Rickreall Creek Watershed Enhancement Environmental Assessment and Finding of No Significant Impact

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United States Department of the Interior
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Salem District
Marys Peak Resource Area

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BLM

Salem District

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RICKREALL CREEK WATERSHED ENHANCEMENT
ENVIRONMENTAL ASSESSMENT

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1.0 INTRODUCTION

This Environmental Assessment (EA) will analyze the impacts of three proposed projects, Mid and Late-Seral Enhancement, Legacy Tree Release, and Large Woody Debris Enhancement, on the human environment in the Rickreall Creek, Mill Creek, Salt Creek, and Luckiamute River 5th field watersheds. The EA will provide the decision-maker, the Marys Peak Field Manager, with current information to aid in the decision-making process. It will also determine if there are significant impacts not already analyzed in the Environmental Impact Statement for the Salem District's Resource Management Plan (RMP) and whether a supplement to that Environmental Impact Statement is needed or if a Finding of No Significant Impact is appropriate.

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

1.1 PROJECTS COVERED IN THIS EA

Project 1, Mid-Seral and Late-Seral Habitat Enhancement, is a proposal to perform density management on approximately 1,344 acres[1] of overstocked 49 to 93 year old[2] forest stands within Adaptive Management Area (AMA), Adaptive Management Reserve[3] (AMR), and Riparian Reserves land use allocations (LUAs). This would be implemented through six timber sales: C-9, Cedar Ridge, Gilmore, Rick-Line, Robb Mill Loader, and Waymire. The first sale would be offered in the spring of 2013.

Project 2, Legacy Tree Release, is a proposal to conduct legacy tree release and coarse woody debris (CWD) and snag creation within approximately 790 acres of 80 to 199 year-old stands in LSR and RR LUAs to increase structural diversity.

Project 3, Large Woody Debris (LWD) Enhancement is a proposal to place large wood on up to six miles of stream segments including the mainstem Rickreall Creek above Mercer Reservoir, the South Fork Rickreall Creek, and North Fork Rickreall Creek. Treatment would occur on up to 1.5 miles of BLM-administered lands and up to 4.5 miles of private lands to increase habitat complexity in the Rickreall Creek Watershed.

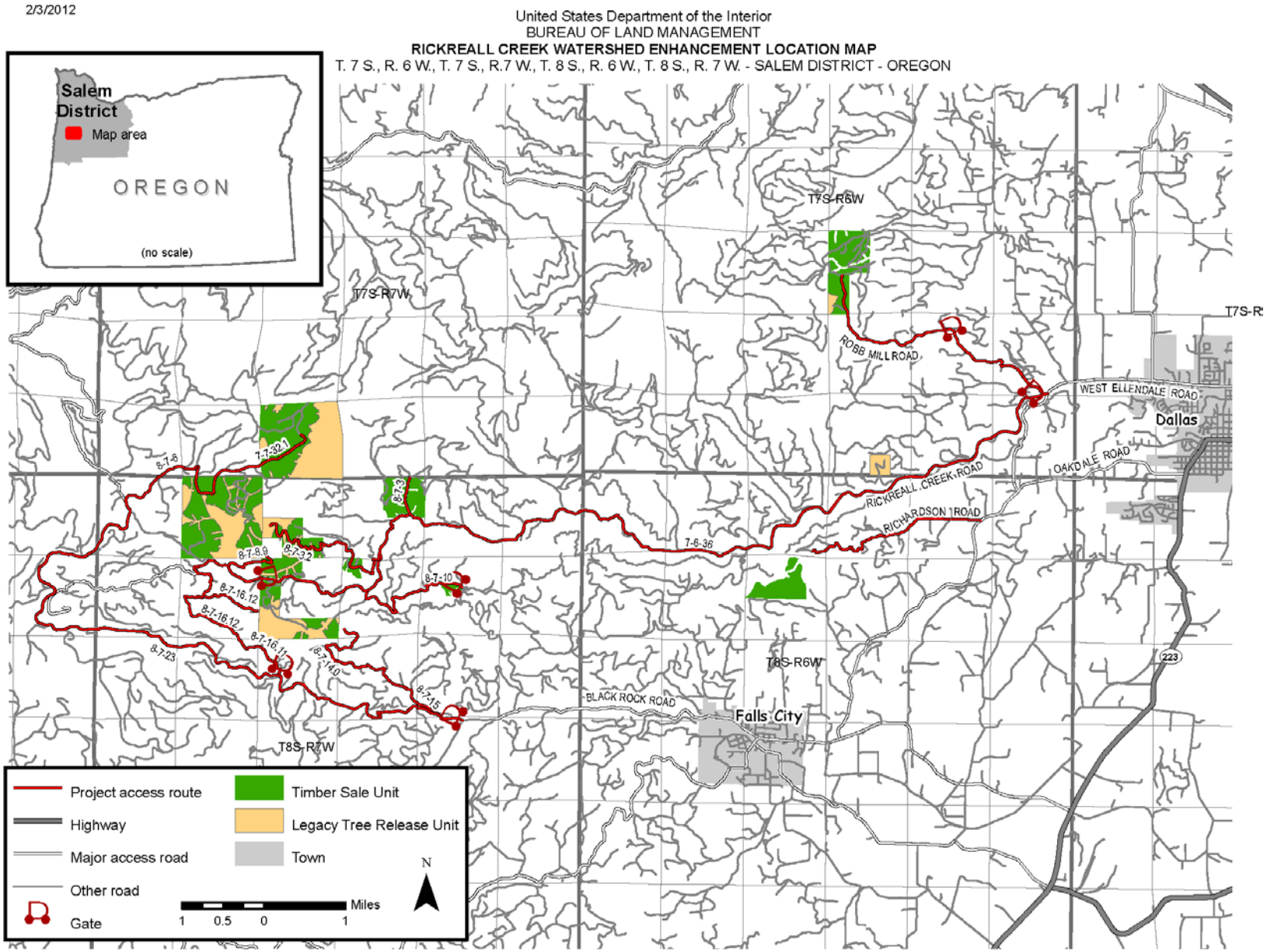
1.2 PROJECT AREA LOCATIONS

The project areas are located approximately 5 to 10 air miles west of Dallas, Oregon, in Polk County on forested land managed by the Marys Peak Resource Area, Salem District of the Bureau of Land Management (BLM) and on private land. The project areas are within BLM-managed lands in T. 7 S., R. 6 W., Section 22, T. 7 S., R. 7 W., Section 33, T. 8 S., R. 7 W., Sections 3,4, 5, 9, and 10, and on private land in T. 8 S., R. 7 W., Sections 1, 2, 3, 4, 9, and 10 Willamette Meridian (Map 1).

See Map 2 (p. 16) for estimated boundaries for the six planned timber sales under Project 1.

[1] Acres are approximations based on GIS data at the time of this analysis in March 2012.
[2] Stand data was collected in 2009 and 2010. Stand ages presented in this EA are current at the time of this analysis in March 2012.
[3] Adaptive Management Reserves are Adaptive Management Areas with Late-Successional Reserve overlay.

Map 1. Location of Proposed Projects



1.3 CONFORMANCE WITH LAND USE PLANS, POLICIES, AND PROGRAMS

The Salem District initiated planning and design for this project to conform and be consistent with the Salem District's 1995 Resource Management Plan. Following the March 31, 2011 decision by the United States District Court for the District of Columbia in Douglas Timber Operators et al. v. Salazar, which vacated and remanded the administrative withdrawal of the Salem District's 2008 Record of Decision and Resource Management Plan (2008 ROD and RMP), we evaluated this project for consistency with both the 1995 RMP and the 2008 ROD and RMP. Based upon this review, the selected alternative contains some design features not mentioned specifically in the 2008 ROD and RMP. The 2008 ROD and RMP did not preclude use of these design features, and the use of these design features is clearly consistent with the goals and objectives in the 2008 ROD and RMP. Accordingly, this project is consistent with the Salem District's 1995 RMP and 2008 ROD/RMP.

The proposed action is located outside the coastal zone as defined by the Oregon Coastal Management Program.

The following documents provided additional direction in the development of the Rickreall Creek Watershed Enhancement projects:

- *Late Successional Reserve Assessment, Oregon Coast Province – Northern Portion* (June 1998, referred to herein as *LSRA*);
- *Mill Creek, Rickreall Creek, Rowell Creek, Luckiamute River Watershed Analysis* (1998)

All of the above documents, along with the Rickreall Creek Watershed Enhancement interdisciplinary team (IDT) reports (EA section 8.1), are hereby incorporated by reference in the Rickreall Creek Watershed Enhancement EA and available for review in the Salem District Office. Additional information about the proposed projects is available in the Rickreall Creek Watershed Enhancement EA Analysis File, also available at the Salem District Office.

1.3.1 SURVEY AND MANAGE REVIEW

On December 17, 2009, the U.S. District Court for the Western District of Washington issued an order in *Conservation Northwest, et al. v. Sherman, et al.*, No. 08-1067-JCC (W.D. Wash.), granting Plaintiffs' motion for partial summary judgment and finding NEPA violations in the *Final Supplemental to the 2004 Supplemental Environmental Impact Statement to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines* (USDA and USDI, June 2007). In response, parties entered into settlement negotiations in April 2010, and the Court filed approval of the resulting Settlement Agreement on July 6, 2011. Projects that are within the range of the northern spotted owl are subject to the survey and management standards and guidelines in the 2001 ROD, as modified by the 2011 Settlement Agreement.

The Rickreall Creek Watershed Enhancement Projects are consistent with the Salem District Resource Management Plan/Forest Land and Resource Management Plan as amended by the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines* (2001 ROD), as modified by the 2011 Settlement Agreement.

The Rickreall Creek Watershed Enhancement Project 1, in stands less than 80 years old, applies a 2006 Exemption from a stipulation entered by the court in litigation regarding Survey and Manage species and the 2004 Record of Decision related to Survey and Manage Mitigation Measure in *Northwest Ecosystem Alliance v. Rey*, No. 04-844-MJP (W.D. Wash., Oct. 10, 2006). Previously, in 2006, the District Court (Judge Pechman) invalidated the agencies' 2004 RODs eliminating Survey and Manage due to NEPA violations. Following the District Court's 2006 ruling, parties to the litigation entered into a stipulation exempting certain categories of activities from the Survey and Manage standards and guidelines, including both pre-disturbance surveys and known site management. Also known as the Pechman Exemptions, the Court's Order from October 11, 2006 directs:

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

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

Per the 2011 Settlement Agreement, the 2006 Pechman Exemptions remain in force:

"The provisions stipulated to by the parties and ordered by the court in Northwest Ecosystem Alliance v. Rey, No. 04-844-MJP (W.D. Wash. Oct. 10, 2006), shall remain in force. None of the following terms or conditions in this Settlement Agreement modifies in any way the October 2006 provisions stipulated to by the parties and ordered by the court in Northwest Ecosystem Alliance v. Rey, No. 04-844-MJP (W.D. Wash. Oct. 10, 2006)."

The portions of the Rickreall Creek Watershed Enhancement Project 1 meet Exemption A because they entail no regeneration harvest and entail thinning only in stands less than 80 years old. Stand age was collected by increment boring a sample of trees. The ages of sample trees were averaged. Stands are even-aged or older stand components so small that basal area-weighted age calculations change the age two years or less.

Some units of Project 1 (stands greater than 80 years old) and the Legacy Tree Release and Large Woody Debris Enhancement projects (Projects 2 and 3) may proceed even if the District Court sets aside or otherwise enjoins use of the 2007 Survey and Manage Record of Decision. This is because some units of Project 1, the legacy tree release and large woody debris enhancement projects meet the provisions of the last valid Record of Decision, specifically the 2001 Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (not including subsequent Annual Species Reviews). Details of the project surveys are described below:

On-site fungal, plant and animal habitat evaluations (to include any applicable Survey and Manage protocol surveys) would occur prior to project implementation to ensure that any Survey and Manage species sites are buffered or excluded from treatment units.

1.3.2 NORTHERN SPOTTED OWL (NSO) STATUS REVIEW

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

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

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

Proposed Rule to Revise Critical Habitat for Northern Spotted Owls
On February 28, 2012, the U. S. Fish and Wildlife Service (USFWS) announced a proposal to revise critical habitat designated for the northern spotted owl. This proposed rule allows for public comment before a final rule is expected to be published in November 2012. In the interim, the BLM will review the implications of the proposed critical habitat with respect to each project area described in this EA. Where needed, the BLM will conference with the Service to address any adverse effects that proposed projects may have on the revised critical habitat rule. The Decision Record for this EA will address any recommended changes received from the Service.

1.3.3 COMPLIANCE WITH THE AQUATIC CONSERVATION STRATEGY

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

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

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

EA section 5.0 shows how the Rickreall Creek Watershed Enhancement projects meet the Aquatic Conservation Strategy in the context of the PCFFA cases. In addition, project design features (EA Section 2.6) would provide protection measures to meet ACS objectives.

1.4 DECISION CRITERIA

The Marys Peak Field Manager will use the following criteria and objectives in selecting the alternative to be implemented. The field manager will select the alternative that best meets these criteria. The selected action would:

- Meet the purpose and need of the Projects (Section 1.6).
- Comply with the *Salem District Record of Decision and Resource Management Plan*, May 1995 (RMP) and related documents which direct and provide the legal framework for management of BLM lands within the Salem District (Section 1.3).

- Would not have significant impact on the affected elements of the environment beyond those already anticipated and addressed in the RMP EIS.

1.5 RESULTS OF SCOPING

A scoping letter, dated August 19, 2010, was sent to 19 potentially affected or interested individuals, groups, and agencies. Two responses were received during the scoping period. Substantive comments were used to develop issues analyzed in this EA and to refine the action alternatives. In particular, the public expressed concern during the scoping period about the potential impacts of road construction. To address this concern, the IDT fully developed and analyzed an action alternative without road construction (Alternative 3 – No New Road Construction).

1.5.1 ISSUES CONSIDERED BUT NOT ANALYZED IN DETAIL

Issue 1: The American Forest Resources Council supports thinning treatments in riparian areas that would achieve maximum benefits of moving the stands towards late-seral habitat.

Thinning treatments with smaller (25 to 60 feet) no cut buffers would not meet the shade sufficiency analysis within the primary shade zone.

Issue 2: The American Forest Resources Council discourages the use of diameter limits and the limit of removing the trees for commercial purposes. The legacy tree release project's diameter limit of 30 inches and restriction for not allowing commercial timber removal is consistent with consultation with USFWS and LSR objectives. Trees greater than 30 inches in diameter typically have older forest structure (i.e.: large moss covered limbs, some form of decadence, multiple or broken tops). This structure provides beneficial habitat for late-successional forest species.

Issue 3: The BLM, USFS, and NMFS currently disagree on the identification and interpretation of the best available science to guide riparian management and for determining the potential effects of riparian thinning on ESA-listed salmonids. As it relates to proposed projects, the issues raised by NMFS are being considered by the BLM in its development of consultation documents.

1.5.2 RELEVANT ISSUES

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

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

Issue 2: What effects would the removal of green trees (direct loss of live structure and indirect loss of dead wood structure related to density-dependent suppression mortality) have on forest habitat conditions and the wildlife species that depend upon this habitat? How would listed wildlife species and their habitat be affected by project activities (Project 1 and associated road building and Projects 2 and 3), which BLM, by law and policy, is required to protect, maintain, or recover? How would the proposed release of legacy trees and the creation of snags and CWD affect wildlife habitats within the project area and across the watershed?

Issue 3: What effect would thinning, road work, timber hauling, legacy tree enhancement and the placement of large woody debris have on resident and anadromous fish and aquatic habitat?

Issue 4: What effects would density management thinning, gap creation, laminated root rot (*Phellinus weirii*) treatment, road work, legacy tree release, and log removal for large woody debris enhancement have on air quality, fire risk, and fuel loading?

Issue 5: What effects would the thinning and road work have on native, non-native/noxious weeds and Special Status botanical and fungal species?

Issue 6: What effects would density management have on mid and late-seral forest stand health, forest structure, growth and composition? How would the effects contribute to Adaptive Management Area, Late Successional Reserves, and Riparian Reserves LUA objectives?

Issue 7: What would be the effects to soils from mechanical harvesting equipment when used on slopes between 35 and 45 percent?

1.6 PURPOSE OF AND NEED FOR ACTION

PROJECT 1 – MID AND LATE-SERAL HABITAT ENHANCEMENT

Purpose

The purpose of Project 1 is to accelerate the development of late-seral/old-growth forest conditions to enhance terrestrial wildlife and aquatic habitats and support local economies by providing a stable timber supply. The proposed action areas were chosen for mid and late-seral habitat enhancement of forest stands to meet the future needs of northern spotted owl, marbled murrelet, and other species dependent upon Late Successional/Old Growth (LSOG) forest habitats, and for improvement to the watershed and road system.

The following describe the purposes for the action:

Late-Successional Reserves LUA:

- Plan and implement silvicultural treatments that develop, accelerate, and enhance late-successional forest conditions and are beneficial to the creation and maintenance of late-successional habitat (RMP, p. 16).

Adaptive Management Area LUA: Implement a subset of the specific management opportunities that were identified to be consistent with AMA objectives (RMP, pp. 19-20):

- Thinning to create and maintain late-successional forest conditions may occur up to the 110-year age class (106-115 years).

Manage mid-seral stands in Riparian Reserves LUA to:

- Apply silvicultural practices for Riparian Reserves to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy (ACS) Objectives. (RMP, p. 11).

Develop and maintain an environmentally sound road system (RMP p. 62) to:

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

Need For Action

Of the federally managed lands, only seven percent of the Rickreall Creek watershed, 15 percent of Luckiamute River watershed, 15 percent of Mill Creek watershed and none of Salt Creek watershed currently provides LSOG habitat for fish and wildlife. There is a need to accelerate the development of LSOG forest conditions. Implementing density management on these mid and late seral stands would accelerate the development of desired forest conditions.

Stand exam data, collected in 2009 and 2010, indicate the forests in the project areas exhibit declining growth rates and limited structural diversity. These second-growth stands are often characterized by a single-layered, dense overstory canopy with little to no large wood, live or dead, remaining from primary-growth stands.

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

Figure 1, below, shows a stand proposed for treatment that is currently overstocked and lacking understory development.

Figure 1. Photo of Project 1 proposed unit (Rick-Line timber sale, 2010)

PROJECT 2 – LEGACY TREE RELEASE

Purpose

The purpose of Project 2 is to: (1) release declining older legacy trees that are being encroached by densely-stocked younger conifer stands; (2) enhance terrestrial wildlife habitats by creating CWD within stands where this structural component is lacking, and; (3) maintain and enhance the vegetative diversity of selected stands to benefit numerous wildlife species.

A mounting body of research has demonstrated the importance of maintaining and enhancing forest legacy features, CWD, and in-stream wood structures. The Northwest Forest Plan, LSRA, and local watershed analyses have all identified these types of treatments as a key component of restoration efforts within the LSR LUA.

The following describe the purpose for the action:

Late-Successional Reserves LUA:

- Plan and implement silvicultural treatments inside Late-Successional Reserves that are beneficial to the creation and maintenance of late-successional habitat (RMP p. 16).

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

- Enhance or restore habitat (e.g. CWD, snag habitat, instream large wood) for populations of native riparian-dependent plants, invertebrates, and vertebrate species;
- Improve structural and spatial stand diversity on a site-specific and landscape level in the long-term.

Manage snags and down logs to benefit wildlife species (LSRA, page 37):

- Restoration of the CWD component is crucial to the development of foraging habitat for predators such as the spotted owl.
- Active recruitment of CWD should be considered as a major component of habitat development for stands at any age within the assessment area.

Need for Action

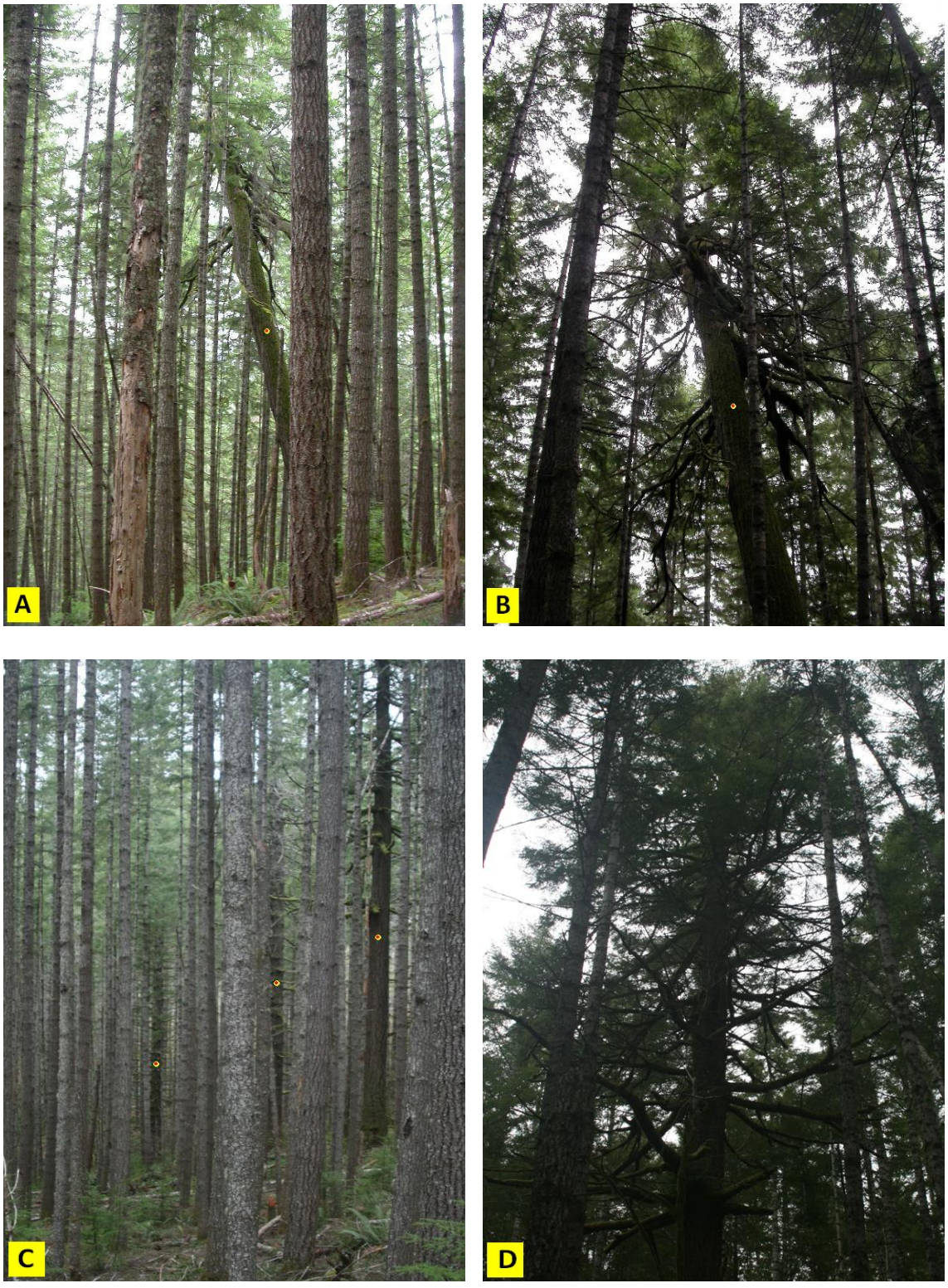
Some of the conifer-dominated forest stands on BLM-administered lands in the project area contain older legacy trees that survived a previous stand replacement event (fire or timber harvest). Several of these legacy trees are declining because they are lacking light, soil moisture, and growing space from competition with the more densely stocked younger conifer cohort (see Figure 2).

Forest stands that lack live legacy components are usually deficient in the quality and quantity of CWD, including dead snags and down logs. As these conifer-dominated stands develop through the mid-seral forest stage, the ascending canopy of densely stocked younger conifers reduces understory plant diversity, which in turn decreases the diversity of invertebrate and vertebrate wildlife species.

The proposed action would address the immediate need to save declining legacy trees, create high quality CWD, and restore hardwood and shrub diversity to benefit numerous wildlife species that are associated with late-successional forest structure. In particular, the threatened marbled murrelet is known to nest on large mossy limbs of live old-growth trees. This project would benefit the marbled murrelet by helping maintain and recover habitat quality within the AMA and LSR allocations as directed by the Northwest Forest Plan.

Figure 2, below, shows examples of legacy trees and legacy tree characteristics that would be protected or enhanced under the proposed Project 2.

Figure 2. Examples of declining older forest legacy trees that would benefit from release from encroaching younger conifer forest stand. (A) Declining old forest legacy tree. (B) Older forest legacy tree showing dead lower limbs and deformed top. (C) Three older forest legacy trees within dense young conifer stand. (D). Older forest legacy tree showing dead lower limbs and canopy encroachment.



PROJECT 3 – LARGE WOODY DEBRIS ENHANCEMENT

Purpose

The purpose of the proposed project would be to meet or exceed desirable and proper functioning conditions large woody debris (LWD) stocking levels. The Oregon Department of Fish and Wildlife desirable benchmark for key pieces of wood per mile was 48 (Foster et al., 2001). NMFS habitat indicator for large woody debris to be proper functioning condition was 80 pieces per mile.

The following describe the purpose for the action:

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

- Maintain and restore access to stream channels for all life stages of fish species;
- Provide for riparian and aquatic conditions that supply stream channels with shade, sediment filtering, leaf litter and large wood, and streambank stability;
- Enhance or restore habitat (e.g. CWD, snag habitat, instream large wood) for populations of native riparian-dependent plants, invertebrates, and vertebrate species;
- Log structures (Figure 3) would help to rehabilitate the stream and enhance natural populations of anadromous and resident fish by improving spawning and rearing habitat (RMP, p. 27).

In addition, this action would help to "restore the distribution, diversity, and complexity of watershed and landscape features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted," one of the objectives identified in the Aquatic Conservation Strategy (ACS) on page 5-6 of the RMP.

Need for Action

Rickreall Creek supports populations of coho salmon, winter steelhead trout, and resident cutthroat trout. The stream channel currently is deficient in large woody debris needed for structural habitat diversity. Logging operations (e.g. yarding and skid trails, conifer removal from Riparian Reserves), road construction, and log jam removal and stream cleaning have combined to produce stream habitat that lacks LWD and quality pools.

There is a need to:

- Cut and remove trees within legacy tree release areas (Project 2).
- Place instream LWD within 6 miles of fish bearing streams located on BLM-managed and private lands.

Figure 3. Example of large woody debris enhancement completed in 2008 on Lobster Creek.

2.0 ALTERNATIVES

2.1 ALTERNATIVE DEVELOPMENT

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

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

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

2.2 ALTERNATIVE 1 – NO ACTION

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

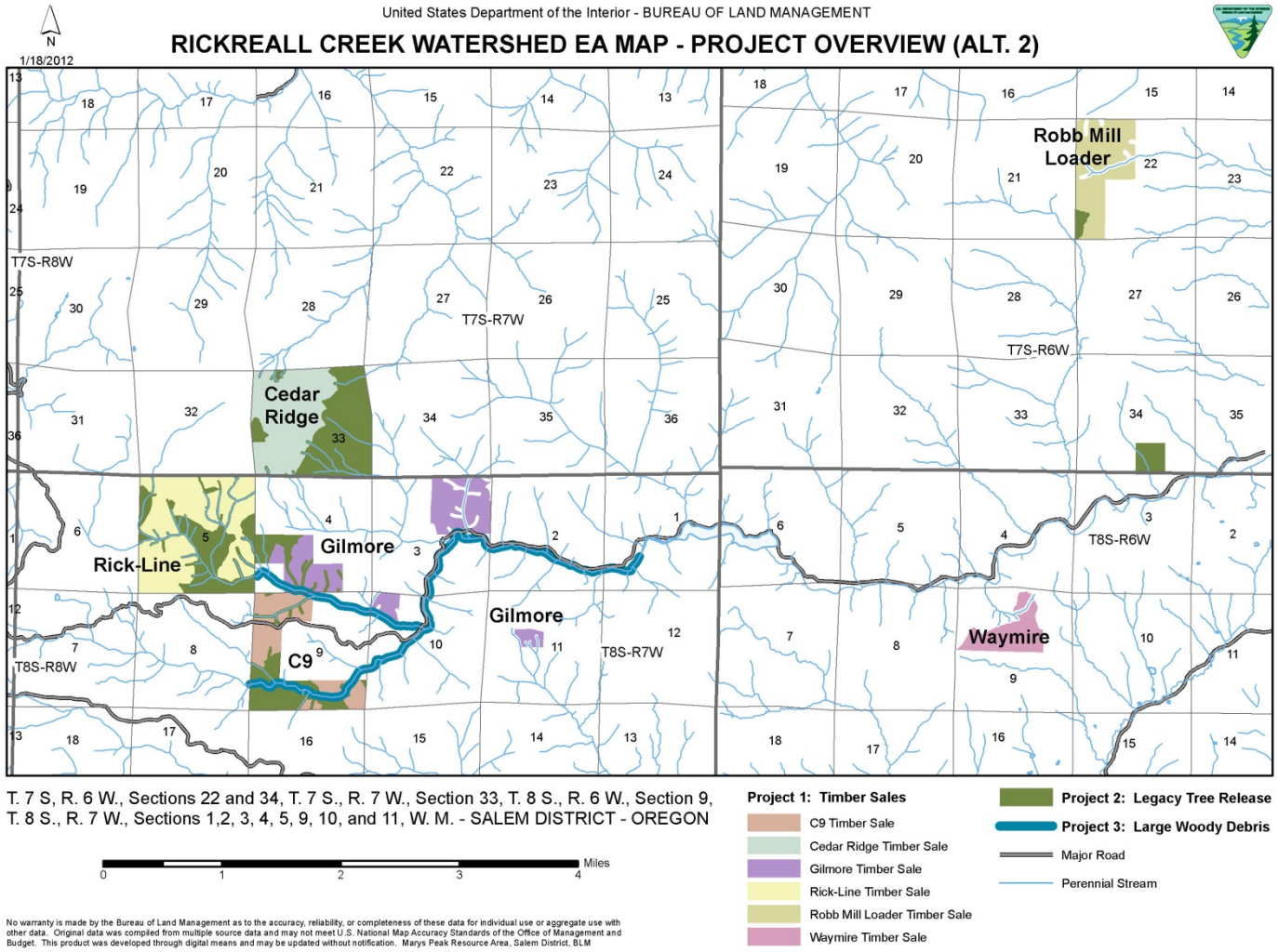
- Silviculture treatments to enhance fish and wildlife habitats
- Timber harvest
- Road construction, reconstruction, renovation, or decommissioning
- Fuel reduction treatments
- Big game and migratory bird habitat improvement
- Cut, girdle, or top-cut individual trees or clumps of trees (¼ acre to one acre in size) which are encroaching on and adversely affecting the survivability of older forest legacy trees
- Creating high quality down logs and snags (collectively CWD)
- Placement of large woody debris within approximately 6 miles of fish bearing streams

Only normal administrative activities and other uses (e.g. road use, programmed road maintenance, harvest of special forest products on public land) would continue on BLM-managed lands within the action areas. On private lands adjacent to the action areas, forest management and related activities would continue to occur. Selection of the No Action Alternative would not constitute a decision to change the land use allocations of these lands. Selection of the No Action Alternative would not set a precedent for consideration of future action proposals.

2.3 ALTERNATIVE 2 – PROPOSED ACTION

Three projects are proposed under this Alternative: Mid and Late-Seral Enhancement, Legacy Tree Release, and Large Woody Debris Enhancement. Map 2, on the following page, provides the locations of the three projects.

Map 2. Locations for Mid and Late-Seral Enhancement, Legacy Tree Release, and Large Woody Debris Enhancement, as designed and analyzed under the Proposed Action (Alternative 2)



Project 1 – Mid and Late-Seral Habitat Enhancement

The proposed project consists of density management treatments on six timber sales: C-9, Cedar Ridge, Gilmore, Rick-Line, Robb Mill Loader, and Waymire.

The timber sales below are grouped together by similar LUAs.

Timber sales within the AMA and RR LUAs:
The C-9, Robb Mill Loader, and Waymire timber sales would thin approximately 447 acres of 52 to 90 year old stands (2009 data). The areas would be thinned to a variable density basal area (BA) ranging from 110 to 120 square feet per acre.

Timber sales within the AMR and RR LUAs:
The Cedar Ridge and Rick-Line timber sales would thin approximately 655 acres of 49 to 93 year old stands (2009 data). The areas would be thinned to a variable density basal area ranging from 110 to 120 square feet per acre.

Timber sale within AMA, AMR, and RR LUAs:
The remaining timber sale, Gilmore, would thin approximately 242 acres of 48 to 87 year old stands (2009 data). The areas would be thinned to a variable density basal area ranging from 110 to 120 square feet per acre.

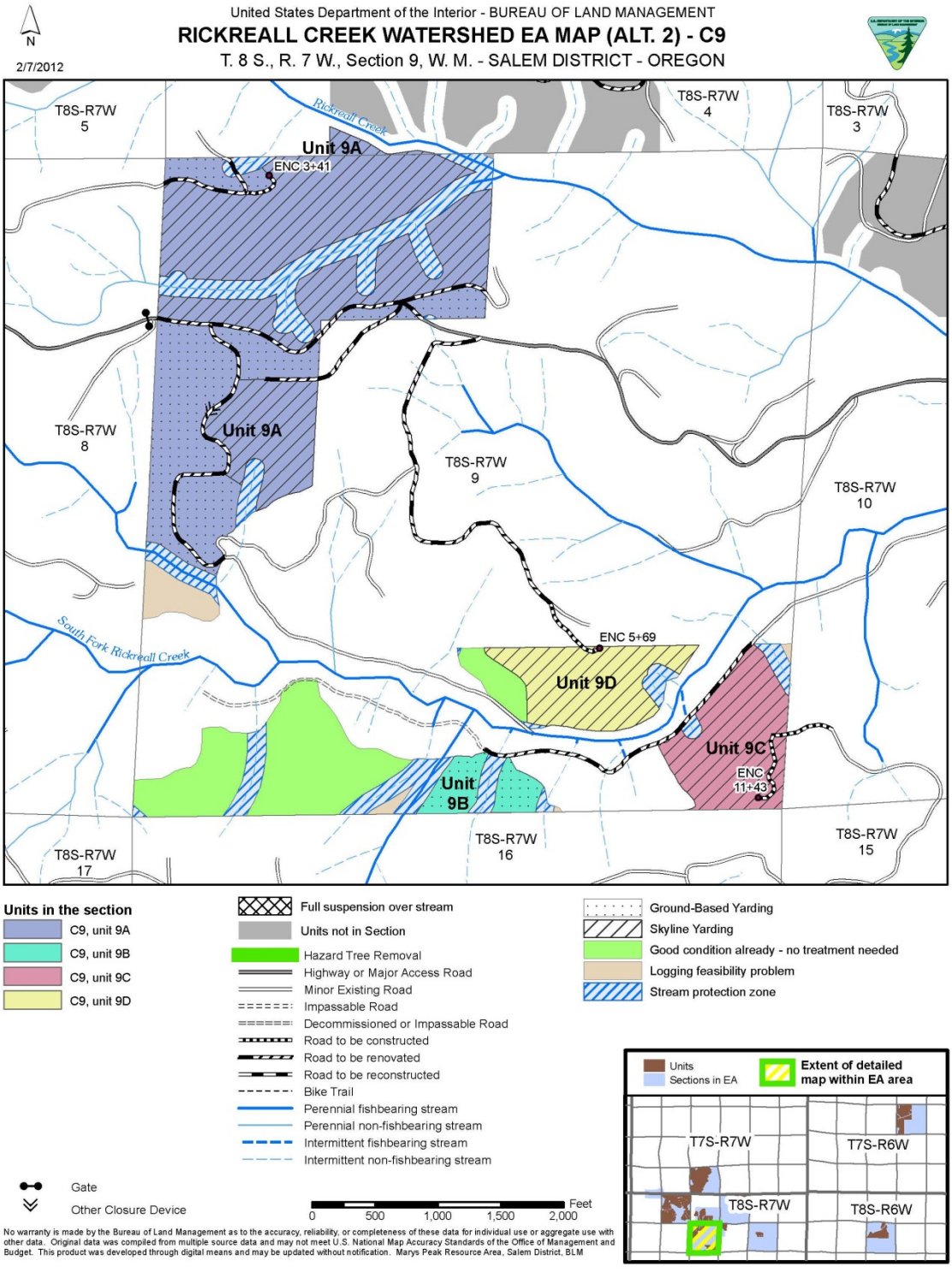
Trees would be harvested by ground-based and skyline harvest systems and would adhere to Project Design Features (Section 2.6) to their respective systems. Approximately 60 percent would be harvested by skyline and 40 percent would be harvested by ground-based methods.

Table 1. Project 1 Activities (Alternative 2)

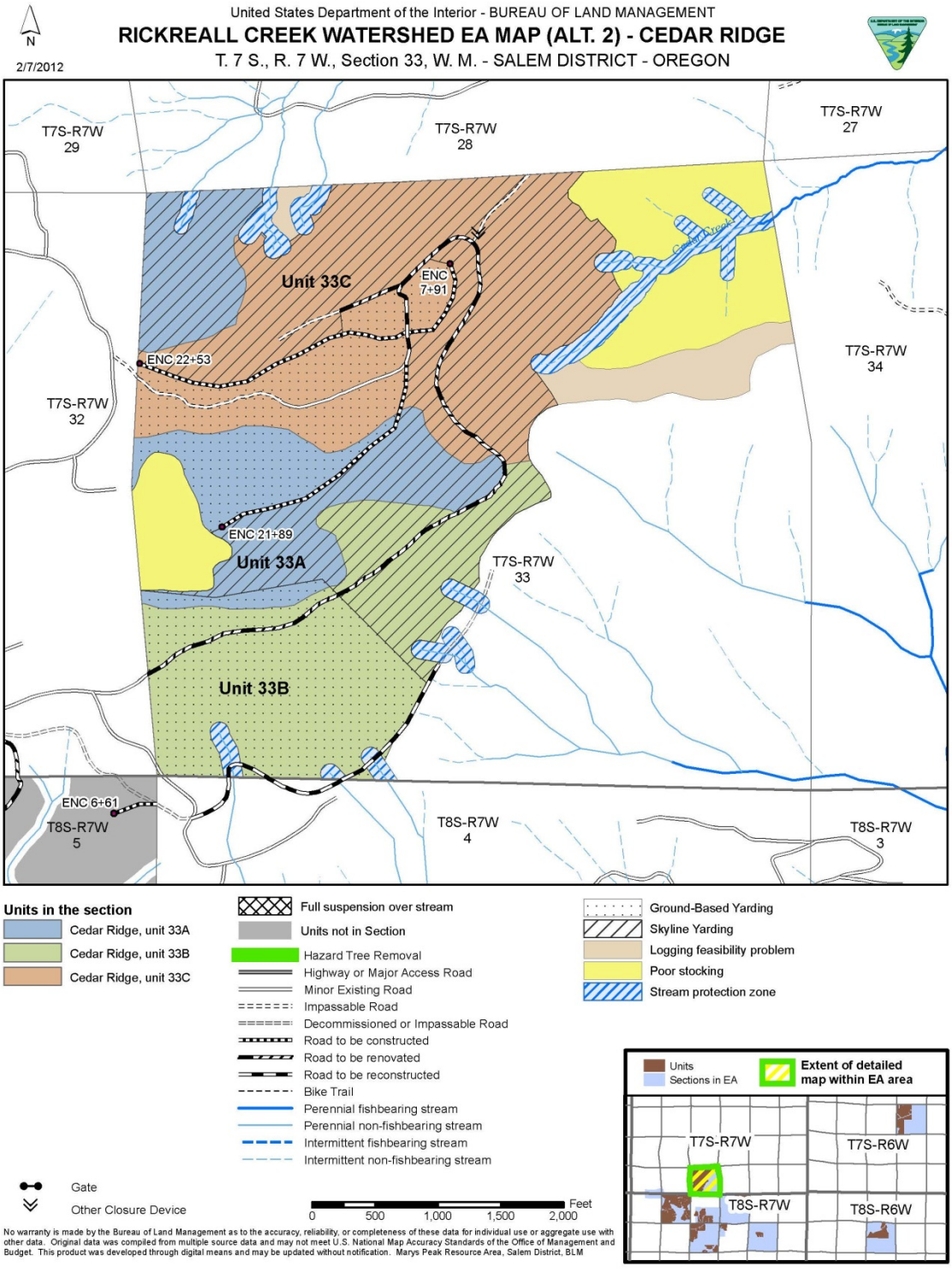
Activity	Alternative 2 Proposed Action
Timber Sales	1,344
C-9	147
Robb Mill Loader	197
Waymire	103
Cedar Ridge	279
Rick-Line	376
Gilmore	242
Road construction (miles)	5.0
Road reconstruction (miles)	2.5
Road renovation (miles)	10.0

The Alternative 2, Project 1 timber sale maps on the following pages indicate the approximate project boundaries, logging systems, and field conditions at the time of this analysis.

