrations of Class 4 or 5 coarse woody debris larger than 20 inches in diameter.

The trees in the project area now average 56 years old, and the major species are western hemlock and Douglas-fir. Western redcedar and red alder are present in small amounts. The majority of the project area was pre-commercially thinned to 222 trees per acre in 1971.

Units 1, 2, and 3 were thinned previously in 1997-98 under the initial DMS thinning. The initial thinning DMS treatments were designed to test whether or not innovative commercial thinning prescriptions may be used to accelerate the development of late-successional stand conditions in even-aged managed forests. With three treatment regimes and an untreated control, these initial treatments have created a range of overstory stand conditions as described in EA section 2.2 and the following paragraphs.

Stand Structure

The previous treatments have enhanced the development of the various stand components of the project area. In the overstory, tree diameter growth rates and crown sizes are greater in the treated areas, when compared to the untreated control area. Crown rescession has largely ceased in the treated areas, so trees here have developed longer, fuller crowns than trees in the untreated areas. These statements are supported by on-site vegetation response measurement data.

In the understory, treatment has stimulated the growth of its various vegetation components: herbs, shrubs and seedlings. Increased light levels into the understory accelerated the growth of some advanced regeneration, although seedlings and saplings which were truly suppressed did not, and would not have been expected to show a “released” growth effect.

The various patch openings exhibit a range of vegetative conditions, from extensive tall shrub development to dense patches of conifer or red alder regeneration. The patch openings were planted with 200 conifer trees per acre, and their growth and per cent survival is highly varied, as was expected.

Previously Thinned Stands: These stands are primarily western hemlock and Douglas-fir, with lesser amounts of red alder and western redcedar. They were thinned from below, with all stems less than 5 inches dbh reserved. Trees per acre (TPA) left ranged from 40-120. They now have a reasonably well-developed component of intermediate sized trees ranging up to about 11 inches dbh.

Areas of very dense western hemlock and red alder regeneration are present. Units 2 and 3 have patch openings which range in size from ¼ - 1 acre. They were planted with conifers at a density of 200 TPA, and have varying amounts of natural tree regeneration and shrub or herbaceous layer development.

Unthinned Stands: As part of the initial thinning treatment, PNW designed a study of riparian reserve buffer widths on Scott Creek. A portion of a Riparian Reserve land use allocation within the boundary of unit 3 that was pre-commercial thinned to 222 TPA, and would become Unit 4 in the current proposal (EA section 2.6).

There are other unthinned riparian areas that would not be thinned, now or in the future; as well as a 41-acre untreated control. In these areas generally, canopies are closed and little understory tree regeneration is present. Red alders are common along the streams.

Special Status / Special Attention and Survey and Manage Plant Species

Botanical inventory of the area were completed in June 1994, July and August 1995, and fall & winter of 1995/1996 to look for any species that require protection or special management. No Threatened & Endangered, Bureau Special Status, or Special Attention botanical species were found in the area proposed for treatment or close proximity during record searches or field surveys.

Invasive/Non-native Species

An invasive/non-native species risk assessment was completed in June 1994, July and August 1995, and in 2006, to look for any invasive/non-native species that require special management. The project area was found to have a risk assessment rating of moderate. A moderate rating indicates the proposed project should proceed as planned with measures in place to control and/or prevent the establishment of invasive/non-native plant species in areas of ground disturbance. Four Priority III invasive/non-native species, Canadian thistle (*Cirsium arvense*), Bull thistle (*C. vulgare*), Klamath weed (*Hypericum perforatum*), and Tansy ragwort (*Senecio jacobaea*), were identified in the proposed project area. These species were mainly found along roadsides and forest openings. A 2006 re-survey of the invasive/non-native species situation found no change beyond what was anticipated as a result of the initial treatment identified in the 1996 Keel Mountain EA.

Environmental Effects - Section 3.2

3.2.1 Proposed Action

Stand Structure

High Density (HD) Treatment Prescription (Unit 1): The HD treatment is expected to result in an even-aged, single-story stand structure to a more complex late-successional habitat by employing multiple, low-intensity thinnings. The proposed action is the second of three thinning treatments. A three-step treatment provides information for strategies where protection of interior stand conditions is important during the conversion of even-aged stands into late-successional habitat, such as in areas with wildlife sensitive to open conditions. The proposed treatment would provide information about a conservative management approach aimed at converting homogenous stands to diverse stand structure. The information would apply to stands that have been thinned conservatively in the past.

The low-intensity repeated thinnings would allow trees to adjust fairly slowly to more open conditions. This treatment provides information directly usable in stands where multiple entries are economical, access is fairly easy, risk of windthrow is high, and continuous protection by overstory trees is desirable (DMS Study Plan pp. 6-7).

Variable Density Treatment Prescription (Unit 2): This prescription is expected to create a very high level of structural diversity within a stand. It would be used to investigate the relative importance of various sub-treatments such as patch openings and leave islands, and provide a reference for evaluating spatial scale relationships found in the other treatments. This treatment is expected to maintain within-stand structural diversity while enhancing differences within this treatment over time (DMS Study Plan p. 7, 8).

Moderate Density (MD) Treatment Prescription (Unit 3): The site would not likely be fully occupied by overstory trees, and the treatment would result in lower growth (per acre) of the overstory. Thinning to levels below full site occupation provides a scientific baseline for conditions where lack of a closed canopy changes microclimatic conditions and a large amount of site resources are available for understory stand components, such as tree regeneration and other understory vegetation. This proposed treatment represents an attempt to accelerate the development of late-successional habitat in two thinning entries. Understory vegetation, which has developed rather slowly during the first 12 years, is expected to respond quickly to the increased resources after the second thinning, and the stands should start providing components of late-successional habitat fairly quickly. The treatment response may provide useful information to assess potential outcomes when dense stands are opened up with a single, very intensive thinning (DMS Study Plan p. 7).

Riparian Buffer Case Study Treatment Prescription (Unit 4): Thinning these stream reaches provides a case study of how stands may respond when only a single entry is used to convert dense stands to open conditions potentially favorable for development of late-successional habitat. (DMS study p. 10).

Patch openings: Since the adjacent forest would be rethinned around these openings, we expect the additional light and nutrient availability to further accelerate the future growth of all vegetation in the patch openings.

Special Status / Special Attention and Survey and Manage Plant Species

The proposed project would have no effect on any Threatened or Endangered Species (see Affected Environment), nor would it contribute to the need to list any Special Status/Special Attention/Survey & Manage Species known or expected to occur in the vicinity of the project area. Site management of any Federal or Oregon State Threatened and Endangered (T&E), Bureau Special Status (SS) or Bureau Special Attention botanical species found during the course of the project would be accomplished in accordance with current direction.

Invasive/Non-native Species

No adverse effects from invasive/non-native species would be anticipated. Monitoring of the previous thinning has not identified increases in existing populations beyond what was anticipated. Design features would reduce the risk of any spread of new populations of invasive/non-native species as a result of the Proposed Action. Populations of invasive/non-native species could increase in vigor in the short term as more sunlight reaches the forest floor after treatment.

As the canopy closes over the next 20 years, it is anticipated that populations in the project areas would be shaded-out and reduced to low-vigor, per-project size populations.

Residual Stand

For uncut trees within or near yarding trails, some scraping of bark and damage to roots can be expected from the logging operation. Implementing Project design features described in would reduce the risk of damaging remaining trees (EA section 2.2.2).

3.2.2 No Action Alternative

Stand Structure

Without treatment, the project area would not continue on the path of accelerated development of late-successional stand structure. Crowns would be expected to recede over the next 10 to 20 years, reducing the live crown ratio and slowing growth rates on the trees. Average tree size would continue to increase, but at a slower rate as competition for light, water, and soil nutrients increases. The investment of time and money already spent by the BLM to develop the study site would be compromised, and the research and monitoring goals of the DMS project would not be realized.

SEIS Special Attention Species and Special Status Species:

With no human caused changes and excluding natural disturbances to the habitat that currently exists at the proposed project sites, no impact to any known or undiscovered T&E/SS/SA botanical species would be expected to occur. As the habitat in the proposed project area naturally changes over time, species composition within different botanical groups would increase or decrease during different stages of succession as suitable environmental conditions and substrates became available.