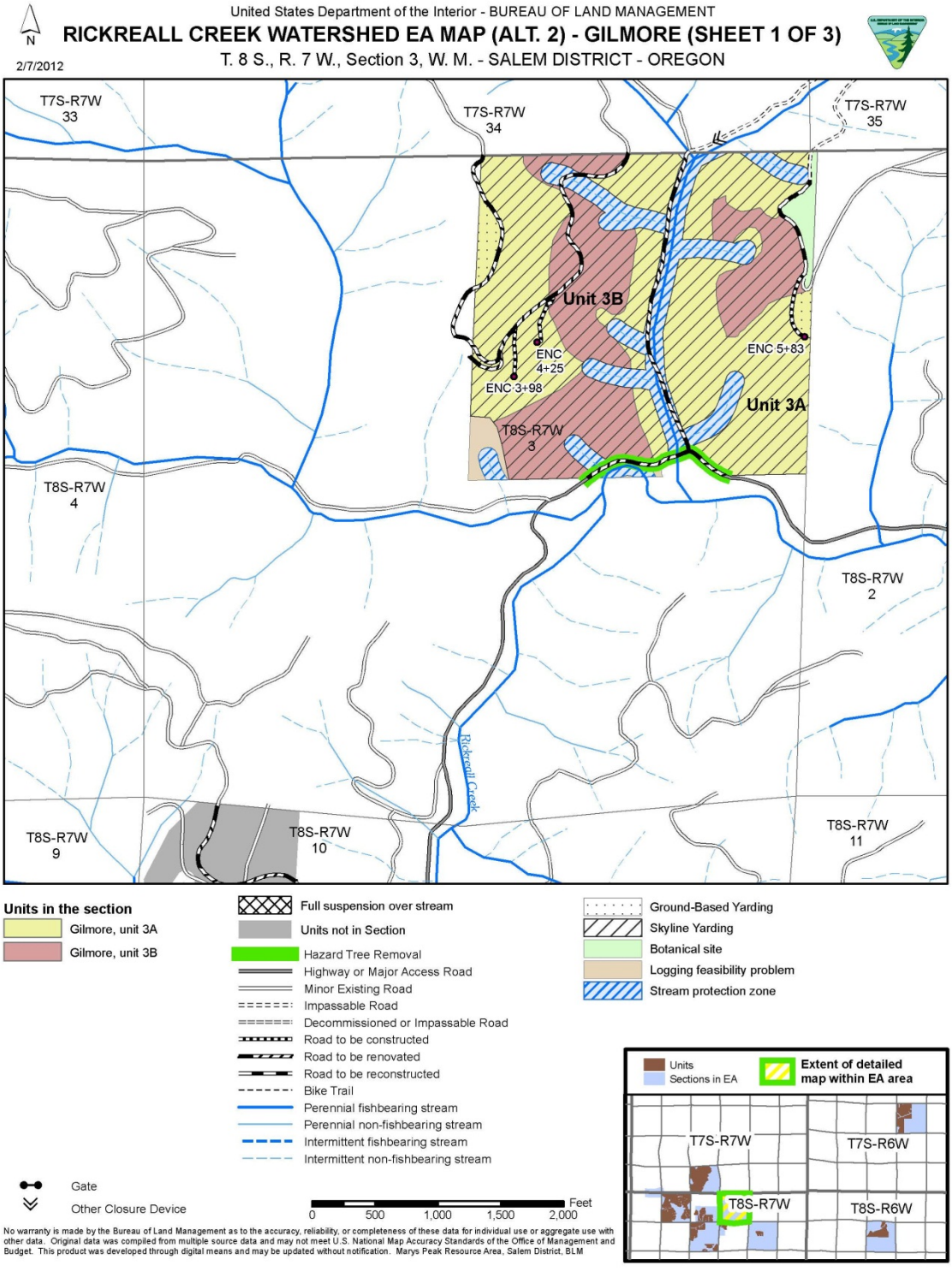
Map 3. C-9 Timber Sale (Alternative 2 – Proposed Action)



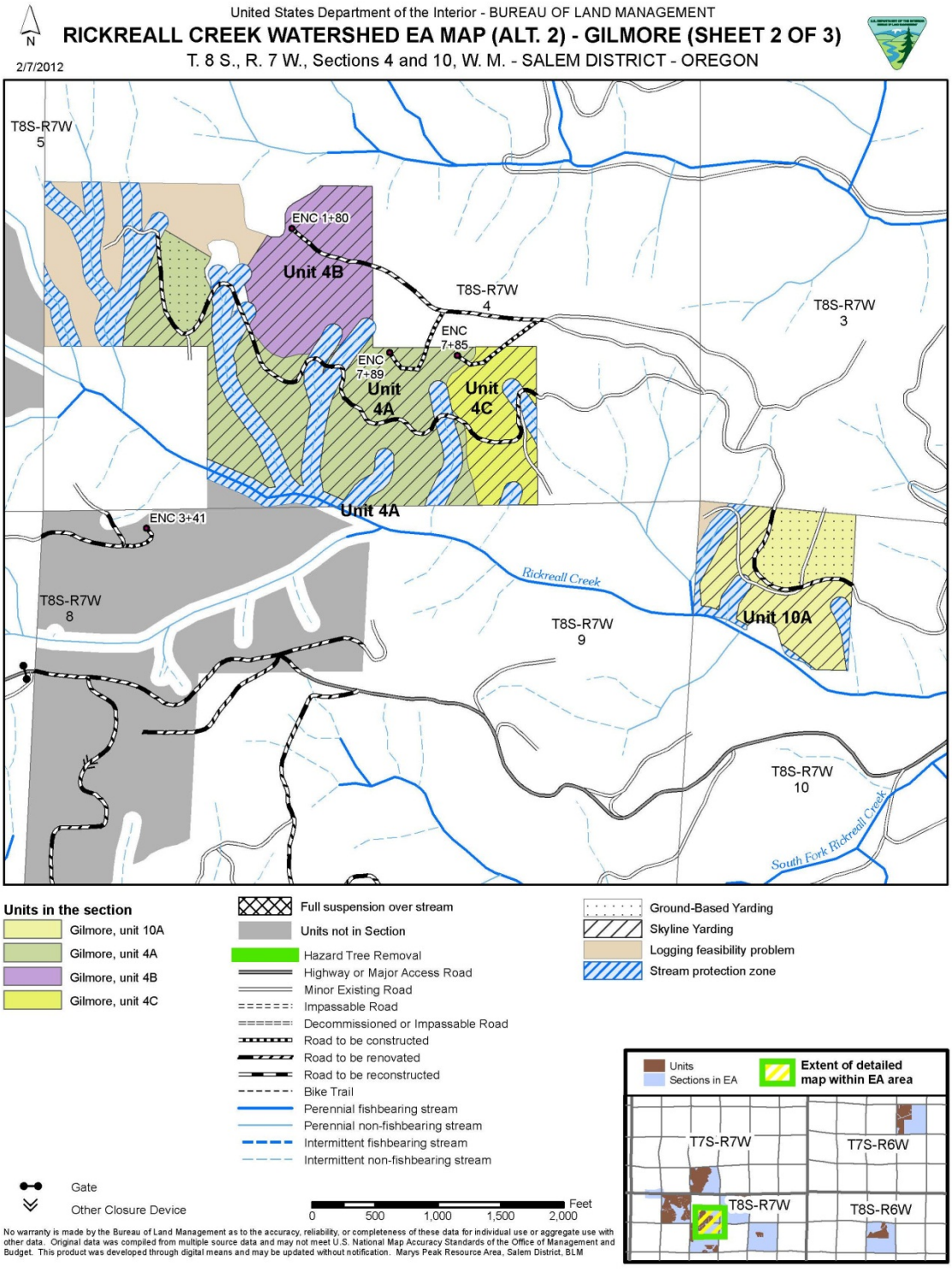
Map 4. Cedar Ridge Timber Sale (Alternative 2 – Proposed Action)



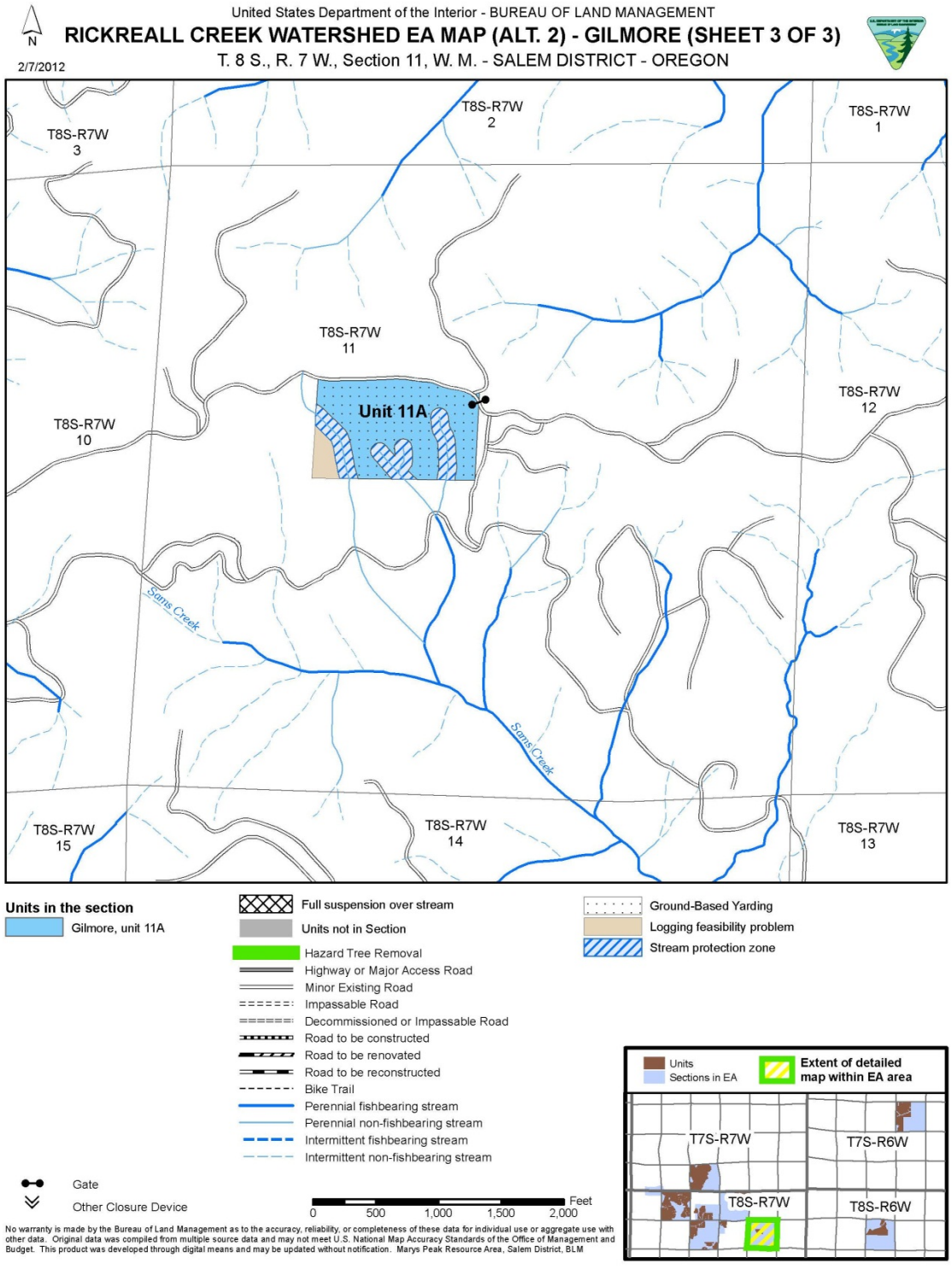
Map 5. Gilmore Timber Sale – Map 1 of 3 (Alternative 2 – Proposed Action)



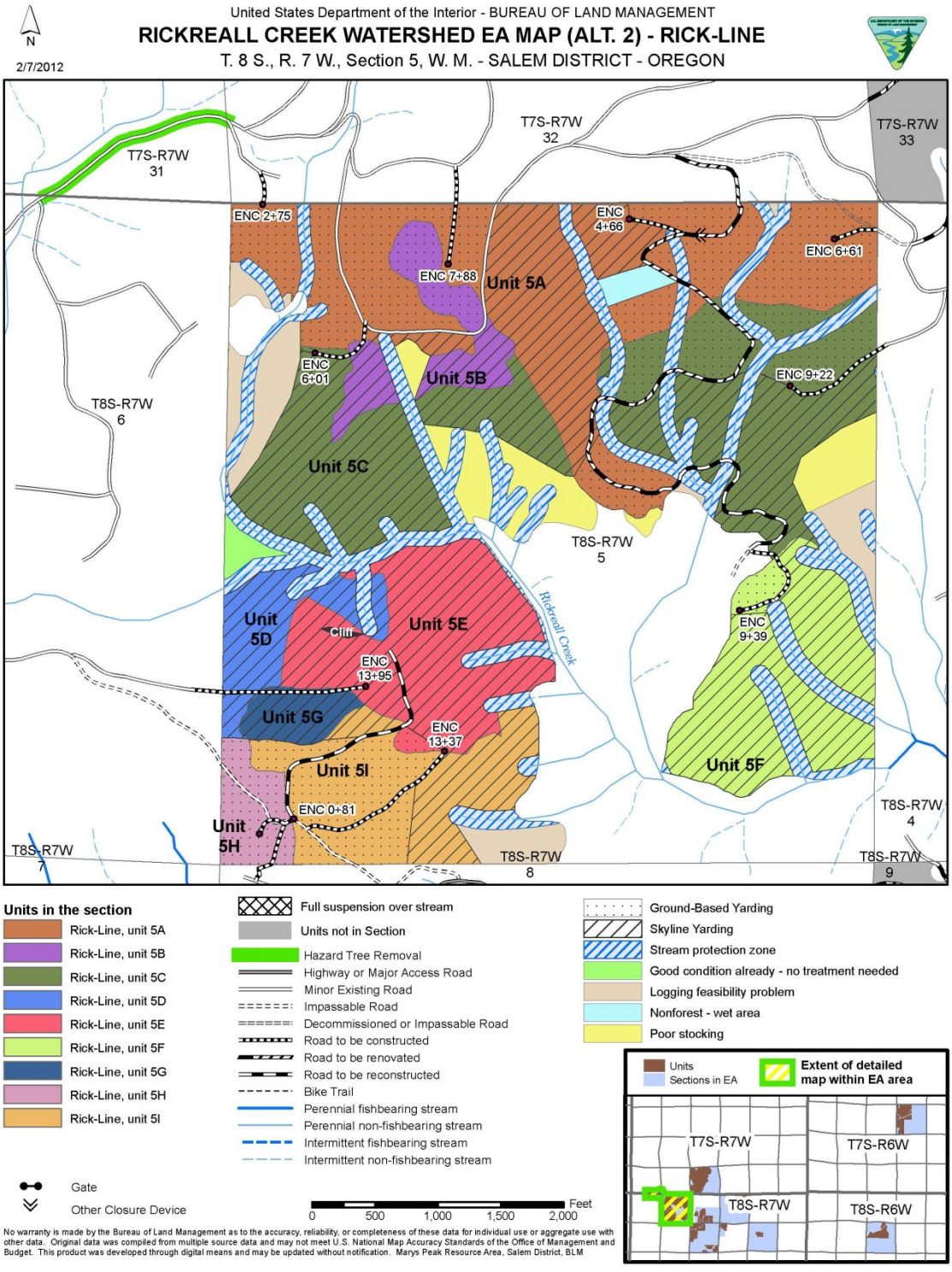
Map 6. Gilmore Timber Sale – Map 2 of 3 (Alternative 2 – Proposed Action)



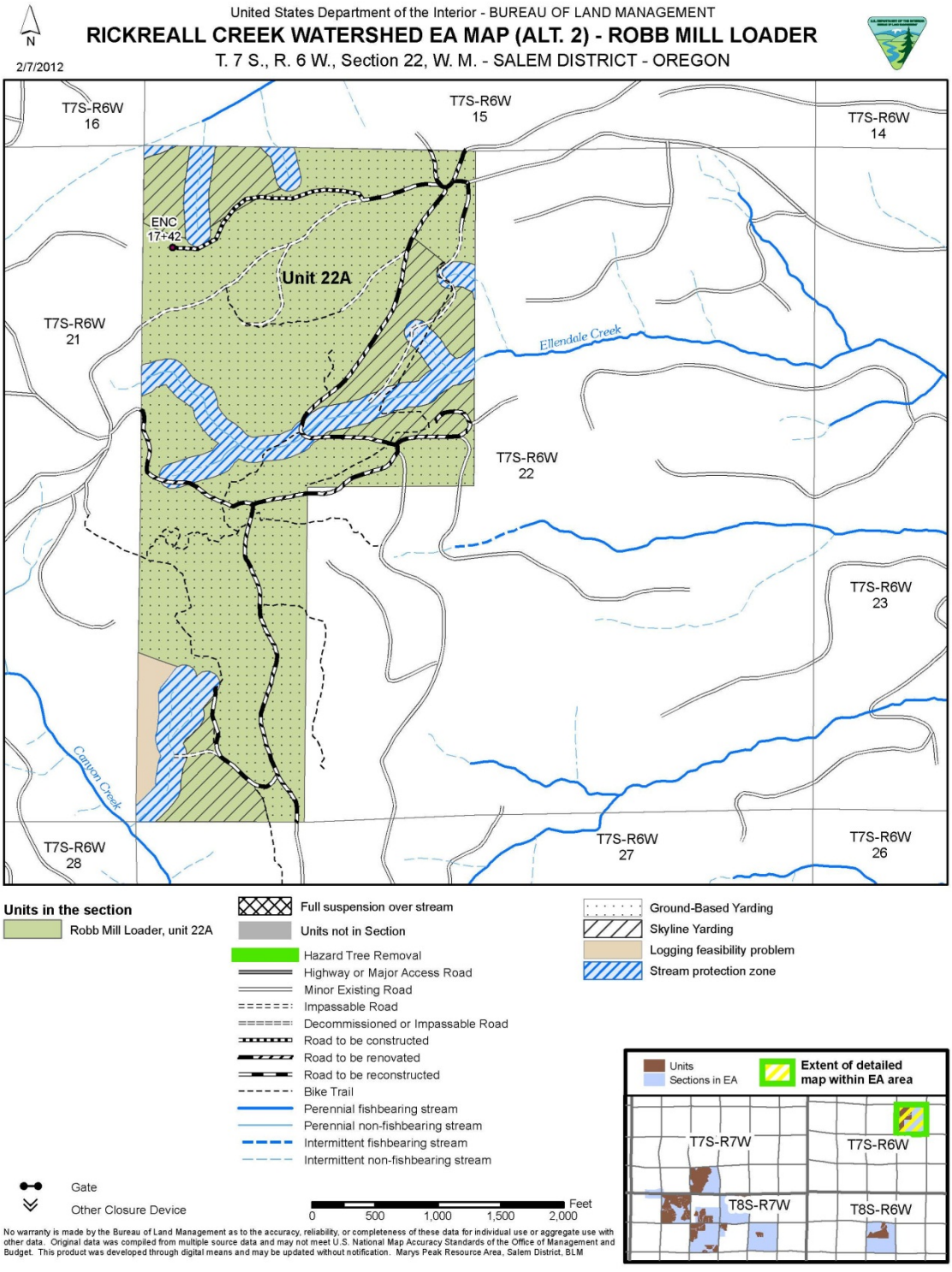
Map 7. Gilmore Timber Sale – Map 3 of 3 (Alternative 2 – Proposed Action)



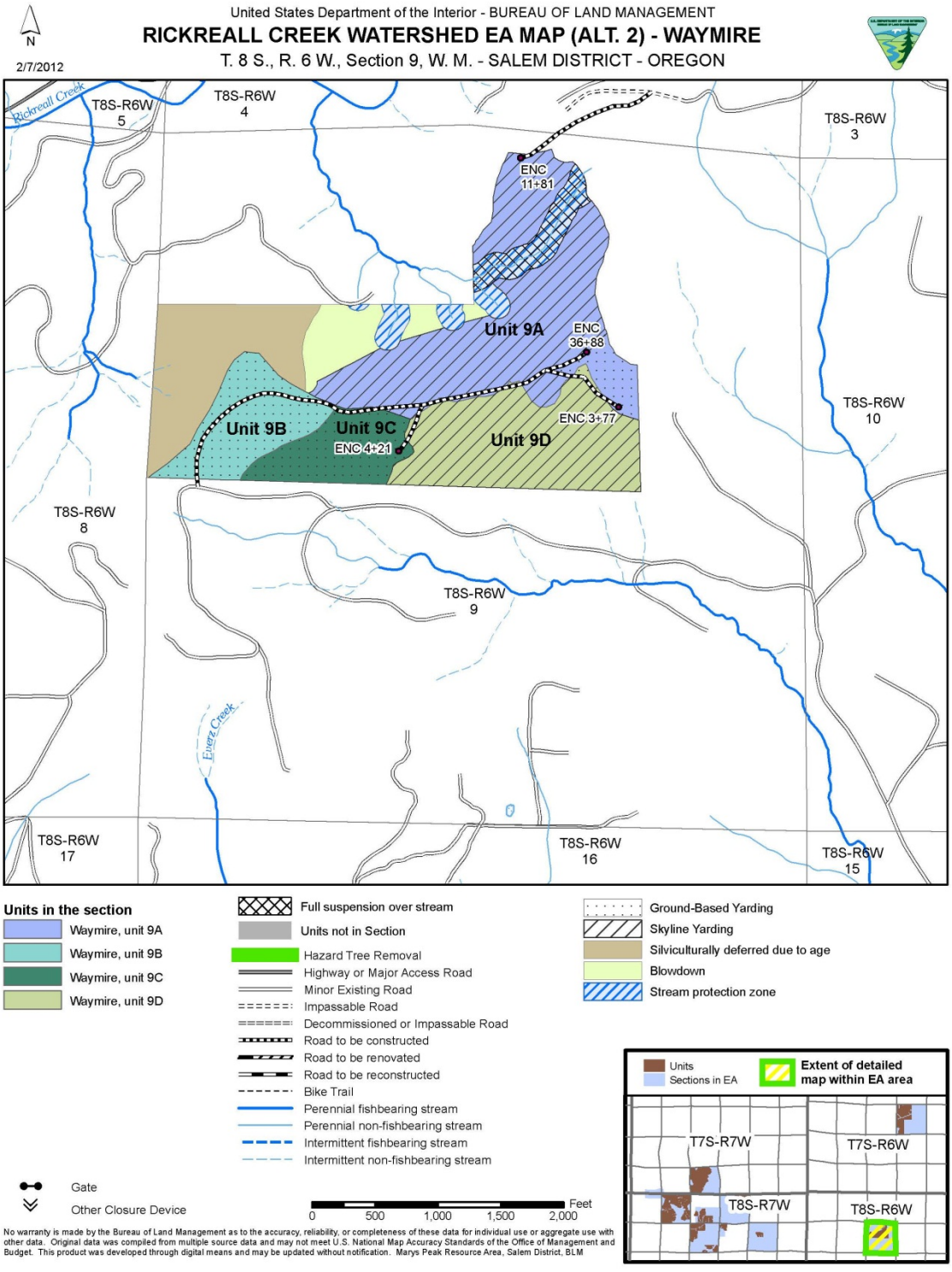
Map 8. Rick-Line Timber Sale (Alternative 2 – Proposed Action)



Map 9. Robb Mill Loader Timber Sale (Alternative 2 – Proposed Action)



Map 10. Waymire Timber Sale (Alternative 2 – Proposed Action)



Project 2 – Legacy Tree Release

Older forest legacy trees (mature open-grown trees or old-growth remnant trees) that occur in densely-stocked conifer stands would be released through the felling, girdling, and topping of individual trees or creation of gaps (¼ acre to one acre in size). Up to 790 acres in forest stands aged 40 to 110 years old have been identified for potential treatment. Due to the patchiness of stand suitability and limitations on available funding, an estimated 400 acres of the highest priority stands would likely receive treatment over a five year period. Locations for patch openings would target the densely stocked conifers adjacent to legacy trees or dominant over-story trees with large limbs. Selected locations may also target areas where dense conifers are encroaching on existing natural gaps or clusters with unique hardwoods and high shrub diversity.

The majority of trees to be felled, topped, or girdled would be Douglas-fir trees that are 5 to 20 inches diameter breast height outside bark (DBHOB), and none would be greater than 30 inches DBHOB. The felled, girdled, or topped trees would function as snags and CWD adjacent to older forest legacy trees. None of the felled trees would be harvested for commercial timber purposes. A small portion of the felled trees would be removed and placed into streams to improve fish habitat (Project 3).

Stands selected for legacy tree release are shown on Map 2 (page 16) of this EA.

Project 3 – Large Woody Debris Enhancement

Large Woody Debris enhancement would occur on up to six miles of three stream segments including the mainstem Rickreall Creek above Mercer Reservoir, the South Fork Rickreall Creek, and North Fork Rickreall Creek. Treatment may occur on up to 1.5 miles of BLM-administered lands and up to 4.5 miles of private lands. This project is a cooperative effort between Rickreall Creek Watershed Council, Forest Capital Partners, LLC., and BLM to increase habitat complexity in the Rickreall Creek system.

The BLM would provide approximately 330 trees to be used in the wood placement project. Rickreall Creek Watershed Council would contract for the felling, yarding, and placement of trees in the streams consistent with Project Design Features outlined in this EA. On approximately ½ mile of stream, the existing down trees spanning, but not contacting, the stream channel would be relocated to increase the hydraulic interaction with the stream channel, primarily by reorienting the logs. Trees would be felled from BLM-managed lands within the Rickreall Creek fifth-field watershed and placed in up to 6 miles of stream channels.

2.4 ALTERNATIVE 3 – NO NEW ROAD CONSTRUCTION

This alternative was developed in response to public input favoring limited to no new road construction. Projects 2 and 3 remain the same under this alternative. The changes to Project 1 activities in this alternative are addressed below.

Project 1 – Mid and Late-Seral Habitat Enhancement

Without new road construction, fewer acres would be accessible for timber harvest. These reduced acreages available for treatment are shown below. The silvicultural prescription within the remaining units would be the same as those discussed and analyzed under Alternative 2.

Timber sales within the AMA and RR LUAs:
The C-9 and Robb Mill Loader timber sales would occur on approximately 279 acres. The Waymire timber sale would not occur under this alternative.

Timber sales within the AMR and RR LUAs:
The Cedar Ridge and Rick-Line timber sales would occur on approximately 291 acres.

Timber sale within AMA, AMR, and RR LUAs:
The Gilmore treatments would occur on approximately 173 acres.

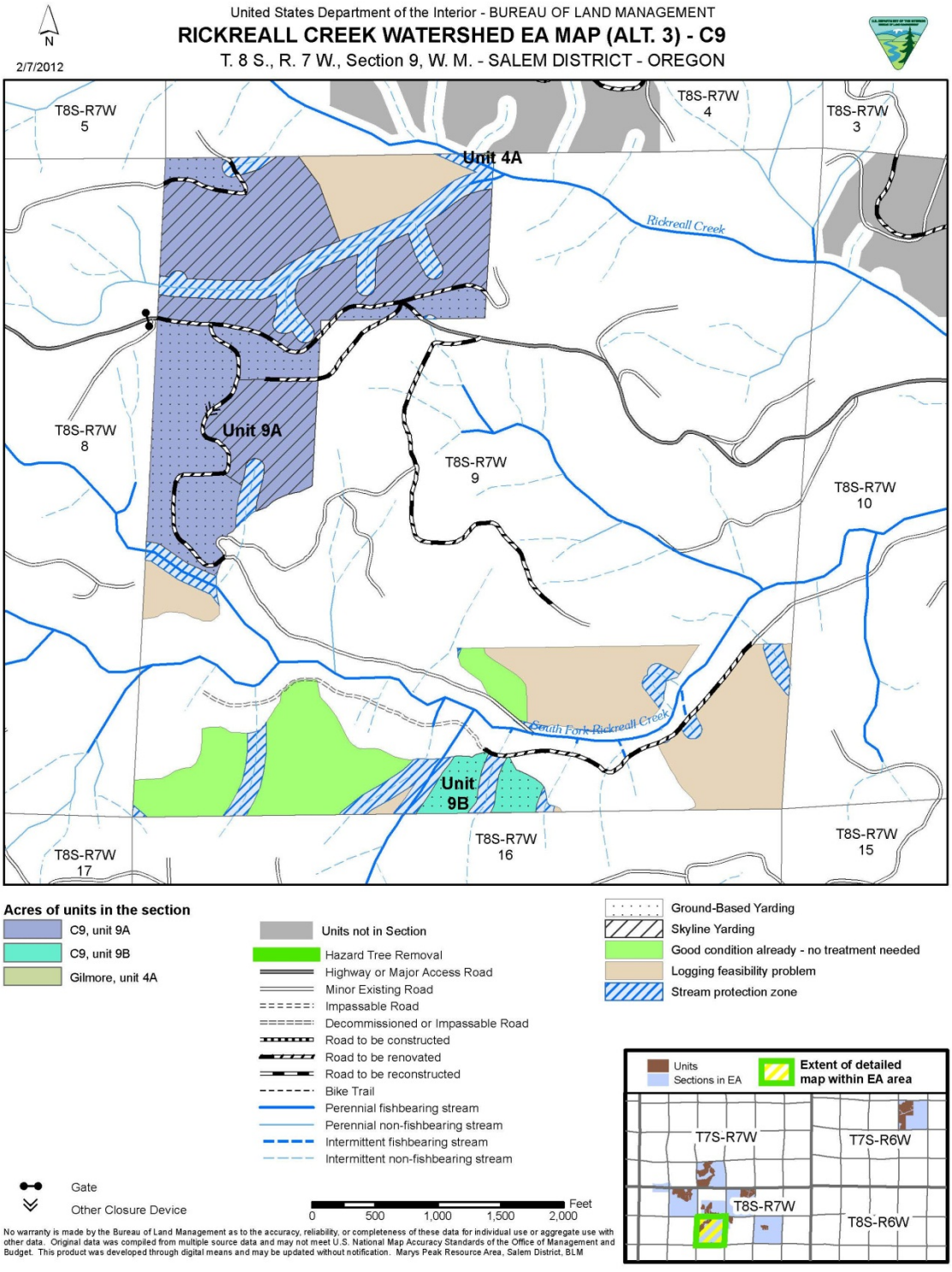
Trees would be harvested by ground-based and skyline harvest systems and would adhere to Project Design Features (Section 1.6) to their respective systems. Approximately 60 percent would be harvested by skyline and 40 percent would be harvested by ground-based methods.

Table 2. Project 1 Activites (Alternative 3)

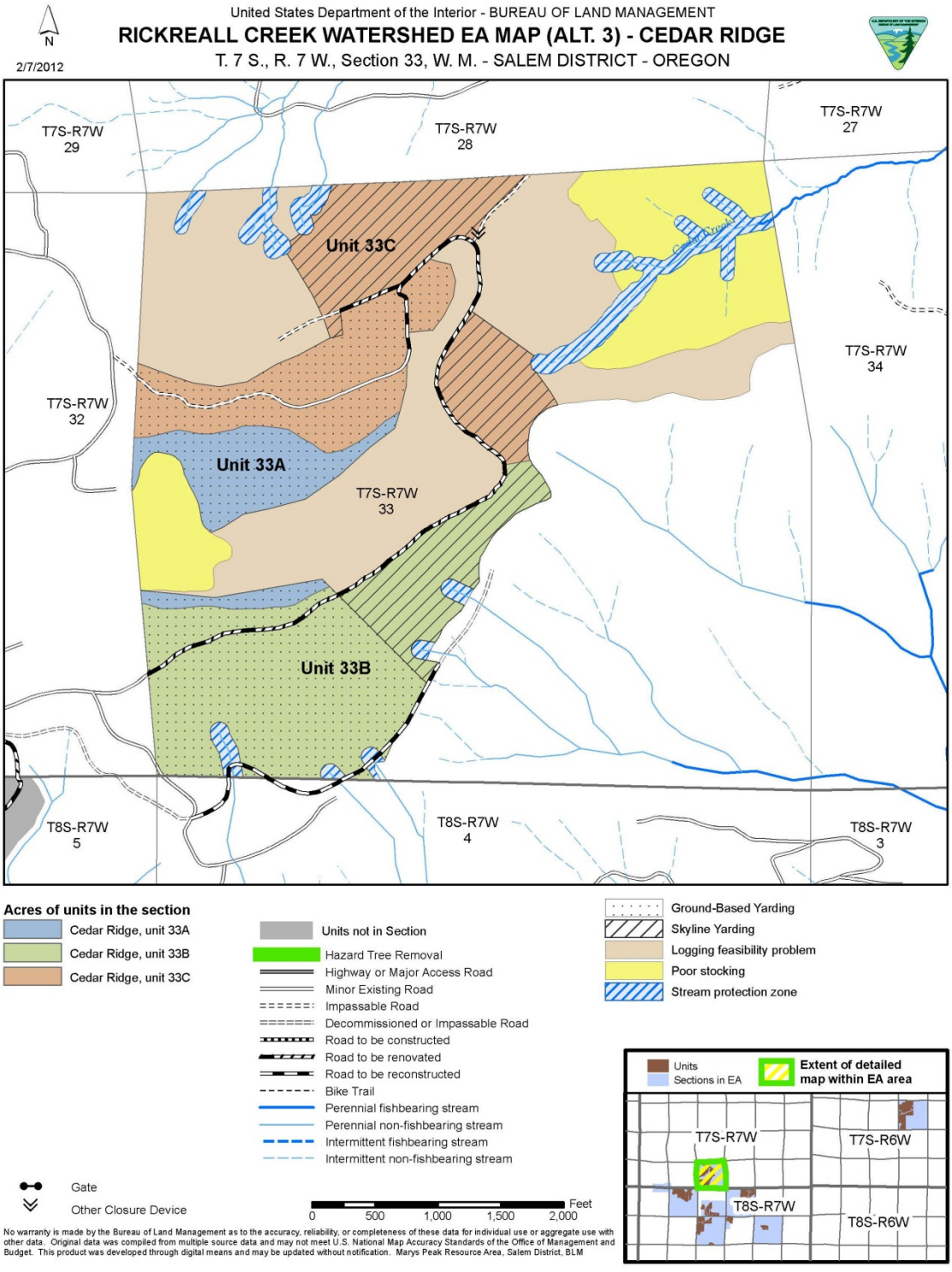
Activity	Alternative 3 No New Road Construction
Timber Sales (acres)	743
C-9	97
Robb Mill Loader	180
Waymire	0
Cedar Ridge	175
Rick-Line	118
Gilmore	173
Road construction (miles)	0
Road reconstruction (miles)	1.5
Road renovation (miles)	10.0

The Alternative 3, Project 1 timber sale maps on the following pages indicate the approximate project boundaries, logging systems, and field conditions at the time of this analysis.

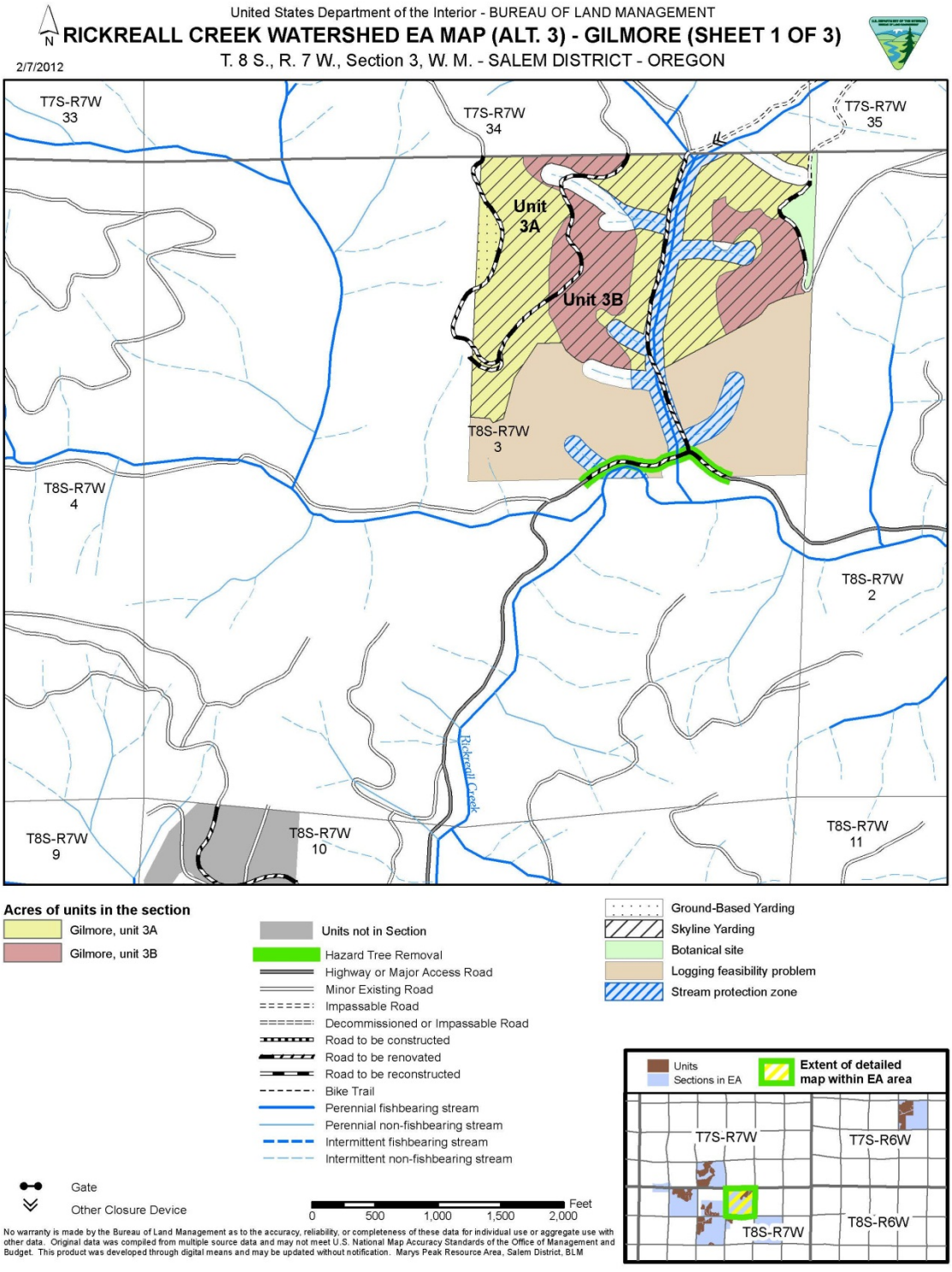
Map 11. C-9 Timber Sale (Alternative 3 – No New Road Construction)



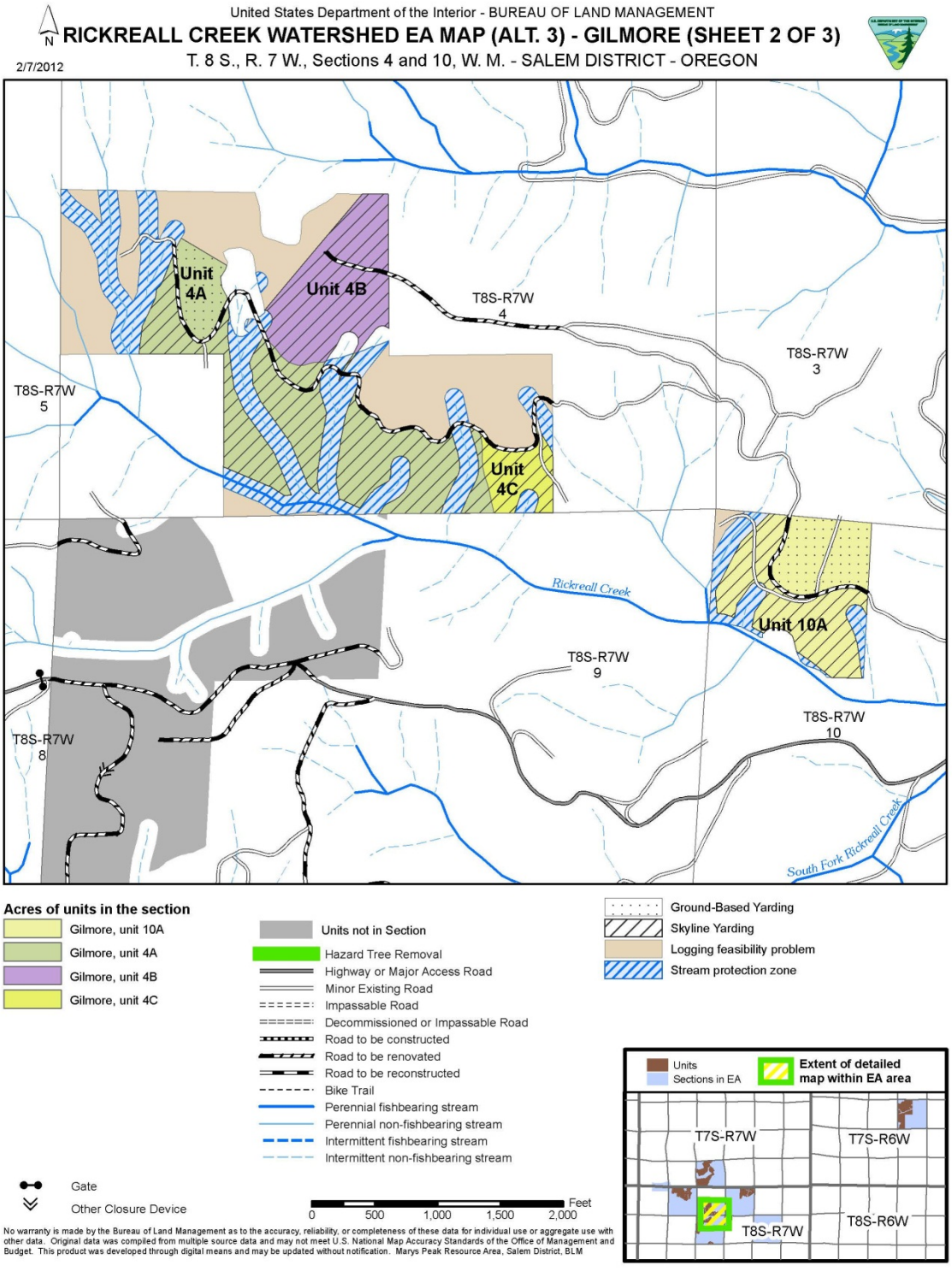
Map 12. Cedar Ridge Timber Sale (Alternative 3)



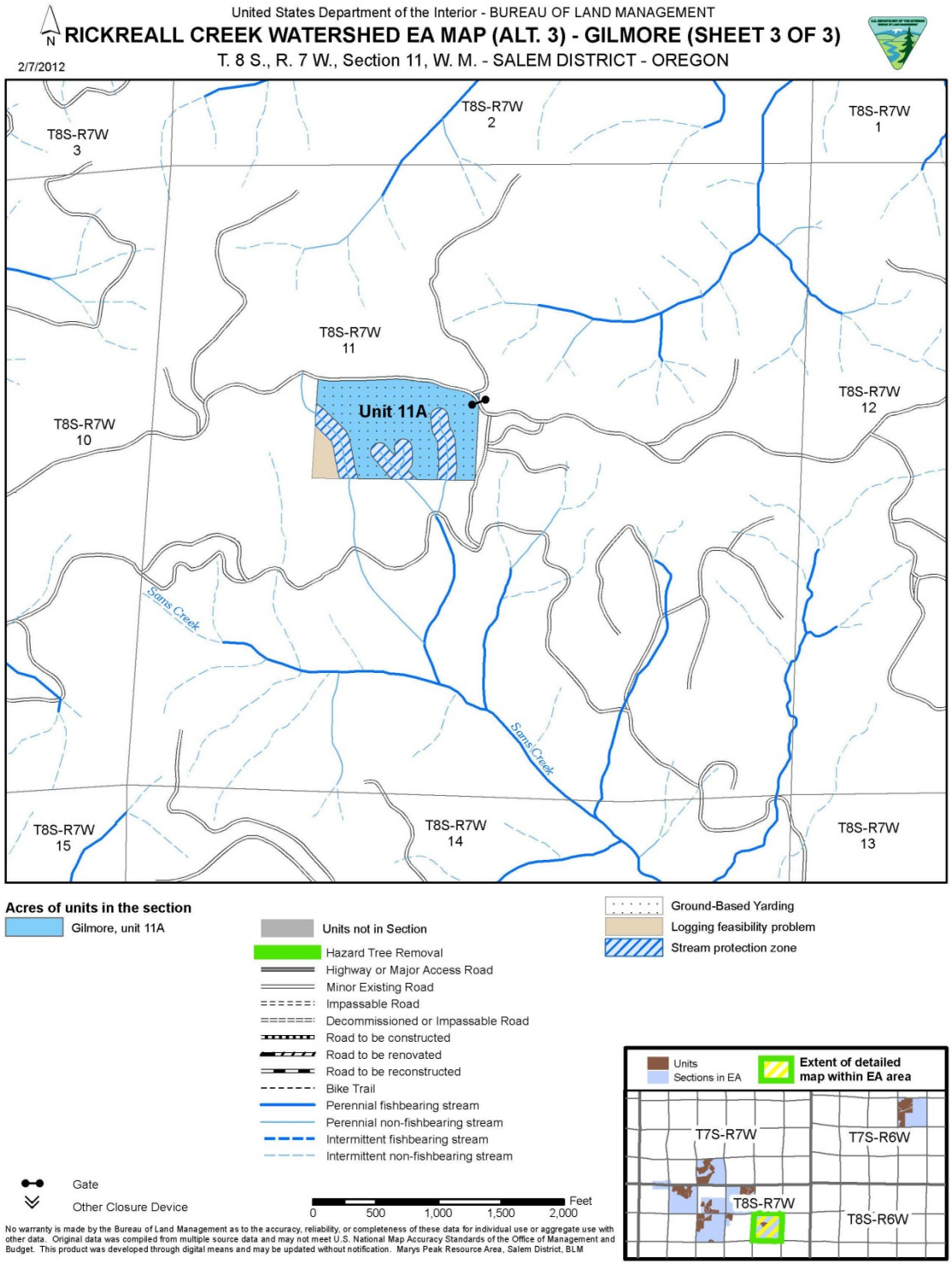
Map 13. Gilmore Timber Sale – Map 1 of 3 (Alternative 3)



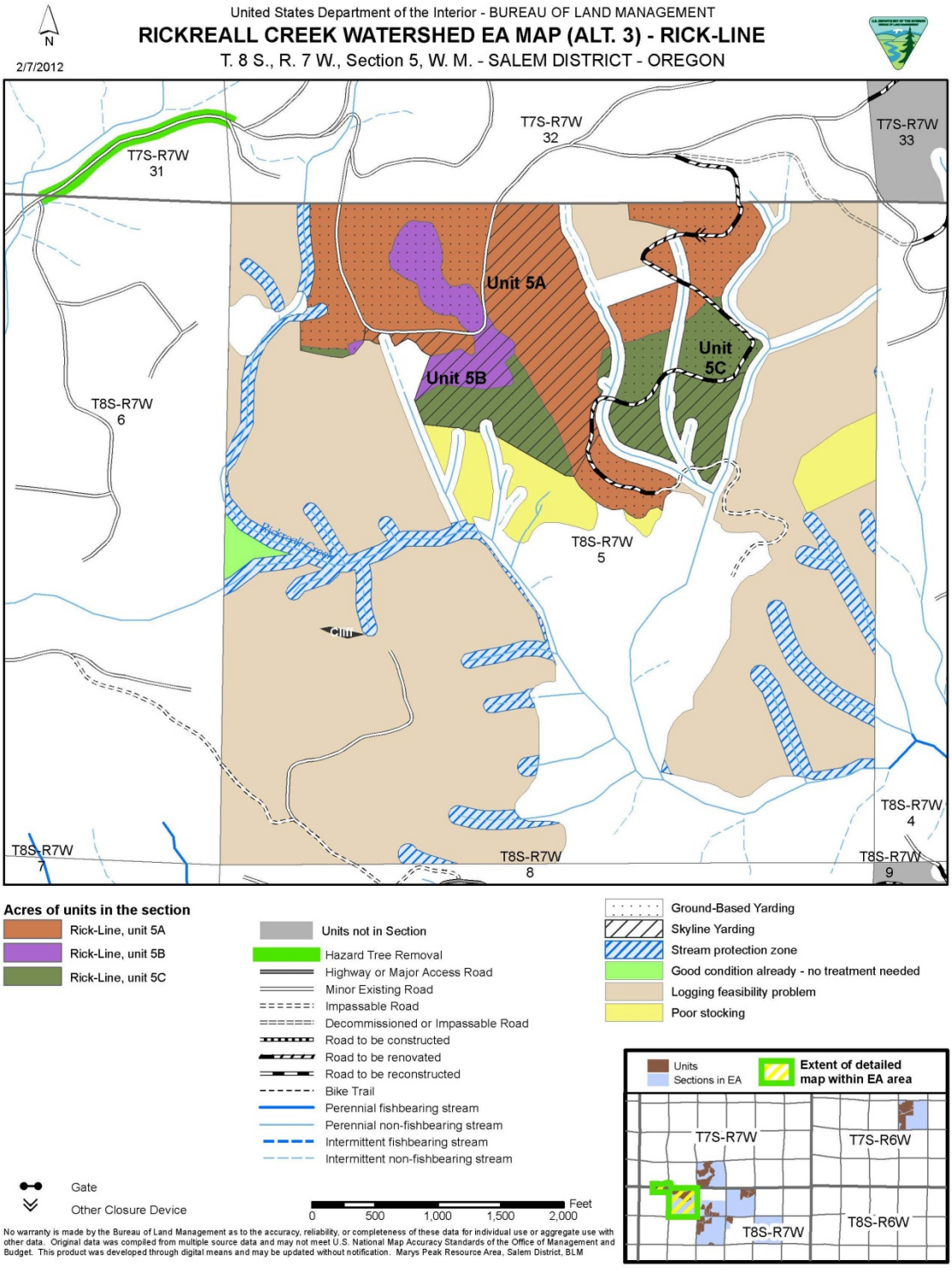
Map 14. Gilmore Timber Sale – Map 2 of 3 (Alternative 3)



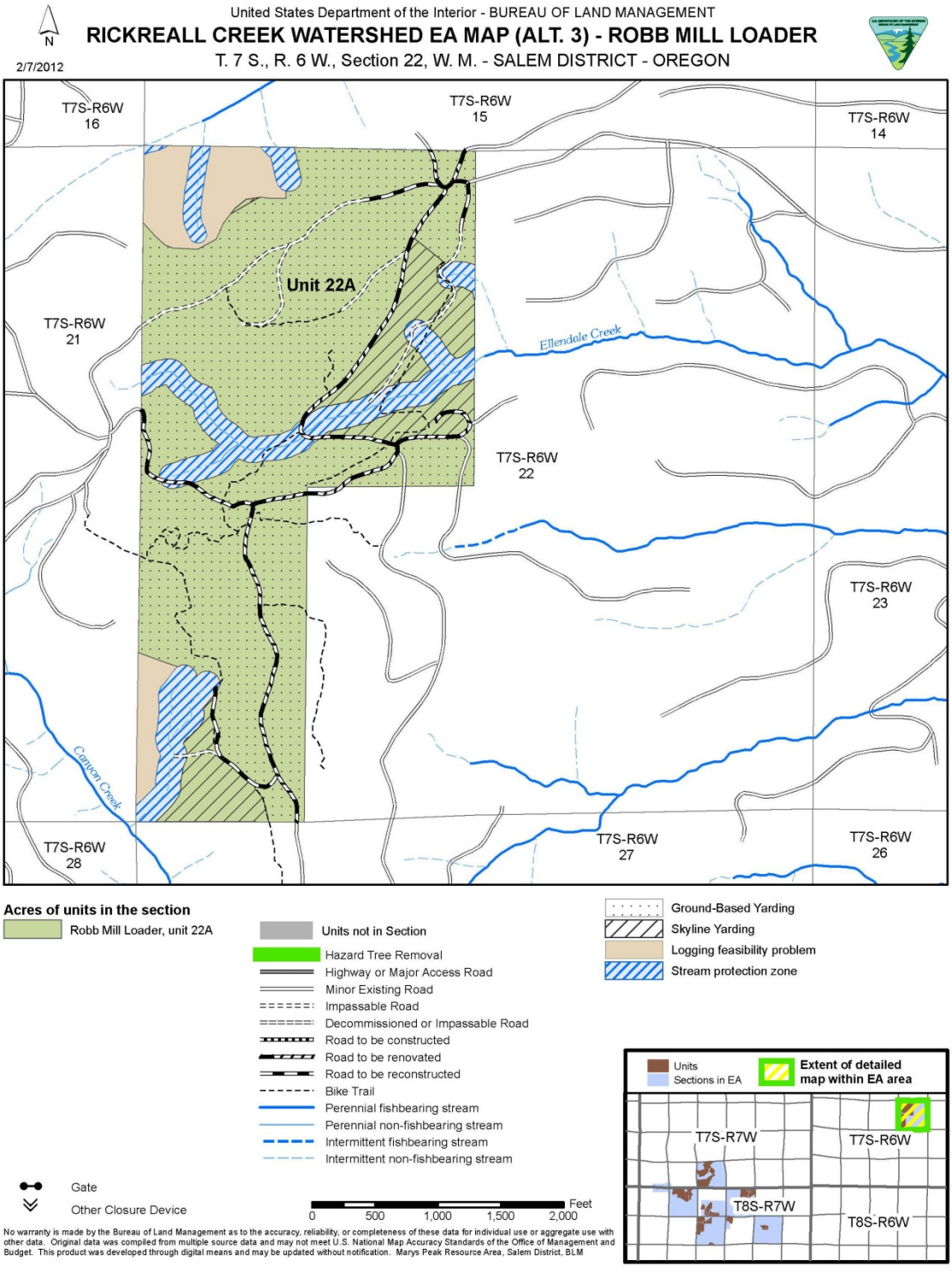
Map 15. Gilmore Timber Sale – Map 3 of 3 (Alternative 3)



Map 16. Rick-Line Timber Sale (Alternative 3)



Map 17. Robb Mill Loader Timber Sale (Alternative 3)



2.5 CONNECTED ACTIONS

Road Work

Road Construction
Approximately five miles of new roads would be constructed, primarily on ridge-tops. No stream crossings are needed for these new roads. Cross drain culverts and drive thru dips would be installed as needed. Constructed roads would receive the following actions as needed upon completion of burning operations: installation of waterbars, application of grass seed applied to exposed soils on cut/fill slopes, and entrances blocked.

Table 3. Comparison of Road Work by Alternative

Activity	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 No New Road Construction
New road construction (miles)	0.0	5.0	0.0
Road reconstruction (miles)	0.0	2.5	1.5
Road renovation (miles)	0.0	10.0	10.0

Road Reconstruction
Under Alternative 2 (Proposed Action), approximately 2.5 miles of existing but undrivable roads would be reconstructed to a usable condition and possibly a new design standard. (Approximately 1.5 miles would be constructed under Alternative 3.) Reconstruction may include road realignment, slide and fill failure repair, and/or structure upgrades. At the time of this analysis, six stream culverts have been identified for possible replacement to meet RMP standards, but this number may increase depending on road conditions when the project is implemented. Reconstructed roads would be resurfaced and culverts would be replaced or installed as needed to promote proper water drainage and minimize sediment delivery to streams. Reconstructed roads would receive the following actions as needed upon completion of burning operations: installation of waterbars, application of grass seed applied to exposed soils on cut/fill slopes, and entrances blocked.

Road Renovation
For both action alternatives approximately 10.0 miles of existing and generally drivable roads would be renovated to their original design standard. At the time of this analysis 11 stream culverts have been identified for possible replacement to meet RMP standards. Six cross drain culverts and six drive through dips have been identified for possible replacement, but this number may increase depending on road conditions when the project is implemented. Renovation may include blading and shaping of roadway, clearing brush from cut and fill slopes, cleaning or replacing culverts, re-establishing ditches, and applying rock surfacing material to depleted surfaces.

Fuel Treatments
Fuel treatment strategies would be implemented on portions of the project areas to reduce both the intensity and severity of potential wildfires in the long term (after fuels reduction has

occurred) and for site preparation in density management harvest units, or in gaps created within density management harvest units. Post-harvest fuels hazard surveys would be conducted and site-specific treatments would be recommended. A variety of fuel treatments may be implemented including slashing brush, lopping slash and brush, lopping and scattering of slash, pullback of slash from property lines, roadsides and mountain bike trails, broadcast burning, hand or machine piling and burning, swamper burning, landing piling and burning, selling the material as firewood, or allowing the material to be utilized for energy production from biomass.

These treatments may occur along roads, property lines, or mountain bike trails (where Memorandums of Understanding (MOUs) exist), on landings, or within harvest units.

2.6 PROJECT DESIGN FEATURES

The following is a summary of the Project Design Features (PDFs) that reduce the risk to the affected elements of the environment described in EA Section 3.0.

2.6.1 PROJECT DESIGN FEATURES FOR PROJECT 1 – MID AND LATE-SERAL ENHANCEMENT

Table 4. Season of Operation and Operating Conditions

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

[4] Low soil moisture is defined as 15% or lower. Actual conditions supersede calendar dates in determining operational periods.

Season of Operation or Operating Conditions	Applies to Operation	Objective
During periods of dry weather and low soil moisture, generally May 1 to October 31	Timber hauling on the following roads: Road #7-6-36 below Mercer Reservoir, County Road #736; any unsurfaced roads.	Minimize soil erosion and stream sedimentation
July 1 to August 31	In-stream work period (culvert installation)	Minimize soil erosion and stream sedimentation

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

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

- Implement erosion control measures such as waterbars, slash placement and seeding in skid trails where the potential for erosion and delivery to water bodies, floodplains and wetlands exists (BMPs R 22, 25, 26, 29, 30, 31, 33, 35, 86). Construct waterbars on skid trails using guidelines in Table I-21, page 289, Appendix I.
- Scatter treatment debris on disturbed soils and waterbar yarding trails that could erode and deposit sediment in water bodies, floodplains, and wetlands (BMPs TH 18, 19, S4).
- Existing and new skid trails would be less than 10 percent of the harvest area (TH 9).
- Limit width of skid trails to what is operationally necessary for the equipment (approximately 12 foot width) (TH 10).
- Ensure one-end suspension of logs during ground-based skidding (TH 11).
- Restrict ground-based harvest and skidding operations to periods of low soil moisture when soils have resistance to compaction and displacement (TH 12)
- To the extent practicable, limit conventional ground-based equipment to slopes less than 35 percent (TH 14).
- Ground-based equipment would be allowed to operate on slopes less than 45 percent within the skyline yarding areas. The equipment would be allowed to cut, process, and deck logs only. No yarding of logs with ground based equipment would be allowed on slopes greater than 35 percent.
    - This activity would take place with the following mitigations applied:
        1. No new skid trails, landings or temporary roads would be constructed
        2. Ground-based equipment would occur on the contours and would ride over a layer of slash.
        3. The range of slopes would not exceed 45% slope for a sustained distance of 100 feet or more.
        4. Upon completion of the operation of a unit, the Hydrologist and/or Soil Scientist in conjunction with the Administrative Officer would review the unit to ensure that adverse effect to soil quality did not occur. Once that review was certified, then the operation could proceed to the next cable unit.

- Skid and harvest roads would be blocked where they access main vehicular roads following completion of ground-based yarding (TH 21).
- Other ground-based yarding equipment could be utilized as long as it meets best management practices and results in equivalent or less than the level of impacts analyzed for the project (TH 15).
- Fell harvested trees away from stream channels when possible (TH 17, S 3).
- During periods of rainfall when water is flowing off road surfaces, the contract administrator may restrict log hauling to minimize water quality impacts, and/or require the purchaser to install silt fences, bark bags, or apply additional road surface rock (R 73).
- Repair damaged culvert inlets and downspouts to maintain drainage design capacity (R 39, 43).
- Landings should be kept to the minimum size needed to accomplish the job and use existing road surfaces as much as possible (TH 13, R 1, 4, 6).
- Road decommissioning activities would result in the re-establishment of overland flow paths through the road prism and re-establishment of natural stream function where culverts are removed (R 90-100).

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

- All soil disrupting equipment and transportation vehicles (low-boys, trailers, dump trucks, etc.) would be required to be clean and free of dirt and vegetation prior to arriving on BLM-managed lands as directed by the contract administrator (SP 1).
- All large areas of exposed mineral soil (roads to be constructed, skid roads, landings), as determined by the contracting officer would be grass seeded with Oregon Certified (blue tagged) red fescue (*Festuca rubra*) at a rate equal to 40 pounds per acre or sown/planted with other native species as approved by the resource area botanist. (*See botany report-Appendix 1 for justification*) Prior to applying seed, the contractor will supply the BLM with the seed certification (blue tag) and seed label (R 97).

To Meet the Objectives of the Riparian Reserves

- Stream Protection Zones (SPZs) where no cutting and/or yarding is permitted would be established along streams and identified wet areas within harvest areas. SPZ width would be established through shade sufficiency analysis (TH **7**).
- From the SPZ to the upper edge of the Riparian Reserve, stand density would be reduced using the same prescription used on the upland forest, though additional trees would be left as necessary to maintain 50% canopy cover in the secondary shade zone (S 9).
- To protect water quality, all trees within one tree height of SPZs would be felled away from streams. Where a cut tree does fall within a SPZ, the portion of the tree within the SPZ would remain in place (TH 17, S 3).
- Except for approximately five skyline corridors in the NW portion of Unit 9A in the Waymire Timber Sale, no yarding would be permitted in or through any SPZs within the harvest areas. Yarding on those five skyline corridors within the SPZ would be done with full suspension (TH 7, 16, 17).

- No refueling would be allowed within 100 feet of any standing or running water (SW 8, 9, SP 1, RST 10).
- Woody material removed from stream crossing for culvert maintenance must be retained in the stream network.
- Hand piling of fuels intended for burning is prohibited closer than 100 feet from any stream channel.
- Mechanical fuels treatment would be prohibited closer than 200 feet from any stream channel.

To Protect and Enhance Stand Diversity and Wildlife Habitat Components

- Priorities for tree marking would be based on Marking Guidelines. Tree selection would be designed to leave a range of tree diameters, maintain tree species diversity, create variable density of leave trees, and retain legacy and wildlife tree structure while meeting target densities. A unit-average range of 100 to 160 square feet basal area of trees would be retained. Variable basal area prescriptions and diameter cut limit prescriptions would be implemented. Marking guidelines do not apply to Rights-of-Way.
- In stands greater than 80 years of age, except C-9 9B, and selected younger stands (Gilmore 4A, Rick-Line 5A, and 5C, Cedar Ridge 33B, and Robb Mill Loader 22A): un-thinned clumps up to 0.5 acre in size, and gaps up to 0.5 acre in size would be retained within contiguous treatment areas of greater than 20 acres at a rate of 1 acre of clump and 1 acre of gap per 20 acres. Clumps would be located surrounding natural features (snags, rock outcrops, steep slopes), or to reduce risk of windthrow (near boundaries with private land or ridge tops) and to be well-distributed and avoid likely yarding corridors. Gaps would be sited at existing understory, vigorous shrub understory, or legacy trees. Within gaps, up to 5 trees of the largest diameter would be retained.
- In all stands, clumps up to 0.1 acre in size would be retained. Other areas would remain untreated due to logging infeasibility and riparian buffers.
- Any plus trees (trees selected for genetic traits) and their reference trees, and bearing trees would be reserved from harvest.
- Understory conifers less than 7 inches DBHOB would be excluded from harvest.
- Any Continuous Vegetation Survey plot reference trees would be reserved from harvest to aid in plot relocation for future plot measurements.
- Except in yarding corridors and skid trails, all western red cedar and hardwood tree species would be retained. Thinning would be implemented to maintain current species composition or to increase the proportion of minor species (western hemlock, noble fir, grand fir) where they are not abundant.
- In areas infected with *Phellinus weirii*, symptomatic trees and all Douglas-fir trees (the most susceptible species) would be removed within approximately 50 feet of dead or symptomatic trees. If openings greater than approximately 0.5 acre are created, the need for planting would be evaluated. If needed, seedlings of non-susceptible or immune species would be planted.
- Any tree found to have a stick or ball nest, regardless of size (tree or nest) would be protected, unless it is a safety hazard.

- All live trees with damage (hollow, cavities, dead or broken tops, etc.) would be reserved.
- Remnant/legacy structure, live or dead, would be protected; live legacy would be released from any live crown competition; dead legacy would be protected with adjacent leave trees.
- Additional trees would be cut around the largest diameter trees with the fullest live crowns to maintain their open-grown, wolf- tree structure.

To Protect and Enhance Coarse Woody Debris Conditions

- Existing snags and CWD would be reserved, except where they pose a safety risk or affect access and operability. Any snags or logs felled, or CWD moved for these purposes, would remain on site within the project areas. Additional trees would be reserved around snags greater than 20 inches DBHOB and 40 feet in height to protect them from logging operations and to reduce the necessity of falling them for safety.
- At least two green trees per acre intended to be part of the residual stand would be felled, girdled, or topped to function as CWD at the completion of harvest operations. Trees to be utilized for CWD creation would be stand average DBHOB or larger. Incidentally felled or topped trees (i.e. tail trees, intermediate supports, guyline anchors, hang-ups, etc.) that are left by harvest operations would be counted toward this target. If such incidentally felled trees are removed or sold, additional trees would be felled, girdled, or topped to meet this target.
- The desired input of new CWD to proposed harvest units would follow management strategies described in LSRA (Table 24, p. 96). An assessment of CWD recruitment resulting from harvest activities (stand damage, limbs and tops, felled/topped trees) and post-harvest processes (wind throw, bug kill, etc.) would be conducted within 5 years of harvest action. Any units or portions of units that lack the desired CWD input (Table 5) would be available for CWD treatment, dependent upon available funding

Table 5. Coarse Woody Debris Management Strategies for Project 1 units

LSRA CWD Strategy[1]	Applicable Units	Desired CWD Input[2]	Treatment comments
Strategy # 1	C-9: 9A, 9B, 9D; Gilmore: 4A Rick-Line: 5F, 5I	3	>80year old stands with minimal input needed to meet moderate to high volume CWD.
Strategy # 2	C-9: 9C	2	Small unit >80year old with low CWD and limited treatment potential
Strategy # 2	Gilmore: 3A, 3B, 4B, 4C, 10A; Rick-Line: 5A-5E, 5G, 5H; Robb-Mill Loader: 22A; Waymire: 9A	3-5	50-74year old stands with minimal to moderate CWD existing. Would benefit from added hard snags/logs
Strategy # 3	Gilmore: 11A	2	Small unit, 45year old, with small QMD and low CWD. Defer CWD recruitment to future

Strategy # 3	Waymire: 9B, 9C, 9D	2	unique stand conditions and hardwood component limit CWD treatment potential
Strategy # 4	Any Dropped Units	NA	Portions of units that were dropped from treatment and not treated by Project 2 would retain natural processes of CWD recruitment.

1. Coarse woody debris strategies are described in the LSRA (page 95), summarized as: Strategy-1 emphasizes meeting immediate needs for moderate to high levels of CWD; Strategy-2 balances immediate needs with future CWD recruitment; Strategy-3 emphasizes long-term development of CWD; Strategy-4 allows for natural processes to dominate.
2. Desired Input includes all CWD that has been newly recruited during or after harvest.

In the Event of Windthrow

It is possible that trees will blow down following harvest activities. Windthrown trees within harvest areas may be salvaged without further NEPA analysis under the following conditions:

1) The project Interdisciplinary Team (IDT) determines them to be in excess of needs for coarse woody debris, consistent with LUA objectives;
2) The project IDT determines the action would be consistent with the project purpose and need and falls within the expected range of effects;
3) Logging system and equipment would be limited to those conditions analyzed for the initial harvest, limited to existing roads, skyline corridors, and skid trails, and
4) Subject to all applicable project design features contained herein. Affected areas will be surveyed for reforestation needs and may be planted with tree seedlings.

To Protect Air Quality, Reduce Fire Risk, and Manage Fuels

Projects 1 and 2

- A Prescribed Fire Burn Plan would be initiated and signed by the Authorized Officer prior to any prescribed burning activity.
- Burning would be conducted in accordance with the Salem District RMP, *Oregon State Implementation Plan* and *Oregon Smoke Management Plan* as administered by the Oregon Department of Forestry and would comply with the provisions of the Clean Air Act. It would be conducted under good atmospheric mixing conditions to lessen the impact on air quality in Smoke Sensitive Receptor Areas.
- Harvest units in which future prescribed broadcast burning would be applied to restore Oregon white oak habitat would have hand firelines constructed, existing snags adjacent to control lines would be felled, and no new snags would be created within 250 feet of these control lines. Where slash accumulations are heavy adjacent to thin barked trees, slash would be pulled back or hand piled to facilitate survival of these trees.
- Broadcast burning, swamper burning, or hand, machine, and landing pile construction and burning may be used individually or in combination in areas where fuel loading is heavy, the fire risk is determined to be high, or site preparation is required to help facilitate tree planting in *Phellinus weirii* pockets or gaps.
- Large woody debris greater than six inches in diameter would not be piled.
- Hand piles should be located at least 10 feet from green trees to minimize damage, or

on top of bigleaf maple stumps to help prevent resprouting.

- Machine and landing piles would only be constructed within 25 feet of designated roads and landings. Equipment used in the construction of machine piles or landings would remain on the roads or landings during the construction.
- Machine and landing piles would be located as far as possible from reserved trees to minimize damage.
- Hand, machine, and landing piles would be covered with .004 mil. thick black polyethylene plastic. The plastic shall not exceed 100 square feet in size and would be placed and anchored to help facilitate the consumption of fuels during the high moisture fall/winter burning periods.
- Lopping and scattering of fuels would be incorporated in areas where fuel loading is relatively heavy but not heavy enough to warrant burning.
- Pullback of fuels would be incorporated in areas where fuel loading is relatively light (especially along roads, property lines, and mountain bike trails) and not heavy enough to warrant burning.
- Utilization of small diameter slash for firewood or energy production from biomass would be incorporated where appropriate. If biomass removal occurs in lieu of prescribed burning; only logging debris accessible from existing roads and landings would be available for removal.

To Protect Special Status Species

- Required pre-disturbance surveys and known-site management for any listed botanical, animal, or fungal species would be accomplished in accordance with BLM Manual 6840- Special Status Species Management, and Record of Decision and Standards and Guidelines for Amendment to the Survey & Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (S&M ROD, January 2001) prior to project implementation.
- The resource area biologist and/or botanist would be notified if any special status botanical, fungal, or animal species are found within or adjacent project areas and appropriate mitigation would be applied according to bureau policies.
- Site management of any federal Threatened and Endangered (T&E) or bureau special status, including survey and manage botanical or fungal species found as a result of additional inventories or incidental findings would be accomplished in accordance with BLM Manual 6840 (12/12/2008, IM-2009-039).
- For any listed botanical species whose characteristics make locating them with field surveys practical, clearances would generally be done by field surveys using intuitive controlled methods, field clearances, field reconnaissance, inventories, database searches, known site maps and records and/or habitat examinations. Clearances for fungi are considered "not practical" and surveys are not required.
- To minimize disturbance to resident spotted owls, all felling and yarding operations at Gilmore Unit 11A would be restricted from occurring during the March 1 to July 15 time period. This restriction can be lifted if resident owls are found to be non-nesting during this time. Hauling from this unit is not restricted during this time.
- Project implementation would be conducted in conformance with the applicable biological opinion or letter of concurrence concerning federally listed wildlife species. Pertinent terms and conditions from these consultation documents would

include:

- No project activities would occur within 300 feet of unsurveyed suitable marbled murrelet habitat during the critical breeding period (April 1 to August 5);
- Project activities occurring within 300 feet of unsurveyed suitable marbled murrelet habitat during the period of August 6 to September 15 must not begin until 2 hours after sunrise, and must end 2 hours before sunset;
- No project activities would occur within 300 meters (roughly 1,000 feet) of known spotted owl nest sites during the critical breeding period (March 1 to July 15).

To Protect Public Safety During Harvest and Fuel Treatment Operations

- Oregon Occupational Safety and Health Administration and the BLM would require the operator to place signs, temporarily block roads with vehicles or moveable barricades, and/or use flaggers to ensure public safety during active logging, hauling, and fuel treatment operations.

To Protect Cultural Resources

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

Project Design Features specific to Robb Mill Loader Timber Sale Area

To Maintain Recreation Opportunities

- To facilitate restoring trails to remain open after operations for continued recreation, prior to logging operations, the BLM would flag or otherwise mark those trails. Following completion of logging operations, mountain bike trails would be cleared under the guidance of BLM personnel.

Project Design Features specific to Waymire Sale Area

- Where present, Oregon white oak trees greater than 7 inches DBHOB with greater than 30% crown ratio would be released by removing competing conifer trees.
- Prescribed broadcast burning would be applied to Units 9B, 9C, and 9D, to be conducted one to five years following conifer removal and fuel disposal. Burning would be conducted in the spring or fall during periods of vegetation dormancy, and of sufficient intensity to reduce understory shrub layers and improve conditions for the germination and growth of native species. Prescribed broadcast burning would be repeated at intervals of approximately five years following initial burning, to maintain Oregon white oak vigor and open understory conditions.

- Brush and trees < 5 inches DBHOB (conifer and bigleaf maple species) would be cut in areas planned for prescribed broadcast burning. Fuels resulting from conifer cutting would be piled by hand and burned or treated by lopping and scattering.
- Gaps up to 1.0 acre in size would be created at a rate of up to 1 acre per 10 acres, to maintain or establish Oregon white oak and to establish ponderosa pine. Gaps would not be located in the Riparian Reserves.
- Foam additives used during broadcast burn operations would be managed to ensure keeping foam solution out of flowing water courses.
- Yarding would be permitted through SPZs and would be limited to full-suspension yarding on approximately five corridors in Unit 9A.

2.6.2 PROJECT DESIGN FEATURES FOR PROJECT 2 – LEGACY TREE RELEASE

To Protect and Enhance Stand Diversity and Wildlife Habitat Components

- Some trees selected for CWD treatment would be scattered individual trees or in small clusters (five or less per clump). These trees may be felled, basal girdled, top-cut at 60 feet (creating dead snag), or crown girdled above five or more live branch whorls (creating dead top in live tree).
- Most trees selected for CWD treatment would be felled or basal girdled within patches (¼ acre to one acre in size) that surround or lie adjacent to older forest legacy trees. No more than one acre of patches would occur per three acres of treatment area (less than 33 percent in patches), and canopy closure greater than 60 percent would be maintained over the entire treatment unit.
- Up to 5 large trees per acre (greater than 18 inches DBHOB) and up to 20 small trees per acre (less than 18 inches DBHOB) would be selected for CWD treatment within patches.
- Patch cuts may also release minor hardwood species or re-open natural canopy gaps that are closing in with young conifers.
- To avoid impacts to trees that exhibit complex upper canopy structure, no older forest legacy trees or large conifer trees (>30 inches DBHOB) would be cut.
- No trees having visible stick nests, or prominent crown deformities (broken tops, mistletoe clumps) would be selected for cutting, and trees with prominent epiphyte accumulations (especially those with cyanolichens) would not be cut.

To Protect Special Status Species

- No suitable northern spotted owl or marbled murrelet nest trees would be cut or damaged to unsuitable conditions;
- Project implementation would be conducted in conformance with the applicable biological opinion or letter of concurrence concerning federally listed wildlife species. Pertinent terms and conditions from these consultation documents would include:
    - ✓ No project activities would occur within 300 feet of unsurveyed suitable marbled murrelet habitat during the critical breeding period (April 1 to August

5);
- ✓ Project activities occurring within 300 feet of unsurveyed suitable marbled murrelet habitat during the period of August 6 to September 15 must not begin until 2 hours after sunrise, and must end 2 hours before sunset.
- ✓ No project activities would occur within 300 meters (roughly 1000 feet) of a known spotted owl nest site during the critical breeding period (March 1 to July 15);
- ✓ The Area Biologist would be notified if any federally listed wildlife species are found occupying stands proposed for treatment during project activities.

- Required pre-disturbance surveys and known-site management for any listed botanical, fungal, or animal species would be accomplished in accordance with BLM Manual 6840- *Special Status Species Management*, and *Record of Decision and Standards and Guidelines for Amendment to the Survey & Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines* (S&M ROD, January 2001).
- The resource area biologist and/or botanist would be notified if any listed botanical, fungal, or animal species are found occupying stands proposed for treatment during project activities. If the species is a federal listed ESA, bureau sensitive species or Category A, B or E Survey and Manage species then all of the known sites would be withdrawn from any timber harvesting activity. If the species is other than a federal listed ESA, bureau sensitive species or Category A, B or E Survey and Manage species, then appropriate mitigation action would be taken.
- For any listed botanical species whose characteristics make locating them with field surveys practical, clearances would generally be done by field surveys using intuitive controlled methods, field clearances, field reconnaissance, inventories, database searches, known site maps and records and/or habitat examinations. Clearances for fungi are considered "not practical" and surveys are not required.

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

- Stream protection zones (SPZs) would be established along all streams and identified wet areas within the proposed treatment units. These zones would be a minimum of approximately 55 feet from the high water mark.
- Scattered individual trees or small clusters of trees (less than five) may be cut for CWD within the SPZ, but no patch cuts would be located in the SPZ.
- Treated trees within the SPZ or within one tree height of SPZs would be felled toward streams.
- Up to 20 percent of felled trees in any unit may be removed and placed in streams to enhance aquatic habitat for fish. Trees would be removed by helicopter or by mechanized equipment from existing roads.

To Protect Cultural Resources

The project area occurs in the Coast Range. Survey techniques are based on those described in Appendix D of the *Protocol for Managing Cultural Resource on Lands Administered by the Bureau of Land Management in Oregon*. Post-project survey would be conducted according to standards based on slope defined in the Protocol appendix. Ground disturbing

work would be suspended if cultural material is discovered during project work until an archaeologist can assess the significance of the discovery.

To Protect Areas of Critical and Environmental Concerns (Rickreall Ridge)

Any timber thinning within the Rickreall Ridge ACEC boundaries would comply with the goals and objectives of the Rickreall Ridge ACEC management plan.

2.6.3 PROJECT DESIGN FEATURES FOR PROJECT 3 – LARGE WOODY DEBRIS ENHANCEMENT

- Follow PDFs described in Aquatic and Riparian Habitat Projects as addressed in the *Endangered Species Act Section 7 Programmatic Consultation and Biologic Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation Fish Habitat Restoration Activities in Oregon and Washington, CY 2008 - CY 2012* (aka ARBO).
- Follow ODFW guidelines for timing for in-water work (typically July 15 to October 15).
- Follow ODFW guidelines for LWD enhancement projects.
- Develop and Implement a spill containment plan.
- Refuel equipment at least 150 feet from water bodies.
- Use whole trees of sufficient size and aggregated in a manner to mimic natural accumulation.
- Any falling of stream side trees would be directionally felled toward the stream to the extent practicable.
- If any additional conifer trees would be severed the resource area botanist would survey for any federal or Oregon state T&E and bureau special status or survey and manage species prior to cutting.
- Any debris created within the road prism during felling and removal of conifers would be removed and scattered outside of the road prism.
- If extensive areas of mineral soil are exposed during log placement, as determined by the authorized officer the area would be sown with Oregon Certified (blue tagged) red fescue (*Festuca rubra*) at a rate equal to 40 pounds per acre or sown/planted with other native species as approved by the resource area botanist.
- Proposed project would comply with the Oregon Division of State Lands General Authorization for Fish Habitat Enhancement and with the U.S. Army Corps of Engineers Regional General Permit for Stream Restoration.
- Implementing project activities on private lands should include efforts to protect existing access and privately owned infrastructure. The following design features could be implemented to protect access and infrastructure where conflicts may exist:
    - ✓ Expediting recovery of scour resistant vegetation (planting willows), alders and conifers in the riparian areas would protect banks and minimize lateral erosion which could undermine the existing road.
    - ✓ Incorporation of LWD or placement of boulders in the stream channel and floodplain nearest the road, designed to direct high flows away from the road.
    - ✓ Log structures should be placed in such a manner as to reduce lateral channel

migration and should be located in areas were the road is higher than the existing floodplain.
    - ✓ Where possible, include the placement of additional logs across the full length of the floodplain to prevent un-checked chute cutoffs.
- Conduct project implementation in conformance with the applicable Biological Opinion or Letter of Concurrence concerning federally listed wildlife species. Pertinent Terms and Conditions from these consultation documents would include:
    - ✓ All green trees selected for placement in streams would be inspected and approved by Resource Area Biologist to ensure that they do not currently provide nesting structure for spotted owls or marbled murrelets and that no trees greater than 36 inches DBH would be removed.
    - ✓ Felling and helicopter yarding of selected trees would occur after August 5 and before April 1 in any year.
    - ✓ Felling and helicopter yarding conducted between August 6 and September 15 would be restricted to occur during the period from two hours after sunrise to two hours before sunset.
    - ✓ The Resource Area Biologist would be notified if any federally listed wildlife species are found occupying stands proposed for green tree selection during project activities.

To Protect Special Status Species

- Required pre-disturbance surveys and known-site management for any listed botanical, fungal, or animal species would be accomplished in accordance with BLM Manual 6840- *Special Status Species Management*, and *Record of Decision and Standards and Guidelines for Amendment to the Survey & Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines* (S&M ROD, January 2001).
- The resource area biologist and/or botanist would be notified if any listed botanical, fungal, or animal species are found occupying stands proposed for treatment during project activities. If the species is a federal listed ESA, bureau sensitive species or Category A, B or E Survey and Manage species then all of the known sites would be withdrawn from any timber harvesting activity. If the species is other than a federal listed ESA, bureau sensitive species or Category A, B or E Survey and Manage species, then appropriate mitigation action would be taken.
- For any listed botanical species whose characteristics make locating them with field surveys practical, clearances would generally be done by field surveys using intuitive controlled methods, field clearances, field reconnaissance, inventories, database searches, known site maps and records and/or habitat examinations. Clearances for fungi are considered "not practical" and surveys are not required.

2.7 COMPARISON OF ALTERNATIVES WITH REGARD TO PURPOSE AND NEED

The tables on the following pages, separated by project, present the differences between the alternatives with regard to the Purpose of and Need for the projects (Section 1.6).

Table 6. Comparison of Alternatives by Purpose and Need for Project 1 – Mid and Late-Seral Habitat Enhancement

Purpose and Need (EA Section 1.6)	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (No New Road Construction)
Plan and implement silvicultural treatments that develop, accelerate, and enhance late-successional forest conditions and are beneficial to the creation and maintenance of late-successional reserve habitat (RMP p. 16). **Thinning to create and maintain late-successional forest conditions may occur up to the 110-year age class (106-115 years)(AMA RMP pp. 19-20).**	Does not meet this purpose and need. Accelerated development of late seral forest conditions would not be realized. Smaller diameter CWD input would occur over the next few decades within project area stands.	In the short-term, increases horizontal spatial variability within treated stands; minor reduction and disturbance to existing CWD material (snags and down logs) resulting from felling, yarding, and road construction. Reduced future recruitment rate of small sized CWD would be partially offset by immediate creation of larger CWD of desirable size, and augmentation of decadence processes; retention of hardwood tree and shrub diversity. In the long-term, the gradual transition in structural characteristics of treated stands would more closely resemble late-seral forest (larger diameter trees and limbs, sub-canopy development, greater tree species diversity, greater volume and size of hard CWD, canopy gaps.	Similar to Alternative 2, except treatment would occur on fewer acres. Missed opportunity to enhance late-successional forest conditions on additional acres adjacent to project areas.

Purpose and Need (EA Section 1.6)	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (No New Road Construction)
Apply silvicultural practices for RR to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain ACS Objectives. (RMP p. 11).	Stand structure would remain relatively uniform, except for gaps created by natural disturbance. Larger, open-grown trees would continue to lose lower crown from competition by surrounding trees.	Treatment includes variable density thinning to increase spatial and structural diversity of the stands.	Similar to Alternative 2, except treatments would occur on few acres. Missed opportunity to enhance vegetation characteristics for ACS objectives on additional acres adjacent to project areas.
Provide appropriate access for timber harvest and silvicultural practices used to meet the objectives above. **Reduce environmental effects associated with identified existing roads within the project areas.**	Existing road densities, drainage, and road surface conditions would not be changed. Condition of the 7-7-32 would be expected to further deteriorate. Maintenance would be delayed of feeder roads, though main routes would be maintained.	Constructs 5.0 miles of new roads. New construction would be decommissioned following harvest. Reconstructs 2.5 miles renovates 10 miles of road to improve drainage and road surface conditions to reduce road surface erosion into streams	No road construction would occur. Reconstructs 1.5 miles and renovates 10 miles of road to improve drainage and road surface conditions to reduce road surface erosion into streams.

Table 7. Comparison of Alternatives by Purpose and Need for Project 2 – Legacy Tree Release

Purpose and Need (EA Section 1.6)	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (No New Road Construction)
Plan and implement silvicultural treatments inside LSR that are beneficial to the creation and maintenance of late-successional reserve habitat (RMP p. 16).	No silviculture treatments would occur. Accelerated development of late-successional forest characteristics would not be realized.	Legacy trees on approximately 400 acres would be released by felling, girdling, and topping of surrounding individual or small groups of trees. Released legacy trees would retain large limbs and deep crowns to provide habitat for late-successional forest species.	Same as Alternative 2.
Enhance or restore habitat in RR (e.g. CWD, snag habitat, instream LWD) for populations of native riparian-dependent plants, invertebrates, and vertebrate species (RMP pp. 9-15)	Habitat conditions would remain largely unchanged.	Felled, girdled, and topped trees would function as snags and CWD to improve habitat for a variety of species.	Same as Alternative 2.
Improve structural and spatial stand diversity on a site-specific and landscape level in the long-term.	Does not meet the purpose and need. Structural and spatial diversity would continue on its current trajectory.	Legacy tree release would improve structural diversity on approximately 400 acres in the Rickreall Creek watershed.	Same as Alternative 2.

Table 8. Comparison of Alternatives by Purpose and Need for Project 3 – Large Woody Debris Enhancement

Purpose and Need (EA Section 1.6)	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (No New Road Construction)
Maintain and restore access to stream channels for all life stages of fish species	Does not meet the purpose and need. Outside of stochastic events, stream channels would generally remain in their current conditions.	Structural complexity provided by the addition of 330 trees in the stream channels would increase the variety of habitat for fish across multiple age classes.	Same as Alternative 2.
Provide for riparian and aquatic conditions that supply stream channels with shade, sediment filtering, leaf litter and large wood, and streambank stability	Does not meet the purpose and need. Riparian and aquatic conditions would generally remain in their current condition.	The placement of approximately 330 trees would improve riparian and aquatic conditions by increasing structural complexity and streambank stability.	Same as Alternative 2.
Enhance or restore habitat (e.g. CWD, snag habitat, instream large wood) for populations of native riparian-dependent plants, invertebrates, and vertebrate species	Does not meet the purpose and need. No restoration or enhancement of habitat would occur.	Input of large wood into stream channels would increase streambank stability, pool forming, and complex structure to benefit a wide variety of riparian-dependent species.	Same as Alternative 2.
Log structures would help to rehabilitate the stream and enhance natural populations of anadromous and resident fish by improving spawning and rearing habitat (RMP p.27).	Does not meet the purpose and need. Recruitment of LWD to stream channels would continue to occur at a low rate. Rickreall Creek would remain deficient in LWD.	Approximately 330 trees would be placed in stream channels to improve channel conditions to enhance fish habitat.	Same as Alternative 2.

2.8 COMPARISON OF PROJECT 1 ACTIVITIES FOR ALTERNATIVES 1, 2, AND 3

Table 9. Comparison of Project 1 Activities for Alternatives 1, 2, and 3

Activity	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 No New Road Construction
Mid and Late-Seral Enhancement (acres)	0	1,344	743
C-9	0	147	97
Cedar Ridge	0	197	175
Gilmore	0	242	173
Rick-Line	0	376	118
Robb Mill Loader	0	197	180
Waymire	0	103	0
Ground-based yarding (acres)	0	499	400
Skyline yarding (acres)	0	842	343
New road construction (miles)	0	5.0	0
Road reconstruction (miles)	0	2.5	1.5
Road renovation (miles)	0	10.0	10.0

2.9 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

Reduction in road renovation and inclusion of areas to be helicopter yarded (Option 1): An alternative to harvest a portion of the Rick-Line treatment area with a helicopter and reduce road renovation (Road 7-7-32) by 800 feet was considered and analyzed. It was determined that the area should be conventionally harvested due to the high cost of helicopter use in conjunction with current value of Douglas-fir and western hemlock. In addition, helicopter yarding is typically utilized in areas where timber harvest operations are inaccessible due to a lack of roads, in areas of sensitive soils, or where adverse impacts to fisheries would occur. None of these conditions exist within the Rick-Line timber sale areas.

Road construction within Northern Spotted Owl Suitable in Waymire Timber Sale Area (Option 2): An alternative to construct approximately 1,000 feet of new road within NSO habitat to access a portion of the Waymire timber sale was considered and analyzed. It was determined that these areas would instead be accessed by recently constructed Weyerhaeuser Company road located south of the Waymire timber sale areas. Not constructing road within NSO suitable habitat would maintain suitable habitat conditions while enhancing the habitat through density management treatments.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS

The elements of the human environment determined to be affected are air quality, fire risk and fuels management, carbon sequestration and climate change, fisheries and aquatic habitat, recreation, soils, vegetation, water, wildlife. This section describes the current condition and trend of the affected elements and the environmental effects of the alternatives on those elements.

3.1 AIR QUALITY, FIRE RISK, AND FUELS MANAGEMENT

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

- What effects would proposed projects have on air quality, fire risk, and fuel loading?

AFFECTED ENVIRONMENT

Mid and Late-Seral Habitat Enhancement (Project 1) and Legacy Tree Release (Project 2)

Air Quality

The major source of air pollutants within the Rickreall Creek project area would come from potential wildfire starts, and from associated resource management activities including prescribed burning (broadcast, swamper burning, hand, machine, and landing piles), and dust from the use of natural-surfaced roads in association with road construction, road maintenance, and log hauling. The anticipated haul routes would include BLM, private and county maintained asphalt, gravel, and dirt surfaced roads.