Invasive / Non-native Plant Species (including Noxious Weeds):

With no new human caused disturbances in the proposed project area, the established invasive/non-native species population numbers should remain at current level for a few years. These levels would decline as native vegetation encroaches and displaces the non-natives species. These species would likely maintain a small population presence along roads and in natural openings and may increase in population size in areas where natural disturbances occur.

3.3 Soil and Site Productivity

Affected Environment - Section 3.3

Soils on this project range from clay loams to stony loams. Project soils are well-drained and deep (20-40 inches) to very deep (>60 inches). These soils series are suited for timber production. While slopes within the units seldom exceed 35 percent, erosion hazard is moderate to severe where a few slopes approach 50 percent near streams. Table 6 details selected soil attributes for each site.

Table 6: Soil Series and Average Slope Range by Unit

Unit(s)	Soil Series ¹	Average Slope Range within Unit
1	Kinney Cobbly Loam	3-35%
	Harrington-Klickitat Complex	15-55%
2	Kinney Cobbly Loam	3-35%
3	Kinney Cobbly Loam	3-35%
	Blachly Clay Loam	3-35%
4	Harrington-Klickitat Complex	0-50%
	Kinney Cobbly Loam	0-35%

Environmental Effects - Section - Section 3.3

3.3.1 Proposed Action

Timber Harvest

The proposed action would leave the majority of the surface vegetation, root systems, and litter intact. Slash from thinned trees would also remain on site. Expected amounts of surface soil displacement, surface erosion, and dry ravel resulting from thinning would be minimal. The area of soil compacted from harvest would be less than 15 acres (< 10% of the project area) – within the District management direction (RMP p. C-1-2). The majority of this includes some already compacted landings and skid roads from the previous harvest and historic logging. Where practical, portions of previous skid roads would be used for this harvest.

While repeatedly turning equipment around causes heavy compaction and soil displacement, landings would utilize a portion of existing haul or harvest roads. The existing roads lie on compacted soil and have minimal topsoil (organic material).

Ground mostly adjacent to roads would be used to sort and deck logs until transport; soil compaction in these places (out of the road prism) would not inhibit natural revegetation or biochemical soil processes more than approximately one to five years. In the small portions of the project area steeper than 50 percent slope (approximately less than two acres total), soil rutting hazard is severe where topsoil is removed. Soil displacement can be mitigated by careful construction and maintenance of roads, skid trails, yarding corridors, and landings to control erosion (including water bars, slash placement, and seeding). Soil displacement is also dependent on equipment capabilities and operation.

On the approximately 108 acres that would be skyline yarded, compaction would not inhibit natural revegetation or biochemical soil processes more than approximately one to five years.

Roads

Constructing up to 0.18 miles of new temporary natural surface spur roads would also displace topsoil and compact subsoil on less than 0.5 acres. These new road segments would be left in a stable condition so that maintenance is unnecessary.

Road beds would be waterbarred, seeded with native grasses, and left to be utilized in the next stand treatment. The location and design of the roads would be such that any resulting runoff would infiltrate rapidly into adjacent undisturbed soils, well away from riparian areas. Road construction would convert forested land to non-forested land. Over time, some recovery back to forested conditions would occur. Placing slash debris over exposed surfaces, water bars, and blocking vehicle access would decrease surface erosion and runoff. This also provides a source of organic material to the disturbed soil. For further erosion discussion see EA section 3.4.

Road maintenance (e.g. brushing, grading, etc.) and improvement (e.g. upgrading, replacing, or adding cross drains or culverts) necessary to use dirt roads would keep currently non-forested land as non-forested land. Such improvements provide better drainage and less road surface erosion.

Vegetation generally reestablishes within one or two seasons and erosion rates return to low levels (at or near geologic rates) thereafter. Road improvements would occur during dry season to minimize soil impacts. Associated road decommissioning would enhance soil productivity and facilitate revegetation of formerly non-forested ground.

Pile Burning

On the sites where piles are burned, surface organic material would be removed. Pile burning and rain impact on burned spots can decrease infiltration capacity until natural re-vegetation occurs. Since burning would occur during wet soil conditions, heat damage to the upper soil layer (A-horizon) would be moderated and only occur in scattered localized sites.

Cumulative Effects:

No cumulative effects to soil resources would result from thinning or connected actions in the project area. Effects would be contained within the project areas, and there would be no other uses affecting this resource.

3.3.2 No Action Alternative

Current soil compaction within the project area, associated with past logging, would continue to recover at the current rate. No new soil compaction or displacement would take place within the project area. Erosion would proceed at or near a geologic rate. Maintained rock roads would continue to be part of the transportation system and be maintained according to the Salem District transportation management plan, and would remain as non-forest land providing access for management activities and public use.

3.4 Water and Hydrology

Affected Environment - Section 3.4

The project area contains several small headwater streams tributary to the Hamilton Creek watershed. These headwater streams are in proper functioning condition: well shaded, stable beds and banks, adequate quantities of wood, sediment and a diversity of riparian species.

On public lands, stream side shading from riparian vegetation is adequate to buffer streams from temperature increases. Hamilton Creek is listed for not meeting summer stream temperature standards and is addressed in the Total Maximum Daily Load (TMDL) for the South Santiam River (Hydrology report p. 14). Recognized beneficial uses of in-stream flows include anadromous fish, resident fish, recreation, and esthetic value. Hamilton Creek is tributary to the municipal watershed for the cities of Lebanon and Albany. The Hamilton Creek watershed is not a key watershed.

Municipal Watersheds: The project area drains to the Hamilton Creek 6th field watershed, which is nested within the South Santiam River 5th field watershed. The cities of Lebanon and Albany, OR withdraw drinking water from the South Santiam River just downstream from its confluence with Hamilton Creek.

Environmental Effects - Section 3.4

3.4.1 Proposed Action

Summary

Detectable effects to watershed hydrology, channel morphology, and water quality as a result of the proposed action are unlikely. This action is unlikely to permanently alter the aquatic system either by affecting its physical integrity, water quality, sediment regime or stream-flow. The long term effects of the proposal may be slightly beneficial for the aquatic system as a result of increased wood recruitment and species and structural diversity in the riparian zone.

Temporary road construction and road repair at stream crossings would result in small (limited to the road right-of-way), short term (1 year or less) alteration of channels. All effects would likely be within the range of effects disclosed in the RMP/FEIS (BLM, 1994).

Other than these effects, this proposal would be unlikely to alter the current condition of channels, wetlands and ponds in the project area: minimization of direct and indirect disturbances from the proposed action would likely result in the maintenance of stream channels and wetlands in their current condition. At the same time, where current conditions in channel are poor, this proposal is unlikely to lead to detectable improvement in the short term.

While this proposal may slightly reduce effective shade in the primary shade zone adjacent to Scott Creek in Unit 4, it is unlikely to have any detectable effect on stream temperatures, pH, or dissolved oxygen. Sediment transport and turbidity in this watershed may increase over the short term as a direct result of road repair and construction, culvert removal, hauling and yarding in and around riparian zones. These effects are unlikely to be detectable or visible beyond the first winter following disturbance or beyond a distance of approximately ¼ mile downstream from the disturbance. Over the long-term (beyond two years), current conditions and trends in turbidity and sediment yield would likely be maintained under the proposed action.

Watershed Hydrology

Ground Water: It is unlikely the proposal would result in any detectable change to local ground water (Hydrology report pp. 27). The proposal would remove less than half the existing forest cover and the root systems of the conifers retained would quickly exploit any additional soil moisture availability. Proposed road construction would not involve excavation into side slopes where water tables could be intercepted.

Base Flow: It is unlikely the proposal would result in any detectable change to local base flow, because the proposed project would remove approximately half the existing forest cover, so that the root systems of the conifers retained would quickly exploit any additional soil moisture availability.

Peak flow effects from harvest: Since portions of the project area are in a zone subject to transient snow accumulations in the winter, it can be assumed that the reduction in stand density may result in some small increase in snow accumulation and melting during rain-on-snow (ROS) events. However, due to the small area considered in this action, this effect is not likely to result in detectable changes to peak flows in these watersheds.

Peak flow effects from new road construction: New road construction under the proposed action would be limited to stable slopes. Slopes in these areas are low to moderate, and would not require extensive full-bench or cut-and-fill construction. This is unlikely to have a detectable effect on peak flows because there would be no interception of surface or ground water with delivery to streams.