The project areas are located approximately 5 to 12 miles west of the Willamette Valley Smoke Sensitive Receptor Area and the cities of Dallas, and Falls City, Oregon, and closer to numerous unincorporated, rural areas.

Fire Risk

The climate in Northwest Oregon is generally mild and wet in the winter. Occasionally, snowfall will remain at higher elevations for an extended period of time. Summers are warm with periods of dry weather usually during the months of July, August, and September. Summer temperatures during this period average approximately 60° F with high temperatures reaching the mid to upper 90s, and occasionally topping 100° F for short periods of time. During average weather years the conditions under the forest canopy remain relatively moist.

The two main causes of wildfire starts across the state are lightning and people. Dry lightning (lightning that that has no accompanying moisture) that occurs during the summer months is rare in Northwest Oregon. Within the Oregon Department of Forestry's West Oregon District none of the fire starts over the last ten years in the analysis area are attributed to lightning (http://oregon.gov/ODF/FIRE/HLCause.pdf). The highest risk ignition source within the analysis area is people. All of the Section(s) within the analysis area are located behind locked gates; however many of these areas may be accessible to the public via rocked roads during harvest operations on private industrial forest land or during hunting season. OHV use on drivable and unimproved roads and trails is prevalent even when gates are locked. The Oregon Department of Forestry regulates the use of forested lands during fire season. OHV riding in non-designated areas falls under the Oregon Department of Forestry Regulated Use Fire Season Closure.

Fire Regime and Condition Class (FRCC)

The modeling predictions from the LANDFIRE Rapid Assessment Vegetation Models (http://www.fs.fed.us/database/feis/fire_regime_table/fire_regime_table.html) within the Rickreall Creek analysis area are described below.

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

Timber Stand and Fire History

The Rickreall Creek analysis area has experienced numerous management activities over the past 100 years as well as one major fire event (the 1987 Rockhouse Fire). This fire burned over 3,000 acres in the Rickreall Creek watershed and was fueled by an unseasonably dry summer, and a relatively common late summer/early fall east wind event.

Clearcut harvesting continued into the late 1960s and early 1970s in the analysis area. There are very few documented records that prescribed burning occurred on these clearcut harvest units, although it is likely as with most timber sales of that era, that some of these areas had some type of prescribed fire activity for either hazard reduction or site preparation. Small amounts of the landscape have had broadcast or spot burning. This is well within the range of a normal fire return interval.

Fuels Management

When harvest and release have been completed, fuels surveys would be conducted and project areas that are identified as containing hazardous fuels or as areas that need site preparation

(regeneration harvest units, and *Phellinus weirii* pockets, or gaps) for reforestation may have hand piles constructed within areas containing dense slash. Machine piles may be constructed along roads, and landing piles may be constructed where logs are hauled to roads. If fuel loads are relatively light along property lines, roads, or legacy trees, slash pullback may be incorporated as the desired fuels treatment.

Large Woody Debris Enhancement (Project 3)

The Rickreall Creek and North and South Fork Rickreall Creek channels are located among typical coast range riparian topography and vegetation. The over story vegetation adjacent to these streams includes Douglas-fir timber stands with some western hemlock, western red cedar, red alder and Bigleaf maple. Brush is a light to heavy growth of salal, vine maple, sword and bracken fern, red huckleberry and numerous other species. There is a light accumulation of CWD on the ground. Larger downed logs and large snags are present, but fairly scarce.

Fuel loading in the streams is minimal. In the past splash dams were used to float logs downstream to mills. In addition it is likely that portions of the channels had stream cleaning projects completed on them in the 1960s and 1970s. Fuel loading in the riparian areas and adjacent timber stands is based on visual estimates and stand exams completed on potential density management thinning project areas (Project 1). The estimated total dead fuel loading for these adjacent stands is not likely to be greater than 25-30 tons per acre. As in the measured stands most of the existing CWD is comprised of Decay Class 3, 4, and 5 wood.

ENVIRONMENTAL EFFECTS

Alternative 1 – No Action

Mid and Late-Seral Habitat Enhancement (Project 1)

Air Quality

In the short term (0-1 year) there would be no need for prescribed burning and no localized effects to air quality. In the long term (1-100 years) as the bottom and middle layer stands continue to grow, the increase in ladder fuels would cause the stands to become more susceptible to a stand replacement fire event and subsequently a larger input of smoke into the environment.

Fire Risk and Fuels Management

The no action alternative would allow the analysis area to continue on its current trend. The current risk of a fire start would remain low. There would be a slow increase in the coarse woody fuel load (1000 hour fuels) as well as the fine fuel load (1, 10, and 100 hour fuels) in these timber stands as stress-induced mortality within the stands increases. Areas infected with the root disease *Phellinus weirii* would see somewhat larger increases in fuel loading as Douglas-fir tree roots are weakened and the trees fall in small 1 to 2 acre pockets. Ladder fuel densities would continue to increase as understory trees grow larger and new understory trees begin to grow. The

potential for these stands to eventually succumb to a wildfire would continue to increase. The same areas currently behind locked gates would remain relatively inaccessible to the public. The risk of a wildfire would gradually increase as the fuel load accumulates and the stands near the mean interval for a naturally occurring return of fire.

Legacy Tree Release (Project 2)

Air Quality

With no legacy tree release there would be no log hauling associated with the large woody debris enhancement project (Project 3), and little need for road maintenance. There would be little need for hazard reduction; consequently, in the short term there would be no need for prescribed burning and no localized effects to air quality. In the long term as the bottom and middle layer stands continue to grow, the increase in ladder fuels would cause the stands to become more susceptible to a stand replacement fire event and subsequently a larger input of smoke into the environment.

Fire Risk and Fuels Management

The analysis area would continue on its current trend. The current risk of a fire start would remain low. There would be a slow increase in the coarse woody fuel load (1000 hour fuels) as well as the fine fuel load (1, 10, and 100 hour fuels) in these stands as stress-induced mortality within the stands increases. Areas infected with the root disease *Phellinus weirii* would see somewhat larger increases in fuel loading as Douglas-fir tree roots are weakened and the trees fall in small one to two acre pockets. Ladder fuel densities would continue to increase as understory trees grow larger and new understory trees begin to grow.

The potential for these stands to eventually succumb to a wildfire would continue to increase. There would be little need for hazard reduction anywhere except along roads. As a consequence, there would be no need for hand or machine piling and burning, or landing burning, and no risk of one of these treatments escaping and starting a wildfire. The same areas currently behind locked gates would remain relatively inaccessible to the public. The risk of a wildfire would gradually increase as the fuel load accumulates and the stands near the mean interval for a naturally occurring return of fire.

Large Woody Debris Enhancement (Project 3)

There would be no need for log hauling associated with the legacy tree release project (Project 2), and little need for road maintenance. There would be little need for hazard reduction; consequently, in the short term there would be no need for prescribed burning and no localized effects to air quality.

Fire Risk and Fuels Management

The no action alternative would allow the analysis area to continue on its current trend. The current risk of a fire start would remain low. There would be a slow increase in the coarse woody fuel load (1000 hour fuels) as well as the fine fuel load (1, 10, and 100 hour fuels) in these riparian stands as stress-induced mortality within the stands increases. Much of the increase in CWD would be hardwood, however small areas infected with the root disease *Phellinus weirii* would see somewhat larger increases in fuel loading as Douglas-fir tree roots are weakened and the trees fall in small 1 to 2 acre pockets. Brush species would fill in quickly behind this blowdown. Consequently, ladder fuel densities would decrease slightly as hardwoods fall out of the stand and it becomes hard to reestablish conifer trees.

The potential for these stands to eventually succumb to a wildfire would continue to increase. There would be little need for hazard reduction anywhere except along roads. As a consequence, there would be no need for landing burning, and no risk of this treatment escaping and starting a wildfire. The same areas currently behind locked gates would remain relatively inaccessible to the public. The risk of a wildfire would gradually increase as the fuel load accumulates and the stands near the mean interval for a naturally occurring return of fire.

Alternative 2 and Alternative 3

Mid and Late-Seral Habitat Enhancement (Project 1)

Air Quality

Hauling would occur over BLM and other roads. Dust created from vehicle traffic from proposed project activities on gravel or natural-surface roads would contribute short-term effects to air quality. None of these management activities would create dust above threshold (the intensity level that is just barely perceptible) levels. These effects would be localized to the immediate vicinity of the operations.

If the increased fuel load resulting from the density management thinning and gap creation timber harvest project is determined by the BLM to be a fire hazard, or to significantly reduce the ability to reforest then prescribed burning in the form of hand or machine piling and burning, swamper burning, or landing burning would be conducted and smoke would be created.

In the future, broadcast burning would be implemented on the white oak restoration areas in Section 9 of the Waymire Project to further the objectives of habitat restoration. Hand or machine pile burning, swamper burning, and landing pile burning would occur during the fall/winter time period, while broadcast burning would happen outside the fall/winter time period. All prescribed burning would require a Prescribed Fire Burn Plan that is signed by the Authorized Officer, and would be coordinated with the local Oregon Department of Forestry office. All burning would be conducted in accordance with the *Oregon State Implementation Plan* and *Oregon Smoke Management Plan*. These plans limit or prohibit burning during periods of stable atmospheric conditions. Burning would be conducted when the prevailing winds are blowing away from SSRAs (Smoke Sensitive Receptor Areas) in order to minimize or eliminate the potential for smoke intrusions. The potential for smoke intrusion would be further reduced by

burning under atmospheric conditions that favor good vertical mixing so that smoke and other particulate matter is borne aloft and dispersed by upper elevation winds.

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

Fire Risk

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

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

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

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

Surface fuel reduction would further reduce the risk in accessible areas. Increasing the height to the live crown base, opening canopies, and reducing surface fuels should result in lower fire intensity, less probability of torching, and a lower probability of an independent crown fire.

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

Fuels Management

The fuel load would increase as a result of the proposed action. Slash created by the harvest of timber and the addition of CWD for wildlife habitat within harvest units would add an estimated 25-47 tons per acre of dead fuel to the density management harvest units. Treatment of selected, high hazard fuel concentrations would occur for hazard reduction and site preparation.

Fuels treatments in areas with elevated risk of human-caused ignition would reduce potential fire starts. Fuels treatments adjacent to areas with high value resources such as riparian habitat, and private lands, would reduce potential costs associated with fire suppression. The proposed fuel treatments associated with prescribed burning would result in small (<0.5 acre), scattered, localized areas of severe soil disturbance. This would potentially alter nutrient availability, soil infiltration, and soil structure. The broadcast burning within the white oak restoration area would take place following initial hazard reduction within the project area which would lessen the fuel loading immediately following harvest. To mitigate this damage burning piles would be conducted during the fall with wet soil conditions, when soil resources are less vulnerable to impacts. Piles would not be constructed in riparian buffers. Broadcast burning would occur during drier times of the year to help facilitate fire spread in fine fuels and herbaceous matter.

Legacy Tree Release (Project 2)

Air Quality

Hauling would occur over BLM and other roads. Dust created from vehicle traffic from proposed project activities on gravel or natural-surface roads would contribute short-term effects to air quality. None of these management activities would create dust above threshold (the intensity level that is just barely perceptible) levels. These effects would be localized to the immediate vicinity of the operations.

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

Where prescribed burning is the designated hazard reduction strategy impacts to air quality within one-quarter to one mile of units would persist for 1-to-3 days. None of the wildlife units are sufficiently close to any major highways that motorist safety would be affected. The overall effects of smoke on air quality is predicted to be local and of short duration. Activities associated with the proposed action would comply with the provisions of the Clean Air Act.

Fire Risk

Initially, the fuel load, risk of a fire start, and the ability to control a fire, would all increase as a result of the proposed action. Slash created by the release of legacy trees and the removal of some logs for the Large Woody Debris Enhancement project would add an estimated 5-25 tons per acre of dead fuel to the density management harvest units. (See Project 1 for a detailed description of the environmental effects of fire.)

Legacy tree release and the removal of a small number of logs for the LWD Enhancement project would not affect the ladder fuels within the project areas. Crown density would remain mostly unchanged.

Surface fuel reduction in strategic locations such as around legacy trees or on landings through hand piling and burning, machine piling/landing piling and burning, swamper burning or slash pullback would further reduce the risk in accessible areas. Reducing surface fuels and opening canopies adjacent to legacy trees should result in lower fire intensity, less probability of torching, and a lower probability of an independent crown fire.

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

Fuels Management

The fuel load would increase as a result of the proposed action. Slash created by the release of legacy trees would add an estimated 5 - 25 tons/acre of dead fuel to the wildlife units. Treatment of selected, high hazard fuel concentrations is possible for hazard reduction protection of the released legacy trees. Hand piling and burning, machine/landing piling and burning, swamper burning, slashing, lopping and scattering, and pullback of slash to create fuel free zones would be used individually or in combination in the project area.

Fuels treatments in areas with elevated risk of human-caused ignition would reduce potential fire starts. Fuels treatments adjacent to areas with high value resources such as riparian habitat, and private lands, would reduce potential costs associated with fire suppression. The proposed fuel treatments associated with prescribed burning would result in small (<0.5 acre), scattered, localized areas of severe soil disturbance. This would potentially alter nutrient availability, soil infiltration, and soil structure. To mitigate this damage pile burning would be conducted during

the fall with wet soil conditions, when soil resources are less vulnerable to impacts. Piles would not be constructed in riparian buffers.

Large Woody Debris Enhancement (Project 3)

Air Quality
Trees and logs to be placed in streams would be hauled over short sections of BLM and other roads. Dust created from vehicle traffic on gravel or natural-surface roads from proposed project activities would contribute short-term effects to air quality. None of these management activities would create dust above threshold levels. These effects would be localized to the immediate vicinity of the operations.

Fire Risk
The effects of the proposed project on fire risk would be minimal. Only brush in the riparian area immediately adjacent to the stream where logs are placed would be impacted. The logs placed in the stream are not generally considered a part of the fuel load since they would have high moisture content and be would be isolated from the surrounding fuel bed. Fuel loading, risk of a fire start and the resistance to control a fire would not be substantially affected by log placement.

See Project 1 for a detailed description of the environmental effects of fire.

Fuels Management
The fuel load would not increase as a result of the proposed action.

3.2 CARBON SEQUESTRATION (STORAGE) AND CLIMATE CHANGE

(IDT report incorporated by reference: Snook, 2011. Rickreall Creek Watershed EA – Carbon Sequestration (Storage) and Climate Change, pp. 1 to 2)

The Rickreall Creek Watershed Enhancement EA is tiered to the PRMP FEIS (1994) which concluded that all alternatives analyzed in the FEIS, in their entirety including all timber harvest, would have only slight (context indicates that the effect would be too small to calculate) effect on carbon dioxide levels. Responsive to public comment, the BLM included project level analysis of carbon storage emissions.

Analyses completed for projects of similar scope, treatment type, stand type, and scale have supported the conclusion of the 1995 RMP that project emissions would be negligible (Revised Upper and Lower Alsea Watershed Enhancement EA - 2010, Upper Siletz Watershed Enhancement EA - 2010, Bottleneck Late Successional Reserve Enhancement - 2010, and Green Peak Density Management Project EA - 2010).

In Table 10, the stands analyzed in the Rickreall Creek Watershed Enhancement EA are compared to these four projects listed above.

Table 10. Comparison of Rickreall Creek Project Stands to Projects with Project Level Carbon and Climate Change Analyses.

Project	Rickreall Creek Watershed	Bottleneck LSR	Upper Siletz Watershed	Upper-Lower Alsea Watershed	Green Peak II Density Mgmt.
Stand Type	Douglas-fir	Douglas-fir	Douglas-fir	Douglas-fir	Douglas-fir
Stand Age[1]	62	68	55	57	70
Prescription BA[2]	120	139	115		92
Prescription TPA[3]	62	56	43	44	47
C Storage, No Action[4]	Not Analyzed	260	110	256	107
C Storage, Proposed Action[5]	Not Analyzed	60	32	58	2.4
C Storage, Proposed Action, percent of No Action	Not Analyzed	23%	29%	23%	22%

[1] Stand age in years, acre-weighted average of all stands.
[2] Prescribed treatment, residual square foot basal area of trees, acre-weighted average of all stands.
[3] Prescribed treatment, residual live trees per acre, acre-weighted average of all stands.
[4] Net annual carbon (C) storage tonnes, live tree storage minus emissions, 50-year analysis period.
[5] Net annual carbon (C) storage tonnes, in live trees and harvested wood minus emissions in harvested wood, harvest operations, and fuel treatment, 50-year analysis period.

Because of the similarity between previous analyses and the similarity in stands and treatments analyzed in the Rickreall Creek Watershed Enhancement, it is expected that effects would be similar in scope, intensity and character, supporting these conclusions:

- Under the Proposed Action, carbon would be released through logging, fuel treatments and emissions resulting from harvested wood, the majority within ten years after harvest.
- Under the Proposed Action, tree growth following harvest would offset greenhouse gases and result in net storage within approximately five years.
- Emissions resulting from the Proposed Action would be small and temporary (limited in context and intensity), and therefore not significant.
- Under the No Action alternative, no greenhouse gases would be emitted from harvest operations or fuels treatments.
- The Proposed Action would result in only 20-30% of the net storage of carbon over 50 years that would occur under the No Action alternative.
- It is currently beyond the scope of existing science to identify a specific source of greenhouse gas emissions or sequestration and designate it as the cause of specific climate impacts at a specific location.

3.3 FISHERIES AND AQUATIC HABITAT

(IDT report incorporated by reference: Snedaker, 2011. Upper Rickreall Creek Environmental Assessment, pp. 1 to 33.)

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

- What effect would the proposed projects have on resident and anadromous fish and their aquatic habitat?

AFFECTED ENVIRONMENT

The proposed treatment units are contained within four 5th field watersheds: Luckiamute River, Mill Creek, Salt Creek, and Upper Rickreall Creek 5th Field Watersheds. The relevant fish bearing streams in proximity to Project 1 activities include South Fork Rickreall, Creek, Laurel Creek, and Ellendale Creek draining to the Rickreall Creek; Waymire Creek, Camp Creek, Little Luckiamute River draining to the Luckiamute River; Little Boulder Creek draining to the North Fork Siletz, and West Fork Cedar Creek and South Branch Creek draining to Mill Creek in the South Yamhill. The proposed haul routes for the management projects would utilize roads within the Upper Siletz, Luckiamute, and Mill Creek 5th Field Watersheds.

Based on field surveys resident fish are known to be adjacent to eight project units. Based on analyses of BLM geographic maps combined with the eight field verified units, resident fish are known or suspected to be less than a half mile from 21 of the 29 proposed treatment units.

ENVIRONMENTAL EFFECTS

Alternative 1 – No Action

Mid and Late-Seral Habitat Enhancement (Project 1)

Current timber stand conditions would be maintained. Expected benefits of thinning riparian stands, accelerating the growth rates of retained timber subsequently increasing the average diameters of trees available for future LWD recruitment, would not be realized. The existing road network would remain unchanged, with no new road construction. In general, impacts to aquatic habitat would be unlikely with the No Action alternative. Limited impacts may occur due to drainage problems on the 7-7-32 road. This road would likely continue to degrade, increasing the risk of mass wasting at the site. Due to distance to fish habitat, these localized effects would be unlikely to affect fish.

Legacy Tree Release (Project 2)

Current late-seral and old-growth stand conditions would be maintained. Expected protection of mature riparian trees thru thinning competing trees adjacent to the mature trees would not be realized. Mortality of old-growth or late-seral tree due to shading could occur and could result in recruitment of nearby streams. Direct impacts to aquatic habitat would be unlikely with the implementation of the no-action alternative as most late-seral sites are located in uplands and almost all treatment sites would be away from fish bearing streams. Indirect beneficial impacts of LWD recruitment due to old-growth mortality falling in to streams could be realized including increased channel complexity, increased sediment retention, and improved water quality. However, implementing the no-action alternative would result in fewer trees available for recruitment associated with the LWD Placement Project (See Project 3 no-action effects discussion).

Large Woody Debris Enhancement (Project 3)

Recruitment of LWD to the stream channels would continue at currently rates, the existing recruited rate appears to be relatively low. Achievement of ODFWs desirable LWD benchmark (Foster et al. 2001; Appendix A) would be delayed, potentially for decades, until natural recruitment occurs thru mortality of mature stands or recruitment events such as landslides and wind throw. Stream channels typically controlled by LWD structure that are inadequately stocked with wood generally result in simplified channel conditions and accelerated bed movement. Structural complexity provided by LWD increases the variety of habitat for fish across multiple age classes (Cederholm et al., 1997). Thus, lack of LWD in the project area streams can be assumed to negatively impact the quality of aquatic habitat for fish.

Alternative 2 – Proposed Action

Mid and Late-Seral Habitat Enhancement (Project 1)

Flow Effects

Falling and Yarding – Reductions in canopy closure and vegetative cover can result in changes in peak or base flows which in turn impair the availability or quality of aquatic habitat. The proposed project would affect forest cover between 0.06 and 0.95 percent of any affected 5th field watershed. Based on the Hydrology Cumulative Effects Analysis the risk of peak flow enhancement by the proposed action was determined to be immeasurable (Wegner 2011b). As no discernible changes in peak and base flows within the treatment area are anticipated, no alternations to fish habitat would be anticipated.

Road Construction – Construction of 2,700 feet of new road in Project 1 may occur within one site potential tree height of stream channels, but none within 75 feet of any streams. The proposed road construction is unlikely to increase the drainage network in the watershed as the majority of new road is located on ridge tops, generally outside riparian reserves, and no new construction would cross any existing stream channels. Thus, impacts to aquatic habitat downstream would not be anticipated.

Road Renovation – In general, road renovation work would not alter peak or base flows at the site. Proposed installation of additional cross drains may reduce the drainage network and have slightly beneficial effects on peak/base flows. However, due to the limited amount of cross drain work anticipated, proposed renovation is highly unlikely to have any detectable impact on flows.

Hauling – Hauling has no causal mechanisms to alter stream flow and would have no effects to fisheries and aquatic habitat

Broadcast and Pile Burning – With incorporation of project design features, buffers and fuels PDFs, the project would not be expected to alter stream flows and would not be expected to impact fisheries or aquatic habitat.

Sediment

Falling and Yarding – Yarding is unlikely to result in measurable changes in sediment delivery to the surrounding stream network (Wegner 2011). No yarding would occur across streams, except for approximately five skyline corridors in the NW portion of Unit 9A in the Waymire timber sale. Trees within the corridor could be felled to facilitate cable yarding activities over the SPZ (a 100 foot SPZ). The proposed tree felling would mimic natural disturbance, such as blowdown. All trees cut for the corridors within the SPZ would be left on site.

The use of skyline yarding, SPZ buffers, residual slash, and use of existing skid trails would keep sediment movement to a minimum. Vegetated buffer widths ranging from 40 to100 feet are sufficient to prevent sediment from reaching streams (Burroughs and King 1985, Corbett and Lynch 1985, Swift 1986). The proposed 50 to 100 foot buffers would be expected to capture sediment prior to reaching stream channels. These buffers combined with residual slash remaining following treatment, should obstruct flow paths and keep sediment movement to a minimum. Slash, limbs and non-merchantable material left following harvest activities, within treatment areas can substantially reduce the magnitude of sediment movement (Burroughs and King 1985, Swift 1986). As the proposed actions are not likely to measurably alter water quality characteristics at the treatment sites, they would be unlikely to alter aquatic habitat downstream from the project area.

Road Construction – Proposed road construction would occur at least 75 feet from streams. Vegetated buffer widths ranging from 40 to100 feet are sufficient to prevent sediment from reaching streams (Burroughs and King 1989, Corbett and Lynch 1985, Swift 1986). Based on the modest gradients associated with the proposed road locations, and the incorporation of buffers of 75 feet or more, transport of sediment to stream channels would not be expected. Based on location of new roads and seasonal restrictions road construction is unlikely to increase sediment which may alter stream channels and fish habitat.

Road Renovation – The proposed road renovation work is intended to improve drainage and road surface conditions, resulting in less erosion into the surrounding area over time. Renovation is proposed to occur over three fish bearing crossings. All other proposed renovation is 130 feet or more from fish habitat. Road renovation treatments adjacent to fish bearing streams would be

expected to result in a minor short-term increase in erosion in the winter following work, until reestablishment of vegetation in the subsequent growing seasons. These minor short-term pulses in sediment may reach the fish bearing streams associated with the road renovation during the onset of initial winter storm events. Overall sediment and turbidity which may be generated by road renovation during winter freshet events would most likely occur when background turbidity in streams is also elevated. The small increase in turbidity which may be generated by road renovation would be undetectable against background turbidity where fish reside; thus impacts fish and aquatic habitat would be likely be immeasurable.

Any sediment generated by road renovation entering the small non-fish bearing tributaries would likely be retained in the channel bedload prior to reaching fish habitat. Research has demonstrated that relatively short segments of small ephemeral/intermittent streams (300 to 400 feet) can effectively store coarse sediment washed from roads which would in turn contribute to protection of water quality in fish bearing habitat downstream (Duncan et al., 1987). The small increase in turbidity which may be generated by road renovation on these roads would be undetectable against background turbidity where fish reside; thus impacts fish and aquatic habitat would be likely be immeasurable.

Hauling – Hauling can increase the risk of sediment reaching stream channels and negatively impacting aquatic habitat. The majority of the sale area and most haul roads are located near the ridge tops and are graveled. Buffer distances of at least 200 feet would be expected to capture the majority of sediment generated from hauling on road surfaces before reaching fish habitat (Burroughs and King 1989, Corbett and Lynch 1985, Swift 1986, Belt et al. 1992). Based on the location of most proposed haul roads combined with the distance from fish habitat, sediment transport would be unlikely to reach fish habitat on most haul roads (Table 11).

Table 11. **Alternative 2 Project haul routes and nearest distance to ESA listed fish habitat (LFH), essential fish habitat (EFH), and resident fish.**

Distances of roads from streams which are appreciably closer than the nearest stream crossing, or there is no stream crossing, are listed in parenthesis.

Haul Road	Season of Use	Miles of Haul	Road Surface	Number of Crossings			Distance to LFH (ft.)	Distance to EFH (ft.)	Distance Resident Fish (ft.)
				Fish	Per[1]	Inter[2]			
Robb Mill Loader	Dry	5.03	Gravel	2	1	3	13,800	1,550	1,550
Gilmore	Year	20.12a	Gravel	8	3	24	15,400	15,400	5 & 350
C-9	Year	5.0a,b,c	Gravel	1	3	18	22,750	22,750	130
Rick-Line	Year	17.99[c,d]	Gravel	14	12	23	1,750	1,750	5
Cedar Ridge	Year	4.2[d]	Gravel	0	4	6	25,050	25,050	3,200
Waymire	Year	6.32	Gravel	4	5	8	4,150	11,150	5

1 – Per=Non fish bearing perennial streams.
2 – Inter = Non fish bearing intermittent streams
a – Rickreall Mainline Road (13 miles) shares haul from Gilmore and part of C-9.

b – Approximately 2 miles of shared haul road between Rick-Line and C-9.
c – Black Rock Mainline Road (12.5 miles) shares haul from Cedar Ridge, Rick-Line, and part of C-9.
d – K-Line Road shares haul from Rick-Line and Cedar Ridge.

The proposed dry season hauling on the Rickreall Mainline Road (7-6-36) and Robb Mill road in proximity to fish habitat are not expected to result in detectable quantities of sedimentation reaching fish bearing streams. Minor short-term pulses in sediment may reach the streams associated with the haul route crossings during the onset of initial winter storm events. The fish bearing stream crossing may experience minor site specific impacts to short reaches of fish habitat downstream due to sediment generated from hauling during initial winter freshets. Application of sediment control PDFs (silt fences, hay bales etc.) and cessation of haul during unseasonal heavy rainfall, would minimize the magnitude of sediment reaching streams. The duration of sediment reaching stream with fish would be short-term. Stream crossings over non-fish bearing streams is highly unlikely to result in measurable levels of turbidity reaching fish habitat.

Research has demonstrated that relatively short segments of small ephemeral/intermittent streams (300 to 400 feet) can effectively store coarse sediment washed from roads which would in turn contribute to protection of water quality in fish bearing habitat downstream (Duncan et al, 1987). Sediment entering the small non-fish bearing intermittent tributaries in the project area would likely be retained in the channel bedload prior to reaching fish habitat. Turbidity generated from proposed dry season hauling over fish bearing and non-fish bearing crossings may occur during winter freshet events when background turbidity is also elevated. Small increase in turbidity which may be generated by proposed dry season hauling would be undetectable against background turbidity where fish reside.

Wet-season hauling on the Black Rock Mainline Road (8-7-23), 8-7-3 road, 8-7-10 road, 8-7-10.3 road and Oakdale Road include crossings over, or adjacent to, fish bearing streams. Crossings over fish bearing streams may have direct short-term connections of road surface flows with stream channels. Cessation of hauling during heavy rainfall periods, when road surface flows are most likely to be connected to stream channels, would minimize the extent of sediment being disturbed and subsequently available for transport to the stream channel.

Minor site-specific impacts to short reaches of fish habitat downstream of these stream crossings could occur due to sediment generated from hauling. Resident fish may experience short-term direct negative affects as a result of proposed wet season hauling due to localized increase in turbidity in the stream channel. Generally fish would be expected to move away from high turbidity to areas of low turbidity or reducing activity during periods of elevated turbidity (Bjornn and Reiser, 1991).

Broadcast and Pile Burning – Burning piles could produce small areas susceptible to erosion and restricted infiltration (Wegner 2011). However burn area would be surrounded by buffers and no burning would occur in SPZ. Vegetated buffer areas ranging in width from 40 to100 feet appear to prevent sediment from reaching streams (Burroughs and King 1989, Corbett and Lynch 1985, Swift 1986). The proposed design feature requiring 100 feet between streams and any piles combined with SPZs associated with the project, a minimum of 50 feet, would be expected to

provide sufficient distance of undisturbed soils and vegetation to capture any surface erosion from pile burning treatments.

Broadcast Burning – Approximately 56 acres of the Waymire sale area may be treated by broadcast burning affecting several small intermittent stream channels draining into tributaries of Rickreall Creek and Waymire Creek. Proposed treatment area in Rickreall Creeks is at least 200 feet upstream of the fish habitat and more than ½ mile upstream from steelhead and coho habitat. Treatment is more than 550 feet upstream from fish habitat in the tributary to Waymire and more than one mile upstream from steelhead habitat in Waymire Creek. To reduce fuel load and burn intensity fuel reduction actions including hand piling logging slash and lop and scatter of tall brush would occur prior to any broadcast fire treatments. Three stream channels may be affected by the construction of the proposed hand constructed fire lines. In areas of shallow soils along meadow edges and near stream channels, fire lines may be established by mowing, foam application or other means in lieu of traditional construction methods.

Prescribed broadcast burning has the potential to increase erosion and sedimentation into the intermittent streams, reducing riparian shade (thereby increasing stream temperatures), and increasing nutrient within the burn units which may cause short-term negative affects aquatic habitat downstream. Vegetation existing along the stream channels is anticipated to be maintained post burn due to the low intensity nature of the prescribed fire and assuming the implementation of appropriate PDFs for prescribed fires and fireline construction. The residual vegetation near the stream channels would provide channel shading, residual duff layers, and protect soil properties, thus minimizing the potential for increased erosion and resulting sedimentation from reaching intermittent stream channels.

Temperature

Falling and Yarding – Site level project designs for treatment units included a standard design feature stream protection zone of at least 50 feet or more. Protection of stream shade is the critical component in protecting stream temperature regimes (Beschta et al., 1989, Belt et al., 1992, Moore et al., 2005). According to the stream shading sufficiency analysis done for the proposed treatment units, stream protection zones (SPZ) of 50 to 85 feet are sufficient to protect critical shade in the primary shade zone, based on topography and average tree height (Snook 2011 and Roux 2011). Unit 9A in Waymire and part of Unit 22A adjacent to Ellendale Creek the SPZs would be widened from 75 and 85 feet sufficiency widths to 100 feet. The proposed vegetation treatment in the secondary shade zone (approximately one tree height from the stream) would not result in canopy reduction of more than 50 percent. Stream shading would be maintained and no change to water temperature from the activities proposed in this project would be anticipated (Wegner 2011). Based on the shade sufficiency analysis, the hydrology report water quality analysis, and the project design features the proposed actions are unlikely to impact fish habitat both at the treatment site and downstream.

Road Construction – The channels nearest new road construction are intermittent, thus not subject to elevation of stream temperatures during summer months. In addition, the existing buffer distance of 75 feet or more between the road and the stream would further limit any increase in solar radiation reaching the stream channel. According to the stream shade

sufficiency analysis done for the project area treatment units the proposed stream protection zones (SPZ) of 50-85 feet was sufficient to protect critical shade in the primary shade zone, based on topography and average tree height (Snook 2011 and Roux 2011). Thus, new road construction would be highly unlikely to have any effect on stream temperatures at the site and highly unlikely to impacts aquatic habitat or fish downstream.

Road Renovation – Road renovation work such as road grading, ditch cleaning, rocking, installation and replacement of culverts would not alter temperature at the site. Vegetation removal associated with roadside brushing would have no effect on stream temperatures except for treatments directly over perennial stream crossings. The only perennial fish bearing stream in proximity to proposed renovation are on Laurel Creek. Clearing of vegetation over perennial stream crossings may affect solar exposure which in turn could affect stream temperature. However, the extent of clearing is limited to brush and hazard trees encroaching the roadway. Small openings created from brushing the three perennial stream crossings along Laurel Creek would affect very short reach reaches of stream and would be dispersed along ½ mile of stream. Brushing along the 7-7-32 road includes five perennial stream crossings more than 0.9 miles upstream of fish habitat. Based on small scale and dispersion of potential impact sites, changes to stream temperature were fish reside would not be expected.

Hauling – Hauling has no causal mechanisms to alter stream temperatures and would have no effects on fisheries or aquatic habitat.

Broadcast and Pile Burning – With incorporation of project design features, buffers and fuels PDFs, the project would not be expected to alter stream temperatures and would not be expected to impact fisheries or aquatic habitat.

Large Woody Debris

Falling and Yarding – Loss of coarse woody debris (CWD) and large woody debris (LWD) due to harvest can alter the stability and quality of aquatic habitat (Beechie et al. 2000, Chamberlin et al. 1991). Based on the stand analysis, including riparian areas, the proposed action would retain trees which would reach larger diameters earlier compared to the no treatment option, creating natural opportunities for higher quality LWD recruitment in the long-term (Snook 2011 and Roux 2011). In the short-term the small diameter woody debris most likely to reach stream channels would continue to fall from within the untreated 50 to 100 foot stream protection zones. Wood recruitment studies conducted in the Pacific Northwest have shown the majority of woody debris recruitment occurs within 18 to 20 meters (59 to 65 feet) of the stream edge (McDade et al. 1990, Van Sickle and Gregory 1990, Meleason et al. 2002). The proposed SPZ widths of 50-100 feet, which accounts for 85 to greater than 100 percent of this woody debris recruitment zone, is anticipated to maintain wood recruitment rates. Therefore, the proposed actions are not expected to cause any measurable short-term effects to aquatic habitat at the site or downstream.

Proposed thinning in the riparian treatment areas is anticipated to increase the average growth of the remaining trees between 18 to 166 percent over 30 years compared to not treating the stands (Snook 2011 and Roux 2011). Larger diameter wood would begin to be recruited from farther up the slopes as the treated stands reach greater heights. Thus, wood with a larger range of sizes

would potentially be recruited into streams over the long-term in treated stands. As short-term recruitment of the existing CWD is expected to be maintained, by SPZ retention zones, the proposed actions are not expected to cause short-term changes to fish habitat at the site or downstream. In the long-term the increase in the size of trees in riparian areas could benefit LWD recruitment to the stream channel. Treatment would be expected to improve tree character such as; deeper crowns, larger diameter branches, and larger diameter tree boles. Thus treatment would potentially improve the quality/complexity of aquatic habitat adjacent to the treatment areas in the future.

Road Construction – Road construction has the potential to alter LWD recruitment to streams at the site level. Stand exam data shows the tallest 40 trees adjacent to all road segments are generally shorter than the distance separating most new roads to the nearby streams (Snook 2011 and Roux 2011). Except for two segments in Rick-Line (Spurs 2 and 5) proposed road construction would not be anticipated to impact LWD recruitment in the short-term at these sites.

Removal of trees within one site potential tree height of streams from new construction may cause a reduction in recruitable CWD and LWD. Removal of riparian timber may alter the stability and quality of aquatic habitat (Beechie et al. 2000, Chamberlin et al. 1991). All new construction would be spatially separated at least 75 feet from stream channels. Over the short-term the small diameter woody debris most likely to reach stream channels would be protected by a combination of the untreated 50-85 foot stream protection zones in project units and the minimum 75 foot buffer between road construction and streams. Wood recruitment studies conducted in the Pacific Northwest have shown the majority of woody debris recruitment occurs within 18 to 20 meters (59-65 feet) of the stream edge (McDade et al. 1990, Van Sickle and Gregory 1990, Meleason et al. 2002). At a minimum the proposed SPZ width, which accounts for at least 85 percent of this woody debris recruitment zone, is anticipated to maintain wood recruitment rates. Therefore, the proposed actions are not expected to cause any short-term effects to aquatic habitat at the site or downstream.

The total area of road within the riparian impacted within one site potential height of streams is very small, less than 0.88 acres. Proposed roads are located on or near ridge tops, all of which are located on low gradient slopes. New construction is located in areas considered low-risk in susceptibility to mass movement (BLM 1998). As only a small fraction of the recruitable wood source near the stream may be affected, the effected soils are considered stable, and the scale of the project treatments is limited to 0.88 acres within one SPT from the stream, the impacts to large wood is anticipated to be undetectable in the adjacent streams over the long-term. Undetectable changes to wood and wood recruitment in stream channel is not expected to measurably effect aquatic habitat at the site or downstream where fish reside. Thus the long-term impacts of road construction would be undetectable to fish and aquatic habitat downstream. The proposed road work may also have modest benefit to the stands creating openings in the adjoining canopy and locally stimulating growth thus potentially enhancing the quality of LWD recruitment from stands adjacent to the roads.

Renovation – Proposed renovation road work would not be expected to affect large woody debris where fish reside. The majority of vegetation clearing conducted along roadways would be of small diameter debris unlikely to affect channel processes. Proposed culvert replacement may

remove various diameters of trees in the road fill associated with the crossing; however, no wood removal would occur that meets large wood debris criteria (24 inch DBH by 50 feet long). Any larger material removed from culvert fill slopes would be replaced in the stream channel below the crossing.

Hauling – Hauling has no causal mechanisms to alter LWD and would have no effects on fisheries or aquatic habitat.

Broadcast and Pile Burning – With incorporation of project design features, buffers and fuels PDFs, the project would not be expected to alter LWD and would not be expected to impact fisheries or aquatic habitat.

Legacy Tree Release (Project 2)

Proposed legacy tree release outside of the riparian zones would not be expected to have any direct impacts to aquatic habitat. The hydrology analysis did not anticipate any changes to stream flows, surface flows, groundwater, or water quality (Wegner 2011). Minor site specific soil disturbance may occur; however, the disturbance would be highly unlikely to affect streams. Treatments inside the riparian zones may result in indirect impacts to LWD recruitment to intermittent channel if timber were removed from the riparian areas (See Project 3 for a further discussion of effects). No other LWD impacts would be anticipated, as LWD and CWD would be retained on site and the potential impact of losing the much thicker older cohort of old-growth type trees, which could also provide LWD material, would be reduced.

Large Woody Debris Enhancement (Project 3)

The placement of large wood in through helicopter yarding, ground based placement, and felling of timber adjacent to the stream channel would both increase the amount of habitat and provide the key elements necessary to maintain that habitat. Instream work of this type is considered to be beneficial to both the habitat and fish populations as they respond to the improved habitat. Habitat surveys conducted on Rickreall Creek in the stream reaches proposed for wood placement were noted as being deficient in LWD (ODFW 1993, 1994a, 1994b), indicating that additions of LWD would be expected to benefit stream function.

Flow
The indirect beneficial effects of the action are anticipated, including improved sorting and routing processes of gravels, an increase in the amount of pool habitat, greater access of the stream to its hyporheic zone and floodplain, and greater summer and winter rearing potential for juvenile salmonids within the treated reaches of Rickreall Creek and South Fork Rickreall Creek (Tonina and Buffington, 2007, Rosenfeld and Huato, 2003). Increased connectivity to floodplains and hyporheic zones would cause modest improvement to in-stream flows, primarily during summer base flows. This period of flow augmentation would be an incremental step toward restoring historic flow regimes. Restoring historic flow regimes is anticipated to be beneficial to fish and aquatic habitat.

Temperature
Forest density and hence shading in the riparian zone adjacent to Rickreall Creek would be left virtually unaltered under this proposal. It is anticipated that small holes in the riparian canopy (less than 10 square meters) would occur in the vicinity of trees that are felled. These would be dispersed along both streambanks for over six sections in the Upper Rickreall Creek. While this has the potential to slightly increase the amount of water surface exposed to direct solar radiation, it is not expected to result in an increase in stream temperatures, because fallen trees would also provide shading directly over the channel and riparian canopies would quickly fill in where additional light is available. Over time, increases in the quantity of stored substrates and pools may lead to a slight decrease in summer stream temperatures in the main channel.

Large Woody Debris
Indirect affects to LWD recruitment to intermittent tributaries from large wood source areas (see project 2) within riparian areas could occur. Removal of trees from hill slopes prone to landslides could indirectly negatively LWD recruitment to aquatic habitat downstream. Recruitment of LWD to streams could be reduced due to reduced number of trees (potential LWD) on hill slopes in the event of a landslide. Trees targeted for removal were dispersed over lands with low to moderate levels of landslide risks (BLM 1998). Local erosion due to compaction and displacement from falling was determined to be localized with implementation of SPZ buffers. The dispersed nature of the tree removal under the legacy release project or based on the Aquatic Restoration Biologic Opinion project design features, combined with the undetectable impact on sedimentation strongly suggests that no additive risks to hillside movement would be expected from the proposed action. Since no changes in landslide risks would be expected no changes in wood recruitment would be expected to occur from proposed tree removal.

Localized affects to LWD recruitment and shade from stream side tree falling may occur. Falling of trees adjacent to Rickreall Creek and South Fork Rickreall would shift the location of material from the stand adjacent to the stream, which has a potential to be recruited, and is converted directly to instream structure. Falling trees from the adjacent stand would reduce the amount of timber potentially available to recruitment at a volume equal to or less than the increase in instream structure. This assumes some tree adjacent to the stream may not fall into the stream if left to natural events. Thus the overall effects to LWD recruitment from falling adjacent riparian tree into the stream would be neutral to slightly beneficial.

Design features of incorporating multiple key logs (minimum two times bankfull width) in all structures would be anticipated to enhance structure function and reduce transport risk. Hildebrand (1998) found in their study logs shorter than the average channel width moved significantly more frequently than logs one and a half to two times the average channel width. Hildebrand (1998) also noted multiple piece LWD structures were more effective in creating and maintaining pools than individual pieces and small pieces were protected from transport when incorporated into structures with large pieces which anchored the site.

Sediment
Direct short-term negative impacts to fish and aquatic habitat may occur due to propose placement activities increasing turbidity at project sties. The placement of the wood by

helicopter, machine or falling could mobilize fine sediments locally as a result of sediment disturbance. Indirect short-term impacts to fish and aquatic habitat may occur during the first winter following treatment due to local hydraulic changes altering bed and bank scour and deposition. Generally fish would be expected to move away from high turbidity to areas of low turbidity or reducing activity during periods of elevated turbidity (Bjornn and Reiser, 1991). With the use of PDFs, including working during the ODFW instream work periods and ODFW wood placement guidelines, effects are anticipated to occur only at the site and within a short distance downstream. Sediment movement would be expected to return to background levels within the first winter after project implementation.

Alternative 3 – No New Road Construction

Mid and Late-Seral Habitat Enhancement (Project 1)

Flow, Temperature, LWD, and Sediment

Falling and Yarding – Alternative 3 would reduce the amount of drainage and watershed area affected approximately 43percent. Alternative 3 would change forest cover between 0.32 and 11.7 percent in any of the effected 7th field drainages and between 0.008 and 0.56 percent of any effected 5th field sub-watershed. Other than a net reduction in the total number of acres treated proposed thinning prescription would be the same as proposed under Alternative 2. Flow, temperature, LWD, and sediment effects would be similar in scope and nature as described under Alternative 2.

Hauling – No changes in haul route would occur in Robb Mill Loader. Minor changes to haul routes in Gilmore would occur under this alternative. Several roads and segments of roads would not be utilized for haul in Cedar Ridge, Rick-Line, and C-9. In general, the nature and magnitude of effects to fisheries and aquatic habitat would the same as described under Alternative 2. The exception is Waymire, which would have no hauling as elimination of road construction precludes this sale.

Road Construction and Renovation – Alternative 3 would eliminate new road construction compared to Alternative 2. The 2700 feet of new construction and 5 miles of renovation proposed under Alternative 2 within one site potential tree heights of stream channels would not occur under Alternative 3. Impacts associated with the construction and renovation of road in the project area under Alternative 2 would not occur. Limited impacts may occur due to drainage problems noted in Section 5 (7-7-32 road). This road would likely continue to degrade increasing the risk of mass wasting at the site. Due to distance to fish habitat these localized effects would be unlikely to affect fish habitat.

Machine Pile and Hand Pile Burning – A 43 percent reduction in treatment area would occur under this alternative. However, the nature and magnitude of effects to fisheries and aquatic habitat from Machine Pile and Hand Pile Burning under Alternative 3 would be similar as described under Alternative 2.

Broadcast Burning – Without proposed road construction in Waymire no activities would occur including broadcast burning. No effects to aquatic habitat or fish would occur.

Legacy Tree Release (Project 2) and Large Woody Debris Enhancement (Project 3)

Environmental impacts for these projects under Alternative 3 are anticipated to be similar to those analyzed under the proposed action.

3.4 HYDROLOGY

(IDT Report incorporated by reference: Wegner, 2011. Rickreall Creek Watershed Enhancement Hydrology Environmental Assessment pp.1 to 9.)

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

- What would be the effects of the proposed projects on water quality?

AFFECTED ENVIRONMENT

Project Area Precipitation and Basin Hydrology

Project areas are located west of Dallas, Oregon in the coast range at elevations ranging from 1,290 – 2,240 feet[5]. The general project area receives approximately 80-100 inches of rain annually and has a mean 2-year precipitation event of 5.5 inches in a 24-hour period (assuming a general latitude of 44.92 and longitude of 123.46 with average elevation of 1,750 feet http://www.nws.noaa.gov/ohd/hdsc/noaaatlas2.htm). The project area lies below the transient snow zone (TSZ), an elevation zone subject to rain-on-snow events (ROS) that have the potential to increase peak flows during winter or spring storms. Located primarily at lower elevations snow accumulation is rare in rain dominate zones. Catchments within this zone are typically hydrologically flashy because of frequent rainstorms during the winter. Changes in peak flows in a rain-dominated zone can occur, and are related to: 1) the reduced interception and evapotranspiration rates due to tree felling, and 2) increased routing of precipitation to stream channels due to soil compaction and roads (Spence et al., 1996; Ziemer and Lisle, 1998). Typical extent of effect is peak events occurring slightly earlier in the fall than in untreated watersheds.

The project areas are located in four 5th field watersheds (Mill Creek, Luckiamute River, Rickreall Creek, and Salt Creek). All of all proposed units ultimately drain to the Willamette River. There are no key watersheds in the project areas.

Project Area Stream Flow

There are potentially 17 stream crossings that may require upgrades to meet current RMP guidelines for culvert sizing. All potential culvert replacements are on first order streams except

[5] Unless otherwise indicated, geographic information is an estimate derived from the BLM's GIS database.

one, which is on a second order channel and all ultimately drain to Rickreall Creek.

Project streams are similar to other Western Oregon streams where highest discharge takes place during winter storm events. Summer base-flow normally begins in perennial channels sometime in late July and continues through October. Many small headwater first order channels (intermittent or ephemeral) dry up completely during this period.

Peak Flow

Peak flow refers to the instantaneous maximum discharge associated with individual storm or snowmelt events (U.S.E.P.A., 1991). The two largest peak flow events in the last century took place in 1964 and in February of 1996. Both were estimated at or above a 100 year flood return interval and both were in response to substantial snow pack melt-off. Smaller peak flows are associated with snow pack melting during the spring. The State of Oregon has estimated peak flows for most watersheds in Western Oregon, including project area watersheds. These estimates may be viewed at the following web site: http://www.wrd.state.or.us/surface_water/flood/index.shtml.

Jones and Grant (1996), among others, hypothesize that forest harvest leads to increases in total storm runoff while road construction and wood removal from channels results in earlier, and higher peak flows. Stream channel patterns and dimensions (i.e. width, depth and gradient) adjust to accommodate storm flows ranging from 1-5 year events and therefore, change in the size or timing of peak flows can affect channel scour and fish habitat. The cumulative effect of increases in peak flow can be large, causing flooding, with stream channel and bank damage leading to increased fine sediment transport and higher turbidity. Alterations in peak flow timing and quantity are particularly of concern in watersheds with potential for snow accumulation and quick melt-off during ROS events such as occurred in the 1996 flood. Changes in peakflows are harder to determine as the watershed size becomes larger. Seventh field and 6th field watersheds are appropriate sized watersheds to review impacts of predicted changes in peakflows because the changes can be measured in channel dimensions and patterns as the size of the stream channels are generally less than 20 feet wide and sampling sites are easier to monitor.

Potential for peak flow augmentation due to forest harvest: Current Condition

Rigorous analyses were completed of peak flow potential for both rain-dominated and rain-on-snow dominated 6th field watersheds. Project area watershed analyses were completed in the *Final Environmental Impact Statement for the Revision of the Management Plans of the Western Oregon Bureau of Land Management* (FEIS 2008). This analysis is located on pages 753-759 of Volume II and also in Appendix I of Volume III of the FEIS. The analysis included the existing condition and proposed timber harvest in a ten year planning period. The Rickreall Creek watershed was identified as being at a threshold for being able to measure cumulative impacts to streams from changes in peak flow amounts. Because the FEIS was completed using data from 2004 all the analyses were updated using 2011 stand and vegetation modeling data (see peak flow cumulative effects discussion below).

Existing Peak Flow and Water Quality Effects from Roads

Road surfaces have been implicated as important contributors to increased peak flows. As the slope increases, the extent of surface and subsurface disturbance required to construct a stable road increases. Under the worst-case scenario, more than 50% of cut banks near stream channels may intercept groundwater and rout it through road ditches (Toman, 2004). In addition, when road ditches drain intercepted water directly to streams, they act as an "extension" of the stream network and can have a measurable effect on stream flow which may include an augmentation of peak flows on a watershed scale (Wemple et al., 2003).

Streams near roads are at higher risk for water quality contamination from material washed off the road surface and for increased stream temperature as a result of reductions in streamside shading. During storms, runoff from unpaved forest roads may deliver sediment to streams resulting in increased sediment transport, deposition of fines in gravels and turbidity levels that exceed natural background levels (Beschta 1978, Binkley and Brown, 1993). Alternative 2 includes approximately 5 miles of new road construction on ridge tops that would not require any additional stream culvert installations. Approximately 0.2 miles of new road construction, spur 2 and 5 in the Rick-Line timber sale and spur 1 in the Robb Mill Loader timber sale, would occur in the riparian reserve area, crossing above stream inception points. These new spurs would maintain a minimum of 50 feet buffer from the marked areas. Also included in the proposal is up to 12 miles of road reconstruction and renovation work that includes 17 potential stream culvert upgrades to meet BMP standards in the 2008 RMP. Approximately six new drain dips and six new cross drains would also be installed in the road surfaces to help improve watershed function by reducing the roads influence on hill slope hydrology.

Project Area Stream Channels

The mainstem of Rickreall Creek flows through or near three of the thinning project areas. Approximately 6 miles of the mainstem of Rickreall Creek, South Fork of Rickreall and North Fork of Rickreall Creek would have large woody debris placed in the channel (approximately 330 trees) through the project areas. The proposed areas in the Rickreall watershed are classified as transport reaches and are generally unconfined with cobble substrates but also areas of exposed bedrock. The stream gradients are in the 2 to 5 percent range except where there are ledges of exposed bedrock which form small waterfalls.

Stream channels in the main project areas are primarily small 1st and 2nd order headwater streams; these are "source" reaches, following the classification of Montgomery and Buffington (1993). On steeper gradient streams (10-20%), these have developed into confined, step-pool channels. All of the channels are low in their existing amount of contributed large wood from nearby riparian forests but are well shaded and meet the Oregon DEQ standard of 80% shade. All hazard trees cut in the Stream Protection Zones (SPZ) would be left as long as they do not pose a threat to safety of existing structures (culverts and bridges, etc.)

The remaining channels in the project areas are small with intermittent or ephemeral flow. These small tributary channels formed in the silt/gravel loam soils in the project area and flow intermittently on the surface before disappearing underground, only to pop out again down-slope. Many are associated with high water tables in earth-flow terrain which forms in some of the

softer slump deposits or on the surfaces of benches and flats. It is likely that ground water and intricate patterns of subsurface flow, as opposed to surface run-off, is the primary system of water delivery to these small channels. Most are lower gradient (<5%) with small substrates (gravels, sands and silts) reflecting the adjacent soils.

Project Area Wetlands

Numerous small wetlands or wet areas were identified and mapped within the initial project areas surveys. The areas have been removed from harvest consideration in all the project areas. These types of sites mostly coincide with high water tables identified in the BLM GIS Timber Production Capability Classification. All wetland sites (identified or not) are excluded from treatment in this proposal.

Project Area Water Quality

The Oregon Department of Environmental Quality's (DEQ) 2004/2006 - 303d List of Water Quality Limited Streams (http://waterquality.deq.state.or/wq/303dpage.htm) is a compilation of streams which do not meet the state's water quality standards. Upper Rickreall Creek and Mill Creek are listed as drinking water source areas by the State DEQ. The following streams in the project areas are also on the 303d list for a variety of reasons ranging from water quality parameters and sedimentation but all are listed for temperature concerns. South Fork Mill Creek; temperature, mile 0 to 3.8, Rickreall Creek; temperature and various water quality parameters, mile 0 to 33.1, Skid Creek; sediment, mile 0 to 1.7, Little Luckiamute River; temperature and various water quality parameters, mile 0 to 26.4, and Lower Salt Creek; temperature and various water quality parameters, mile 0 to 32.8. These areas range from as close as 55 feet to more than 10 miles downstream from the proposed activities.

The DEQ also published an assessment, the 319 Report, which identifies streams with potential non-point source water pollution problems (2008 - Oregon Statewide Assessment of Nonpoint Sources of Water Pollution). The Luckiamute and Yamhill watersheds are currently undergoing a data collection phase or data analysis by the DEQ to determine what parameters (if any) and what subwatersheds (if any) should be listed as needing a TMDL completed to correct water quality or habitat related problems.

Rickreall Creek had a TMDL completed on it by the Oregon DEQ in 2006. The BLM in accordance with the TMDL has completed a Water Quality Restoration Plan for the BLM lands in Rickreall Creek that displayed potential for improvements to stream shade cover to improve stream temperatures. All of the sites reviewed thus far in Rickreall Creek on BLM lands have met or exceeded the shade cover guideline. Possible improvements were identified as adding large woody debris to the channels to improve channel stability, and habitat.

Municipal and Domestic Water

There are two known municipal or domestic water users in the specific project areas. The cities of Dallas and Sheridan collect waters from the Rickreall Creek watershed and the Yamhill watershed respectively to supply public water users in those communities. There are instream domestic water rights in the Salt Creek watershed approximately one mile below project

activities, in the Mill Creek watershed both surface and groundwater permits are located approximately 6 miles below project activities. Also further downstream in the Yamhill River the City of Sheridan holds a water right for municipal water use. In the Luckiamute watershed, specifically Waymire Creek, there are private surface water permits approximately 1,000 feet downstream from project activities. In the Rickreall Creek watershed the City of Dallas holds a water right for municipal water use and maintains Mercer Reservoir which is located mid-basin and approximately one mile below project activities. Further down the watershed there are numerous private water rights on record for both surface and groundwater approximately five miles below project activities.

ENVIRONMENTAL EFFECTS

Alternative 1 – No Action

The No Action alternative would result in a continuation of the condition and trends of water resources as described under the USWA and Affected Environment section of this report. No reduction of forest canopy would take place. No additional disturbance to flow paths resulting from timber harvest and road work or use would occur. Streams disturbed from past management would continue to evolve towards a stable condition. Existing water routing through road drainage structures would continue with the existing level of erosion.

Alternative 2 – Proposed Action (Projects 1, 2, and 3)

Stream Flows
Project 1 includes timber harvesting activities and has been analyzed since increases in mean annual water yield following the removal of watershed vegetation have been documented in numerous studies around the world (Bosch et al., 1982). Vegetation intercepts, and evapotranspires precipitation that might otherwise become runoff. Thus, it can be assumed that the action considered under this proposal would likely result in some small increase in water yield (including a small increase in summer base flow) which correlates with the removal of a portion of the conifer overstory in the watershed. Project 2 also results in a minor amount of vegetation reduction as the smaller vegetation around the larger legacy trees is cut and left on the ground to help lower competition for the legacy trees. This level of vegetation reduction is similar to natural decay is an expected situation in a natural ecosystem. Changes in water yields from this type of activity would be impossible to separate from natural variation and the impacts of this project will not be discussed further. Project 3 would include the placement of approximately 330 trees on stream reaches in the Rickreall watershed. There would be no impact to stream flow amounts from this activity and it will not be discussed further in this section.

For Project 1 activities, approximately 5% (20 acres) of the harvest activities in the Rick-Line project area and 40% (118 acres) of the harvest activities in the Cedar Ridge project area lies within the potential rain-on-snow zone. For the Upper Rickreall watershed this small level of acreage (0.6 percent of the basin) to be thinned in the ROS zone equates to a very low risk for potential impacts to stream channels from extreme flow events because the majority of the upper

basin is located at elevations below the ROS zone and would dampen any ROS generated flow from any specific event.

Water Quality

Fine sediment and Temperature
For Project 1 harvest areas, appropriate SPZs have been designed following the 2008 RMP direction and would maintain the riparian characteristics and shade requirements needed to maintain stream temperatures.

Harvest-generated slash would be maintained in the yarding corridors to minimize the need for machines to travel on bare soil, and ground-based equipment would only be allowed on slopes less than 35 percent. Tree removal is proposed on some steeper slopes (greater than 70 percent) in nine of the project units. Table 12 describes the potential harvest areas (approximately 82 acres) and their relationship to stream channels. The existing condition of the areas shows no sign of mass wasting on BLM lands. Considering the harvest type (Skyline), the existing road locations above and below the proposed units, and the small size of the steeper portions of the units it is not anticipated that the thinning harvest activity would trigger any mass wasting or slumping in the project areas. Therefore, increases in sediment delivery to streams due to mass wasting are unlikely to result from this action.

Table 12. Steep Portions of Harvest Areas and their Landscape Position.

Project 1 Areas	Unit Number	Acres / Harvest Type	Description
C-9	9A	12 / Skyline	300 -500 feet above stream channel
Cedar Ridge	33C	2 / Skyline	Directly below 7-7-32.1 road
Gilmore	3A/ 3B	15 /Skyline	Directly above the 8-7-3 road in 2 locations. One location 200 feet from Laurel Creek
Gilmore	4B	5 / Skyline	Below 8-7-3.3 road 300 feet above Kyle Creek
Gilmore	10A	2 / Skyline	Directly below 8-7-3.2 road on east edge of riparian buffer
Rick-Line	5C	7 / Skyline	Below the 8-7-6 road above top of riparian buffer
Rick-Line	5E	20 / skyline	Below the 8-7-5 road, mid slope 200 feet above 3 riparian buffers
Rick-Line	5E	5 / Skyline	Well below the 8-7-5 road at bottom of unit 200 feet above mainstem Rickreall Creek
Rick-Line	5E	7 / skyline	Below spur road 7, located between 2 riparian buffers
Waymire	9A	5 / Skyline	Below spur road 1, near top of ridge

In the less steep portions of the project areas, the no-harvest SPZs in riparian areas have high surface roughness, which would function to trap any overland flow and sediment before it could reach any streams. Ground-based skidding would occur during periods of low soil moisture with little or no rainfall, in order to minimize soil compaction and erosion. Aerial and skyline yarding are not projected to increase sediment production in the project areas.

For the protection of stream channels and aquatic resources, SPZs or no-treatment zones were applied to all stream channels and "high water table areas" (small wet areas in Unit 33C – Cedar Ridge, Small wetland Unit 4A and 10A –Gilmore, small wetland in Unit 5A - Rick-Line) in the project area. Stream buffers extend a minimum of 55 feet from stream channels and to the extent of the riparian vegetation around "wet areas". These no-treatment zones would maintain the existing geomorphic conditions in the stream corridors including the streambanks and bottoms from project related impacts.

Existing trail use in the Robb Mill Loader project area is not having a detrimental impact on water quality through sediment introduction to stream channels. The existing trail use is allowed under the current Memorandum of Understanding with the user group.

Channel Morphology

The proposed projects are unlikely to affect stream channel stability and function as all field identified streams and wet areas would be protected with a minimum 55 foot SPZ. No yarding would occur across streams except for five skyline corridors in the northwest portion of Unit 9A in the Waymire timber sale. This small length of disturbance is expected to mimic a natural disturbance event such as blowdown. All trees cut for the corridors within the riparian buffer would be left on the ground and across the creek. No bank stabilizing vegetation would be removed. Project 3 includes the placement of approximately 330 trees into three reaches of Rickreall Creek that total approximately six miles of stream channels. This equates to about 55 trees per mile and is still below the NMFS proper functioning condition LWD level for the stream channel. The placement of this LWD could have localized effects on stream bank stability but would be impossible to separate from natural tree blowdown and associated bank loss over such a long treatment area. Most trees are expected to remain close to where they are placed but they would be allowed to adjust based on stream flow and site conditions. Previously completed LWD placement projects have shown that the structures tend to accumulate bedload as they become more stabilized in the stream systems. As the number of treatment sites is limited, they have thus far not had any impacts on changing the channel geomorphological characteristics of the treated stream channels. This type of treatment was described as being beneficial in the WQRP completed for the Rickreall TMDL. Project 2 activities would not be located near stream channels and would not have any impacts to stream morphology.

Burning

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

be expected to reestablish vegetation entirely within one to two growing seasons.

No burning would occur within SPZs to protect water resources and the remaining vegetated buffer would filter out any sediment delivered from upslope areas. It is not expected that any additional erosion would occur from these units and thus there should be no impact to sediment generation or nutrient levels available to the remaining vegetation which would maintain the productivity of the stand.

Road Work and Hauling

The five miles of proposed new construction would occur on moderate to low gradient slopes, with no stream crossings. Approximately 500 feet of new road construction (spur 2, 5- Rick-Line, and spur 1 – Robb Mill Loader) is located within one site potential tree of stream channels (see fisheries report), and no new stream crossings are proposed. The risk of impacts to water quality due to road construction would be limited by restricting work to periods of low rainfall and runoff. Construction would employ techniques (BMPs) to reduce concentration of runoff and sediment to a minimum, such as outsloping, and rock placement. These new roads would be decommissioned after use. The proposed final road system is located in a stable geologic landform with no risk of road related landslides from the roads on BLM lands. The placement of new roads on the landscape is an average of more than 200 feet from existing streams and the road locations are on topographic divides where any road generated water or sediment would have no impact on drainages in the project area. No additions of sediments to stream channels in the project area is expected from new road construction, use, and decommissioning.

The proposed action included 12 miles of road reconstruction and renovation and includes 17 potential stream culvert replacements to meet BMP standards. Approximately six new drain dips and six new cross-drains would also be installed in existing road surfaces to help improve watershed function by reducing the roads influence on hill slope hydrology. Drainage on existing roads would be improved where needed, including adding rock surfacing where needed on all project haul roads. Drainage improvements would likely improve water quality over existing conditions.

Project Design Features in Table 4 describe limitations on project activities for timber yarding activities, road construction and renovation activities, timber hauling and instream work (culvert replacements and LWD placement). Activities have varying potential dates of operation but are based on soil moisture requirements needed to protect both soil and water resources. The “low soil moisture” limitation is considered to be 15 percent soil moisture. Timber hauling during periods when water is flowing on roads and into ditches could potential increase stream turbidity if flows from ditches were large enough to enter streams. All hauling would be restricted at any time of the year if necessary to avoid excessive increases in erosion and sedimentation. Based on the road locations and the project design features there is no expected impacts on stream turbidity from the project proposal. For a discussion on cumulative effects from roads and hauling, see the discussion on Soils (Section 4.6).

Alternative 3 – No New Road Construction (Projects 1, 2, and 3)

Direct and Indirect Effects

Stream Flows

Project 1 includes timber harvesting activities that could be completed without the construction of any new roads and has been analyzed for increases in mean annual water yield. Numerous studies around the world (Bosch et al., 1982) have shown that following the removal of watershed vegetation increases in runoff because vegetation intercepts and evapotranspires precipitation that might otherwise become runoff. Thus, the action considered under this proposal would likely result in some small increase in water yield (including a small increase in summer base flow), which correlate with the removal of a portion of the conifer overstory in the watershed. Projects 2 and 3 would have the same effects as previously discussed.

For Project 1 activities, approximately 90% (112 acres) of the Rick-Line project area and 40% (72 acres) of the Cedar Ridge project area lie within the potential rain-on-snow zone. For the Upper Rickreall watershed this small level of acreage to be thinned in the ROS zone equates to a very low risk for potential impacts to stream channels from extreme flow events because the majority of the upper basin is located at elevations below the ROS zone and would dampen any ROS generated flow from any specific event.

Water Quality

Fine sediment and Temperature:

For Project 1 harvest areas, appropriate SPZs have been designed following the 2008 RMP direction and would maintain the riparian characteristics and shade requirements needed to maintain stream temperatures.

Harvest generated slash would be maintained in the yarding corridors to minimize the need for machines to travel on bare soil, and ground-based equipment would only be allowed on slopes less than 35 percent. Tree removal is proposed on some steeper slopes (greater than 70 percent) in five units in the project areas. Table 13 describes the potential harvest areas (approximately 22 acres) and their relationship to stream channels. The existing condition of the areas shows no sign of mass wasting on BLM lands. Considering the harvest type (skyline), the existing road locations above and below the proposed units, and the small size of the steeper portions of the units it is not anticipated that the thinning harvest activity would trigger any mass wasting or slumping in the project areas. Therefore, increases in sediment delivery to streams due to mass wasting are unlikely to result from this action.

Table 13. Steep Portions of Harvest Areas and their Landscape Position

Project 1 Areas	Unit Number	Acres / Harvest Type	Description
Gilmore	3A/3B	10 / Skyline	Directly above the 8-7-3 road in 2 locations. One location 200 feet from Laurel Creek
Gilmore	4B	3 / Skyline	Below 8-7-3.3 road 300 feet above Kyle Creek

Gilmore	10A	2 / Skyline	Directly below 8-7-3.2 road on east edge of riparian buffer
Rick-Line	5C	7 / Skyline	Below the 8-7-6 road above top of riparian buffer

In the less steep portions of the project areas, the no-harvest SPZs in riparian areas have high surface roughness, which would function to trap any overland flow and sediment before it could reach any streams. Ground-based skidding would occur during periods of low soil moisture with little or no rainfall, in order to minimize soil compaction and erosion. Aerial and skyline yarding are not projected to increase sediment production in the project areas.

For the protection of stream channels and aquatic resources, SPZs or no-treatment zones were applied to all stream channels and "high water table areas" (small wet areas in Unit 33C – Cedar Ridge, small wetland Unit 4A and 10A – Gilmore, small wetland in Unit 5A – Rick-Line) in the project area. Stream buffers extend a minimum of 55 feet from stream channels and to the extent of the riparian vegetation around "wet areas". These no-treatment zones would maintain the existing geomorphic conditions in the stream corridors including the streambanks and bottoms from project related impacts.

Existing trail use in the Robb Mill Loader timber sale area is not having a detrimental impact on water quality through sediment introduction to stream channels. The existing trail use is allowed under the current MOU with the user group.

Channel Morphology
Projects are unlikely to affect stream channel stability and function as all field identified streams and wet areas would be protected with a minimum 55 foot SPZ. No yarding would occur across streams. No bank stabilizing vegetation would be removed.

Project 3 includes the placement of approximately 330 trees into approximately 6 miles of stream channels. This equates to about 55 trees per mile and is still below the desired LWD levels for the channel. The placement of this LWD could have localized effects on stream bank stability but would be impossible to separate from natural tree blowdown and associated bank loss over such a long treatment area. Most trees are expected to remain close to where they are placed but they would be allowed to adjust based on stream flow and site conditions. Previously completed LWD placement projects have shown that the structures tend to accumulate bedload as they become more stabilized in the stream systems. Because the number of treatment sites is limited, they have thus far not had any impacts on changing the channel geomorphological characteristics of the treated stream channels. This type of treatment was described as being beneficial in the WQRP completed for the Rickreall TMDL. Project 2 activities would not be located near stream channels and would not have any impacts to stream morphology.

Burning
The majority of slash associated with this project in the tractor yarding areas would be left on site. Where large amounts of slash are found along roads and landings, it would be piled and burned. Burning piles could produce small areas without soil cover that are more susceptible to erosion. Burning could also produce patches of bare soil with altered properties that restrict

infiltration. Burn piles would occupy very small areas surrounded by larger areas that would absorb runoff and trap any sediment that moved from the burn sites. These burned areas would be expected to reestablish vegetation entirely within one to two growing seasons.

No burning would occur within SPZs to protect water resources and the remaining vegetated buffer would filter out any sediment delivered from upslope areas. It is not expected that any additional erosion would occur from these units and thus there should be no impact to sediment generation or nutrient levels available to the remaining vegetation which would maintain the productivity of the stand.

Road Work and Hauling

There is no new road construction proposed with this alternative. Included in this alternative is 12 miles of road reconstruction and renovation work that includes 17 potential stream culvert replacements to meet BMP standards. Approximately six new drain dips and six new cross-drains would also be installed in existing road surfaces to help improve watershed function by reducing the roads influence on hill slope hydrology. Drainage on existing roads would be improved where needed, including adding rock surfacing where needed on all project haul roads. Drainage improvements would likely improve water quality over existing conditions.

Project Design Features in Table 4 describe limitations on project activities for timber yarding activities, road renovation activities, timber hauling and instream work (culvert replacements and LWD placement). All of these activities have varying potential dates of operation but are based on soil moisture requirements needed to protect both soil and water resources. The “low soil moisture” limitation is considered to be 15 percent soil moisture. Timber hauling during periods when water is flowing on roads and into ditches could potential increase stream turbidity if flows from ditches were large enough to enter streams. All hauling would be restricted at any time of the year if necessary to avoid excessive increases in erosion and sedimentation. Based on the road locations and the project design features, there is no expected impacts on stream turbidity from the project proposal.

3.5 RECREATION, RURAL INTERFACE, VISUAL RESOURCE MANAGEMENT

(IDT report incorporated by reference: Meredith, 2011. Rickreall Creek Watershed Recreation/Rural Interface/Visual Resources Report, pp. 1 to 12.)

The following recreation, rural interface, and visual resource management issues will be addressed in the environmental effects section below:

Recreation

- How would the proposed projects affect designated and dispersed recreational use of the area?

Rural Interface

- What effects would the truck traffic accompanying the projects have on residents along the haul route? What delays for recreational traffic are expected from the operations?

Visual Resource Management

- What effects would the projects have on the visual resource class of 1, 3, and 4? Would the projects be visible from the major roads or observation points?

AFFECTED ENVIRONMENT

Recreation

The project areas are within a forest setting accessed by gravel roads. Evidence of man-made modifications (roads, timber harvest activities, utilities, buildings, houses) is visible from both private and public lands within or in the vicinity of the project areas. The project areas have dispersed recreation with no developed recreation sites. Two recreation sites, Mill Creek County Park and the BLM Mill Creek recreation site are over two miles to the northwest of the proposed Robb Mill Loader timber sale.

The majority of the proposed projects' off-highway vehicle (OHV) use designation is open. Only 11 acres in the Cedar Ridge timber sale and a portion of Rickreall Ridge ACEC to the east of the sale is closed. No designated OHV trails are within the project areas. Many roads are gated to restrict traffic. Activities that may occur in the area include OHV riding, biking, hunting, target shooting, driving for pleasure, and special forest product harvest.

Robb Mill Loader sale has a mountain bike trail system maintained through a Memorandum of Understanding with the user group. No other designated trails exist within the project areas. Any trail is unauthorized and would likely be obliterated through the proposed project implementation. Waymire sale has an undesignated trail along one ridge, which would be eliminated through associated roadwork.

Rural Interface

Rural interface zones are BLM-administered lands where they intersect a created half-mile buffer around county zoning. The BLM must take into account homes located near proposed projects. The Waymire sale area is the only portion of Project 1 that is within the rural interface zone as defined in the Salem District RMP (p. 39). The next closest rural interface zone to Project 1 is ¼ mile to the northeast of Robb Mill Loader sale. The haul route would pass residential houses and pass through rural interface zones. Project 2 is within the rural interface zone in Township 7 South, Range 6 West, Section 34. Project 3 is not within the rural interface zone. Roads surrounding these proposed projects have historically experienced log truck traffic.

Visual Resources

Visual resource values and opportunities to maintain scenic quality are greatest on BLM-administered lands seen from state and county scenic highways and roads, parks, rural residential areas, scenic ACECs, special recreation management areas, and recreation sites and trails. The intermixed land ownership pattern between public and private lands greatly limits the BLM's ability to manage the project areas as a contiguous viewshed. Timber management operations near or adjacent to the project areas are observable from private and public lands and major roads. The view from major roads and highways of the surrounding terrain is one of timber management, various age classes of trees are visible.

Other Resources

There are no designated Wild and Scenic Rivers within the project area. Little Luckiamute River is an eligible recreational Wild and Scenic River is 0.88 miles south of C-9 unit 9B, over a mile south of Gilmore unit 11A, and over 1.2 miles south of Waymire unit 9B.

There is no wilderness within the project area.

ENVIRONMENTAL EFFECTS

Alternative 1 – No Action

With the exception of unexpected changes (i.e. wildfire or disease), the proposed units would continue to provide a forest setting for dispersed recreation opportunities. An increase in log truck traffic, noise, and other disturbances related to the harvest of the proposed units and other projects would not occur. Timber management activities and log truck traffic would continue on both private and public lands in the vicinity. No modifications to the landscape character of the project area would be expected to occur. Modifications to the landscape character in the area around the projects would still be expected, as a result of activities on other lands.

Alternative 2 and Alternative 3 (Projects 1, 2, and 3)

Recreation
Dispersed recreation use within the proposed units would be restricted approximately three to five years during timber management activities and return to prior usage upon completion of harvest. Other BLM lands nearby would remain available for recreational opportunities. Recreational users in the vicinity may hear noises associated with project operations and may experience traffic delays. Tree removal from the proposed units may crush undergrowth vegetation. Most undergrowth vegetation would return within five years.

Harvest activities may obliterate unauthorized trails. No reconstruction of unauthorized trails would be allowed. Off-highway vehicle use would be expected to increase if roads, skid trails, and gates are not closed or blocked after harvest operations. Logging debris could be ignited by vehicle or OHV traffic, from vehicle sparks (lack of proper spark arrestor or catalytic converter in the muffler system), heating fine fuels (grasses) from idle vehicles, or discarding burning materials such as cigarettes. Robb Mill Loader trails under an agreement would be reopened by the user group after harvest operations and continue providing a mountain bike riding area.

Rural Interface
In general, the concerns of property owners near timber harvest and hauling activities tend to be associated with noise, traffic, and dust from logging and hauling activities, effect to scenic, water and wildlife values, increased public access that may lead to problems with fire hazard, garbage, dumping, and vandalism.

Rural interface is only present within Project 2 in Township 7 South, Range 6 West, Section 34. Residents along the haul route and in close proximity to the projects' activities may hear noises associated with project operations and may experience traffic delays and dust from gravel road traffic. Disturbance from this proposed timber harvest would be short-term, lasting a few weeks to months during active operations. The projects would have no effect on the rural interface zone other than increased log truck traffic and noise.

Visual Resources
The project units are in the background to middle ground. Using viewshed analysis, portions of Cedar Ridge, Robb Mill Loader, Waymire timber sales and one section of the Legacy Tree Release are visible. They are at times visible in the distance from major public travel routes, and may not always be observable from rolling mountains, remaining trees, and vegetation blocking the view. BLM lands are largely unidentifiable from other lands when looking at the landscape from any vantage point. Traffic speeds reduce the time any unit is visible. Gates restrict much of the vehicular access also reducing visible units. No special visual features or specific concerns were identified in scoping.

The proposed projects would comply with VRM objectives. Visual disturbance of the project area would be associated with modifications to vegetation and other ground disturbing activities from timber sale operations. Evidence of harvest activities would not be observable within five years as understory vegetation returns to a more natural appearance and the remaining stand continues to mature. A forest setting and most of the canopy would remain. Harvest activities would remove a portion of trees from the proposed units and damage undergrowth vegetation.

Logging debris and crushed vegetation would change colors as time passes, leaving the view of the units undesirable. If burned, the blackened logging debris would result in short-term decline in visual quality. Fuel treatments would comply with state smoke management regulations, thus reducing the affect to visual quality to a few days. Understory vegetation and the remaining trees would rebound and grow, covering logging debris and burn pile scars. Project design features, time in view, and unit locations mitigate any adverse effect to scenic resources according to VRM class 1, 3, and 4 objectives.

3.6 SOILS

(IDT report incorporated by reference: Wegner, 2011. Rickreall Creek Watershed Soils Report, pp. 1 to 5.)

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

- What effects would the proposed projects have on soil quality and site productivity?
- What would be the effects to soils from mechanical harvesting equipment when used on slopes between 35 and 45 percent?

AFFECTED ENVIRONMENT

Typical soils in the project areas parent material is composed of residuum and colluvium that is derived from basic igneous, sedimentary rock and volcanic ash. These soils are generally

moderately deep to deep soils that are well drained and not prone to excessive levels of instability. Soil Map Unit 39F, which lies on 60 to 90 percent side slopes, is considered to be a shallow soil and is prone to higher levels of erosion. The slope limitations lead the harvesting based system to be of either cable/skyline or helicopter logging systems.

Shallow soils on steeper slopes have a tendency to be younger soils that have poorly developed soil structure. As a result they are prone to high level of soil erosion and compaction due to the lack of depth and ability to sustain a load and not be deformed. Approximately 15% of the lands contained within the treatment units have soils with a depth to weathered bedrock of less than 20 inches deep.

These soil types range from volcanic to sedimentary parent materials and are generally well drained. They contain varying amounts of sand-loam particles up to cobble sized particles. They are generally located in valley bottoms and floodplain terraces. The project areas are all previously disturbed sites and would remain as disturbed sites when the work is completed.

Soil maps and descriptions of project soil characteristics are available at the Natural Resource Conservation Service web site: http://websoilsurvey.nrcs.usda.gov/app/.

ENVIRONMENTAL EFFECTS

Alternative 1 – No Action

This alternative would result in no change to the affected environment by active management activity. Short-term impacts to soils would be avoided. Soil erosion that is currently occurring would continue to occur at the existing levels.

Alternative 2 – Proposed Action (Projects 1, 2, and 3)

Direct and Indirect Effects to Soil Quality and Site Productivity

Under this action alternative 40 percent of the acres would be harvested by ground-based equipment and 60 percent would be harvested by cable or skyline operations. The tractor harvesting would follow established PDFs as described in Section 2.6 of this EA.

Implementation of PDFs, slope limitations, and seasonal restrictions would minimize impacts to soils. Operation on wet or moist soils with a silty clay loam to clay loam soil texture could potentially lead to excessive levels of soil compaction within the rooting zone. This could result in subsurface soil compaction that could potentially affect site productivity and soil quality.

Ground-based harvesting equipment may be utilized to facilitate the yarding of trees and slash associated with cable yarding operations on slopes greater than 35% but less than 45%. Since this type of operation is in excess of RMP Standards and BMPs, additional mitigation measures (described in Section 2.6) would be applied to ensure that it would not result in an adverse effect:

The intent of the BMPs are to ensure that ground-based harvest equipment does not result in an adverse effect to soil quality, result in sediment enriched runoff, or loss of topsoil. Since the operation on slopes greater than 35% would be in excess of RMP standards, additional measure would include a monitoring feedback loop to the agency representative to ensure the actions are not resulting in adverse impacts.

Soil displacement is generally light in harvester/forwarder skid trails because the equipment travels on top of slash and does not dig into the soil, and soil compaction is light to moderate. The potential for unacceptable levels of soil compaction would be at a minimum, because ground-based harvesting would occur when soils have low soil moisture (dry season). The amount of compaction from necessary timber harvest related infrastructure (e.g. skid trails/roads and landings) would be kept to no more than 10% of the unit.

Expected amounts of surface soil displacement, surface erosion, and dry ravel resulting from harvest operations would be minimal in skyline yarding areas. Some additional soil displacement and compaction would be expected in ground-based yarding areas, but overall the aerial extent and degree would remain well below the established district guidelines of 10 percent or less.

Those portions of the treatment units that are ground-based harvested are expected to recover over time and impacts on soil quality or site productivity are not expected to be long term or result in a long term adverse impact to the soils resource. The 9.8 acres of new roads, combined with existing roads within the treatment units, would equate to approximately 3.2% of the treatment units. This level of road disturbance to the soils resource would pose a low risk to creating an adverse effect to soil quality or site productivity.

Burning of slash that would be tractor piled would be limited to right of way within the road prism and existing landings. These piles would be created by mechanical methods and could potentially result in the creating of hydrophobic soils. However, since they would be considered to be less than 10% of the project area, not created within sensitive areas and only occur on areas where the soils are already disturbed by ground-based harvesting and yarding, it is unlikely that they could potentially result in an adverse effect to soil quality.

Based on the above referenced mitigation measures and PDFs, it is unlikely that the implementation of the proposed action would adversely affect soil quality or site productivity.

Alternative 3 – No New Road Construction (Projects 1, 2, and 3)

Direct and Indirect Effects to Soil Quality and Site Productivity
Under this action alternative 55 percent would be harvested by ground-based equipment and 45 percent would be harvested by cable or skyline operations. The tractor harvesting would follow established PDFs (Section 2.6). No new roads would be constructed under this alternative. Within the lands to be treated under this alternative are approximately 32 acres of existing roadways. Of these, approximately 23.5 acres would be reconstructed. There would be limited, if any, road decommission following project level activities.

There would be no new road construction and fewer acres treated by ground-based harvesting and skyline harvesting or yarding. The same project design features as described under Alternative 2 would be applied. Therefore it is unlikely that the implementation of Alternative 3 would result in a direct or indirect effect to soil quality or site productivity.

3.7 VEGETATION

(IDT reports incorporated by reference: Snook, 2011. Forest Vegetation and Silviculture Specialist Report Abstract, Rickreall Creek Watershed Enhancement EA pp. 1 to 14, and Exeter, 2011. Marys Peak Resource Area Botanical Report – Rickreall Creek pp.1 to 6.)

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

- Would the proposed actions have any impacts on Bureau Special Status (SS), including survey and manage (S&M) botanical and fungal species?

- Would the proposed action lead to a significant increase in noxious weed species on site or would the occurrence of noxious weed species have adverse effects on the project area?

AFFECTED ENVIRONMENT

Mid and Late-Seral Enhancement (Project 1)

Present Stand Condition and History

The site index (King, 50-year) for the project areas are relatively low, averaging Site Index 115 (low site III). Site index ranges from 93 to 136.

The Waymire and Robb Mill Loader project areas are in the relatively warm and dry grand fir plant associations, at elevations of 800-1400 feet, described in the Field Guide to Forested Plant Associations of the Northern Oregon Coast Range, by McCain and Diaz (2002). The other four project areas are at higher elevations, up to 3,400 feet, in the western hemlock plant associations.

The Timber Production Capability Class (TPCC) describes soil and site issues that contribute to fragility of lands to management impacts or reforestation failure under even-age (clearcut) harvest. Conditions identified by the TPCC classification in the Rickreall project areas include soils that are seasonally droughty due to physical properties, soils that are inherently low in nutrients, soils that have surface horizons that are highly erodible and susceptible to dry ravel, and slopes over 70 percent. The sites are suitable meaning that losses, if incurred, would be within acceptable limits (BLM Manual Supplement Rel. No. 5-185, H5251-1 TPCC Guide, Salem District, 07/07/86).

The project areas consists of forest stands dominated by Douglas-fir, small sawtimber (11-21" DBH) to large sawtimber (>21" DBH), fully stocked, originating from natural regeneration in 1920 to 1965 after clearcut harvest. Stands in the project area are 45-90 years old (2009). Stand age was collected by increment boring a sample of trees. The ages of sample trees were averaged. Stands are even-aged or older stand components so small that basal area-weighted age calculations change the age two years or less. Stand structure in the 45-80 year old stands is quite uniform and simple, and they average fewer than 1 tree per acre >30" DBH. The stands older than 80 are generally more structurally complex, and contain 2-7 trees per acre >30" DBH. Very few older legacy trees remain in the stands, but can be found in limited numbers in Robb Mill Loader, Waymire and C-9, and Gilmore 10A. Stands in the Waymire project area contain small gaps and hardwood clumps.

Douglas-fir is the dominant species in all stands. In the lower elevations, grand fir is present. Western hemlock is present in nearly all the stands, but is most common in Cedar Ridge, areas of Rick-Line and C-9. Noble fir is found sparsely in the highest elevations of Rick-Line and Cedar Ridge. Western red cedar is scarce, but a few are found in moist sites throughout the project area. Hardwood components consist of Pacific madrone found in Waymire, Gilmore and Robb Mill Loader, Oregon white oak found in Waymire, and bigleaf maple and red alder found in all project areas.

The stands in the project area are in a mid-seral condition, at high density, and are undergoing density mortality. The stands are in the "stem exclusion" phase (Oliver and Larson, 1996) of development. Inter-tree competition can be described by the concept of relative density index (RDI) Below a relative density index of 0.25, trees are experiencing little inter-tree competition, and at 0.35 are considered to be "fully stocked". Above relative density index of about 0.55, competition is strong and tree growth and vigor declines, and mortality of suppressed trees begins.

Currently the weighted average stand relative density for all stands in the project is 0.75. Under such competition, crowns recede from below due to shading, and stems become taller and more slender as height growth continues but diameter growth slows in response to the loss of crown. Death of suppressed trees occurs from lack of sunlight, from insects and diseases, or from buckling if tree stems become very tall and thin (Oliver and Larson, 1996). Research (Tappeiner, 1997) indicates that old-growth stands developed at much lower tree densities at early ages compared to contemporary young stands such as those in the project area. The growth rates in the old stands would indicate early densities of about 20-50 trees per acre.

Stand exam data was collected in 2009 and 2010, and is summarized in Table 14, below.