Peak flow effects from roads: Most of the roads that would be utilized under this proposal already exist. This proposal would not alter these roads in a way that would likely reduce or increase any existing effect to peak flows attributable to the current road network, and thus, it would maintain the current condition and trends relative to hydrology and stream flow that existing roads contribute to. Improvement and repair of road surfaces would be implemented under the proposed action. Some of these actions may reduce existing road effects on local and watershed hydrology.

Stream Channel Morphology (Physical Integrity)

Under the proposed action, with the exception of stream crossing repairs, there would be no direct alteration of any stream channel, wetland or pond morphological feature. In most of the project area yarding operations and equipment would be at least 20 feet from stream channels.

Units 1 and 4 each contain stream reaches proposed for the thin-through riparian treatment. Along these streams, some trees directly adjacent to the active channel may be cut and harvested. Unit 4 has a streamside area less than one acre in size, where bank erosion would be a concern if any trees were to be felled and removed. This area would be designated on the timber sale contract map, for any felled trees to be left in place. The trees need to be felled to create a “thin-through” treatment effect that is consistent on both sides of the stream, for the Microclimate and Microhabitat portion of the Riparian Buffer Study.

In anticipation of trees cut adjacent to the active channel in some locations, increased suspended sediment and turbidity in the creek, in association with minor bank scour, is expected. This increase is likely to be short-term (minutes to hours) and localized (may extend for a short distance, less than 100 meters, down the channel).

Trees felled into the stream and left in place would increase channel complexity. Possible channel responses could include the formation of small pools, low-velocity zones, areas of deposition, bank undercutting and channel scour. Actual channel adjustments would be determined primarily by stream flows in the years following project implementation. Channel changes could extend a few meters upstream and/or downstream of the original project site.

Water Quality

Sediment: Sediment transport and turbidity in this watershed may increase over the short term as a direct result of road repair and construction, culvert removal, together with hauling and yarding in and around riparian zones (Hydrology report pp. 21-26). Over the long-term (beyond two years), current conditions and trends in turbidity and sediment yield would be maintained under the proposed action.

Tree removal, road renovation and construction would not occur on steep unstable slopes where the potential for mass wasting adjacent to stream reaches is high. Therefore, increases in sediment delivery to streams due to mass wasting are unlikely to result from this action.

In addition, potential impacts resulting from tree harvest, road construction, maintenance and use would be mitigated to reduce the potential for detectable sediment delivery to streams, by implementing Best Management Practices (BMPs), such as stream and road buffers, minimum road widths, minimal excavation, ensuring appropriate drainage from road sites, and seasonal limitations on road use and ground-based harvest operations (RMP Appendix C, pp. C-1 to C-9).

Temperature: The Oregon Department of Environmental Quality's (ODEQ) Willamette Total Maximum Daily Load (TMDL) has goals for the maintenance of and/or increase in effective shade adjacent to perennial streams. By thinning the overstory within the "primary shade zone" (about 60 feet, maximum) of a number of the perennial streams in the project area, this action would not follow these recommendations.

Some reaches are proposed for a "thin-through" buffer treatment; while other reaches were treated to within about 25 or 50 feet of the active channel in the initial thinning, and are proposed for re-thinning in this proposal. The riparian reserve boundaries are unchanged from the initial thinning for the majority of stream reaches.

Theoretically, the reduction in shade could result in increased heat load to the treated segments of these streams; on hot summer days during low flow this could result in higher peak temperatures. This effect, if it occurs, would be documented by stream temperature monitoring during the study. Temperature increases would likely be small (no more than a one or two degree increase in the peak temperature) and would not be detectable more than a few hundred meters downstream of the treated reach. The effect would diminish as the remaining stand filled in canopy openings and would likely last less than five years.

However, this theoretical effect is unlikely to actually occur because the increase in heat load would be minor and stream temperatures in this stream reach are well buffered by ground water inputs which, at elevations of 2,400 feet, tend to keep headwater stream temperatures well below the water quality threshold of 18 degrees centigrade (Hydrology report p. 20).

The BLM's Oregon State Office (OSO) has consulted with ODEQ about the DMS project. In its memo dated 9/8/06, the OSO states that "The Density Management Study affords an additional opportunity to evaluate assumptions and provisions of the Temperature TMDL Implementation Strategy.....We understand that DEQ cannot "approve" or "authorize" the actions planned in the DMS, but that DEQ is interested in remaining involved and providing feedback regarding this monitoring and adaptive process. Thus, we would continue to invite DEQ's participation and review of results from the 2006 and future field seasons, and would solicit DEQ input regarding changes to the monitoring design. In addition, we would continue to work with DEQ to ensure that data produced by the study is used to further refine and improve methods for analyzing stream temperature and the impacts of forest treatment on parameters that affect stream temperature." The DMS Study Coordinator would follow up with both the OSO and ODEQ in this regard.

Cumulative Effects

Since the proposal is not likely to result in detectable direct or indirect effects to stream flow the proposal would be unlikely to contribute to any potential cumulative effects to either annual flow, base flow, flow timing or peak flows in these watersheds (Hydrology report p.19). The proposal would result in no net increase in forest openings in Transient Snow Zone with crown closure <30% and therefore would not contribute cumulatively to peak flow augmentation that may be occurring in these watersheds as a result of forest harvest. Proposed road use and construction is unlikely to alter surface or subsurface hydrology or to contribute cumulatively to any change in the watershed base, peak or annual flow.

This action could contribute cumulatively to accelerated sediment loads observed in the watershed; however, it would be very difficult to detect (Hydrology report pp. 26-27). Typically, sediment yields from forest harvest decrease over time as a negative exponential. The quantity of surface erosion with delivery of sediment during large storm events would likely drop back to current levels (0.045 t/ac) within three to five years as the remaining forest stand fills out and skid roads recover.

In a similar manner, the risk of short term increases in stream turbidity as a result of road repair and hauling would likely contribute to direct increase in turbidity levels directly below road/stream intersections. Cumulatively however, the limited magnitude and duration of this effect would likely be insignificant for water quality on the scale of the sixth field watershed and would be unlikely to have any effect on any designated beneficial uses. Again, this contribution to watershed sediment yields would be short-lived (primarily in the first winter following road repairs).

Over the long term, the incremental improvement of forest stand characteristics (larger conifer trees with longer, deeper crowns, increased species diversity, and wood recruitment) in the riparian zone would support the cumulative improvement in these conditions that is anticipated throughout these watersheds in response to the forest plan. This would add cumulatively to the improvement in the condition of stream channels and wetlands in the watershed.

3.4.2 No Action Alternative

The No Action Alternative would result in the continuation of current conditions and trends at this site as described in the Description of the Affected Resource sections of the individual project areas of this report. Effects to the watersheds would continue to occur from the development of private and other agency lands (primarily timber harvesting and road building).

Cumulative Effects

The “no action” alternative would result in the continuation of current conditions and trends at this site as described in the *Description of the Affected Resource* section of this report. Cumulative effects to the watershed would continue to occur from the development of private and other agency lands (primarily timber harvesting and road building).

3.5 Fisheries and Aquatic Habitat

Affected Environment - Section 3.5

General Fisheries Habitat

Scott Creek and two forks of Hamilton Creek are fish-bearing within the project area. Fish are present in Scott Creek throughout the stream’s course through the southwest ¼ of Section 13. Hamilton Creek tributaries support fish up to a confluence of two 2nd order streams in the northern fork in the northwest ¼ of Section 13, and up to approximately the center of Section 13 in the southern fork.

The fish species found in both stream systems are resident cutthroat trout (*Oncorhynchus clarki*). Streams in the project area are generally of moderate gradient, with boulder-cobble dominated substrates. Banks are stable and well-vegetated. Slopes near the streams vary from moderate to steep.

Near the end of Road # 12-1E-14.02, a 24-inch culvert in the southern fork of the Hamilton Creek tributaries is undersized and is a barrier to upstream movement of cutthroat trout due to the gradient at which it was installed

Threatened and Endangered Species

Upper Willamette River (UWR) chinook salmon (*O. tshawytscha*) and UWR steelhead trout (*O. mykiss*) are listed as ‘threatened’ under the Endangered Species Act of 1973 (ESA). Both species are present in the Hamilton Creek watershed at varying distances downstream of the proposed project units (see Table 7). Consultation with the National Marine Fisheries Service on the effects of the proposed project is required for projects that “may affect” ESA listed species.