Table 14. Average Pre-Treatment Stand Characteristics (ORGANON projections)

Project 1 Timber Sales	Age[1] (yrs)	Timber Sales Weighted Average[7] Stand Values					
		Trees Per Acre[2]	% Douglas-fir in Stand	Total Basal Area[3] (sq. ft.)	Quadratic Mean Diameter (in.)[4]	Relative Density Index[5]	Crown Ratio[6]
C-9	84	176	86%	301	17.8	0.85	0.25
Cedar Ridge	55	226	70%	253	14.4	0.77	0.32
Gilmore	63	192	95%	249	15.1	0.74	0.30
Rick-Line	57	235	88%	259	14.2	0.79	0.31
Robb Mill Loader	49	223	100%	202	12.9	0.65	0.29
Waymire	67	169	82%	222	15.8	0.66	0.25
Weighted Average[7]	**62.5**	**212**	**87%**	**249**	**14.7**	**0.75**	**0.30**

[1]Total stand age in 2009 for all projects except Cedar Ridge (2010).
[2]Number of trees per acre, all species.
[3]Basal area per acre in square feet: cross-sectional area occupied by tree boles on each acre, a measure of density .
[4]Diameter at breast height (4.5 feet) of tree of average basal area (quadratic mean diameter).
[5]Relative Density Index, the density of trees per acre relative to the maximum density possible (Reineke, 1933).
[6]Crown Ratio – the ratio of tree live crown to total tree height.
[7]Project 1 consists of 28 stands, varying in size, between six Timber Sales. Stand values for each were calculated by acre weighted average values.

Forest Health

The following endemic diseases and insects occur in the proposed project area. Red ring rot is one of the most common and widespread heart rots, caused by the *Phellinus pini* fungus. It is found in a few Douglas-firs in the project area. Laminated root rot, caused by the fungus *Phellinus weirii*, is a native root pathogen that spreads through root to root contact between live, susceptible trees, including Douglas-fir and grand fir. It kills trees by destroying their root, which then leads to windthrow. It is a natural part of many forest ecosystems (Thies and Sturrock, 1995) that generally increases diversity by creating gaps, favoring shrubs and hardwoods, and contributes snag and downed wood habitat. *Phellinus weirii* affects less than five percent of the project area, creating small (0.1 to 0.5 acre) openings. Dwarf mistletoe, a parasitic plant, infects a few western hemlock in Rick-Line Unit 5H. It causes growth loss by diverting the tree's photosynthate into formation of brooms, but rarely causes tree mortality. The dense witches broom branches can be valuable habitat for some wildlife species.

Douglas-fir bark beetles are endemic in the project area. Bark beetles feed on the cambium under the bark of live and very recently (1-2 years) dead trees, and lay eggs there that hatch and mature under the bark, emerging as adults. Douglas-fir trees weakened by root disease infection are more likely to be attacked by the beetle (Hadfield, 1986). In stands under 100 years old, the risk of mortality to healthy green trees is low, even when beetle populations may be quite high.

The risk of windthrow from severe winter storms always exists, and the upper lee slopes of major southeast- to northwest-running ridges generally experience the highest degree of

windthrow in the Oregon Coast Range. Recent windthrow has occurred on the north edge of the Waymire project area.

Federal Threatened and Endangered and Bureau Special Status (includes Survey and Manage) Botanical and Fungal Species

Inventory of the project area for bureau special status vascular plant, lichen, bryophyte and fungal species were accomplished through review of; 1) existing survey records and spatial data, 2) habitat evaluation and evaluation of species-habitat associations and presence of suitable or potential habitat, and 3) field clearances, field reconnaissance and inventories utilizing intuitive controlled surveys, in accordance with survey protocols for the specific groups of species. Specific field surveys for bureau sensitive species were accomplished in the summer of 2010.

The table below shows special status species known sites within project areas identified during surveys and their status.

Table 15. Status and Location of Special Status Species in Project 1 Areas

Project area	Special Status Species	Status
C-9	*Chaenotheca chrysocephala*(L) *Chaenotheca furfurace*(L)	S&M – B[6] S&M – F[7]
Cedar Ridge	No known sites found.	
Gilmore	*Chaenotheca chrysocephala*(L) *Chaenotheca furfuracea*(L)	S&M – B S&M – F
Rick-Line	*Plagiothecium piliferum*(B) *Chaenotheca chrysocophala*(L) *Chaenotheca furfuracea*(L) *Nephroma bellum*(L)	Strategic Species S&M – B S&M – F S&M – F
Robb Mill Loader	*Cetrelia cetrarioides*(L)	S&M – E[8]
Waymire	*Cetrelia cetrarioides*(L) *Chaenotheca chrysocephala*(L) *Chaenotheca ferruginea*(L) *Chaenotheca furfuracea*(L) *Leptogium teretiusculum*(L)	S&M – E S&M – B S&M – B S&M – F S&M – E/strategic

L = Lichen; -B= bryophyte

Noxious weeds

The following noxious weeds occur in the Rickreall Creek drainage mainly along existing right-of-ways: bull and Canadian thistles (*Cirsium vulgare* and *C. arvense*), false brome (*Brachypodium sylvaticum*), Armenian blackberry (*Rubus armeniacus*), herb Robert (*Geranium robertianum*), meadow and spotted knapweed (*Centaurea xmoncktonii* and *C. stoebe*), Purple loosestrife (*Lythrum salicaria*), Scot's broom (*Cytisus scoparius*), St. John's wort (*Hypericum perforatum*), and Tansy ragwort (*Senecio jacobaea*).

[6] Category B species: Manage all known sites; pre-disturbance surveys not practical and not applicable
[7] Category F species: Known site management and pre-disturbance surveys not applicable
[8] Category E species: Manage all known sites; pre-disturbance surveys not applicable.

Legacy Tree Release (Project 2)

The stands originated with natural regeneration, following harvest, and are aged 40-110 years. A scattering of Douglas-fir and western hemlock trees originated before the majority, as they are relatively large (approximately 36" to 60" DBH), full-crowned, and open-grown. These trees form a layer somewhat taller than the majority of the conifer in the stands, and are generally 100 to 200 years old. They are a small component of these mid-seral stands, but are a very important structural and functional component of them because of their size, crown structure, deep and fissured bark, large limbs, and (in some cases) defect, dead or broken tops, and cavities. These trees survived either past fire or harvest, or established after fire or harvest a decade or more before the majority of the stand. Because they experienced little inter-tree competition for a majority of their growth period, they grew rapidly, achieved large diameters, and developed very large crowns and long, thick limbs. A subset of these older forest legacy trees are targeted for release under the proposed action. The proposed action would cut, girdle, or top only the younger stand component of trees aged 30-90 years old.

Federal Threatened and Endangered and Bureau Special Status (includes Survey and Manage) Botanical and Fungal Species

There are no known sites of any bureau special status plant or fungal species within the proposed project areas. Field clearances have not been completed on project locations which occur outside of Project 1.

Noxious weeds

The following noxious weeds occur in the Rickreall Creek drainage mainly along existing right-of-ways: bull and Canadian thistles (*Cirsium vulgare* and *C. arvense*), false brome (*Brachypodium sylvaticum*), Armenian blackberry (*Rubus armeniacus*), herb Robert (*Geranium robertianum*), meadow and spotted knapweed (*Centaurea xmoncktonii* and *C. stoebe*), Purple loosestrife (*Lythrum salicaria*), (Scot's broom (*Cytisus scoparius*), St. John's wort (*Hypericum perforatum*), and Tansy ragwort (*Senecio jacobaea*).

Large Woody Debris Enhancement (Project 3)

Federal Threatened and Endangered and Bureau Special Status (includes Survey and Manage) Botanical and Fungal Species

There are no known sites of any bureau special status plant or fungal species within the proposed project areas. Field clearances have not been completed on project locations which occur outside of Project 1.

Noxious weeds

The following noxious weeds occur in the Rickreall Creek drainage mainly along existing right-of-ways: bull and Canadian thistles (*Cirsium vulgare* and *C. arvense*), false brome (*Brachypodium sylvaticum*), Armenian blackberry (*Rubus armeniacus*), herb Robert (*Geranium robertianum*), meadow and spotted knapweed (*Centaurea xmoncktonii* and *C. stoebe*), Purple

loosestrife (*Lythrum salicaria*), (Scot's broom (*Cytisus scoparius*), St. John's wort (*Hypericum perforatum*), and Tansy ragwort (*Senecio jacobaea*).

ENVIRONMENTAL EFFECTS

Alternative 1 – No Action

Mid and Late-Seral Habitat Enhancement (Project 1)

Stand Development

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

Stand structural conditions would remain on the current trajectory of increasing density and decreasing individual tree growth rates. Stand growth projections were made using the ORGANON growth and yield computer simulation model, Edition 8.2 (Hann et al., 2006). In 30 years without treatment, the relative density of stands would increase from the current average of 0.75 to an average of 0.86.

Without treatment, stand structure would become increasingly uniform, except for gaps created by disturbance. Hardwood tree species would become overtopped and most of them lost from the stand. The main input of coarse woody debris would come from density mortality, disturbance events and endemic levels of insects and disease, resulting in more snags and downed logs than with treatment. Mortality may be greater than if the stands were thinned, but dead trees would be smaller in size. Density mortality is predicted (ORGANON model) to average 38 trees per acre of about 10.4" DBH in the next 30 years without treatment, and only one tree per acre of 14.8" DBH with density management in that same time period. The modeling provides a basis for comparison of density-induced mortality but does not include mortality from disturbance and stochastic events. One study of stands aged 14-38 years, over 22 years showed total annual stem mortality of 1-5% (Lutz and Halpern, 2006).

Understory development would be very limited: very few new understory trees would establish, and existing understory trees would die or slow in growth due to increasing competition. Crown ratio, the proportion of the tree crown height to the total tree height, is directly related to the health and vigor of the tree. As the canopy closes and lower limbs are lost to shading, Organon modeling predicts crown ratios would decrease from the current average of 0.30 to 0.23 in 30 years. Wind firmness and individual tree stability would also decrease.

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

Characteristics of stands in the Rickreall projects for 30 years from present with and without treatment as projected by ORGANON are compared in Table 16 on the following page.

Table 16. Rickreall Stand Characteristics with Treatment vs. No Treatment 30 years in the future (year 2040)

All values shown are project 1 timber sales weighted average stand values.

Project 1 Timber Sales	Tmt. or No Tmt.	Age[1] (yrs.)	TPA[2]	% DF (TPA)	BA[3] (Sq.Ft.)	QMD (in.)[4]	Avg QMD growth	RDI[5]	CR[6]	Density Mortality		
										TPA	BA	QMD
C-9	Tmt.	114	45	81	194	28.3	5.4	0.45	0.34	0.8	1.0	11.6
	No Tmt.	114	138	84	356	21.8	4.0	0.92	0.20	42.0	26.1	12.4
Cedar Ridge	Tmt.	85	61	76	195	24.4	5.3	0.48	0.39	0.0	1.0	19.0
	No Tmt.	85	170	76	264	17.2	2.9	0.90	0.27	35.0	22.0	10.2
Gilmore	Tmt.	93	51	86	200	27.4	5.6	0.48	0.35	1.0	1.0	16.0
	No Tmt.	93	150	95	314	19.7	4.1	0.84	0.26	42.5	21.0	10.0
Rick-Line	Tmt.	87	63	77	191	23.8	5.6	0.47	0.35	1.3	1.0	13.4
	No Tmt.	87	123	81	414	24.9	3.5	0.91	0.21	44.0	25.0	10.1
Robb Mill Loader	Tmt.	79	78.2	94	194	21.4	5.1	0.51	0.25	0.8	0.8	13.7
	No Tmt.	79	190	97	275	16.3	3.4	0.80	0.21	33.0	16.4	9.5
Waymire	Tmt.	97	62	54	177	23.6	4.7	0.45	0.26	2.3	2.0	12.7
	No Tmt.	97	169	81	222	15.8	3.0	0.66	0.21	18.0	11.0	10.9
Weighted Average[7]	**Tmt.**	**91**	**60**	**80**	**193**	**24.8**	**4.0**	**0.47**	**0.34**	**0.9**	**1.0**	**14.8**
	No Tmt.	**91**	**170**	**88**	**300**	**18.2**	**5.4**	**0.86**	**0.23**	**38.0**	**21.6**	**10.4**

[1] Modeled from stand age in 2010 to 2040.
[2] Trees per acre ≥7" DBH.
[3] Basal area in square feet: cross-sectional area occupied by tree boles on each acre, a measure of density
[4] QMD=quadratic mean diameter, the DBH of tree of mean basal area.
[5] Relative Density Index, the density of trees per acre relative to the maximum density possible (Reineke, 1933).
[6] Crown Ratio – the ratio of tree live crown to total tree height.
[7] Project 1 includes 28 stands, varying in size, between six Timber Sales. Stand values for each timber sale were calculated by acre weighted average values, and an overall weighted average calculated.

Forest Health
Without treatment, current endemic disease and insect agents would continue to affect stands at about the current rate and intensity. Laminated root rot would expand laterally at a rate of about one foot per year (Nelson and Hartman, 1975). As density increases, crowns recede and trees become less stable and more susceptible to windthrow.

Federal Threatened and Endangered and Bureau Special Status (includes Survey and Manage) Botanical and Fungal Species
Known sites would not be affected by the proposed action. Some of the sites which occur in areas with a high canopy closure may perish due to lack of sunlight and therefore would be negatively impacted.

Noxious Weeds
Right-of-ways would continue to be maintained by grading roadways and mowing competing vegetation along the access routes. However, without any new human caused disturbances (road construction, road renovations, timber falling, timber yarding, etc.) in the proposed project area the established noxious weed populations would remain at a low level and slightly increase following road maintenance activities but still remain at a low level.

Legacy Tree Release (Project 2)

Without treatment, only natural disturbance agents such as disease, insects, and wind would create stand structural diversity and contribute to late-successional structural development. These events would generally be small in scale and occur in random locations, and unlikely to contribute to release of declining legacy trees.

Stand development would remain on the current trajectory of increasing density and decreasing individual tree growth rates. Declining older forest legacy trees would continue to slow in growth and to lose crown depth and width due to competition from surrounding trees. The effectiveness of release treatments decrease as decline of the legacy trees continues because the condition of legacy trees becomes irreversible – large diameter lower limbs once lost cannot be re-grown, and as total crown area is reduced, the capacity to rebound after release is greatly reduced.

The main input of coarse woody debris would come from density mortality, resulting in gradual recruitment of coarse wood. Typically, high density mid-seral stands produce annual mortality of 0.5-2 snags per acre due to density mortality (based on Organon modeling, Hann, 2003). However, they would be of the smallest diameter classes, generally less than 16” DBH. Mortality from disturbance and stochastic events could produce coarse wood as well.

This alternative does not meet the objectives to release declining older forest legacy trees that are undergoing encroachment from densely-stocked younger conifer stands or to enhance terrestrial wildlife habitats by creation of snags and downed wood.

Federal Threatened and Endangered and Bureau Special Status (includes Survey and Manage) Botanical and Fungal Species

No effect since there are no known sites of any bureau special status species present within the project area. However, the implementation of this project may improve habitat occurring on the lower bole of 'released' older forest trees by increasing sunlight to the ground level.

Noxious Weeds
No effect. There would not be any human caused disturbances.

Large Woody Debris Enhancement (Project 3)

Federal Threatened and Endangered and Bureau Special Status (includes Survey and Manage) Botanical and Fungal Species
No effect since there are no known sites of any bureau special status species present within the project area.

Noxious Weeds
No effect. There would not be any human caused disturbances.

Alternative 2 – Proposed Action

Mid and Late-Seral Habitat Enhancement (Project 1)

Stand Development

Alternative 2 includes proposed treatments that would result in the following (acre-weighted) stand characteristics, displayed for the timber sales and Project 1 overall weighted average.

Table 17. Average post-treatment stand characteristics (ORGANON projections) immediately after thinning stands in Rickreall Project 1(trees > 7" DBH only).

All values shown are Project 1 timber sales weighted average stand values.

Project 1 Timber Sales Alt 2	Age[1] (yrs.)	Timber Sales Weighted Average[7] Stand Values Post-Treatment					
		Trees Per Acre[2]	% Douglas -fir	Basal Area[3] (sq ft)	Quadratic Mean Diameter (in)[4]	Relative Density Index[5]	Crown Ratio[6]
C-9	84	44	81	128	23.1	0.32	0.35
Cedar Ridge	55	62	74	122	19.1	0.33	0.39
Gilmore	63	52	85	127	21.0	0.33	0.38
Rick-Line	57	65	76	114	18.0	0.31	0.40
Robb Mill Loader	49	79	93	114	16.3	0.33	0.36
Waymire	67	64	53	117	18.9	0.32	0.30
Weighted Average[7]	**62.5**	**62**	**78**	**120**	**19.1**	**0.32**	**0.38**

[1]Total stand age in 2009 for all projects except Cedar Ridge (2010).
[2] Number of trees per acre of all species. [3]Basal area per acre, not including hardwood trees.
[4] Diameter at breast height (4.5 feet) of tree of average basal area (quadratic mean diameter).
[5] Relative Density Index, the density of trees per acre relative to the maximum density possible (Reineke, 1933).
[6] Crown Ratio – the ratio of tree live crown to total tree height.
[7] Project 1 includes 28 stands varying in size between six timber sales. Stand values were calculated by acre weighted average values and an overall weighted average calculated.

Stand development for 30 years growth after density management under Alternative 2 and without treatment is compared in Table 16. Thinning to the recommended density is expected to put the stand on a trajectory toward development of stand structure and individual tree characteristics desirable for attainment of composition and structural diversity objectives in the following ways:

Restored structural complexity of the stands
The proposed treatment includes variable density thinning, creation of small gaps, thinning around "wolf" trees, and retention of snags, minor species, hardwoods and small clumps. This would increase spatial and structural diversity of the stand. Some trees would experience no competition and grow very full crowns, and some trees would remain at close spacing.

Accelerated development of desired tree characteristics
Residual trees would increase in diameter and crown size. Limb diameter and crown depth would be maintained because trees would be released from competition that decreases growth and causes loss of shaded lower limbs. The long-term results of density management would be larger average diameters and deeper crowns (higher crown ratios). Density management would result in an additional 1.9 inches of diameter growth in 30 years, 56 percent more growth than without treatment.

Maintain species diversity
The stands in the project area are dominated by Douglas-fir. There is a small component of hardwoods and varying levels of noble fir, western hemlock, grand fir and western red cedar. Density management prescriptions would increase the proportion of minor species.

Maintenance of stand health and stability
Trees with less competition maintain deeper live crowns, maintaining a lower center of gravity and decreasing their height/diameter ratios, reducing susceptibility to wind damage. Some researchers now suggest that wind firmness and individual tree stability may be factors in a tree reaching age 300 and over. With treatment, the tree ratios of height to diameter would be maintained. With treatment, crown ratios are predicted (Organon v. 8.2) to average 0.34 after 30 years of growth. Without treatment, crown ratios are predicted to average 0.23 in that same period.

Long term increase in quality coarse woody debris recruitment
Thinning short-circuits the snag recruitment that results from inter-tree competition (Carey, 1999), and little density mortality (1 tree per acre) is expected to occur for 30 years after treatment. See the discussion of density mortality in the no action alternative effects.

Measures to protect existing large snags are likely to be effective, but many of the smaller snags would likely be felled for safety reasons. Future treatments to create downed logs and snags would increase the number of snags and downed log volumes. Inputs would be of large diameter, created from average size of residual stand, and of decay class 1 material. In the long term, increased diameter growth resulting from density management would result in larger trees available for recruitment for coarse woody debris.

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

Approximately 415 acres (31%) of Rickreall Project 1 are within Riparian Reserve boundaries. However, the habitat conditions within these Riparian Reserves, outside the stream protection zone (SPZ) are essentially identical to habitat conditions within the uplands (outside of Riparian Reserve). From the SPZ to the upper edge of the Riparian Reserve, stand density would be reduced using the same prescription used on the upland forest. Habitat for aquatic and riparian dependent species would be maintained or enhanced in Riparian Reserves in the following ways:

Long term increase in quality instream large woody debris (LWD) recruitment
With treatment, trees would reach large diameters earlier compared to the no treatment option, creating opportunities for high quality LWD recruitment. Smaller wood would continue to fall from within the untreated stream protection zones, and larger wood would begin to be recruited from farther up the slopes as the treated stands reach heights of 200 feet. Thus, wood with a larger range of sizes would potentially be recruited into streams over the long term in treated stands.

Maintenance of stream temperature through shading
Stream shading would not be affected by the proposed treatments. Stream Shading Sufficiency Analysis (USDA, USFS et. al., 2004 as amended January 2010) was completed for the proposed treatment, and SPZs widths are of sufficient width to provide shade in the primary shade zone, based on topography and average tree height. Vegetation density is high and would remain at 50% or more canopy cover with treatment in the secondary shade zone (from the primary shade zone to approximately one tree height from the stream), meeting the additional criteria set forth for shade sufficient to maintain stream temperatures.

Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands.
From research on the BLM Western Oregon Density Management Study, (Ares et al., 2009 and Olson and Rugger, 2007) thinning increased cover of grasses and forbs. Species richness increased because species typically found under forest canopies remained and flourished, and were joined by open-site herbs and grasses. They found greater species richness when prescriptions included gaps and leave islands as part of a variable thinning treatment. Increased overstory variability encouraged development of multiple layers of understory vegetation. In the six year period following treatment, plant communities transitioned from an increased cover of species associated with open sites and early seral stages, to a greater proportion of shade-tolerant forest floor species. Since thinning occurred in riparian reserves within 20 to 50 feet from

streams in the sampled areas, these results are applicable to riparian areas and would support thinning to maintain species composition and structural diversity of plant communities.

Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.
Research (Ares, et al, 2009 and Olson and Rugger, 2007, Norvell and Exeter, 2004, Progar and Moldenke, 2002) has found that thinning treatments generally maintained habitat for native plant, invertebrate and invertebrate riparian-dependent species. Specifically, thinning was found to increase species richness of arthropods, and forest riparian buffers serve as refuge for both forest-upland and forest-riparian arthropod species. Thinning was found to have minimal effects on most species of aquatic vertebrates including salamanders. Native plants were found to persist and increase in coverage after density management. Patch openings and wide thinning drastically reduced the diversity of epigeous ectomycorrhizal fungal species, but medium and high retention thinning showed little change in fungal diversity. Buffers of widths defined by the transition from riparian to upland vegetation or topographic slope breaks appear sufficient to mitigate the impacts of upslope thinning on the microclimate above headwater streams. Because the microclimate, as well as the structure and composition of the forest stand and understory vegetation are protected within the untreated buffer, habitat elements seem to be protected.

Risk assessment
There would be a short term (one to three years) elevated risk of a bark beetle infestation from the increased fresh down wood, resulting from the logging operation. Risk would be limited due to relatively small size of the down wood. Additional mortality is very unlikely to reduce tree stocking below desired levels.

Laminated root rot (*Phellinus weirii)* if detected during tree selection would be reduced by removing susceptible trees from around current infection centers, halting or slowing the spread of disease. It is possible that infection centers would be latent or not recognized, allowing continued spread, but harvest would have a neutral effect on the rate of spread.

The potential for windthrow from winter storms would be higher for the first decade following density management. The risk would be reduced by selecting leave trees with deep, healthy crowns. Risk is greater near adjacent private land after recent harvest, and where aspect (the lee side of ridges from prevailing winds), topography, and shallow soils increase risk. Wind throw is not expected to reduce tree stocking by more than 20 percent for the first decade after treatment over the treated area (Busby et al., 2006). A two-year study of wind damage following variable density thinning (Roberts et al., 2007), showed a loss of 1.3% of stems concentrated in topographically vulnerable conditions. The study showed overall level of wind damage resulting from variable density thinning is not statistically greater than unthinned stands, nor uniform thinning.

Skyline and ground-based yarding systems would result in bole and crown damage to an estimated 1-3% of the residual trees. Damage may result in greater incidence of stem decays in the future, adding to late-successional structure and function. Restrictions to yarding during the sap-flow period in the spring would reduce damage. Typically during skyline yarding, 1-2 leave

trees per acre are felled to facilitate yarding (create skyline corridors). These trees are left on site to provide coarse woody material.

Federal Threatened and Endangered and Bureau Special Status (includes Survey and Manage) Botanical and Fungal Species

There are no known sites of any T&E or bureau sensitive species within the project areas, nor were any located during surveys. One strategic moss species, *Plagiothecium piliferum* known site would be protected. This site represents the lone known site to occur in Polk County.

Several survey and manage species known sites were found within the proposed project areas and include: *Cetrelia cetrarioides, Chaenotheca chrysocephala, Chaenotheca ferruginea, Chaenotheca furfuracea*, *Leptogium teretiusculum*, and *Nephroma bellum*. These species would be protected according to management recommendations.

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

Noxious weeds

Exposed mineral soil often creates environments favorable for the establishment of non-native plant species. All exposed mineral soil areas (culvert installation sites, fill staging areas and excess fill sites) pose the greatest risk of exposing mineral soil with the implementation of this project.

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

All of the noxious weeds species that are known to occur within the Rickreall watershed area are regionally abundant and are widespread throughout western Oregon, with the exception of Purple loosestrife. A fully integrated statewide management plan has not been implemented for any of these species. The Marys Peak Resource Area has an integrated non-native plant management plan in place for the control of non-native plant species and is active in its control of Oregon listed noxious weeds. Purple loosestrife occurs at the western end of the Dallas Reservoir and is a wetland species. It generally infests ponds and standing water. There are no ponds within the proposed project areas and the invasion of purple loosestrife within the project is not likely.

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

1) Mitigation measures have been incorporated into this project to keep the amount of exposed mineral soil minimized,
2) the size of the projects is very small,
3) the implementation of the Marys Peak integrated non-native plant management plan allows for early detection of non-native plant species which allows for rapid control,
4) the known noxious weeds species which occur in the project area are regionally abundant throughout the Oregon Coast Range Physiographic Province, and control measures generally consist of biological control,
5) generally these species often persist for several years after becoming established but soon decline as native vegetation increases within the project areas, and
6) there are no other Oregon listed noxious weed species that are anticipated to become established with the implementation of this project and design features. In addition, all project areas would be monitored to detect for any noxious weed infestations and targeted for removal. All non-native species would be eradicated as funding allows.

Sowing seed on exposed soil areas tends to abate the establishment of noxious weeds. If the contract is not administered correctly and the seed sown is not Oregon certified seed, or the species recommended, the sowing may increase the amount of non-native species in the project area and may lead to a greater infestation of noxious weeds than anticipated.

Legacy Tree Release (Project 2)

Stand Development

In Alternative 2, Project 2 would consist of up to 790 acres. These areas are outside of stands proposed for density management. In stands proposed for density management, where legacy trees exist, surrounding smaller trees would be removed to release them.

The proposed action would have a small impact at the stand level, but would effectively meet the purpose and need to release declining older forest legacy trees and increase levels snags and downed wood. Removing competition affecting older forest legacy trees would increase their growth rates, halt the loss of lower crown limbs due to shading, and maintain or increase crown depth and width. Maintaining or increasing vigor of the legacy trees may result in greater longevity.

Cut, girdled or topped trees that remain on site would directly increase the quantity of coarse wood in the project areas. The coarse wood would be of high wildlife habitat value because it would be in early decay classes and of larger size than coarse wood through density mortality. There would be a short term (one to three years) elevated risk of a bark beetle infestation from the increased fresh down wood, resulting from the creation of snags and down wood. Fresh downed wood allows bark beetles to lay their eggs and produce brood unimpeded by the natural ‘pitching out’ response of a living tree. This can lead to a buildup of bark beetle populations that are then more likely to attack and overwhelm nearby live trees. A study of beetle response to coarse wood creation of larger magnitude than the proposed action resulted in less than one tree per acre of live tree mortality from bark beetles (Ross and Hostetler, 2006).

At the stand level, cutting, girdling or topping a small proportion of the stand would be similar in scale to small natural disturbances such as root disease or bark beetle mortality, or small-scale wind disturbance. The proposed action would increase diversity and increase late-successional stand attributes by creating small gaps, snags, and down logs that are important components of older forest structure, and help restore species diversity by retaining hardwood trees, and allowing development of understory vegetation.

Federal Threatened and Endangered and Bureau Special Status (includes Survey and Manage) Botanical and Fungal Species
There are no known sites of any bureau special status plant or fungal species within the proposed project areas.

Noxious Weeds
This project would disrupt little mineral soil or any exposed mineral soil would be minimal and localized. The risk rating for the long-term establishment of noxious weed species and consequences of adverse effects on this project area through the implementation of this project would be low.

Large Woody Debris Enhancement (Project 3)

Federal Threatened and Endangered and Bureau Special Status (includes Survey and Manage) Botanical and Fungal Species
There are no known sites of any bureau special status plant or fungal species within the proposed project areas.

Noxious weeds
This project would disrupt little mineral soil or any exposed mineral soil would be minimal and localized. The risk rating for the long-term establishment of noxious weed species and consequences of adverse effects on this project area through the implementation of this project would be low.

Alternative 3 – No New Roads

Mid and Late-Seral Habitat Enhancement (Project 1)

Stand Development

Treatments proposed for each stand are identical to Alternative 2; however Alternative 3 does not include all stands or portions of stands. The weighted average values for stand characteristics by Project 1 Timber Sales, and their weighted overall average are within 2% of the values shown in Table 16 and Table 17 above. Average post-treatment stand characteristics immediately after thinning stands in Rickreall Project 1(trees > 7” DBH only), for Alternative 3 are essentially the same as those shown for Alternative 2 in Table 16. Rickreall Stand Characteristics with treatment vs. no treatment 30 years in the future (year 2040), are essentially the same for

Alternative 3 as those shown for Alternative 2 in Table 17.

The Alternative 3 treatment is expected to put stands on a trajectory toward development of stand structure and individual tree characteristics desirable for attainment of composition and structural diversity objectives in the same ways as Alternative 2. However, Alternative 3 totals 743 acres, 55% of the acreage in Alternative 2 (1,344 acres). On untreated acres, the effects described in the No Action Alternative would occur. Minor differences in weighted stand characteristics would occur and are listed below.

Accelerated development of desired tree characteristics
Density management would result in an additional 1.8 inch of diameter growth in 30 years, a 54 percent increase from no treatment.

Maintenance of stand health and stability
With treatment, crown ratios are predicted (Organon v. 8.2) to average 0.33 after 30 years of growth. Without treatment crown ratios are predicted to average 0.23 in that same period.

Attainment of Aquatic Conservation Strategy Objectives from density management within the Riparian Reserves.
Approximately 225 acres (30%) of Rickreall Project 1 in Alternative 3 is within Riparian Reserve boundaries. However, the habitat conditions within these Riparian Reserves, outside the stream protection zone (SPZ), are essentially identical to habitat conditions within the uplands (outside of Riparian Reserve). From the SPZ to the upper edge of the Riparian Reserve, stand density would be reduced using the same prescription used on the upland forest. Habitat for aquatic and riparian dependent species would be maintained or enhanced in Riparian Reserves same ways as Alternative 2. However, these effects would occur on 237 acres in Alternative 3 rather than 431 acres as in Alternative 2, 55% of the acreage included in Alternative 2. On untreated acres, the effects described in the No Action Alternative would occur.

Risk assessment
Risks, including elevated risk of a bark beetle infestation, windthrow, and logging damage would be as described in Alternative 2, but would occur on 45% fewer acres than Alternative 2.

Laminated root rot (*Phellinus weirii)* if detected during tree selection would be reduced by removing susceptible trees from around current infection centers, halting the spread of disease. It is possible that infection centers would be latent or not recognized, allowing continued spread, but harvest would have a neutral effect on the rate of spread. The opportunity to reduce the effects of laminated root rot would occur on 45% fewer acres in Alternative 3.

Legacy Tree Release (Project 2)

Stand Development
In Alternative 3, Project 2 would consist of about 1,344 acres. This includes the 790 acres proposed on Alternative 2 that are not included in Project 1, as well as an additional 598 acres not included in Project 1 in Alternative 3. So, these areas are located outside of stands proposed for density management in Alternative 3.

The effects described in Alternative 2 would be very similar in Alternative 3 on 790 acres not included in Project 1. In Alternative 3, 598 acres would be treated to release legacy trees and create coarse wood only. Those same acres would be treated in Alternative 2 to release legacy trees in conjunction with density management. The effect on legacy trees would be virtually the same, so there is very little difference in Alternatives.

Large Woody Debris Enhancement (Project 3)

Federal Threatened and Endangered and Bureau Special Status (includes Survey and Manage) Botanical and Fungal Species and Noxious Weeds

Impacts are anticipated to be the same as those analyzed under the Proposed Action (Alternative 2).

3.8 WILDLIFE

(IDT report incorporated by reference: Hopkins, 2011. Rickreall Creek Watershed Restoration Projects Biological Evaluation, pp. 1 to 25)

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

- How would the proposed action affect terrestrial habitats within the project area and across the watershed?
- How would the proposed action affect wildlife species, which BLM, by law and policy, is required to protect, maintain, or recover?

AFFECTED ENVIRONMENT

Landscape Level Conditions

The proposed projects occur on BLM-managed lands in the Upper Rickreall Creek 6th Field Watershed. Small portions of Project 1 overlap into adjoining watersheds. The 6th Field watershed was chosen as the appropriate scale for conducting the wildlife affects analysis because of its relative size (21,640 acres) and because it encompasses the upland conifer-dominated forest ecosystem typical of the proposed project areas, without including the large expanse of lowland agricultural-dominated ecosystems of the 5th-field watershed. A broad-scale analysis of federal lands within this part of the Oregon Coast Range was presented within the *Late Successional Reserve Assessment for Oregon's Northern Coast Range Adaptive Management Area (Late-Successional Reserve RO269, RO270 & RO807).* [USDA-FS and USDI-BLM 1998, referred to as *LSRA*]. The *LSRA* recognizes that these watersheds provide an important corridor with linkages between adjacent blocks of federally managed lands.

The federally managed lands (Forest Service and BLM administered lands) in the watershed are allocated as Late-Successional Reserve (LSR) and Adaptive Management Area (AMA). Both of

these land-use allocations are intended to maintain and restore late-successional forest conditions to benefit numerous wildlife species. Over the past 150 years since settlement, extensive timber harvest and several forest fires have resulted in the loss and fragmentation late-successional forest conditions within the affected watersheds.

Federal lands comprise about 4,050 acres (19%) of the total 21,640 acres in the Upper Rickreall Creek watershed. Currently, about 24% of these federal lands exhibit older forest habitat conditions (963 acres; stand-age >80 years old). However, only about 10% of these stands are classified as old-growth forests (402 acres; stand-age >200 years old), most of which lies on Forest Service lands (308 acres). Early- and mid-seral forest stands comprise about 69% of the federal lands within the Upper Rickreall Creek watershed (2,920 acres; stand-age 0-70 years old). Late-successional forest are almost absent for private forest lands within Rickreall and adjacent watersheds. Private forest lands in this part of the Oregon Coast Range are dominated by early-seral and mid-seral forest stands (>90%) that are currently being managed on short rotations (40-50 years).

Stand Level Conditions

Approximately 1,930 acres of forest stands were evaluated for Project 1 density management treatments, resulting in 1,344 acres of proposed treatment units. Many areas were dropped from treatment consideration due to logging feasibility, adequate or poor stocking, stream protection zones, or other operational and resource concerns. Most of the forest stands evaluated in Project 1 are composed of mid-seral conifer-dominated stands (40-80 years old) with high tree density, moderate to high canopy closure, and are intermingled with hardwoods and some shrub patches. Some of the proposed treatment units were aged at 80 to 90 years old (250 acres). These stands also exhibit typical mid-seral characteristics rather than late-seral forest conditions.

The Project 2 units include most of the stands that were dropped from Project 1 (420 acres) along with a several stands that had not been proposed for density management (370 acres). Project 3 units include the portions of stands aged 60-90 that lie in close proximity to the targeted stream reaches. A more complete description of vegetation characteristics within the proposed projects can be found in the Silviculture Prescriptions in the Analysis File.

Special Habitats and Special Habitat Components

Special habitat types as recognized by the Salem District RMP and the associated Watershed Analyses include caves, cliffs, exposed rock, talus, wetland types, and meadows. These habitat types often host unique floral and faunal species that contribute valuable biodiversity to the local landscape. A few of the Rick-Line units have small exposed rocky areas. Exposed rocky areas lie adjacent to a few of the Gilmore units also. There are no other special habitat types that would be affected by the proposed projects.

Within forested ecosystems, dead wood (snags and down logs), often referred to as coarse woody debris (CWD), is a special habitat component that has been shown to strongly influence the diversity and abundance of wildlife species. Rose et al. (2001) identify 93 vertebrate wildlife species in Oregon and Washington that use snags (for nesting, foraging, roosting, courtship,

drumming, hibernating), and 86 species that use down logs (for nesting, foraging, denning, hibernation, hiding cover, thermal cover, travel corridor, lookout). Most of the 93 species associated with snags use trees that are 15+ inches in diameter, while about one third of these species prefer snags 30+ inches in diameter. Larger diameter hard snags and hard down logs (Decay Class 1 and 2) would, over time, provide for the needs of more wildlife species than smaller and softer snags and down logs.

Mid-seral forests in this region exhibit a wide range in the density of snags and down logs that are present (*LSRA*, Mellen-McLean et al. 2009, Rose et al. 2001). The total CWD volume averaged for each of the project areas in Project 1 (Table 18) falls within the low to moderate range of CWD volume that has been documented for natural stands of the same age-class (*LSRA*, p. 94, Table 22). The past harvest events and fire history in the Upper Rickreall Creek and adjacent watersheds has resulted in a net loss of the largest size classes of snags and down logs over time.

Table 18. Coarse Woody Debris Conditions In Proposed Project 1 Treatment Units

Project 1 Treatment Units	Stand Age	Down Log Volume [1]	Snag Volume [2]	Snags per acre	Snag QMD [3]	Total CWD Volume
C-9	84	1,909	538	12.8	29.0	2,499
Cedar Ridge	55	1,297	226	11.9	12.5	1,523
Gilmore	63	915	242	11.1	15.5	1,157
Rick-Line	57	948	225	9.6	15.2	1,172
Robb Mill Loader	49	502	109	8.7	12.9	610
Waymire	67	175	200	9.4	20.9	376

[1] Down log volume in cubic feet/acre for pieces 12 inches in diameter at intersect, 20 feet long, and all decay classes. Cedar Ridge data recorded for pieces 5 inches diameter and 8 feet long.
[2] Snag volume in cubic feet/acre for all standing dead trees 10 inches in diameter and 10 feet tall.
[3] Quadratic mean diameter of an average snag calculated from stand exam data.

Only C-9 and Cedar Ridge have moderate to high levels of down logs. Larger size snags (>30 inches DBH) that benefit a greater number of wildlife species are rather scarce on all Project 1 units, except C-9 and Waymire which both have a scattered component of large legacy snags in most of the units. Suppression mortality processes and small wind-throw events have recently contributed additional small diameter snags and down logs in many of the Project 1 units. Projects 2 and 3 show very similar stand characteristics and CWD conditions.

The presence of live legacy trees within mid-seral forest can boost the diversity and abundance of wildlife species (Masurek and Zielinski 2004). All of the Waymire units along with C-9 unit 9A, 9D, and Rick-Line unit 5I have a component of scattered live old-growth legacy trees. There are also scattered live old-growth legacies within many of the Project 2 units.

Special Status Species and Birds of Conservation Concern

Special Status Species that may occur within this project vicinity and which may be affected by the proposed action include the northern spotted owl and marbled murrelet. The red tree vole is

the only Special Attention Species (Survey and Manage) that may be affected by the proposed action. A review of an interagency database (GeoBOB) and the Oregon Natural Heritage Database found no records of any other Special Status Species or Special Attention Species within or adjacent to the planned treatment units. Concerns for all Special Status and Special Attention Species that might occur within the project area have been reviewed and addressed in the Wildlife Report; Appendix A. Concerns about potential effects to Birds of Conservation Concern are addressed in the Wildlife Report, Appendix B.

Northern Spotted Owl

Most of the planned treatment units for Project 1, 2, and 3 currently provide only dispersal habitat for spotted owls since these units generally lack the older forest structure that would provide suitable nesting, roosting, and foraging habitat for this species. Some portions of units in Project 1 and 2 have scattered large open-grown trees or an older cohort of legacy trees that may provide foraging habitat for owls (about 310 acres).

The BLM and cooperators have conducted spotted owl surveys in the Upper Rickreall Creek and adjacent watersheds since the mid-1980s. Very few spotted owl sites were ever located in the Upper Rickreall Creek and adjoining watersheds. A historic owl site was located adjacent to the Waymire project area from 1996-2002. That owl pair moved to the Dutch Creek site in 2003 which is currently the only active spotted site within the Upper Rickreall Creek watershed. Continued surveys in the Waymire vicinity have only located barred owls after 2003. The Dutch Creek owl site is located on State lands adjacent to Gilmore unit 11A (<0.25 mile for nest tree).

Within the median provincial home range (1.5 mile radius, USFWS 2008a) of the Dutch Creek owl site there is very little suitable nesting habitat (20%), and even less dispersal habitat (10%) on all ownerships (Table 19). High quality nesting habitat is generally lacking within the entire watershed. The 2010 Dutch Creek nest site was in an artificial nest box within foraging habitat.

Table 19. Habitat Conditions At The Dutch Creek Spotted Owl Site.

Site Name - Number	Habitat in 0.5 miles [1]			Habitat in 0.5 - 1.5 miles [2]			Total NRF Acres (%)[3]	Total Analysis Area
	NRF	Disp	NonH	NRF	Disp	NonH		
Dutch Creek - 2943A	191	35	175	715	438	2,868	906 (20)	4,523

[1] The area within 0.5 miles of the owl site center on all ownerships totals about 502 acres; owl habitat is classified into NRF= nesting, roosting, and foraging habitat, Disp= dispersal habitat, and NonH= non habitat that is generally avoided.
[2] Acres of owl habitat in 0.5 to 1.5 miles of the site center on all ownerships totals about 4,021.
[3] Total Nesting, Roosting, and Foraging habitat within 1.5mile radius of the owl site center on all lands.

Project units that lie within Sections 33, 3, 4, and 5 have been designated as critical habitat (CHU OR-7) for the spotted owl (USDI-FWS 2008b). This CHU overlaps about 905 acres of Project 1 units and 590 acres of Project 2 units. (See Section 1.3 – NSO, for discussion about recent draft CHU proposals.)

Marbled Murrelet

There are no known occupied murrelet sites within the Upper Rickreall watershed. The closest occupied site is over three miles northwest of Cedar Ridge. Most of the proposed Project 1, 2, and 3 units are young conifer stands that lack suitable nesting structure for marbled murrelets. A few proposed units (Table 20) have some scattered old-growth legacy trees within them that may provide suitable nesting structure for murrelets (large mossy branches, potential nesting platforms, and well-developed canopy cover) (McShane et al. 2004).

The presence of large open-grown trees and old-growth legacy trees within and adjacent to some of the proposed Project 1 and Project 2 presents a risk that potential nesting structure or the surrounding forest stand may be altered by the proposed action. This risk was addressed by a combination of protocol surveys (Evans-Mack, et al. 2003) and project design features that manage this structure in compliance with Option 3 of the Policy for the Management of Potential Marbled Murrelet Nesting Structure within Younger Stands. issued by the Level 2 Streamlined Consultation Team for the North Coast Planning Province, Oregon (USFWS et al., 2004). Surveys for marbled murrelets were conducted at C-9 units in 2009 and 2010 and failed to detect any murrelets. Project 1 and Project 2 units that lie within Sections 33, 3, 4, and 5 are within Critical Habitat Unit OR-02-D (USDI-FWS, 1996).

Table 20. Marbled Murrelet Habitat Conditions In Proposed Project 1 Areas

Project Areas	Critical Habitat	Habitat Conditions
C-9	No	Cluster of legacy trees at bottom edge of unit 9D
Cedar Ridge	Yes	No potential nesting structure in units
Gilmore	Yes	Widely scattered legacy trees in 4A, 4B, 4C.
Rick-Line	Yes	Small cluster of legacy trees in unit 5I
Robb Mill Loader	No	No potential nesting structure in units
Waymire	No	Widely scattered legacy trees in all units

Red Tree Vole

The red tree vole is a Bureau Sensitive Species (BSS) and currently a Survey and Manage Species (USDA-FS and USDI-BLM 2001). The BSS status applies to the red tree vole populations in the northern Oregon coast range, north of Highway 20 (Corvallis to Newport). Populations north of Highway 20, which includes the Upper Rickreall Creek and adjoining watersheds, are believed to be relatively rare and poorly distributed (USDA-FS and USDI-BLM 2007). The USFWS made a determination that the Northern Oregon Coast distinct population segment of the red tree vole was Warranted, but Precluded (WP) for listing on October 12, 2011 (76 Federal Register 63720; Thursday, October 13, 2011). This determination does not impose any regulatory requirements under the ESA.

The red tree vole has returned as a Survey and Manage species as a result of a December 17, 2009 court ruling that overturned the 2007 Survey and Manage ROD (USDA-FS and USDI-

BLM 2007) and reverted to the 2001 Survey and Manage ROD (USDA-FS and USDI-BLM 2001). Due to the presence of scattered older legacy trees, pre-disturbance surveys for this species would be required (Biswell et al., 2002) within portions of the following Project 1 units: 9D (C-9), 4A, 4B, 4C (Gilmore), 5I (Rick-Line), and all units of Waymire. There are no known red tree vole populations within the Upper Rickreall Creek watershed. The nearest populations of these voles occurs in adjacent watersheds to the north and south where they have been documented from spotted owl nest sites (Forsman, 2004), or confirmed by surveys in old-growth forest stands (Salem BLM unpublished data). If red tree voles occur within the Upper Rickreall Creek watershed, they are likely restricted to the few patches of older forest habitats that occur on federal lands.

Birds of Conservation Concern

All of western Oregon, including Upper Rickreall Watershed, lies within the Northern Pacific Forests Bird Conservation Region (USDI-FWS, 2008c). Within this region there are several migratory land birds which are considered Bird of Conservation Concern (BCC) because they appear to be exhibiting downward population trends for several years (Altman 2008a; Rich et al. 2004, USDI-FWS, 2008c). Thirty-three of the 88 landbird species that regularly occur in the Marys Peak Resource Area are considered BCC species (Table 21). Sixteen BCC species have a high likelihood of occurring within Project 1, 2 or 3 areas. Incidental observations obtained during wildlife related field work have confirmed the presence of 15 of these species during the breeding season.

Table 21. Bird Species Groups Likelihood of Occurrence within the Project Areas

Bird Species Grouping	Within MPRA	Likelihood of occurrence in Project Areas [1]			
		High	Moderate	Low	Not Present
Bird of Conservation Concern	33	16	9	6	2
Other Regularly Occurring Landbirds	55	23	16	12	4
Total bird species	88	39	25	18	6

[1] The likelihood that bird species occur in one or more of the project areas based on recent literature review (see Wildlife Report, Appendix B).

ENVIRONMENTAL EFFECTS

Alternative 1 – No Action

This alternative would not conduct any thinning harvest (Project 1) or release legacy trees and create CWD (Project 2), or fell and place logs into streams (Project 3). There would be no immediate change to the mid-seral conifer forest conditions on BLM-managed lands in these watersheds. Stand development processes would continue unaltered within the mid-seral forest stands of the project areas. Over the next decade, barring any stand disturbance events such as

windthrow, suppression mortality would continue to contribute the snags and down logs almost entirely in the smaller size classes (<15 inches DBH).

The current pattern of habitat use by wildlife species within all project areas would be expected to continue unchanged. The scattered older legacy trees that are suffering encroachment from the ascending mid-seral stands in Project 1 and Project 2 would continue to suffer crown loss and between 10% to 20% of these trees would likely die within the next decade or two. The condition of late-successional forest would slowly improve over time from ingrowth, but some of the live legacy component that currently exists would be lost. This alternative would forego the potential benefits of accelerating the development of late-successional forest structure and ensuring survival of numerous legacy trees.

On federal lands, the dispersal habitat conditions for spotted owls and the current conditions within designated critical habitat for spotted owls and marbled murrelets would remain unchanged. The incremental benefit to the regional strategies for restoring critical habitat for spotted owls and marbled murrelets would not occur.

Alternative 2 – Proposed Action (Projects 1, 2, and 3)

Landscape Level

There are about 2,127 acres of mid-seral conifer forests on federal lands within the Upper Rickreall Creek watershed (BLM = 1,806 ac., USFS = 321 ac.). Proposed density management thinning (Project 1) would affect about 1,344 acres (63%) of these mid-seral forest stands on federal lands. Creation of snags, down logs, and small gaps to release legacy trees (Project 2) would affect about 400 acres (19%) of mostly mid-seral stands. Because the thinning treatments retain >40% canopy closure, protect existing snags, and retain shrub and hardwood diversity, and because the legacy release and coarse woody debris creation would enhance forest habitat conditions while maintaining >60% canopy cover, the mid-seral conifer stands on federal lands would retain their connectivity and habitat functionality at the landscape scale. Project 3 activities would have no discernible effect on forest habitat conditions at the landscape scale.

Stand Level Conditions

The proposed density management thinning (Projects 1) would change the existing forest structure and alter the development of future forest stand conditions in the proposed project areas. The anticipated changes to stand structure are well described in the silvicultural prescriptions in the Analysis File. Wildlife species are most likely to be effected by the following direct and indirect changes to forest habitat conditions:

Short-term (<10 years)

- light to moderate reduction of canopy closure (resulting canopy >40%) over entire treatment area;
- increased horizontal spatial variability within treated stands (gaps and clumps);
- minor reduction and disturbance to existing CWD material (snags and down logs)

resulting from felling, yarding, and road construction;
- reduced recruitment rate of small sized CWD, which would be partially offset by immediate creation of larger sized CWD, and augmentation of decadence processes;
- retention of hardwood tree and shrub diversity.

Long-term (>10 years)
- a significant recovery of overstory canopy closure within treated stands;
- the gradual transition in structural characteristics of the treated stands to more closely resemble late-seral forest (larger diameter trees and limbs, sub-canopy development, greater tree species diversity, greater volume and size of hard CWD, canopy gaps);
- extended persistence of hardwood tree and shrub cover diversity;

Project 1 treatment units would result in altered forest stand conditions, such that expected use by some wildlife species may decline while others would stay the same or increase (Hagar and Friesen 2009). The reduced canopy closure, minor loss of small snags, increased growth of shrubs, and abundance of created slash would likely disrupt the current pattern of wildlife use for the short term. Project 1 treatment units would continue to function as mid-seral conifer-dominated habitats for most of the wildlife species which currently use these stands, and many wildlife species, especially those associated with late-seral forest structure and CWD would benefit from the proposed treatment. The immediate augmentation of CWD would provide larger pieces (>15 inches DBH) of hard material sooner than if left untreated.

The dense conifer-dominated stand conditions in Project 2 units would remain largely unchanged except in the small patch cuts where legacy trees would be released from canopy encroachment. Project 2 units would retain their current stand-level conditions because treatments would target scattered individual trees or small patch cuts dispersed within the units. The immediate augmentation of CWD levels by creating small patches of snags and down logs would benefit numerous wildlife species without appreciably diminishing the future recruitment of CWD within the majority of the treatment units. Within the patch openings it is expected that existing live legacy trees and adjacent dominant trees would re-grow more live crown and improve the structural complexity of the treated stands sooner than if left untreated. The release of legacy trees within the small patch cuts would extend the persistence of most legacy trees within these stands and would benefit wildlife species associated with older forest canopy structure.

In both Project 1 and 2 treatment units, there is a high likelihood that some windthrow would occur to scattered individual trees or in small localized patches within a few years after treatment. But the increased risk of windthrow within density management units (Project 1) or in patches with legacy trees (Project 2) is expected to be minor at the stand scale and negligible at the landscape scale. The expected minor windthrow events would provide a localized boost in the numbers of fresh snags and down logs which would improve the habitat quality for those wildlife species that are closely associated with CWD conditions.

The scattered selection of 330 larger trees for felling and stream placement (Project 3) would not appreciably affect stand level conditions. Selection of trees for felling would avoid trees with nest structures and would likely have no effect on current pattern of wildlife use within the treated stands.

Special Habitats and Special Habitat Components

Special habitat types within or adjacent to any treatment unit would be protected by buffers that would maintain their existing habitat value.

The special habitat component of CWD would increase in quality as a result of the proposed projects. As described above (Stand Level Conditions), the loss of small snag component would largely be offset by the immediate creation of larger (>15 inches) snags and down logs that have greater wildlife value. In a study of early-seral conifer stands (14 to 38 years) in western Oregon, Lutz and Halpern (2006) examined 22 years of tree growth and mortality data and found that suppression mortality of Douglas-fir killed more than 3 times as many trees as abiotic mortality, however, the total mass of dead wood created by abiotic agents was more than 4 times greater than the total mass of dead fir wood created by density-dependent suppression mortality (regardless of stand age). At the landscape scale, the loss of suppression mortality CWD component in Project 1 units would be minor because:

- Project 1 units incorporate small skipped patches where stand conditions would proceed unchanged;
- Project 1 units lie adjacent to Project 2 units where no thinning would occur and where creation of CWD as individual trees or in small patches would immediately boost CWD conditions without an appreciable decrease in recruitment potential;
- And, dense mid-seral forests on non-federal lands in the watershed are currently abundant.

Special Status and Special Attention Species

Northern Spotted Owl

The forest stands proposed for treatment in Project 1, 2 and 3 are unlikely to provide more than dispersal habitat for the few spotted owls that may be passing through the Upper Rickreall Creek watershed. The proposed treatments are expected to maintain canopy closure (>40% in Project 1; >60% in Project 2) which would retain the current habitat function of all units. Spotted owl critical habitat unit OR-7 overlaps about 905 acres of Project 1 units and 590 acres of Project 2 units. These mid-seral stands that provide for dispersal or foraging are considered a primary constituent element of critical habitat (USDI-FWS 2008). But since the proposed treatments would maintain sufficient canopy closure, retain existing habitat function, and accelerate the development of nesting structure over the long term, the proposed action is not likely to adversely affect this CHU or diminish its current conservation value. Overall, Project 1 and 2 treatments are likely to improve habitat conditions for spotted owls and their critical habitat over the long term (>10 years). Project 3 would have a negligible effect on critical habitat. A summary of potential effects to spotted owls from all projects within the proposed action is provided in Table 22.

Only one project unit, Gilmore 11A, would lie within close proximity to an active spotted owl site. Unit 11A is a 45 year old stand with 12.1 inch average stand diameter, with no live legacy trees. This type of forest is typically considered marginal dispersal habitat for owls. With the

inclusion of a seasonal restriction for Gilmore 11A, there would be no noise disturbance to the active spotted owl site during the critical breeding season (March-1 to July-7). However, due to the close proximity of the treatment unit to the nest site (<0.25 mile), and the very low amount of suitable foraging habitat available within the potential home range of this owl site (20%), the proposed thinning of Gilmore 11A (14.8 acres) **may likely adversely affect** the spotted owl, due to the short-term alteration of this stand which may provide poor quality foraging habitat that lies close to an active owl site.

Table 22. Summary of Effects to Federally Listed Wildlife Species and Critical Habitat.

Affected Component	Determination [1]	Notes
Northern Spotted Owl		
Noise Disturbance	NLAA	Gilmore unit 11A (14.8 acres) lies within 0.25 miles of active owl site and would have a seasonal restriction from March 1 to July 7.
Habitat Modification	LAA	Gilmore unit 11A (14.8 acres) may provide marginal foraging habitat for the adjacent owl site which has a limited amount of foraging habitat within the provincial home range radius (1.5 miles).
Critical Habitat	NLAA	Cedar Ridge (295 acres), Rick-Line (393 acres), and a portion of Gilmore (217 acres) fall within designated critical habitat unit OR-7 along with 590 acres of Project 2. All treatments would retain current habitat function.
Future Habitat Conditions	Beneficial NLAA	Treatments are likely to accelerate the development of late-seral forest structure over the long-term (>10 years), which would promote better nesting habitat structure and improve habitat for primary prey species.
Marbled Murrelet		
Noise Disturbance	No Effect	No known murrelet sites adjacent to any treatment unit, and no murrelets were detected at surveyed habitat within or adjacent to project areas.
Habitat Modification	No Effect	No suitable nesting structure would be altered by Project 1 or 2. Scattered legacy trees would retain potential nesting structure, which currently shows no evidence of murrelet use at units that were surveyed.
Critical Habitat	NLAA	Cedar Ridge (295 acres), Rick-Line (393 acres), and a portion of Gilmore (217 acres) fall within designated critical habitat unit OR-02-D along with 590 acres of Project 2 units. Most units would be considered a primary constituent element of critical habitat.
Future Habitat Conditions	Beneficial NLAA	Treatments are likely to accelerate the development of late-seral forest structure over the long-term (>10 years), which would promote development of potential nesting structure sooner than if left untreated.

[1] Affect determinations for purposes of Endangered Species Act consultation include: LAA= likely to adversely affect, NLAA= not likely to adversely affect, and No Effect.

Marbled Murrelet

None of the Project 1, 2, and 3 units would affect existing marbled murrelet suitable habitat, and no occupied marbled murrelet sites exist within close proximity (<0.5 mile) of any treatment unit. Table 20 provides a summary of effects to marbled murrelets and their habitat. About 905 acres of Project 1 units and 590 acres of Project 2 units lie within the designated critical habitat unit OR-02-D. The primary constituent elements of marbled murrelet critical habitat include: (PCE-1) individual trees with potential nesting platforms, and, (PCE-2) forested areas within 0.5 miles of individual trees with potential nesting platforms, and with a canopy height of at least one-half the site-potential tree height (USDI-FWS 1996). Some of the scattered legacy trees within Project 1 and 2 would be considered PCE-1, while most of the Project 1 and 2 units within the CHU have sufficient canopy height to be considered PCE-2.

Because the proposed treatments would retain all trees with potential nesting structure, maintain sufficient canopy closure, and accelerate the development of future nesting structure over the long term, they are likely to benefit marbled murrelets without diminishing the current conservation value of this CHU.

Red Tree Vole

Most of the proposed action areas are mid-seral forests that lack older forest characteristics which could support persistent populations of red tree voles (Biswell, et al. 2002). Portions of Project 1 units that have a prominent component of legacy trees (at least 2 per acre) may provide suitable habitat for voles and these areas would receive pre-disturbance surveys to determine if any voles are present. Active red tree vole sites that may be found would be excluded from the proposed thinning harvest in accordance with the current management recommendations for this species (USDA-FS and USDI-BLM 2000). A density management thinning would likely degrade habitat quality for red tree voles in the short-term (<20 years) by removing adjoining trees crowns. But ingrowth of canopy closure and development of deeper live crowns with epicormic branching would improve habitat conditions in the long-term (>20 years).

The proposed action in unlikely to affect the persistence of red tree voles in the watershed or contribute to the need to list this species under the ESA, because:

- Most of the proposed treatment units are unsuitable habitat that does not currently support persistent vole populations;
- Any active red tree vole sites that are encountered would be managed in accordance with current protection recommendations; and,
- The existing patches of older forest on federal lands that may provide for population persistence would not be affected by this action.

Bird of Conservation Concern

In the central Oregon Coast Range the majority of birds complete their breeding cycle within the April 15 to July 15 time period, while some birds (eagles, owls, hawks, woodpeckers) begin breeding as early as February or March and others (flycatchers, finches) may not finish breeding until August. Due to the ubiquitous nature of breeding birds within their suitable habitat, it is reasonable to expect that soil disturbance (affecting ground-nesting birds) and vegetation manipulation may have a direct negative impact on bird nesting success if it occurs during the breeding season. Felling and yarding trees during the breeding season in the Project 1 treatment units would likely destroy some nests and disrupt normal breeding behavior of any BCC species that nest or forage in these units.

Following thinning harvest and legacy tree release actions, the resulting habitat conditions would be unfavorable to some bird species, while still providing similar habitat conditions for most of the species that might currently nest in those stands (Hagar and Friesen 2009). At the watershed scale, this proposed action is expected to have no discernible negative effects on populations of BCC species because the proposed units would largely retain their habitat value, and these mid-seral stands which are targeted for treatment are currently the most abundant age-class across all ownerships within this watershed.

Alternative 3 – No New Road Construction

This alternative would reduce the amount of density management thinning (Project 1) to 743 acres, with most of the units dropped from Project 1 being added to Project 2. The overall effects of this alternative are similar to the effects discussed in Alternative 2 (Proposed Action). At the watershed scale, the percentage of mid-seral forest stands treated would drop from 69% (Alternative 2) to 40% (Alternative 3). The risk of negative effects to special status species would be similarly reduced, except for spotted owls since Gilmore unit 11A would be retained in this alternative. While this alternative reduces the potential for short-term negative effects to current mid-seral forest habitat and existing patterns of wildlife use, it would forego the substantial benefit of treating additional 626 acres to meet the need for long-term enhancement of late-successional forest structure and restoration of declining legacy trees.

4.0 CUMULATIVE EFFECTS

4.1 AIR QUALITY, FIRE RISK, AND FUELS MANAGEMENT

Alternative 1 – No Action

Mid and Late-Seral Enhancement (Project 1)

Under the no action alternative there would be no commercial harvest of timber, no log hauling, and no prescribed burning, and therefore no cumulative effect to air quality or fire risk. The timber stands would continue on their trajectory toward a natural return of fire as the main

disturbance mechanism with the fuel load slowly increasing over time and with it the potential for producing large quantities of smoke associated with a wildfire.

Legacy Tree Release (Project 2)

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

Large Woody Debris Enhancement (Project 3)

There would be no large woody debris enhancement and no log hauling associated with this project. No burning would be required, and therefore no cumulative effect to air quality or fire risk would occur. The stands would continue on their trajectory toward a natural return of fire as the main disturbance mechanism with the fuel load slowly increasing over time and with it the potential for producing large quantities of smoke associated with a wildfire

All Action Alternatives

Mid and Late-Seral Enhancement (Project 1)

Air quality issues would be local and of short duration during timber harvest, and burning of hand, machine, and landing piles, and eventually broadcast burning. With the current trend in the public's activities on federal lands the potential for wildfire starts would be expected to remain the same or increase slightly if recreational activities increase. The density management thinning units within the analysis area would likely see a decrease in use as a result of the slash created during harvest. The gaps created within the density management thinning units and the opening up of *Phellinus weirii* pockets and replanting these areas with conifer trees would likely see an increase in activity where they are accessible to the public as they green up and begin providing early seral habitat for deer and elk. There would be a decrease in the potential for wildfire moving from surface fuels in the harvest units into the crowns with the removal of ladder fuels, however there would be a cumulative short term one to five year increase in the risk of a fire start due to the residual slash left following harvest. This increase would be somewhat mitigated by the burning of hand, machine, and landing piles. The 1987 Rockhouse Fire that burned within the Rickreall Creek Watershed and the small amount of prescribed burning treatments that occurred would further mitigate the potential spread of wildfire in the analysis area. Cumulative potential for a wildfire start would decrease in the longer term over the next few decades as the logging slash decays, and because the potential natural increase in the fuel load as a result of suppression mortality would not be present following harvest.

Legacy Tree Release (Project 2)

Air quality issues would be local and of short duration during legacy tree release and log removal, and burning of hand, machine, and landing piles. With the current trend in the public's activities on federal lands the potential for wildfire starts would be expected to remain the same or increase slightly if recreational activities increase. The wildlife project units within the analysis area would likely see a decrease in use as a result of the slash created during release and log removal. There would be a small increase in the potential for wildfire to move from newly created surface fuels in the wildlife units into the crowns because ladder fuels would not be removed. The cumulative short term impact would last one to five years. This increase would be somewhat mitigated if burning occurs. Cumulative potential for a wildfire start would decrease in the longer term over the next few decades as the created slash decays.

Large Woody Debris Enhancement (Project 3)

Air quality issues would be local and of short duration during log placement. With the current trend in the public's activities on federal lands the potential for wildfire starts would be expected to remain the same or increase only slightly if recreational activities increase. The large woody debris enhancement project units within the analysis area would likely see no change in use.

4.2 CARBON SEQUESTRATION (STORAGE) AND CLIMATE CHANGE

All Action Alternatives

Because of the similarity between previous analyses and the similarity in stands and treatments analyzed in the Rickreall Creek Watershed Enhancement, it is expected that effects would be similar in scope, intensity and character, supporting the conclusions that the cumulative effect of management of BLM Western Oregon forest lands is a net increase of carbon storage above average historic conditions. (The WOPR EIS, incorporated here by reference, states that by 2106, the No Action Alternative (management under the 1995 RMP) would result in a total carbon storage of approximately 603 million tonnes, 5% higher than average historic conditions (576 million tonnes, WOPR, 3-224).

4.3 FISHERIES AND AQUATIC HABITAT

All Action Alternatives

The cumulative effects of the proposed actions associated with the Upper Rickreall Creek Watershed Enhancement Project to the vegetation, hydrology, and soil resources were assessed under the Hydrology Report (Wegner 2011), and the Silvicultural Prescription (Snook 2011 and Roux 2011). Combined with the direct and indirect affects analysis presented in the Fisheries Report these additional cumulative effects analyses form the basis of the fisheries resource cumulative effects analysis.

Cumulative impacts to fishery resources could occur if proposed actions result in alterations in runoff contributing to changes in flows where fish reside. Based on the Hydrology reports analysis of alterations to peak flows in the project area (Wegner 2011b) changes in flows were considered immeasurable at the site level and are unlikely to contribute to cumulative effects, subsequently no cumulative effects are anticipated on aquatic resources.

The Hydrology report indicated that the proposed treatments were considered unlikely to have detectable effects on stream temperatures and not expected to result in any cumulative effects to temperature (Wegner 2011). No cumulative effects are anticipated for peak flows, streambanks, and instream structure which could also affect temperature. As no cumulative effects were anticipated for these project activities on temperature, streambank conditions, and peak flows these treatments would not result in cumulative effects for fisheries resources.

The proposed stand treatments are not expected to alter large woody debris (LWD) recruitment, stream bank stability, and sediment supply to channels at the 5th field watershed scale in the short-term or long-term. As short-term LWD recruitment is protected and long-term LWD recruitment is enhanced only slightly positive cumulative effects are anticipated for instream structure from the proposed actions. A positive affect to wood abundance would be realized with the placement of wood structure in Rickreall Creek as part of Project 3. The presence of Mercer Reservoir below the project area limits the cumulative benefit of the proposed restoration project to the overall fish community of Rickreall Creek.

Approximately 5 percent of the land base within the Rickreall Creek Watershed is federally administered, approximately half administered by the BLM. The trend in LWD recruitment on federal lands is increasing as the stands mature within the Northwest Forest Plan designated Riparian Reserves (Reeves et al. 2006). Analysis conducted under the FEIS Revision of the Resource Management Plans of Western Oregon indicated trends of LWD recruitment on all Western Oregon and Washington BLM administered Riparian Management Areas. Overall, LWD recruitment was considered likely to continue to improve over the next 100 years (BLM, 2008). Private lands account for roughly 94 percent of the land base in the Upper Rickreall Creek Watershed. An assessment of Oregon Forest Practices indicated on non-federally administered forest lands roughly 94 percent of the riparian network would be considered inadequately stocked for future recruitment of LWD (IMST 1999). However, based on the various policies currently being applied to coastal Oregon forest lands, the amount of riparian area with large and very large conifer trees, which would contribute towards large wood recruitment, is projected to increase significantly (Spies et al., 2007).

Proposed road renovation activities associated with the Density Management are unlikely to reach fish habitat and would not be expected to contribute to any cumulative effects. Hauling may contribute a minor amount of sediment to the stream network in the wet season. Most haul routes are located near ridge tops with a limited number of stream crossings. Portions of the haul route within the effected drainages may occur in close proximity to fish habitat; however, site level impacts were expected to be immeasurable. As site level impacts are not anticipated to be immeasurable, cumulative effects to aquatic resources would be immeasurable.

Extensive road work has occurred on BLM-managed lands and adjacent industrial forest over the last decade in the Upper Rickreall Creek Watershed. In addition to timber sale road construction substantial restoration work has occurred to improve road stability, reduce road generated sedimentation, and remove barriers to aquatic habitat movement at stream crossings. Site level road work, both private and public, have had negative and positive impacts on aquatic habitat. However, these projects are unlikely to detectably alter fish productivity at 5th field scale due to the small scale of project work and lack of connectivity between treatment areas.

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

4.4 HYDROLOGY

(IDT Reports incorporated by reference: Rickreall Creek Watershed Enhancement Hydrology Environmental Assessment pp.1 to 18.)

All Action Alternatives

Peak Flow

A rigorous analysis of peak flow potential for both rain-dominated and rain-on-snow dominated 6th field watersheds in the Project 1 areas was completed in the *Final Environmental Impact Statement for the Revision of the Management Plans of the Western Oregon Bureau of Land Management* (FEIS 2008). This analysis is located on pages 753-759 of Volume II and also in Appendix I of Volume III of the FEIS. The analysis included the existing condition and proposed timber harvest in a ten year planning period. Private land harvesting was also projected and included in the analysis. The 2008 FEIS analysis indicated that the Rickreall watershed was near a threshold for being able to display impacts from increases in water yields. The 200 analysis was updated to include more current stand data and vegetation modeling runs. Further, additional analysis was completed using the most current research on the subject (Grant, 2008). The entire set of analyses is located in the Rickreall Creek Watershed Enhancement Cumulative Effects Analysis which is summarized below.

Using information based on a recent report by Grant (2008), an analysis was completed that totaled up the existing amount of lands in the 6th field watersheds in the project area. This includes Upper Mill Creek, Middle Little Luckiamute River, Upper Salt Creek, and Upper Rickreall Creek watersheds. Table 23 displays the information. An "open" condition means that the lands were either recently harvested and currently had less than 30% crown closure or were naturally open (meadows, rock slopes, etc.).

Table 23. Watershed Activity Data (with the implementation of Alternative 2.)

Watershed (6th Field HUC)	Size (acres)	Open Acres (Alt 2 acres)	Percent of basin in open condition	Road Density (mi/mi2)

Upper Mill Creek	16,870	2716 (166)	16.1	4.11
Middle Little Luckiamute River	23,477	5836 (79)	24.8	5.60
Upper Salt Creek	15,192	1967 (37)	12.9	3.77
Upper Rickreall Creek	21,676	6186 (1126)	28.5	5.22

Using the envelope curves developed by Grant, the predicted change in peak flow increases for this level of basin harvest in the rain dominated hydroregion falls below the detection level for peak flow changes established by Grant for each watershed.

The Grant paper set the peakflow detection level at 10% based on measurement error in natural stream systems and natural variability in stream systems. The analysis assumes that the current level of harvest activity on private lands remains the same and that all the acres in the sale are resulting in less than 30% crown closure when completed, this results in a worse –case scenario. As proposed, the actual level of post harvest crown closure is projected to be an average of 55 percent. Technically, following the assumptions in Appendix I of the WOPR, none of the proposed harvest activities in Alternative 2 would result in a measurable impact to water yields. Based on these side boards, it is expected that the addition of the Alternative 2 harvest activities in all the project watersheds would fall into the immeasurable level for peak flow increases based on the Grant envelope curve and the updated WOPR analysis.

Sediment and Temperature

The no-harvest SPZ widths along all streams in both projects follow the guidelines established in the 2008 RMP and by the Oregon DEQ that would maintain a minimum of 80% shade for the streams. Because stream shading would be maintained there are no anticipated changes to stream temperature from the implementation of these projects.

Acres proposed for treatment in the Rickreall watershed equate to approximately 5% of the lands in the upper watershed and less than 4% of the entire Rickreall watershed. The creation of new roads on ridge tops, temporary skidding roads, yarding corridors and the removal of trees are unlikely to measurably increase sedimentation into project area streams because the established stream buffers would filter out potential sediment that might enter the buffer. The 79 acres of harvest in the Luckiamute watershed, the 166 acres of harvest in the Mill Creek watershed, and the 37 acres of harvest in the Salt Creek watershed are all below 1% of the watershed areas and would not have a measurable impact on the in channel sediment regime of the watersheds.

An analysis of sediment and temperature cumulative effects on BLM lands was completed in the *Final Environmental Impact Statement for the Revision of the Management Plans of the Western Oregon Bureau of Land Management* (FEIS 2008). This analysis is located on pages 759-775 of Volume II. BMP's used to limit sediment introduction to water sources are listed in Appendix I (Pages 268-316) in Volume III of the FEIS. That analysis combined with this more site specific review results in no anticipated effects to stream sediment or temperature from existing conditions.

4.5 RECREATION

(IDT report incorporated by reference: Rickreall Creek Watershed Recreation, Rural Interface, Visual Resources Report, pp. 1-12.)

All Action Alternatives

Timber harvest would interrupt any recreation activities for approximately three to five years, which is expected to return to prior usage. Additional road closures may occur upon completion of harvest activities. This project would have minimal to no impact on recreational uses due to the fact there are other opportunities available. Residential development along haul routes routinely receives log truck traffic from timber management activities on private and public lands.

Timber management has occurred on both private and public lands for many years and would continue to occur in the vicinity. Timber management activities would continue to result in temporary changes to visual resources while logging debris and crushed undergrowth vegetation dies turning brown to red. If logging debris piles are burned blackened areas would be visible until vegetation growth covers the scars. Smoke would dissipate. Vegetation would likely green up and return within five years, leaving project units less noticeable from roads and residences.

4.6 SOILS

(IDT Report incorporated by reference: Rickreall Creek Watershed Enhancement Soils Report, pp. 1 to 8.)

Alternative 2 – Proposed Action (Projects 1, 2, and 3)

Approximately 40 percent of the acres would be harvested by ground-based equipment and 60 percent would be harvested by cable or skyline operations. The tractor harvesting would follow established PDFs as described in Section 2.6 of this EA.

Proposed road work would equate to approximately 9.8 acres of new roadways and 13.3 acres of road reconstruction. Total roads within the treatment units would equate to approximately 45.6 acres. The construction of the new roadways would result in only 3.2% of the project area with disturbed soils. Approximately 16.6 acres of the newly reconstructed and reconstructed road ways within the project area would be potentially decommissioned following project level activities.

Presently approximately 2.5% of the project area has soils that have been disturbed by road ways. Many of these roadways are not main travel corridors and naturally recover over time when left alone. The field review of the project area confirms that with the exception of the heavily travelled corridors, many of the roadways recover over time and do not pose a risk to a long term adverse effect to soil quality or site productivity.

Therefore, it has been determined that the project activities associated with Alternative 2, including the road construction, are unlikely to result in an adverse effect to soil quality or site productivity.

Alternative 3 – No New Road Construction (Projects 1, 2, and 3)

There would be no new roads constructed under this action alternative, fewer acres impacted by ground-based harvesting and skyline or cable harvesting activities. Presently approximately 3.6% of the project area has soils that have been disturbed by road ways. Many of these roadways when left alone over time naturally recover. As with the analysis completed under Alternative 2, the field review of the project area confirms that with the exception of the heavily travelled corridors, many of the roadways would recover over time and do not pose a risk to a long term adverse effect to soil quality or site productivity

Under this action alternative, no new roads would be constructed and 28.3 acres of the existing road ways are proposed to be reconstructed. There are few or no roads proposed to be decommissioned following project activities; therefore, no new acres of soils are proposed to be disturbed. Refer to the detailed cumulative effects analysis as described under Alternative 2.

Therefore, it has been determined that the project activities associated with Alternative 3 are unlikely to result in an adverse effects to soil quality or site productivity.

4.7 VEGETATION

(IDT Reports incorporated by reference: Forest Vegetation and Silviculture Specialist Report Abstract, Rickreall Creek Watershed Enhancement EA pp. 1 to 14, and Marys Peak Resource Area Botanical Report – Rickreall Creek pp.1 to 6)

Alternative 2 – Proposed Action

Mid and Late-Seral Habitat Enhancement (Project 1)

Age Class

Rickreall watershed contains approximately 123,795 acres. Of those, approximately 3,098 are BLM-managed. Approximately 198 acres are non-forested (meadows and rocky areas) and 2,900 acres are forested.

Alternative 2 would create little change in the age class distribution of the Rickreall Analysis area, as the density management would be in mid-seral stands, changing stand structure, but not changing their age class. Currently, age class distribution in the 2,900 acres of forested BLM-managed land in the watershed consists of 545 acres (19% of BLM-managed land), early seral (age 0-39 years), 2,078 acres (71%) mid-seral (age 40-79 years), 217 acres (7.4%) late-seral (80-199 years) and 67 acres (2.3%) old-growth habitat (age 200+ years). In Alternative 2, approximately 10 acres of patch cuts (gaps up to 0.5 acre) would be created. Because the patch cuts are small, would retain some overstory trees, and would be primarily forest edge, they would have some attributes of both early seral and mid-seral stand structure. The patch cuts would create a small change on the landscape, representing 0.03% of the BLM-managed land.

Legacy Tree Release (Project 2)

The cumulative effect of this Project would be to maintain the structure and function of legacy tree habitat on the landscape for a longer period of time. On BLM-managed lands, legacy trees would persist for several decades more than without treatment. Maintaining these trees on the landscape would affect the development of future stands, the genetic material available for future tree regeneration, wildlife habitat, and aesthetics. Treatments would occur on approximately 790 acres, or 27% of the forested BLM-managed stands. Legacy trees that occur within stands to be treated by density management in Alternative 2 represent a maximum of 1,408 acres, or 48% of forested, BLM-managed stands in the watershed. In total, almost 75% of forested BLM-managed lands would be treated. However, the intensity of the treatments is low, since less than one tree per acre on average would be released, and some stands contain no legacy trees within Project 1.

Alternative 3 – No New Road Construction

Mid and Late-Seral Habitat Enhancement (Project 1)

Similar to Alternative 2, Alternative 3 would create little change in the age class distribution of the Rickreall Analysis area. In Alternative 3, approximately 5 acres of patch cuts (gaps up to 0.5 acre) would be created. Because the patch cuts are small, would retain some overstory trees, and would be primarily forest edge, they would have some attributes of both early seral and mid-seral stand structure. The patch cuts would create a small change on the landscape, representing 0.02% of the BLM-managed land.

Legacy Tree Release (Project 2)

The cumulative effect of this Project would be so similar to Alternative 2, and the amount of legacy tree treatment on the landscape would essentially be the same as Alternative 2. However, legacy tree treatments alone would occur on approximately 1,344 acres, or 48% of the forested BLM-managed stands. Legacy trees that occur within stands to be treated by density management in Alternative 3 represent a maximum of 790 acres, or 27% of forested, BLM-managed stands in the watershed. In total, almost 75% of forested BLM-managed lands would be treated. However, the intensity of the treatments is low, since less than one tree per acre on average would be released and some stands contain no legacy trees within Project 1.

4.8 WILDLIFE

(IDT report incorporated by reference: Hopkins, 2011. Biological Evaluation. Pp. 1-25.)

All Action Alternatives

Private lands within the watershed appear to be managed on short harvest rotations (estimated to be 40- to 50-year rotations), whereby about 20% to 25% of the current area of mid-seral forests are expected to be harvested over the next decade. This private harvest would likely be balanced

by the in-growth of a similar percentage of early-seral forest stands that are transitioning to mid-seral forest conditions over the next decade.

In addition to the proposed thinning harvest in Project 1, BLM has previously thinned (since 1995) only 228 acres of mid-seral forests, and has planned about 7 acres of foreseeable future thinning (next five years) within the Upper Rickreall Creek watershed (Table 24). These past, proposed, and foreseeable future thinning harvests, which span a 20 year period, would alter about 66% of the available mid-seral forests on BLM (1,805 acres) and Forest Service Lands (322 acres) within this watershed. While this represents a cumulative modification of nearly two-thirds of the mid-seral forest stands on federal lands, this type of thinning harvest does not result in a loss of forest function or connectivity across the watershed, and it would not contribute to the need to list any wildlife species of concern because mid-seral forest structure is not a limiting factor for any of these wildlife species.

There would be no cumulative negative effects from Project 2 treatment because this type of treatment affects only scattered trees or patches within each stand, the risk of damage to legacy trees is very low, treated stands would retain their existing function, and there have been no previous treatments of this type within the affected watersheds.

Collectively, both Project 1 and 2, along with previous BLM density management thinnings (228 acres) contribute to the cumulative beneficial enhancement of forest structure and stand diversity on BLM-administered lands within the affected watersheds.

Table 24. Summary of Proposed, Past, and Foreseeable Harvest Acreage on BLM lands.[1]

	Upper Rickreall Creek
Baseline Data	
Total Watershed Acres	21,640
BLM-administered lands in Watershed	3,024
Proposed Action	
Project 1 – Density Management of Mid-Seral Stands	1,465
Project 2 – Legacy Tree Release and CWD Creation	790
Past Actions on BLM [2]	
Density Management Thinning	228
Legacy Tree and CWD treatments	0
Foreseeable Future Actions on BLM [3]	
Density Management Thinning	7
Legacy Tree and CWD treatments	0

[1] Only the proposed units in the Upper Rickreall Creek 6th Field watershed considered since portions of units lying in adjacent watersheds represent a negligible amount of treatment area at the watershed scale.

[2] Past Actions occurring on BLM-administered lands within each watershed since 1995

(beginning of Northwest Forest Plan implementation).

[3] Foreseeable future actions on BLM-administered lands within each watershed for the next five years (current planning horizon).

Within the northern Oregon Coast Range, the condition of dispersal habitat for spotted owls is a matter of elevated concern (Courtney et al. 2004, USDI-FWS 2008a). The Project 1 units, which would thin about 905 acres in CHU OR-7, would not contribute to any cumulative loss of dispersal habitat since the functional capacity as dispersal habitat would be maintained. There would be no cumulative effects to marbled murrelet or their critical habitat since no suitable nesting structure would be lost, and there would be no cumulative effects to red tree voles since no older forest habitats (which best support population persistence) would be affected.

5.0 COMPLIANCE WITH THE AQUATIC CONSERVATION STRATEGY

Existing Watershed Condition

Luckiamute River Watershed

Four percent of the Luckiamute River watershed is managed by BLM and 96 percent is managed by private. Approximately 44 percent of the total BLM-managed lands consist of stands greater than 80 years old and approximately 23 percent of BLM-managed lands are located in riparian areas (within 100 feet of a stream).

Mill Creek Watershed

Thirty-six percent of the Mill Creek watershed is managed by BLM and 64 percent is managed by private. Approximately 16 percent of the total BLM-managed lands consist of stands greater than 80 years old and approximately 29 percent of BLM-managed lands are located in riparian areas (within 100 feet of a stream).

Rickreall Creek Watershed

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

Salt Creek Watershed

Approximately 0.1 percent of the Salt Creek watershed is managed by BLM and 99.9 percent is managed by private. Approximately 27 percent of the total BLM-managed lands consist of stands greater than 80 years old and approximately 6 percent of BLM-managed lands are located in riparian areas (within 100 feet of a stream).

Review of Aquatic Conservation Strategy Compliance

The project meets the Aquatic Conservation Strategy in the context of PCFFA IV and PCFFA II [complies with the ACS on the project (site) scale]. The following is an update of how the

projects would comply with the four components of the Aquatic Conservation Strategy. The projects would comply with:

Component 1 – Riparian Reserves: by maintaining canopy cover along all streams and wetlands would protect stream bank stability and water temperature. Riparian Reserve boundaries would be established consistent with direction from the *Salem District Resource Management Plan*.

Construction of 2,700 feet of new road associated with the Density Management treatments may occur within one site potential tree height of stream channels, none within 75 feet of any streams. The proposed road construction is unlikely to increase the drainage network in the watershed as the majority of new road is located on ridge tops, generally outside riparian reserves, and no new construction would cross any existing stream channels. Thus, impacts to aquatic habitat downstream would not be anticipated.

The channels nearest the new road construction are intermittent, thus not subject to elevation of stream temperatures during summer months. In addition, the existing buffer distance of 75 feet or more between the road and the stream would further limit any increase in solar radiation reaching the stream channel. According to the stream shade sufficiency analysis done for the project area treatment units the proposed stream protection zones (SPZ) of 50-85 feet was sufficient to protect critical shade in the primary shade zone, based on topography and average tree height (Snook 2011 and Roux 2011). Thus, new road construction would be highly unlikely to have any effect on stream temperatures at the site and highly unlikely to impacts aquatic habitat or fish downstream.

Component 2 – Key Watershed: by establishing that the Rickreall Creek Watershed Enhancement projects are not located within a Key Watershed;

Component 3 – Watershed Analysis: The *Mill Creek, Rickreall Creek, Rowell Creek, Luckiamute River Watershed Analysis* (1998) describes the events that contributed to the current condition such as early hunting/gathering by aboriginal inhabitants, road building, agriculture, wildfire, and timber harvest. The following are watershed analyses findings that apply to or are components of these projects:

Mill Creek, Rickreall Creek, Rowell Creek, Luckiamute River Watershed Analysis

- Inventory stands between ages 20 and 110 to determine if they are developing older forest characteristics and if they would benefit from creation of CWD, density management or some other treatment to maintain or restore ACS objectives. Further evaluate single-story stands lacking structural diversity and identified as potential for density management (MEGAWA. SI&MR-11).

- Under active management, actions would be taken in early and mid-seral habitats to accelerate the attainment of LSOG habitat conditions. This process might involve density management, underplanting, and creation of coarse woody debris and wildlife trees at different landscape levels and stand densities in locations where the highest success for achieving objectives is expected. Locate any additional stands with hemlock component for potential density management (MEGAWA. SI&MR-17).

- Prioritize density management treatments in stands, including those in Riparian Reserves, to benefit wildlife and aquatic habitat. First priority targets would be the even-aged, densely-stocked stands (50 to 110 years) in the western portion of the Mill and Luckiamute subwatersheds. (MEGAWA. SI&MR-19).

- Propose density management projects which promote ecological values while meeting the relevant criteria for a timber sale. Projects should exhibit a high rate of success in promoting LSR objectives and producing an economically viable timber sale. Funding for the planning and completion of non-timber type projects, such as restoration of snags and coarse woody debris to improve wildlife habitat, should be appropriated from the benefiting resource activity (MEGAWA. SI&MR-19).

- In stands 40-110 years (both riparian and upland forest habitats), accelerate in the shortest time possible the attainment of large trees with large horizontal branches (using density management and other treatments as may be appropriate) to provide increased nesting opportunities for marbled murrelets. Beginning with the oldest stands first, locations for treatment should occur in stands as follows: those closest to the Coast; then those closest to existing occupied stands; and then those closest to existing unoccupied LSOG. (MEGAWA. SI&MR-21).