Table 7: Approximate Distances Downstream From Proposed Project Units To Potential Resident And ESA Listed Fish Habitat¹

Unit Number	Distance To Resident Cutthroat Trout Habitat	Distance To Potential Steelhead Habitat	Distance To Potential Chinook Habitat
1	0 (thin through) on northern fork of Hamilton Cr. Trib.	4.8	10.5
2	min. 50' on southern fork of Hamilton Cr.	5.0	10.7
3	50' minimum on Scott Cr.	4.3	9.2
4	0 (thin through) on Scott Cr.	4.7	9.6

Distance estimates in miles unless stated in feet.

¹ Upstream limits of anadromous fish distribution are obtained from streamnet.org. Stream distances are calculated from ArcGIS.

Environmental Effects -- Section 3.5

3.5.1 Proposed Action

In the thinning units where full Riparian Reserve (RR) widths are maintained, no impacts to fisheries and aquatic species as a direct result of timber harvest are anticipated. In the thinning units with no RR, and those with variable RR widths, long-term anticipated impacts are likely to be positive. The objective of the thinning is to accelerate the growth and late-successional habitat characteristics of the trees left standing. If that objective is attained, the project would have a long-term positive effect on fish and other aquatic species by increasing recruitment potential of large woody debris and nutrients to the aquatic system.

In the streams with “thin through” riparian prescriptions, slight localized short-term increases in sediment input may occur as a result of yarding near the streams.

However, this potential effect would be minimal due to the proposal to “fall and leave” the trees felled on potentially unstable area described under the effects to Stream Channel Morphology (Physical Integrity) in EA section 3.4. Lateral skyline yarding between the 1st and 2nd order streams in Unit 1 has the potential to result in slight sediment increases in those streams.

Throughout most of the project area shade levels along streams would be maintained. Slight decreases in stream shade may occur on the reaches with “streamside retention” and “thin through” prescriptions but effects on stream temperature are expected to be negligible. Stream temperature is one of the response variables to be monitored by the PNW Riparian Buffer Study.

Removal of the culvert on Road # 12-1E-14.02 would restore unimpeded upstream fish passage for resident cutthroat trout and aquatic amphibians, if present. A short-term (hours) input of sediment is expected to occur in the Hamilton Creek tributary during project implementation, and again during the first fall rainstorm. The increased turbidity from the culvert removal is unlikely to be visible or detectable beyond ¼ mile downstream.

It would probably have short-term (hours) adverse effects on resident fish within 1/8 mile downstream of the culvert sites. Likely adverse effects of sediment on fish would be displacement, decreased feeding ability and gill abrasion. No long-term adverse effects of the culvert removal on aquatic species or habitat are expected downstream of the culvert site. Trout present immediately downstream of the culvert would be the most affected, with effects diminishing with distance downstream from the culvert removal site. Restoration of the streambanks at the culvert site, followed by seeding with native grass seed is expected to stabilize the exposed banks and prevent ongoing erosion.

The approximately 800 feet of new road construction to access Units 1 and 4 would have no effect on the aquatic system due to the ridgetop location and absence of hydrologic connection of the proposed roads.

Threatened and Endangered Species

The project would have “no effect” on Upper Willamette River (UWR) steelhead trout or UWR chinook salmon. Consultation with NOAA Fisheries on the potential effects of the project on those species would not be required. The project would also have no effect on Critical Habitat for the species listed above, or on Essential Fish Habitat (EFH) as designated under the Magnuson-Stevens Fishery Conservation Act. The determinations of “no effect” are based primarily on the location of the project relative to ESA listed species distributions: all of the proposed project units are greater than four miles upstream of habitat that may be occupied by ESA listed fish species as shown in Table 7.

Potential effects of project activities on ESA listed fish species would be from increased stream temperatures resulting from a decrease in stream shade levels and increased sediment and turbidity in the project area streams. While the proposal may slightly reduce effective shade in the primary shade zone adjacent to one perennial stream (unit 4), it is unlikely to have any detectable effect on stream temperatures.

Sediment transport and turbidity in this watershed may increase over the short term as a direct result of culvert removal; road repair and construction; and hauling and yarding in and around riparian zones.

These effects are unlikely to be detectable or visible beyond the first winter following disturbance or beyond a distance of approximately ¼ mile downstream from the disturbance. Over the long-term (beyond two years), current conditions and trends in turbidity and sediment yield would likely be maintained under the proposed action.

Cumulative Effects

Threatened/Endangered Species: No cumulative effects to ESA listed fisheries are expected because the Proposed Action would maintain the indicators described in the previous section and there would be no direct or indirect effects to ESA listed fish species.

Other Fish Species: Cumulative effects to fish bearing streams are described in the Hydrology effects, Section 3.4.1.

3.5.2 No Action Alternative

Under this alternative the anticipated beneficial effects of thinning to accelerate growth of riparian conifers would not be realized. The potential short-term sediment input to streams would not occur as a result of falling and yarding near streams, and log hauling on unpaved roads. The potential slight reduction of shade in the primary shade zone also would not occur.

3.6 Wildlife

Affected Environment - Section 3.6

General Description

The Keel Mountain DMS project is located in T.12S., R.1E., Section 13 in the Hamilton Creek Watershed Analysis Area (WAA) at 1900-2400 feet elevation. The project area was first treated as part of an experimental design in 1997.

The proposed next-phase treatments total approximately 155 acres in size. These stands originated after clearcut-logging about 50 years prior to the first treatment. At that time, the stands were in the closed sapling pole stage of succession (mid seral stage). Canopy closures were high, averaging from 70 to 80 percent. The overstory consisted primarily of Western hemlock (60%) and Douglas-fir (40%), averaging 12" to 16" dbh. There is no green-tree old-growth component in these stands. There is a hardwood component consisting mostly of red alder, primarily in riparian areas. The understory layers consist of western hemlock, western redcedar, vine maple, salmonberry, and huckleberries. The ground cover is light to moderate consisting of sword fern, dwarf Oregon grape, and oxalis. This general species composition was maintained through the initial treatment, though understory development has increased (as expected) in the treated stands. Average stand diameter now ranges from 15 inches dbh (control unit not treated) to 19 inches dbh (variable density unit from the initial treatment).

Residual Old Growth Trees, Snags and Coarse Woody Debris (CWD), and Special Habitats

Table 8 summarizes these habitat features for the project area. There are no live old-growth remnant trees in these stands, and there are about 1 to 2 large (>20" dbh. and >15' height) standing dead trees per acre. Snags 12-19.9 inches dbh, range in number from approximately 14 per acre in the variable density treatment unit to 25 per acre in the untreated control unit. The majority of the snags in all units are hard snags in decay classes 1-3. Snag numbers are highest in the control unit due to recent self-thinning, and are smaller than the average live-tree diameter of the stand. Most of the large down logs (>20 inches in diameter at the large end and 20 feet in length) are soft material in decay classes 4 and 5. CWD that would meet RMP requirements is currently lacking in all of the units proposed for treatment.

No special habitats (defined as wet and dry meadows, talus, cliffs & rock outcrop) are present in the project area.

Table 8: Summary of Special Habitats, Remnants, Snags and Coarse Woody Debris (CWD)

Unit	Location	Seral Stage	Remnant Old Growth	Special Habitats *	Snags**	CWD***
1 (High Density)	12S-1E-13	Mid	No	No	21/2	0/<60'
2 (Variable Density)	12S-1E-13	Mid	No	No	14/1.5	0+/<60'
3 (Moderate Density)	12S-1E-13	Mid	No	No	17/1.5	0/<60'
4 (Riparian Buffer Case Study and Control)	12S-1E-13	Mid	No	No	25/2	0/<60'

Estimates based data provided by the Density Management Study Team

Seral Stage Age Classes (years) based on Stand Exam data: Early Seral = 0-30; Early Mid Seral = 30-40; Mid Seral = 40 – 60; Late Mid Seral = 60 -80; Early Mature Seral = 80 - 120; Mature = 120 - 200; Old Growth =200+

* Special habitats (within the units only) include: wet and dry meadows, talus, cliffs & rock outcrops.