Component 4 – Watershed Enhancement: The project has been reviewed against the ACS objectives at the project or site scale with the following results; the no action alternative does not retard or prevent the attainment of any of the nine ACS objectives because this alternative would maintain current conditions. The proposed actions do not retard or prevent the attainment of any of the nine ACS objectives for the following reasons:

Table 25. Project Consistency with the Nine Aquatic Conservation Strategy Objectives

Aquatic Conservation Strategy Objectives (ACSOs)	Rickreall Creek Watershed Enhancement and Associated Actions
1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and	Does not prevent the attainment of ***ACSO 1***. Addressed in Text (*EA sections 3.3 and 3.7*). In summary: **No Action Alternative:** The No Action alternative would maintain the development of the existing vegetation and associated stand structure at its present rate. The current distribution, diversity and complexity of watershed and landscape-scale features would be maintained. Faster enhancement of distribution, diversity, and complexity of watershed and landscape features would not occur. **Proposed Action Alternative (Project 1):** Proposed thinning in the riparian treatment areas is anticipated to increase the average growth of the

Aquatic Conservation Strategy Objectives (ACSOs)	Rickreall Creek Watershed Enhancement and Associated Actions
communities are uniquely adapted.	remaining trees between 18 to 166 percent over 30 years compared to not treating the stands (Snook 2011 and Roux 2011). In the long-term the increase in the size of trees in riparian areas could benefit LWD recruitment to the stream channel. All new road construction would be spatially separated by at least 75 feet from stream channels. Over the short-term the small diameter woody debris most likely to reach stream channels would be protected by a combination of the untreated 50 to 85 foot stream protection zones in project units and the minimum 75 foot buffer between road construction and streams. Wood recruitment studies conducted in the Pacific Northwest have shown the majority of woody debris recruitment occurs within 18 to 20 meters (59 to 65 feet) of the stream edge (McDade et al 1990, Van Sickle and Gregory 1990, Meleason et al 2002. Therefore, the proposed actions are not expected to cause any short-term effects to aquatic habitat at the site or downstream. **Proposed Action Alternative (Project 2):** The Legacy Tree Release project would not occur in riparian reserves and would mimic natural forest processes (windthrow) in the creation of both CWD and LWD in the watersheds. **Proposed Action Alternative (Project 3):** LWD Placement in Rickreall Creek would help to re-establish LWD numbers in the channel needed to retain gravels and debris to improve habitat complexity and stream function. **Alternative 3 (No New Road Construction):** The no new roads alternative would have similar actions to Project 1 but would result in no new roads and approximately 43 percent less harvest in the project watersheds. This reduction in activities is expected to result in similar conditions represent in the analysis but at fewer locations.
2. Maintain and restore spatial and temporal connectivity within and between watersheds.	Does not prevent the attainment of ***ACSO 2***. Addressed in Text (*EA sections 3.3 and 3.7*). In summary: **No Action Alternative:** The No Action alternative would maintain the development of the existing vegetation and associated stand structure at its present rate. The current distribution, diversity and complexity of watershed and landscape-scale features would be maintained. Connectivity within and between watersheds is expected to remain at the existing levels.

Aquatic Conservation Strategy Objectives (ACSOs)	Rickreall Creek Watershed Enhancement and Associated Actions
	Proposed Action Alternative (Project 1): Proposed thinning in the treatment areas is not expected to alter the spatial or temporal connectivity within or between the watersheds. All new road construction would be spatially separated by at least 75 feet from stream channels and connectivity between watersheds is expected to be unaltered as the riparian zones would maintain the existing level of vegetation thus maintaining the connectivity within and between watersheds. **Proposed Action Alternative (Project 2):** The Legacy Tree Release project will not occur in riparian reserves and would mimic natural forest processes (wind throw) and not alter the connectivity in the watersheds. **Proposed Action Alternative (Project 3):** LWD Placement in Rickreall Creek would help to re-establish LWD numbers in the channel needed to retain gravels and debris to improve habitat complexity and stream function and is expected to facilitate enhanced movement of aquatic and terrestrial organisms. **Alternative 3 (No New Road Construction):** The no new roads alternative would have similar actions to Project 1 but would result in no new roads and approximately 43 percent less harvest in the project watersheds. This reduction in activities is expected to result in similar conditions represent in the analysis but at fewer locations. Thus maintaining the existing connectivity in the watersheds.
3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.	Does not prevent the attainment of ***ACSO 3***. Addressed in Text (*EA sections 3.3 and 3.7*). In summary: **No Action Alternative:** It is assumed that the current condition of physical integrity would be maintained. **Proposed Action Alternative (Project 1):** Proposed thinning in the riparian treatment areas is anticipated to in the long-term, increase the size of trees in riparian areas which would benefit the physical integrity of the stream channel. All new road construction would be spatially separated by at least 75 feet from stream channels. The proposed actions are not expected to cause any short-term effects to aquatic habitat at the site or downstream.

Aquatic Conservation Strategy Objectives (ACSOs)	Rickreall Creek Watershed Enhancement and Associated Actions
	Proposed Action Alternative (Project 2): The Legacy Tree Release project will not occur in riparian reserves and would mimic natural forest processes (wind throw) and not alter the connectivity in the watersheds. **Proposed Action Alternative (Project 3):** LWD Placement in Rickreall Creek would help to re-establish LWD numbers in the channel needed to retain gravels and debris to improve habitat complexity and stream function and is expected to facilitate enhanced movement of aquatic and terrestrial organisms. **Alternative 3 (No New Road Construction):** The no new roads alternative would have similar actions to Project 1 but would result in no new roads and approximately 43 percent less harvest in the project watersheds. This reduction in activities is expected to result in similar conditions represent in the analysis but at fewer locations. Thus maintaining the physical integrity of the stream channels in the watersheds.
4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems.	Does not prevent the attainment of ***ACSO 4***. Addressed in Text (*EA sections 3.3, 3.4, and 3.7*). In summary: **No Action Alternative:** It is assumed that the current condition of the water quality would be maintained. **Proposed Action Alternative (Project 1):** Proposed thinning in the riparian treatment areas is anticipated to increase the average growth of the remaining trees between 18 to 166 percent over 30 years compared to not treating the stands (Snook 2011 and Roux 2011). In the long-term the increase in the size of trees in riparian areas could benefit LWD recruitment to the stream channel. New road construction would be spatially separated by at least 75 feet from stream channels. Over the short-term the small diameter woody debris most likely to reach stream channels would be protected by a combination of the untreated 50 to 85 foot stream protection zones in project units and the minimum 75 foot buffer between road construction and streams. Wood recruitment studies conducted in the Pacific Northwest have shown the majority of woody debris recruitment occurs within 18 to 20 meters (59 to 65 feet) of the stream edge (McDade et al., 1990, Van Sickle and Gregory 1990, Meleason et al., 2002. Therefore, the proposed actions are not expected to cause any short-term effects to aquatic habitat or water quality at the site or downstream.

Aquatic Conservation Strategy Objectives (ACSOs)	Rickreall Creek Watershed Enhancement and Associated Actions
	Proposed Action Alternative (Project 2): The Legacy Tree Release project would not occur in riparian reserves stream protection zones and would mimic natural forest processes (windthrow) and not alter the water quality or aquatic habitat in the watersheds. **Proposed Action Alternative (Project 3):** LWD Placement in Rickreall Creek would help to re-establish LWD numbers in the channel needed to retain gravels and debris to improve habitat complexity and stream function and is expected to facilitate enhanced aquatic habitat and water quality parameters in the watersheds. **Alternative 3 (No New Road Construction):** The no new roads alternative would have similar actions to Alternative 2 but would result in no new roads and approximately 43 percent less harvest in the project watersheds. This reduction in activities is expected to result in similar conditions represent in the analysis but at fewer locations. Thus maintaining the physical components of the stream channels in the watersheds and enhance the existing water quality parameters.
5. Maintain and restore the sediment regime under which aquatic ecosystems evolved.	Does not prevent the attainment of ***ACSO 5***. Addressed in Text (*EA sections 3.3 and 3.7*). In summary: **No Action Alternative:** It is assumed that the current levels of sediment into streams would be maintained. **Proposed Action Alternative (Project 1):** Proposed thinning in the riparian treatment areas is anticipated to increase the average growth of the remaining trees between 18 to 166 percent over 30 years compared to not treating the stands (Snook 2011 and Roux 2011). In the long-term the increase in the size of trees in riparian areas could benefit LWD recruitment to the stream channel. New road construction would be spatially separated by at least 75 feet from stream channels. Over the short-term the small diameter woody debris most likely to reach stream channels would be protected by a combination of the untreated 50 to 85 foot stream protection zones in project units and the minimum 75 foot buffer between road construction and streams. Wood recruitment studies conducted in the Pacific Northwest have shown the majority of woody debris recruitment occurs within 18 to 20 meters (59 to 65 feet) of the stream edge (McDade et al., 1990, Van Sickle and Gregory 1990, Meleason et al., 2002. Therefore, the proposed actions are not expected to cause any short-term effects to the sediment regime at the site

Aquatic Conservation Strategy Objectives (ACSOs)	Rickreall Creek Watershed Enhancement and Associated Actions
	or downstream. **Proposed Action Alternative (Project 2):** The Legacy Tree Release project would not occur in riparian reserves stream protection zones and would mimic natural forest processes (windthrow) and not alter the sediment regime or aquatic habitat in the watersheds. **Proposed Action Alternative (Project 3):** LWD Placement in Rickreall Creek would help to re-establish LWD numbers in the channel needed to retain gravels and debris to improve habitat complexity and stream function and is expected to improve the functioning of the stream system in terms of the sediment budget of the stream. This improved sediment retention capability will enhance aquatic habitat and water quality parameters in the watersheds. **Alternative 3 (No New Road Construction):** This alternative would have similar actions to Alternative 2, but would result in no new roads and approximately 43 percent less harvest in the project watersheds. This reduction in activities is expected to result in similar conditions represent in the analysis but at fewer locations. Thus maintaining the existing sediment budget and physical components of the stream channels in the watersheds and enhance the existing water quality parameters.
6. Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing.	Does not prevent the attainment of ***ACSO 6***. Addressed in Text (*EA sections 3.3 and 3.4*). In summary: **No Action Alternative:** No change in in-stream flows would be anticipated. **Action Alternatives (Projects 1, 2, and 3):** No change in in-stream flows would be anticipated.
7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and	Does not prevent the attainment of ***ACSO 7***. Addressed in Text (*EA sections 3.4 and 3.7*). In summary: **No Action Alternative:** No change in in-streams flows would be anticipated. **Proposed Action Alternatives (Projects 1, 2, and 3):** No change in in-stream flows would be anticipated thus no change in the timing, variability and duration of floodplain inundation and water table elevation in meadows

Aquatic Conservation Strategy Objectives (ACSOs)	Rickreall Creek Watershed Enhancement and Associated Actions
wetlands.	and wetlands are expected. **Alternative 3 (No New Road Construction):** Similar to Alternative 2, there would be no new stream crossings and no change in in-stream flows would be anticipated thus no change in the timing, variability and duration of floodplain inundation and water table elevation in meadows and wetlands is expected.
8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands.	Does not prevent the attainment of ***ACSO 8***. Addressed in Text (*EA section 3.3 and 3.7*). In summary: **No Action Alternative:** The current species composition and structural diversity of plant communities would continue along the current trajectory. Diversification would occur over a longer period of time. **Proposed Action Alternative (Project 1):** Proposed thinning in the riparian treatment areas is anticipated to increase the average growth of the remaining trees between 18 to 166 percent over 30 years compared to not treating the stands (Snook 2011 and Roux 2011). In the long-term the increase in the size of trees in riparian areas could benefit LWD recruitment to the stream channel. All new road construction would be spatially separated by at least 75 feet from stream channels. Over the short-term the small diameter woody debris most likely to reach stream channels would be protected by a combination of the untreated 50 to 85 foot stream protection zones in project units and the minimum 75 foot buffer between road construction and streams. Wood recruitment studies conducted in the Pacific Northwest have shown the majority of woody debris recruitment occurs within 18 to 20 meters (59 to 65 feet) of the stream edge (McDade et al., 1990, Van Sickle and Gregory 1990, Meleason et al., 2002. Therefore, the proposed actions are not expected to cause any short-term effects to riparian areas or wetlands at the site level or downstream. **Proposed Action Alternative (Project 2):** The Legacy Tree Release project will not occur in riparian reserves or wetlands and would mimic natural forest processes (windthrow) in the creation of both CWD and LWD in the watersheds. No change is expected in these communities from these activities. **Proposed Action Alternative (Project 3):** No change in in-stream flows would be anticipated thus no change in the function of riparian areas or

Aquatic Conservation Strategy Objectives (ACSOs)	Rickreall Creek Watershed Enhancement and Associated Actions
	wetlands is expected. **Alternative 3 (No New Road Construction):** Similar to Project 1, there would be no new stream crossings and no change in in-stream flows would be anticipated thus no change in the composition or functioning of riparian areas or wetlands is expected.
9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.	Does not prevent the attainment of ***ACSO 9***. Addressed in Text (*EA sections 3.3 and 3.7*). In summary: **No Action Alternative:** Habitats would be maintained over the short-term and continue to develop over the long-term with no known impacts on species currently present. **Proposed Action Alternative and Alternative 3 (No New Road Construction) – Project 1:** Research has found that thinning treatments generally maintained habitat for native plant, invertebrate and invertebrate riparian-dependent species. Specifically, thinning was found to increase species richness of arthropods, and forest riparian buffers thirty meters wide serve as refuge for both forest-upland and forest-riparian arthropod species. Thinning was found to have minimal effects on most species of aquatic vertebrates including salamanders. Native plants were found to persist and increase in coverage after density management. Patch openings and wide thinning drastically reduced the diversity of epigeous ectomycorrhizal fungal species, but medium and high retention thinning showed little change in fungal diversity. Buffers of widths defined by the transition from riparian to upland vegetation or topographic slope breaks appear sufficient to mitigate the impacts of upslope thinning on the microclimate above headwater streams. Because the microclimate, as well as the structure and composition of the forest stand and understory vegetation are protected within the untreated buffer, habitat elements seem to be protected. **Proposed Action Alternative (Project 2):** The Legacy Tree Release project would not occur in riparian reserves or wetlands and would mimic natural forest processes (windthrow) in the creation of both CWD and LWD in the watersheds. **Proposed Action Alternative (Project 3):** LWD Placement in Rickreall Creek would help to re-establish LWD numbers in the channel needed to retain gravels and debris to improve habitat complexity and stream function

Aquatic Conservation Strategy Objectives (ACSOs)	Rickreall Creek Watershed Enhancement and Associated Actions
	and is expected to facilitate enhanced movement of aquatic and terrestrial organisms.

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

6.0 LIST OF PREPARERS

Name	Title
Peter Adams	Soil Scientist
Ron Exeter	Botanist
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Scott Hopkins	Wildlife Biologist
Stefanie Larew	NEPA Coordinator
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Kent Mortensen	Fuels Specialist
Mellissa Rutkowski	Engineer
Hugh Snook and Arlene Roux	Silviculture and Riparian Ecology
Scott Snedaker	Fish Biologist
Heather Ulrich	Archaeologist
Steve Wegner	Hydrologist

7.0 CONTACTS AND CONSULTATION

7.1 AGENCIES, ORGANIZATIONS, AND PERSONS CONSULTED (ESA SECTION 7 CONSULTATION)

U. S. Fish and Wildlife Service

Due to potential affects to spotted owls, marbled murrelets and their designated critical habitat, as outlined in Table 5, Section 7(a) of the Endangered Species Act requires that this proposed action receive consultation with the U.S. Fish and Wildlife Service. Consultation has been addressed by inclusion of the proposed action units within either of two batched Biological Assessments (BAs) that analyzed all projects that may modify the habitat of listed wildlife

species on federal lands within the Northern Oregon Coast Range during fiscal years 2011 and 2012. All projects of the proposed action have been designed to incorporate all appropriate design standards included in these BAs. A Letter of Concurrence (#13420-2010-I-0105) and a Biological Opinion (#13420-2010-F-0184) have been received from the Service and they do not require any changes or additions to the incorporated project design standards. The Biological Opinion also concludes that the proposed action would not result in jeopardy to listed species and would not adversely modify critical habitat for either the spotted owl or marbled murrelet.

National Marine Fisheries Service

Project 1

Upper Willamette River Winter Steelhead are listed as threatened under the ESA, as amended, and are known to occur within the Mill Creek, Luckiamute River and Rickreall Creek systems.

A determination has been made that the proposed Project 1 'may affect' Upper UWR winter steelhead. The 'may affect' determination is primarily due to the proximity of listed fish and critical habitat adjacent to proposed haul routes in the Luckiamute River and Rickreall Creek Watersheds. Due to the Proposed Actions' 'may affect' determination consultation with NMFS would be required on ESA listed UWR winter steelhead.

The proposed actions would have 'no effect' to UWR Spring Chinook salmon and Oregon chub. Generally, the 'no effect' determination is based on the distance upstream of project activities (approximately 8 miles) from ESA listed Chinook salmon critical habitat and historic habitat for Oregon chub. Consultation with NMFS is not required for UWR Spring Chinook salmon, or with USFWS for Oregon chub for these projects.

Projects 2 and 3

Proposed actions which may affect would comply with existing programmatic consultation and relevant design criteria, and no additional consultation would be necessary. The proposed action is covered under NMFS *Endangered Species Act Section 7 Programmatic Consultation Biological and Conference Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Fish Habitat Restoration Activities in Oregon and Washington, CY2007-CY2012*.

Protection of Essential Fish Habitat (EFH) as described by the Magnuson/Stevens Fisheries Conservation and Management Act and consultation with NMFS is required for all projects which may adversely affect EFH of Chinook and coho salmon. The proposed Rickreall Creek Watershed Enhancement EA Project 1 is not expected to adversely affect EFH due to distance of all activities associated with the project from occupied habitat. Consultation with NMFS on EFH is not required for these projects.

7.2 CULTURAL RESOURCES - SECTION 106 CONSULTATION AND CONSULTATION WITH STATE HISTORICAL PRESERVATION OFFICE

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

7.3 PUBLIC SCOPING AND NOTIFICATION-TRIBAL GOVERNMENTS, ADJACENT LANDOWNERS, GENERAL PUBLIC, AND STATE COUNTY AND LOCAL GOVERNMENT OFFICES

A scoping letter, dated August 19, 2010, was sent to 19 potentially affected or interested individuals, groups, and agencies. Two responses were received during the scoping period. Substantive comments were used to develop issues analyzed in this EA and to refine the action alternatives. In particular, the public expressed concern during the scoping period about the potential impacts of road construction. To address this concern, the IDT fully developed and analyzed an action alternative without road construction (Alternative 3 – No New Road Construction). Further, descriptions of the projects have been included in the BLM Project Update publication since November 2009 to solicit comments.

30-Day Public Comment Period

The EA and FONSI will be made available for public review March 7, 2012 to April 6, 2012. The notice for public comment will be published in a legal notice by the *Polk County Itemizer Observer* newspaper. Comments received by the Marys Peak Resource Area of the Salem District Office, 1717 Fabry Road SE, Salem, Oregon 97306, before the close of business (4:30pm) on April 6, 2012 will be considered in making the final decisions for these projects.

8.0 MAJOR SOURCES

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Appendix A Glossary of Terms, Acronyms, and Abbreviations

ACS – Aquatic Conservation Strategy.

Adaptive Management Reserves – Adaptive Management Area with Late-Successional Reserves overlay. Treatments in this designation may be implemented up to the 110 year age class (106-115 years) to create or and maintain late-successional forest conditions.

Alternative – Proposed project (plan, option, or choice).

Anadromous Fish – Species that migrate to oceans and return to freshwater to reproduce.

Area of Critical and Environmental Concern (ACEC) – A land management designation for BLM lands meeting various relevance and importance criteria.

Basal Area (BA) – The cross section area of a tree measured in square feet.

BLM – Bureau of Land Management. Federal agency within the Department of the Interior responsible for the management of 275 million acres.

Best Management Practices (BMPs) – Design features and mitigation measures to minimize environmental effects.

Biological Opinion (BO) – The document resulting from formal consultation that states the opinion of the Fish and Wildlife Service or National Marine Fisheries Service as to weather or not a federal action is likely to jeopardize the continued existence of a listed species or results in destruction or adverse modification of critical habitat.

Council on Environmental Quality (CEQ) – Established by the National Environmental Policy Act of 1969 (NEPA) to guide the implementation of NEPA.

Crown – The portion of a tree with live limbs.

Cumulative Effects – Past, present, and reasonably foreseeable effects added together (regardless of who or what has caused, is causing, or might cause those effects).

Coarse Woody Debris (CWD) – Refers to a tree, or a portion thereof, that has fallen or been cut and left on the ground. Usually refers to pieces at least 20 inches in diameter as described in the Northwest Forest Plan

DBHOB – Diameter at breast height (4.5 feet) outside bark.

Environmental Assessment (EA) – A systematic analysis of site-specific activities used to determine whether such activities have a significant effect on the quality of the human environment.

Essential Fish Habitat (EFH) – Anywhere Chinook or coho salmon could naturally occur.

Ephemeral Streams – Streams that contain running water only sporadically, such as during and following storm events or snow melt.

Endangered Species Act (ESA) – Federal legislation that ensures federal actions would not jeopardize or elevate the status of living plants and animals.

Fish-bearing stream – Any stream containing any species of fish for any period of time.

Fuel Loading – The amount of combustible material present per unit of area, usually expressed in tons per acre (dry weight of burnable fuel).

Girdle – Removal of the inner bark from the entire circumference of a tree, which typically results in the death of the tree within three to five years.

Ground-Based Yarding – Utilizing equipment operating on the surface of the ground to move trees or logs to a landing where they can be processed or loaded.

Harvester/Forwarder Equipment – Cut to length system which uses harvesters to fell, strip the tree of limbs, and cut it into logs, paired with a tracked forwarder with a long reach to gather up the logs and transfer them to a log truck. Many such systems are known for their low pounds per square inch (PSI) impact to the ground.

Interdisciplinary Team (IDT) – A group of individuals of various disciplines assembled to solve a problem or perform a task.

Intermittent Stream – Any nonpermanent flowing drainage feature having a definable channel and evidence of scour or deposition. Includes ephemeral streams if they meet these two criteria.

Invasive Plant – Any plant species that is aggressive and difficult to manage.

Landing – Any designated place where logs are placed after being yarded and awaiting subsequent handling, loading, and hauling.

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

Land Use Allocation – Northwest Forest Plan designated lands to be managed for specific objectives.

Large Woody Debris (LWD) – Woody material found within the bankfull width of the stream channel and is specifically of a size 23.6 inches diameter by 33 feet length (per Oregon Department of Fish and Wildlife – Key Pieces).

National Marine Fisheries Service (NMFS) – Federal agency within NOAA which is responsible for the regulation of anadromous fisheries in the United States.

Non-Native Plant – Any plant species that historically does not occur in a particular ecosystem.

Non-Point – No specific site.

Noxious Weed – Plant species designated by federal or state law as generally possessing one or more of the following characteristics: aggressive and difficult to manage, parasitic, a carrier or host of serious insects or diseases, or non-native, new, or not common to the United States.
ORGANON – A computer-based program used to model projected tree growth, stand density, and crown ratio using existing stand tree species and size.

Perennial Stream – A stream that typically has running water on a year-round basis.

Road Decommissioning – Road is closed to vehicular traffic. Road is waterbarred to reestablish hillslope drainage patterns. May include removal of culverts, ripping, and seeding of roadbed.

Road Reconstruction – Work done to restore a damaged or deteriorated road to a usable condition and possibly a new design standard. Roads are not drivable prior to reconstruction. May include realignment, slide and fill failure repair, and/or structure upgrades. It generally involves a higher degree of engineering than basic road improvement or renovation work.

Road Renovation – Work done to an existing road which restores it to its original design standard. May include blading and shaping, clearing brush from cut and fill slopes, cleaning or replacing culverts, and applying rock surfacing material to depleted surfaces. Roads are generally drivable prior to work commencing.

Rural Interface – BLM-managed lands within ½ mile of private lands zone for 1 to 20 acre lots. Areas zone for 40 acres and larger with homes adjacent to or near BLM-managed lands.

Seral – One stage of a series of plant communities that succeed one another.

Silviculture – The manipulation of forest stands to achieve desired structure.

Skid Trials – Path through a stand of trees on which ground-based equipment operates.

Skyline Yarding – Moving trees or logs using a cable system to a landing where they can be processed or loaded. During the moving process, a minimum of one end of trees and logs are lifted clear of the ground.

Snag – A dead, partially dead, or defective tree at least 10 inches DBHOB and 6 feet tall.

Soil Compaction – An increase in bulk density and a decrease in soil porosity resulting from applied loads, vibration, or pressure.

Soil Productivity – Capacity or suitability of a soil, for establishment and growth of a specified crop or place species, primarily through nutrient availability.

Special Status Species – Any species included in the following categories; T&E, Bureau Sensitive, Bureau Strategic, and Survey and Manage and/or Special Attention.

Stand – A contiguous group of trees sufficiently uniform in age-class distribution, composition, and structure, and growing on a site of sufficiently uniform quality to be a distinguishable unit.

Stream Protection Zone (SPZ) – A buffer along streams and identified wet areas where no material would be removed and heavy machinery would not be allowed. The SPZ is measured to the slop break, change in vegetation, or 55 feet from the channel edge, whatever is greatest.

Succession – Stages a forest stand makes over time as vegetation competes and natural disturbances occur. The different stages in succession are often referred to as seral stages.

Topped – Completely severing the upper portion of a standing live tree. The typical purpose for this action is to enhance wildlife habitat by creating snags from standing live trees.

Visual Resource Management (VRM) – Lands are classified from 1 to 4 based on visual quality ratings and the amount of modification allowed in the landscape.

Waterbars – A ridge of compacted soil or loose rock or gravel constructed across disturbed rights-of-way and similar sloping areas.

Watershed – The drainage basin contributing water, organic matter, dissolved nutrients, and sediments to an identified outlet location, usually a stream or lake.

Weed – A plant considered undesirable and that interferes with management objectives for a given area at a given point in time.

Windthrow – Trees uprooted or blown over by natural events.

Yarding Corridors – Corridors cut through a stand of trees to facilitate skyline yarding. Cables are strung in these corridors to transport logs from the woods to the landing.

Appendix B Water Quality Management Plan

Introduction

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

Best Management Practices

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

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

Table 1.0 Best Management Practices

BMP No.	Roads
R1	Locate roads and landings on stable locations that minimize sediment delivery potential to streams (e.g., ridge tops, stable benches or flats, and gentle-to-moderate side-slopes).
R4	Locate roads and landings outside of jurisdictional wetlands.
R6	Located landings in areas with low risk to landslides
R22	Drain the road surface by using crowning, insloping, or outsloping. Road surfaces, regardless of traffic volume, may use a combination of these methods for effective road drainage into nonerodible areas.
R25	Use rolling drainage dips and/or lead off ditches as options in lieu of culverts for low traffic volume roads with less than 10 percent gradient.
R26	Locate surface water drainage measures where they will drain the road surface without delivering sediment to a stream or waterbody, and at frequencies that are sufficient to prevent damage or serious erosion of the road surface. Install during the dry season.
R29	Divert road and landing runoff water away from headwalls, unstable areas or

	stream channels.
R30	Shape landings to spread surface water runoff to well vegetated, stable ground.
R31	Prevent diversion of water from streams into road ditches or upon road surfaces.
R33	Locate cross drains such that runoff and sediment is not discharged to a stream. Use measures such as ditchline settling basins, culvert endcaps and perforated flex pipes to disperse culvert discharge near streams and waterbodies.
R35	Cross drain culverts should be a minimum of 18 inches in diameter.
R39	Install downspout structures and/or energy dissipators at cross drain outlets or drain dips where water is discharged onto loose material or erodible slopes.
R43	Where debris or sediments may plug cross-drains, use slotted risers, oversized culverts, or build catch basins.
R73	Suspend timber hauling during wet weather when road run-off delivers sediment at higher concentrations than existing conditions in the receiving stream.
R86	Retain low-growing herbaceous ground cover and brush on cut-and-fill slopes, and ditchlines to the maximum possible extent.
R90	Close roads not needed, but not recommended to be fully decommissioned. When this measure is used by itself, it applies only to roads that do not significantly reroute hill slope drainage, involve stream channels, or present slope stability hazards.
R91	Place woody material or other appropriate barriers to discourage off-highway vehicle use on decommissioned roads, unless specifically designated for this use.
R92	Convert existing road drainage structures into long-term no maintenance structures.
R93	Remove stream crossing culverts and entire in-channel fill material during low flow (generally, June 15 to September 15) prior to fall rains.
R94	Place excavated material from removed stream crossings in a stable location where it would not reenter the stream.
R95	Reestablish stream crossings to the natural stream gradient. Excavate side slopes back to a stable slope while reestablishing floodplains at the bankful height.
R96	Construct oversized waterbars that will remain functional on each side of the stream crossing. These structures should not deliver water or sediment directly to the stream.

R97	Apply erosion control, such as seeding and mulching, to all hydrologically connected road related bare soil surfaces, where erosion could occur, including stream banks and stream-adjacent side slopes following culvert removal. Place sediment trapping materials such as straw bales and jute netting at the toe of stream-adjacent side slopes following culvert removal. Complete seeding and mulching erosion control work by October 15 of each year. When straw mulch or rice straw mulch is used; require certified weed free, if readily available. Mulch shall be applied at no less than 2000 lbs. /acre. Vegetative cuttings, shrubs and trees may be considered as needed for erosion control. Planting of shrubs and trees should occur during the winter dormant season.
R98	Implement measures to reduce the level and depth of soil compaction, including ripping or sub soiling to an effective depth; generally to 24-36 inches. Treat compacted areas including the roadbed, landings, construction areas, and spoils sites.
R99	Pull back unstable road fill and either end-haul or recontour to the natural slopes.
R100	Suspend decommissioning activities if rain saturates soils to the extent that there is potential for movement of sediment from the road to the stream.
BMP No.	**Timber Harvest**
TH7	Exclude equipment from riparian management area retention areas (60 from the edge of the active stream channel for fish bearing and perennial streams, lakes and ponds, and 35 feet for intermittent streams), except for road crossings, restoration, wildfire, or similar operational reasons.
TH9	Plan use on existing and new skid trails to be less than 10 percent of the harvest area.
TH10	Limit the width of the skid trails to be what is operationally necessary for the equipment.
TH11	Ensure one-end suppression of logs.
TH14	Limit conventional ground-based equipment to slopes less than 35 percent.
TH15	When specialized ground-based mechanical equipment is used on slopes greater than 35 percent, monitor use, and restrict where water and sediment could channel overland.
TH16	Designate skid trails where water from trail surface would not be channeled into unstable areas adjacent to water bodies, floodplains, and wetlands.
TH17	When hand falling, directionally fall trees towards skid trails. When mechanically harvesting allow activities to facilitate skidding.
TH18	Apply erosion control practices to skid roads and other disturbed areas with potential for erosion and subsequent sediment delivery to water bodies, floodplains, or wetlands.

TH19	Construct waterbars on skid trails using guidelines in Table C-5.
TH21	Block skid trails that intersect haul routes at the end of season use.
BMP No.	**Silvicultural Activities**
S3	Fell thinned trees away from stream channels when possible. If not possible that portion of the tree within the buffer must be left on the ground.
S9	Within Riparian Reserve Areas, design size, shape and placement of restoration areas to maintain as much effective shade as possible.
BMP No.	**Surface Source Water for Drinking Water**
SW8	Avoid loading, or storing chemical, fuel, or fertilizer in sensitive zones in surface source watersheds.
SW9	Conduct equipment maintenance outside site-specific sensitive zones in surface source watersheds.
BMP No.	**Spill Preventation and Abatement**
SP1	Inspect and clean equipment before it reaches the site. Refuel all equipment a minimum of 100 feet away from streams. Immediately remove waste or spilled materials and contaminated soils near any stream or waterbody in accordance with the applicable regulatory standard. Notify Oregon Emergency Response System of any spill over the material reportable quantities within 24 hours.

FINDING OF NO SIGNIFICANT IMPACT

Introduction

The Bureau of Land Management (BLM) has conducted an environmental analysis (Environmental Assessment Number DOI-BLM-OR-S050-2010-0004-EA) for a proposal to implement three projects as follows.

- Project 1, Mid-Seral and Late-Seral Enhancement, is a proposal to perform density management on approximately 1,344 acres of Late Successional Reserve (LSR), Adaptive Management Area (AMA), and Riparian Reserve (RR) land use allocations (LUAs).

- Project 2, Legacy tree release and snag and coarse woody debris (CWD) creation is a proposal for older forest legacy tree release, and snag/CWD creation on approximately 790 acres of LSR, Adaptive Management Area (AMA), and RR LUAs.

- Project 3, Large Woody Debris (LWD) enhancement on up to 6 miles over three stream segments including the mainstem Rickreall Creek above Mercer Reservoir, the South Fork Rickreall Creek, and North Fork Rickreall Creek. This proposed project would be a cooperative effort between Rickreall Creek Watershed Council, BLM and Forest Capital Inc. to increase habitat complexity in the Rickreall Creek Watershed. The BLM would provide approximately 300 trees to be used in the wood placement project. In cooperation with Rickreall Creek Watershed Council and other parties the BLM would work towards contracting for the felling, yarding, and placement of trees in the streams consistent with design features outlined in this EA.

The project areas are within BLM-managed lands in Township 7 South, Range 6 West, Section 22, Township 7 South, Range 7 West, Section 33, Township 8 South, Range 7 West, Sections 4, 5, 9 and 10 and on private land in Township 8 South, Range 7 West, Sections 1, 2, 3, 4, 9, and 10 Willamette Meridian (**EA Map 1**) and within the Rickreall Creek, Mill Creek, Salt Creek, and Luckiamute River Watersheds.

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

The EA and FONSI will be made available for public review March 7, 2012 to April 6, 2012. The notice for public comment will be published in a legal notice by the *Polk County Itemizer Observer* newspaper. Comments received by the Marys Peak Resource Area of the Salem

District Office, 1717 Fabry Road SE, Salem, Oregon 97306, before the close of business (4:30pm) on April 6, 2012 will be considered in making the decisions for these projects.

Finding of No Significant Impact

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

Context*:* Potential effects resulting from the implementation of the proposed actions have been analyzed within the context of the Rickreall Creek, Salt Creek, Mill Creek, and Luckiamute River 5th field Watersheds. The proposed action would occur on approximately 1,344 acres of BLM-managed land and private land, encompassing less than one percent of the forest cover within each of the Rickreall Creek Watershed, Mill Creek, Luckiamute River, and Salt Creek Watershed [40 CFR 1508.27(a)].

Intensity:

1. [40 CFR 1508.27(b) (1)] – **Impacts that may be both beneficial and adverse**: The resources potentially affected by the proposed thinning, legacy tree enhancement and LWD enhancement activities are: air quality, fire risk, and fuels management, fisheries and aquatic habitat, invasive, non-native plant species, migratory birds, other special status species and habitat – wildlife, soils, water quality, and wildlife habitat components. The proposed actions are unlikely to have significant adverse impacts on these resources for the following reasons:

   Project Design Features described in EA section 2.6 would reduce the risk of effects to affected resources to be within RMP standards and guidelines within the effects described in the RMP/EIS.

   Vegetation and Forest Stand Characteristics *(EA sections 3.8 and 4.8):* 1/ No T&E or bureau sensitive-vascular plant, lichens, bryophytes or fungi species would be affected.

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

Implementation of the Marys Peak integrated non-native plant management plan (EA # OR080-06-09) allows for early detection of non-native plant species which allows for rapid control and generally these species often persist for several years after timber harvest but soon decline as native vegetation increases within the project areas. In addition, all road construction and road maintenance areas would be monitored for Scot's broom infestations and eradicated under this proposal and as part of MP's non-native plant management plan. Other species would be eradicated as funding allows. No significant increase in populations of the noxious weed (invasive/non-native) species identified during the field surveys is expected to occur because this project would disrupt very few acres of exposed mineral soil which could provide habitat for noxious weed species. All of the proposed timber removal activities are planned and laid out to remain below the cumulative level of 10 percent aerial extent of soil disturbance from the RMP Timber harvest BMPs, 2008, FEIS, Appendix I.

Stands proposed for harvest activities are not presently functioning as late-successional old growth habitat.

Fisheries, Hydrology, and Soils *(EA sections 3.3, 3.4, 3.6, 4.3, 4.4, and 4.6)*: The estimated 5.0 miles of new road construction would be located outside Riparian Reserves and generally be located on ridge top locations. Gentle to moderate slope gradients in project areas provide little opportunity for surface runoff to reach stream channels. The stream protection zones [SPZs (variable distances ranging from a minimum of 55 feet on perennial and intermittent streams)] would prevent any overland flow and sediment generated by logging from reaching streams. The SPZs would maintain the current vegetation in the primary shade zone and treatments would retain most of the current levels of shading in the secondary shade zone. Soil compaction is limited to no more that 10 percent of each unit's acreage. Road work (including culvert installations) would take place during the dry season.

Wildlife (*EA sections 3.8 and 4.8*): 1/ Existing snags and CWD would be retained. The few large (greater than 20 inches diameter and greater than 15 feet tall) snags that could be felled for safety or knocked over by falling and yarding operations would be retained as CWD. 2/ No suitable habitat for any BLM special status species known to be present would be lost or downgraded. Therefore, the project would not contribute to the need to list any BLM special status species. 3/ Thinning would not significantly change species diversity (a combination of species richness and relative abundance) of the migratory and resident bird community. No species would become extirpated in the watershed as a result of thinning, though some species would be likely to leave or enter thinned stands as a short-term response to reduced canopy closure and tree density.

Air Quality, Fire Risk, and Fuels Management (*EA sections 3.1 and 4.1*): The Mid and Late-Seral Enhancement and Legacy Tree Release projects may create an increased risk of fire from the slash that is created. This would be mitigated by treating slash in small gaps within Density Management harvest areas, within Phellinus weirii pockets, at timber sale landing areas, and along open roads and property lines where the opportunities for ignition are greatest. The fine fuels (fuels in the one and ten hour size classes) would decay within three to five years in most of the units and the risk of surface fire would decrease to near current levels. The thinning would remove most of the ladder fuels and decrease the crown

bulk density, reducing the risk of a canopy fire. Piling and burning slash at landings and in some fuel treatment areas would have a short duration impact on air quality. Strict adherence to smoke management regulations would result in little or no impact to the public.

Carbon Sequestration and Climate Change *(EA sections 3.2 and 4.2)*: The Rickreall Creek Watershed Enhancement EA is tiered to the PRMP FEIS (1994) which concluded that all alternatives analyzed in the FEIS, in their entirety including all timber harvest, would have only slight (context indicates that the effect would be too small to calculate) effect on carbon dioxide levels. Analyses completed for projects of similar scope, treatment type, stand type, and scale have supported the conclusion of the 1995 RMP that project emissions would be negligible.

With the implementation of the project design features described in EA section 2.6, potential effects to the affected elements of the environment are anticipated to be site-specific and/or not measurable (i.e. undetectable over the watershed, downstream, and/or outside of the project areas). The Projects are designed to meet RMP standards and guidelines, modified by subsequent direction (EA section 1.3); and the effects of these projects would not exceed those effects described in the RMP/FEIS.

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

   Public safety along haul routes would be minimally affected because log truck traffic from forest management activities on both private and public land is common and the majority of the public using these haul routes are aware of the hazards involved in driving on these forest roads. In addition, Project Design Features require use of signs, road blocks, and/or flaggers near project activities to provide for public safety (EA section 2.6).

3. [40 CFR 1508.27(b)(3)] – **Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas:** The proposed project would not affect historical or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas, because these are not located within the project area. Appropriate measures would be taken to protect the ACEC located near the Cedar Ridge timber sale (EA section 2.6)

   - Unique characteristics of the geographic areas [40 CFR 1508.27(b)(3)] because there are no historic or cultural resources, parklands, prime farmlands, wild and scenic rivers, wilderness, or ecologically critical areas located within the project areas (EA section 3.1);

   - Districts, sites, highways, structures, or other objects listed in or eligible for listing in the National Register of Historic Places, nor would the proposed action cause

loss or destruction of significant scientific, cultural, or historical resources [40 CFR 1508.27(b)(8)] (EA section 3.1).

4. [40 CFR 1508.27(b)(4)] – **The degree to which the effects on the quality of the human environment are likely to be highly controversial:** The proposed projects are not unique or unusual. The BLM has experience implementing similar actions in similar areas without highly controversial, highly uncertain, unique, or unknown risks.

5. [40 CFR 1508.27(b)(5)] – **The degree to which the possible effects on the human environment area highly uncertain or involve unique or unknown risks:** The effects associated with the project do not have uncertain, unique, or unknown risks, because the BLM has experience implementing similar actions in similar areas without these risks. Project Design Features (EA section 2.6) would minimize risks associated with the project.

6. [40 CFR 1508.27(b)(6)] – **The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration:** The proposed action would not establish a precedent for future actions, nor would it represent a decision in principle about a further consideration for the following reasons: 1/ The project is within the scope of proposed activities documented in the Salem District RMP. 2/ The BLM has experience implementing similar actions in similar areas without setting a precedent for future actions or representing a decision about a further consideration. See #4 and #5, above.

7. [40 CFR 1508.27(b)(7)] – **Whether the action is related to other actions with individually insignificant but cumulatively significant impacts:** The Interdisciplinary Team evaluated the project area in context of past, present, and reasonably foreseeable actions and determined that there is not a potential for significant cumulative effects on affected resources (EA section 4.0). Effects are not likely to be significant because of the project's scope (effects are likely to be too small to be measurable), scale, and duration.

8. [40 CFR 1508.27(b)(8)] – **The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources:** The project would not affect districts, sites, highways, structures, or other objects listed in or eligible for listing in the National Register of Historic Places, nor would the project cause loss or destruction of significant scientific, cultural, or historical resources.

9. [40 CFR 1508.27(b)(9)] – **The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act (ESA) of 1973:** The proposed project is not expected to adversely affect ESA listed species or critical habitat for the following reasons:

   U. S. Fish and Wildlife Service

Due to potential affects to spotted owls, marbled murrelets and their designated critical habitat, as outlined in Table 5, Section 7(a) of the Endangered Species Act requires that this proposed action receive consultation with the U.S. Fish and Wildlife Service. Consultation has been addressed by inclusion of the proposed action units within either of two batched Biological Assessments (BAs) that analyzed all projects that may modify the habitat of listed wildlife species on federal lands within the Northern Oregon Coast Range during fiscal years 2011 and 2012. All projects of the proposed action have been designed to incorporate all appropriate design standards included in these BAs. A Letter of Concurrence (#13420-2010-I-0105) and a Biological Opinion (#13420-2010-F-0184) have been received from the Service and they do not require any changes or additions to the incorporated project design standards. The Biological Opinion also concludes that the proposed action would not result in jeopardy to listed species and would not adversely modify critical habitat for either the spotted owl or marbled murrelet.

National Marine Fisheries Service (NMFS)
Consultation with NMFS is required for all actions which may affect listed fish species and critical habitat under the ESA.

Project 1
Upper Willamette River Winter Steelhead are listed as threatened under the ESA, as amended, and are known to occur within the Mill Creek, Luckiamute River and Rickreall Creek systems.

A determination has been made that the proposed Project 1 "may affect" Upper winter steelhead. The 'may affect' determination is primarily due to the proximity of listed fish and critical habitat adjacent to proposed haul routes in the Luckiamute River and Rickreall Creek Watersheds. Due to the Proposed Actions' "may affect" determination consultation with NMFS would be required on ESA listed UWR winter steelhead.

The proposed actions would have "no effect" to UWR Spring Chinook salmon and Oregon chub. Generally, the "no effect" determination is based on the distance upstream of project activities (approximately 8 to 25 miles) from ESA listed Chinook salmon critical habitat and historic habitat for Oregon chub. Consultation with NMFS is not required for UWR Spring Chinook salmon or with USFWS for Oregon chub for these projects.

Projects 2 and 3
Proposed actions which may affect would comply with existing programmatic consultation and relevant design criteria, and no additional consultation would be necessary. The proposed actions are covered under NMFS *Endangered Species Act Section 7 Programmatic Consultation Biological and Conference Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Fish Habitat Restoration Activities in Oregon and Washington, CY2007–CY2012*.

Protection of Essential Fish Habitat (EFH) as described by the Magnuson/Stevens Fisheries Conservation and Management Act and consultation with NMFS is required for all projects which may adversely affect EFH of Chinook and Coho salmon. The proposed Rickreall

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

10. [40 CFR 1508.27(b)(10)] – **Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment**: The proposed project has been designed to follow Federal, State, and local laws (EA section 1.3).

Approved by: _____ _____

Rich Hatfield — Date

Marys Peak Resource Area Field Manager