** Snags = (per acre, 12 to 19.9"/>20" dbh, all decay classes over 15 feet tall

*** Linear ft per acre >20" dbh & 20' long, hard (decay classes 1-2)/soft (decay classes 3-5) logs

Snag-Associated and Cavity Nesting Species

Table 9 summarizes the number of snags necessary to meet management direction in the RMP (p. 21) for cavity nesting birds. The hairy woodpecker, red-breasted sapsucker and pileated woodpecker are species associated with conifer stands in the western Cascade Mountains, and are most likely to be affected by thinning young stands. Northern Flicker and Downy woodpecker are not typically associated with closed-canopy conifer-dominated stands in the western Cascades, though both species may be found in or around the project areas. The guidelines in Neitro et al (1985) for minimum snag numbers necessary for 40 percent population levels of cavity nesting birds are based a number of snags per 100 acres. Currently, the units of the project area greatly exceed the total number of snags (averaged per 100 acres) necessary to meet 100 percent of potential populations, though not all of the snags have reached the appropriate decay class that would be optimal for some species.

Table 9: Minimum Number of Snags Necessary to Support Species of Cavity Nesting Birds At 40 Percent of Potential Population Levels

(RMP p. 21, as per Neitro et al, 1985)

Diameter class (inches dbh)	Snag Decay Stage		Total by diameter class (per 100 acres)
	Hard 2-3	Soft 4-5	
11+		Downy woodpecker	6
15+	Red-breasted sapsucker	Hairy woodpecker	95
17+		Northern flicker	19
25+	Pileated woodpecker		2
Total – all diameter and decay classes			122

Federally Listed Species: Northern Spotted Owls

The proposed treatment units provide 155 acres of dispersal habitat. About half of the project area is located within 1.2 miles (provincial home range radius) of one known spotted owl site. None of the project area is located in the core area or within disturbance range of the spotted owl site. There are no spotted owl activity centers in the vicinity and the project area is not located in critical habitat.

Special Status and Survey and Manage Species

The following Special Status/Special Attention Species are known or suspected to occur in the Keel Mountain DMS area based on field inventories of the habitats present and a review of the existing literature. Habitat and range data and previous surveys for mollusks and amphibians conducted over 9000 acres on the Cascades Resource Area since 1991 indicate that no Bureau Sensitive or Survey and Manage mollusk species are likely to be present in the proposed treatment units.

Bureau Sensitive – Oregon Slender Salamander: Habitat is generally described as conifer-forested stands dominated by Douglas-fir with large amounts of large rotten (decay class 4 to 5) Douglas-fir down logs. Old logs, stumps and large woody material piles around stumps and exfoliated tree bark on the ground within old-growth and mature conifer forest are used for cover, feeding and breeding. Larger material that can hold moisture through summer drought is generally considered to be most important in maintaining moderate subsurface microclimate conditions. Optimal habitat for these animals is generally described as late-successional forest conditions with cool, moist microclimates and large down wood.

The Oregon slender salamander is found throughout the Cascades Resource Area in stands in the full range of seral stages. Its distribution on BLM land within the planning area appears to be limited by dry conditions at low elevations along the Willamette Valley floor, and by cold conditions at higher elevations (Dowlan, unpublished 2006).

Amphibian surveys were conducted in the project area in 1997 prior to the first treatment, and terrestrial mollusk and amphibian surveys were conducted in 1999 and 2000 two years after treatment had been completed. Transects were sampled that began at the stream edge, and extended through riparian areas upslope as far as 200 meters. The surveys were conducted by a PNW field crew (Rundio and Olson, 2006 in review) in order to measure the influence of headwater site conditions and riparian reserves on terrestrial salamander response to forest thinning. All amphibian species were recorded during these surveys. Oregon slender salamanders comprised 35% of all terrestrial amphibian captures. Eighty to ninety percent of captures were from woody material, consistent with other studies for the species.

Bureau Assessment – Cascade Torrent Salamander: Species in the genus Rhyacotriton are nearly always found in cold, clear streams, seepages, or waterfalls from sea level up to about 1,200 m in elevation. They are frequently found in intermittent streams and seeps, usually under woody debris, under rocks, or buried in very loose uncompacted gravel. Cascades torrent salamander has been found throughout the Cascades Resource Area.

Part of the research associated with the DMS project was to assess initial effects of headwater Riparian Reserves with upslope thinning on stream habitats and amphibians (Olson 2006 in review).

In-channel surveys were conducted for fish and amphibians one year prior to initial treatment, and two years after initial treatment. The species was found in low-order streams at three sample locations within the project area.

Bureau Sensitive - Northern Goshawk: The proposed thinning units provide 155 acres of marginal habitat for Northern Goshawks. The goshawk is a Bureau Sensitive species which prefers older forests with dense canopy closures at higher elevations. The proposed units are mid seral stands located at lower elevations. No goshawks are known to be present in the project area.

Survey and Manage Category B – Red Tree Vole: Red Tree Vole is associated with conifer forests west of the Cascades summit. The project area is within the “Northern Mesic Zone” of the range identified for the species. Surveys are required within the Northern Mesic Zone in suitable habitat for the red tree vole. Suitable habitat for the red tree vole is described as mature, old-growth, or older mixed-age conifer forests with larger trees in the canopy (quadratic mean diameter > 16 inches dbh) and multi-layered canopies and large branches capable of supporting nests and providing travel routes. Conifer stands with a canopy closure of 60% or greater and with two or more predominant conifer trees per acre also qualifies as suitable habitat. Predominant trees are overstory trees remaining from an earlier cohort, which should have a portion of their crowns above the dominant canopy, and have large limbs, well developed crowns, cavities, broken tops, or mistletoe, that may provide structure for red tree vole nests (Biswell et al 2002).

Though the project area is within the Northern mesic zone of the Red Tree Vole range, none of the stands that would be treated meet the stand-level criteria as described above. Therefore the Red Tree Vole survey protocol is not triggered. In addition, the Keel Mountain DMS project falls under an exemption issued in the October 11, 2006, modified injunction in Northwest Ecosystem Alliance et al. v. Rey et al., which makes an exemption for thinning projects in stands less than 80 years of age.

Bats: Three former Protection Buffer bat species occur in the Cascades Resource Area (silver-haired bat, long-eared myotis, and long-legged myotis). These species are associated with caves and mines, bridges, buildings, cliff habitat, or decadent live trees and snags with sloughing bark. Large snags and standing dead trees with bark attached are used variously as solitary roosts, maternity roosts, and hibernacula by these species, and six other bat species associated with Douglas-fir forests (Christy and West 1993). Since this habitat is very rare in the project areas, presence of these three species is unlikely. Other Special Status bat species are more closely associated with caves, rock outcrops, buildings and abandoned mines; these habitat features are not present in the project area.

Migratory and Resident Bird Species

Bird species richness at the stand level has been correlated in some recent studies with habitat patchiness, densities of snags, and density by size-class of conifers (Hagar, McComb, and Emmingham 1996, Hansen et al. 2003).

Even-aged conifer stands provide habitat for a relatively high abundance of a few bird species (hermit warbler, red-breasted nuthatch, and golden-crowned kinglet, for example) which feed on insects gleaned from conifer foliage, however, these species are generally common in conifer stands of all ages.

The proposed thinnings are located in the Western Oregon Cascades Physiographic region. The Partners in Flight conservation plan which addresses the Western Oregon Cascades is the *Conservation Strategy for Landbirds in Coniferous Forest of Western Oregon and Washington* (1999). None of the proposed thinnings are located in a high priority forest type and the Western Oregon Cascades is not identified as a high priority physiographic region.

The proposed thinning areas are in mid seral stands, which are generally low in landbird species composition and richness. Focal species for this forest condition include the Hutton's vireo and black-throated gray warbler. The habitat attributes that these species associate with are deciduous canopy/subcanopy layers. The first thinning provided for a more diverse community of shrub and ground cover plant species that are important in providing insect and plant food resources for bird species which rely on living hardwood trees and shrubs, and on hardwood leaf litter. Abundance of arthropod prey species has been correlated with understory and midstory vegetation, particularly tall shrubs and hardwoods. These habitat elements have improved as a result of the first treatment, and are expected to improve further after the second treatment.

Studies conducted in western Oregon have helped to define a typical avian community that is most closely associated with young Douglas-fir stands with high canopy closure and low structural diversity. The most common species include: hermit warbler, golden-crowned kinglet, winter wren, red-breasted nuthatch, and Swainson's thrush, all of which are also common (or more abundant) in stands with greater structural complexity. Based on current habitat conditions, no migratory or resident bird species with BLM special status are expected to occur in the project area.

Big Game

Big game species that are found in the project areas include Roosevelt elk (*Cervus elaphus roosevelti*) and black-tailed deer (*Odocoileus hemionus*). The project areas are in mid seral stands which provide hiding and low quality thermal cover. Early seral communities are abundant on adjacent private lands surrounding the project areas. The Salem District Record of Decision and Resource Management Plan (RMP) approved May 1995, identifies no critical winter or summer range in the project areas (RMP p.26).

Environmental Effects - Section 3.6

3.6.1 Proposed Action

The density management research is intended to describe and measure the development of older forest characteristics that result from repeated thinning of a young conifer stand. Research that has occurred since the 1980s has determined that it is possible to develop desired structural and compositional diversity and variability in young managed stands through specific actions. Thinning forest stands produces what has been described as "cascading ecological effects" (Hayes, Weikel and Huso, 2003) that result from reduced competition between overstory trees and increased availability of solar radiation to the forest floor.

Growth, size, branch diameter, and crown ratio of the remaining trees is increased, and development of understory vegetation is stimulated, effectively increasing structural complexity and altering habitat quality and availability for a range of invertebrate and vertebrate species.

Residual Old Growth Trees, Snags and Coarse Woody Debris (CWD)

Within treatment units most, if not all, of existing snags >15 inches dbh and in all decay classes would remain standing. This would effectively reserve the best existing habitat features for primary excavators (woodpeckers), and secondary cavity users, such as songbirds, and small mammals. Though not likely, it is possible that snags of this size class may be cut for safety reasons, or fall incidental to thinning operations. Any snag that falls for any reason as a result of thinning operations would remain on-site to become coarse woody material, providing important habitat for a different, but also key group of dead-wood associated species. All dead wood that is on-site when timber marking takes place would remain on-site, either in the form of standing snags or as down logs, after treatment.

Growth of live trees would be accelerated by release from competition, so that larger trees would be available sooner than without treatment, from which additional larger snags could develop naturally or by management action later in the life of the stand.

Up to two decay class 1 and 2 logs per acre would be added throughout the project area, augmenting the existing logs in later stages of decay. These additional logs would generally reflect the average dbh of the stand from which they originate. Accelerated growth from thinning would ensure that larger trees would be available in the future for snag and down log recruitment or creation. The RMP minimum guideline (at least 20" in diameter at the large end, 20 feet in length, and in decay classes 1 and 2, at least 240 linear feet per acre), would be met in the future.

Snag-Associated and Cavity Nesting Species

A more than adequate number of snags in the proper size classes are currently present for 40 percent of potential population levels. The passage of additional time would advance the decay of existing decay class 1 and 2 snags, balancing the ratio of snags across the full range of decay classes. A minor loss of snags due to logging operations is highly unlikely to reduce snag numbers to minimum requirements for 40 percent of potential populations, as described by Neitro et al.

Federally Listed Species: Northern Spotted Owl

No known spotted owls or spotted owl critical habitat would be affected by thinning or connected actions. No suitable habitat would be altered within the provincial home range radius of any known spotted owl sites and dispersal habitat would be maintained after harvest. Seasonal restrictions on habitat modification activities (felling, yarding, and road building) would minimize the risk of disturbance to northern spotted owls during the critical nesting season.

In the short term, 155 acres of dispersal habitat in the Hamilton Creek Watershed would be degraded as a result of thinning, including about 77 acres of dispersal habitat within the provincial home range radius of one known spotted owl site.

In the long term, canopy closures would increase and these stands could attain suitable habitat conditions within 20 to 40 years.

“Degrade” habitat means to affect the quality of spotted owl dispersal habitat without altering the functionality of such habitat. Such treatments can have long-term benefits to spotted owls by encouraging late-successional characteristics to occur more rapidly. In the short-term, disturbance associated with accomplishing treatment (logging, road-building, etc.) may have temporary negative effects on the presence or movement of spotted owls between blocks of suitable habitat. However, the treatments would maintain dispersal habitat, therefore maintaining the ability of the habitat to accommodate movement of birds after thinning is completed.

Over the long term (>20 years), as stands respond to treatment, spotted owl habitat conditions are expected to improve. Residual trees would increase in size and be available for recruitment or creation of snags, culls and CWD for prey species and nesting opportunities for spotted owls.

Special Status and Survey and Manage Species

Bureau Sensitive – Oregon Slender Salamander: The first treatment removed overstory, decreased canopy closure, increased light and air circulation to the forest floor, and presumably increased desiccation rates to duff and woody material on the forest floor during warm and dry months. Despite these habitat changes, second-year post-treatment surveys in the project area indicate that Oregon slender salamander was not affected by the decreased canopy closure (Rundio and Olson 2006 in review).

Oregon slender salamanders would be expected to persist at sites within stands where CWD of adequate size and distribution currently occurs. The CWD currently on-site prior to thinning is expected to continue to provide refuge for terrestrial salamanders after treatment. Design features would minimize disturbance to existing CWD, though some mortality to individuals could result from crushing or loss of wood/soil contact. Ground disturbance from tractor skidding trails and other ground-based logging equipment would be limited to ten percent of project unit areas, and therefore, no more than ten percent of potential Oregon slender salamander habitat within any unit.

These results are consistent with survey results elsewhere in Cascades Resource Area from stands that had been subjected to timber harvest in the past (Dowlan, unpublished 2006). Some stands in the same age class as the Keel Mountain DMS project area had been subjected to regeneration harvest with no green tree retention, similar to the Keel Mountain stands. Logging practices of the time resulted in heavy concentrations of large logs, or “culls” which were cut, but not removed from the site. This large woody material lasts for many decades, and provides moderating microclimates in which terrestrial salamanders can persist.

Bureau Assessment – Cascade Torrent Salamander: No adverse effects to Cascades torrent salamander are expected as a result of thinning. Post-treatment surveys at Keel Mountain and at 11 other western Oregon sites that are included in Olson’s paper on initial effects of headwater Riparian Reserves with upslope thinning on stream habitats and amphibians (2006 in review) found no evidence of adverse effects from thinning to torrent salamander species present in the project areas (with all thinning densities and riparian reserve widths).

Bureau Sensitive – Northern Goshawk: No Northern goshawks are known to be present in the project areas, so none are likely to be affected by thinning. Marginal goshawk habitat in the proposed units would be temporarily altered due to reduction of canopy closures below current levels. This habitat would become higher quality habitat as structural complexity of stands increases and larger trees become available for nest platforms.

Survey and Manage Category B – Red Tree Vole: In the short-term, it is possible that undetected nests within this marginal habitat could be disturbed or destroyed during treatment. After thinning is completed, stands would acquire older forest characteristics sooner than without thinning. Habitat conditions for Red Tree Voles would gradually become more suitable after the treatment as the stands continue to mature and develop older forest characteristics.

Migratory and Resident Birds

This second round of treatments is expected to increase the trend in overall bird species richness (a combination of species diversity and abundance) toward a community consisting of more shrub-associated species. The future development of hardwood/brush components and canopy layers would favor mid seral focal species such as the Hutton's Vireo and black-throated gray warbler. Thinning stands would be expected to immediately enhance habitat suitability for species which prefer a less dense conifer canopy, and reduce habitat suitability for species that prefer continuous conifer canopies. In the short term, some species may be displaced from thinned areas, but would find refugia in nearby unthinned areas. In the long term, these species would return as stands respond to thinning and canopy closes.

Bird species richness would be expected to gradually increase for up to 20 years prior to the closing of the canopy, as hardwood components of stand structure develop, plant species composition becomes more complex, and hardwood shrub layers, epiphyte cover, and snag density become more prominent within the stands. No species would be extirpated and no migratory or resident bird species with BLM special status would be impacted in stands as a result of thinning.

Big Game

Big game species would be temporarily disturbed by the proposed action. Logging equipment noise and human presence may cause animals to avoid or disperse from the project area temporarily. Thermal and hiding cover would be maintained after harvest. Thermal and hiding cover quality would decrease in the short-term (0 to 10 years) as a result of thinning, opening new roads, renovating roads and road improvements. Vegetative forage such as saplings, shrubs, grasses and forbs would increase as a result of canopy gaps created by thinning and road closures after thinning. As a result of increased light, forage quantity would increase and attract early successional species to the areas such as elk and deer.

In the long term (10+ years), thermal and hiding cover quality would increase and vegetative forage such as saplings, shrubs, grasses and forbs would decrease as a result of canopy closure decreasing the amount of light reaching the forest floor.

Cumulative Effects

Residual Old Growth Trees, Snags and CWD: Regardless of the scale for assessing cumulative effects, design features would protect existing CWD, and snags 15+ inches dbh. Any snag that falls for any reason as a result of thinning operations would remain on-site to become CWD, providing important habitat for a different, but also, key group of dead-wood associated species. A minor loss of snags during project implementation would not contribute to an adverse cumulative effect in conjunction with other activities adjacent to the project area, or within the watershed.

Beneficial cumulative effects to CWD and snag habitat and associated species may occur as a result of implementing the project, since larger trees would be available sooner than without treatment to contribute additional large snags and CWD in future stands. Also, accelerated growth from thinning would ensure that larger trees would be available in the future for snag and CWD recruitment or creation.

Survey and Manage and BLM Special Status Species: The proposed action alternative would not contribute to cumulative effects to the Oregon slender salamander and other CWD associated species. Suitable habitat conditions would be maintained in the short term in the project area, providing refugia for low-mobility amphibians and invertebrates. In the long term, larger trees would be available sooner than without treatment to contribute additional large CWD in future stands. Implementation of the proposed action would not eliminate connectivity between project units or adjacent untreated stands under BLM management.

No adverse cumulative effects to red tree vole habitat are expected because:

- No suitable habitat (as described in the Management Recommendations for the Red Tree Vole, Version 2.0 p. 7) would be lost or altered;
- The thinned stands would attain older forest conditions sooner as a result of the DMS treatments.
- Undisturbed habitat in the same or similar age class with connectivity to the thinning units exists within the project area, elsewhere within the affected section.

Thinning in the project area, either individually or collectively, would not be expected to contribute to the need to list any Bureau Sensitive species under the Endangered Species Act (IM OR-91-57, Oregon-Washington Special Status Species Policy) because habitat for the species that is known to occur in the project area would not be eliminated; habitat connectivity would not be changed; any habitat alteration would have only short-term negative effects; and long-term effects would be beneficial.

Migratory and Resident Birds: Habitat changes resulting from the proposed action would not eliminate any forest cover or change habitat patch size. Therefore, thinning would not contribute to a fundamental change in the species composition of existing bird communities within the watershed. Therefore, no adverse cumulative effect would occur to migratory birds.

Northern Spotted Owl: The scale for cumulative effects for the northern spotted owl is the provincial home range of any known spotted owl site (known owl site). The scale was chosen because a goal for conservation and recovery for spotted owl would be to maintain suitable owl habitat within the provincial home range of known owl sites, and maintain dispersal habitat between LSRs and known owl sites.

The proposed action alternative would not contribute to cumulative effects to spotted owls because dispersal habitat within and between known owl sites would be maintained, and no suitable habitat would be removed or downgraded within known owl sites.

3.6.2 No Action Alternative

Habitat Structure and Diversity, and Residual Old Growth Trees, Snags and Coarse Woody Debris (CWD):

It is expected that the development of older forest conditions that was initiated after the first treatment would continue on the current trajectory. Trees would grow more slowly than they would if further release from competition occurred, resulting in smaller trees available for future snags (as a result of natural mortality or snag creation) within the same time frame. Additional decay class 1 and 2 CWD logs would not be added to the existing stock of older well-decayed large logs. Shrub layers would develop more slowly as the conifer canopy closes again in the next 10+ years. Structure in the control unit would continue to develop as described in the effects for the proposed action.

Northern Spotted Owl:

There would be no change in spotted owl habitat and no effect to spotted owls. Habitat conditions would remain as described in the Affected Environment, and would continue to develop over time. In untreated areas, it could take longer to develop suitable habitat conditions if left untreated.

Survey and Manage and BLM Special Status Species:

There would be no change in the trajectory of habitat conditions for Survey and Manage and BLM Special Status Species that was set in motion after the first treatment. Specifically:

- Trees would grow more slowly, and material available for CWD recruitment would average smaller in diameter than if thinning were to occur. Development of Oregon slender salamander habitat conditions would likely be delayed without the addition of new large woody material to replace existing well-decayed material that would eventually disappear.
- The development of goshawk habitat would take longer because larger trees and more structurally complex stands would take longer to develop.
- Since no new disturbance to the conifer canopy would occur, no undetected red tree vole nests would be affected. Suitable habitat conditions, presumed to be older forest conditions, would develop more slowly without treatment.

Migratory and Resident Birds:

There would be no immediate change in the trajectory of migratory and resident bird habitat that was set in motion by the initial thinning treatments. Older forest habitat conditions would continue to develop over time, though more slowly without implementation of the second round of treatments. Species richness of bird communities would probably continue to increase as effects of the first treatment continue to be realized, though fewer shrub and understory species are likely to be present if the canopy is allowed to close sooner.

3.7 Compliance with Aquatic Conservation Strategy

Table 10 shows the projects' compliance with the four components of the Aquatic Conservation Strategy, (1/ Riparian Reserves, 2/ Key Watersheds, 3/ Watershed Analysis and 4/ Watershed Restoration). Unless otherwise specified, this table applies to both projects.

Table 10: Compliance of Components of the Aquatic Conservation Strategy

ACS Component	Project Compliance and Effects
Component 1 - Riparian Reserves	Proposed Action – Density Management treatments would take place inside of Riparian Reserves (RR's), creating a treatment effect that would be monitored by the researchers. The research objective is to evaluate riparian system response to differing riparian buffer widths in a thinning context. By thinning that forest immediately adjacent to the RR's, the trees on the thinned edge would receive an increase in light, water and nutrients. A slight increase in tree growth, as well as increased growth of the brush and shrub layers may be expected along this interface zone. Culvert removal would improve fish passage on one stream.
	No Action – The research objective of evaluating riparian system response to differing riparian buffer widths in a thinning context would not be realized. The slight increase in tree and understory vegetation growth along the interface zone between the Riparian Reserves and the thinning units would not occur. The culvert on Road 12-1E-14.02 would continue to impede fish passage.
Component 2 - Key Watershed	The Hamilton Creek 5th field watershed is not a Key Watershed (RMP p. 6).
Component 3 - Watershed Analysis	The Hamilton Creek Watershed Analysis (completed in March 1995)
Component 4 - Watershed Restoration	The project area is currently lacking Class 1-2 CWD and snags. The proposed action would increase stand diversity throughout the treated area by introducing a pulse of coarse woody debris to the system – 2 green conifer TPA from the overstory. Snag habitat would be evaluated ten years after the sale, and 2 snags per acre would be created then if needed.

3.8 Comparison of Alternatives With Regard to Purpose and Need

Table 11: Comparison of Alternative by Purpose and Need

Purpose and Need (EA section 1.3)	No Action	Proposed Action
Continue development of the project area into a viable and ongoing research study area. The development of accelerated late-successional stand structure would be sustained.	Does not fulfill.	Does not fulfill.
Retain elements that provide ecosystem diversity (snags, old growth trees, large coarse woody debris, etc.) so that a healthy forest ecosystem can be maintained with habitat to support plant and animal populations (RMP p.1, 20).	Fulfills by maintaining current trends that develop diversity slowly (EA sections 3.2, 3.6).	Fulfills by accelerating changes in some parts of some stands to develop more elements of diversity faster (EA sections 3.2, 3.6).
Provide access for timber harvest, silvicultural practices, and research and monitoring activities.	Does not fulfill the primary objective of continuing established and ongoing research.	Fulfills
Reduce environmental effects associated with identified existing roads within the project area.	Does not fulfill: Replacing culverts that are not up to standards would not take place (EA sections 3.4, 3.5).	Fulfills. Removing the culvert on Road 12-1E-14.02 would enhance fish passage (EA sections 3.4, 3.5).

4.0 LIST OF PREPARERS

Table 12: List of Preparers

Resource	Name	Initial
Botany TES and Special Attention Plant Species, Invasive/Non-native plants	Terry Fennell	TGF
Engineering	Steve Ditterick	SLD
Fire/Fuels	Barbara Raible	RH/BR
Fisheries/ Aquatic Resources	Dave Roberts	DAR
Hydrology/ Water Quality	Patrick Hawe	WPH
Silviculture	Charley Thompson	CRT
Soils	Wesley Wong	RH/WW
Wildlife TES and Special Attention Animal Species	Jim England	JSE

5.0 CONTACTS AND CONSULTATION

5.1 Consultation

5.1.1 ESA Section 7 Consultation

5.1.1.1 US Fish and Wildlife Service

The timber sale was submitted for Formal Consultation with U.S. Fish and Wildlife Service (USFWS) as provided in Section 7 of the Endangered Species Act (ESA) of 1973 (16U.S.C. 1536 (a)(2) and (a)(4) as amended).

The Keel Mountain Density Management Study project (DMS project) was submitted during the FY2007/2008 consultation process. The *Batched Biological Assessment for Projects with the Potential to Modify the Habitat of the Northern Spotted Owl, Willamette Province, FY 2007-2008* (BA), was submitted in July 2006. Using effect determination guidelines, the BA concluded that overall, the DMS project may affect, but is not likely to adversely affect the northern spotted owl due to the modification of dispersal habitat (BA, pp. 40-41, 44-45).

The Biological Opinion (BO) associated with this project was issued in September 2006 (reference # 1-7-06-F-0179). The BO concluded that this project would not jeopardize the continued survival of the spotted owl (p. 95). None of the proposed units are located in Critical Habitat for the northern spotted owl.

The proposed thinning and connected actions described in this EA have incorporated the applicable Management Standards that were described in the BA (p. 10) and BO (Section 1.2, pp. 18-19). In addition, this project would be in compliance with the general standards set forth in the BA (p. 6) and the BO (pp. 17-18), including monitoring and reporting on the implementation of this project and any adverse effects. The BO concluded that there would be no proposed Reasonable and Prudent Measures necessary. The BO also concluded that Terms and Conditions would not be applicable since Management Standards common to all activities were developed which included measures to reduce incidental take (p. 97). In addition, as a design feature of this project, the discretionary Conservation Measure set forth in the BO (p. 97) would be implemented. This includes a seasonal restriction during the critical nesting season to delay activities associated with suitable habitat later into the nesting season.

5.1.1.2 NOAA Fisheries (NMFS) – Endangered Species Act Determination of Effect for Lower Columbia River steelhead trout, Lower Columbia River Chinook salmon and Upper Willamette River Chinook salmon.

A determination has been made that this project would have no effect on UWR steelhead trout or UWR Chinook salmon (EA section 3.5). Consequently, no consultation with NOAA Fisheries is required.

The project would also have no effect on Critical Habitat for the species listed above, or on Essential Fish Habitat (EFH) as designated under the Magnuson-Stevens Fishery Conservation Act.

The determinations of “no effect” are based primarily on the location of the project relative to ESA listed species distributions: all of the proposed project units are greater than four miles upstream of habitat that may be occupied by ESA listed fish species, as shown in Table 7.

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

All of the proposed units were surveyed for cultural resources in November and December of 2000 (CR report numbers C0107, C0108, C0109, and C0110). No cultural resources were found. Other surveys in and around the project area did not locate sites previously. In the process of thinning the proposed units, brush and undergrowth may be disturbed or removed increasing visibility for finding surface, below surface and low above surface cultural material. As a consequence, previously unknown cultural resources may be discovered.

Since all of the areas have been previously harvested, it is possible that previously undiscovered sites that do exist would have been damaged. However, all contracts for ground disturbing activities would carry a clause requiring an immediate suspension of all operations upon finding any cultural resources until such time as the BLM is able to evaluate the find and develop appropriate protection or mitigation measures. At the conclusion of thinning operations, portions of the harvested areas would be reexamined for cultural artifacts, including ridgelines and areas of less than 10% slope.

Under the Protocol for Managing Cultural Resources on Lands Administered by the Bureau of Land management in Oregon, it is not necessary for BLM to consult with SHPO on projects in which no nationally significant, National Register of Historic Places listed or eligible properties are to be adversely affected.

5.2 Public Scoping and Notification

5.2.1 Tribal Governments, Adjacent Landowners, General Public, and State County and local government offices:

Scoping: In compliance with NEPA, the project first appeared in the March 2006 edition of the quarterly Salem District Project Update, which was mailed to over 1,000 addresses. Also, a scoping letter was mailed on April 9, 2006 to the regular mailing list, but the BLM received no comments.

EA Public Comment Period: The EA and FONSI will be made available for public review **March 28, 2007** to **April 27, 2007**. The notice for public comment will be published in a legal notice by the *Albany Democrat Herald* newspaper. Comments received by the Cascades Resource Area of the Salem District Office, 1717 Fabry Road SE, Salem, Oregon 97306, on or before **April 27, 2007** will be considered in making the final decisions for this project.

6.0 MAJOR SOURCES AND COMMON ACRONYMS

6.1 Major Sources

Cissel, J.; Anderson, P.; Olson, D.; Puettmann, K.; Berryman, S.; Chan, S.; and Thompson, C. 2006. *BLM Density Management and Riparian Buffer Study: Establishment Report and Study Plan*. USDI/USGS Scientific Investigations Report No. 2006-5087. 143pp. website: <http://ocid.nacse.org/nbii/density/index.html>

Keel Mountain Interdisciplinary Team - Specialist Reports can be found in the Keel Mountain Project file. These reports are available for review at the Salem District Office.

Keel Mountain Interdisciplinary Team - Specialist Reports:

- Wong, W. 2006. *Keel Mountain Soils Report*. Cascades Resource Area, Salem District, Bureau of Land Management. Salem, OR.
- England, J., 2006. *Keel Mountain Wildlife Report*. Cascades Resource Area, Salem District, Bureau of Land Management. Salem, OR.
- Fennell, T., 2006. *Keel Mountain Botany Report*. Cascades Resource Area, Salem District, Bureau of Land Management. Salem, OR.
- Hawe, P., 2006. *Keel Mountain Hydrology/Channels/Water Quality Report*. Cascades Resource Area, Salem District, Bureau of Land Management. Salem, OR.
- Roberts, D., 2006. *Keel Mountain Fisheries Report*. Cascades Resource Area, Salem District, Bureau of Land Management. Salem, OR.
- Thompson, C., 2006. *Keel Mountain Silvicultural Report*. Cascades Resource Area, Salem District, Bureau of Land Management. Salem, OR.

USDA, Forest Service; USDI. Bureau of Land Management. July 2006. *The Batched Biological Assessment on Fiscal Year 2007-2008 projects within the Willamette Province which would modify the habitats of the bald eagle and the northern spotted owl (BA)*.

USDI. U.S.F.W.S. September 2006. *Formal and Informal Consultation on FY 2007-2008 Projects within the Willamette Planning Province which May Affect Bald Eagles, Northern Spotted Owls, and/or Spotted Owl Critical Habitat Due to Habitat Modification and Disturbance (B0)*; reference # 1-7-06-F-0179.

6.2 Common Acronyms

ACS - Aquatic Conservation Strategy
BA – Biological Assessment
BLM - Bureau of Land Management
BMP - *Best Management Practices* (RMP Appendix C)
BO - Biological Opinion
CWD - Coarse Woody Debris
DBH - Diameter at Breast Height
DMS – Density Management Studies Project
EA - Environmental Assessment
EIS – Environmental Impact Statement
EFH – Essential Fish Habitat

ESA - Endangered Species Act
FONSI - Finding of No Significant Impact
GFMA - General Forest Management Area land use allocation (Matrix)
KMAF – Keel Mountain Analysis File
LSR - Late Successional Reserve
LWD – Large woody debris for stream structure
LUA - Land Use Allocation (RMP p. 8)
LWD - Large Woody Debris
NEPA - National Environmental Policy Act (1969)
NOAA - National Oceanic Atmospheric Administration (National Marine Fisheries Service (NMFS) is now called NOAA Fisheries)
ODEQ – Oregon Department of Environmental Quality (State of Oregon)
OHV – off highway vehicle
OSO – BLM Oregon State Office
OSU – Oregon State University
PI – Principal Investigator
PNW – Pacific Northwest Research Station
RR - Riparian Reserves Land Use Allocation
SM – Survey and Manage
S&G – standards and guidelines
SFP – special forest products
TMDL – Total Maximum Daily Load
TPA – trees per acre
USDA - United States Department of Agriculture
USDI - United States Department of the Interior
USFS - United States Forest Service
USFWS - United States Fish and Wildlife Service
USGS – United States Geological Survey