South Yamhill River Watershed Enhancement

Environmental Assessment and Draft Finding of No Significant Impact

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Marys Peak Resource Area

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BLM
Salem District

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SOUTH YAMHILL RIVER WATERSHED ENHANCEMENT
ENVIRONMENTAL ASSESSMENT

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FINDING OF NO SIGNIFICANT IMPACT I

1.0 INTRODUCTION

This environmental assessment (EA) includes the analysis of the proposed projects on the human environment on Bureau of Land Management (BLM) lands in the Marys Peak Resource Area. This EA will provide the decision-maker, the Marys Peak Resource Area Field Manager, with current information to aid in the decision-making process. It will also determine if there are significant impacts not already analyzed in the Environmental Impact Statement (EIS) for the Salem District's Resource Management Plan (RMP) and whether a supplement to that EIS is needed or if a Finding of No Significant Impact is appropriate.

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

1.1 PROJECTS IN THIS EA

This EA includes analyses on two projects in the Adaptive Management Reserve[1] (AMR) and the Riparian Reserve land use allocations: Mid-Seral Habitat Enhancement and Legacy Tree Release and Coarse Woody Debris Creation. A brief overview of each project is included below. Additional details are included in EA Chapter 2 – Alternatives.

Project 1: Mid-Seral Habitat Enhancement – The proposal is to perform density management on approximately 1,168 acres of mid-seral forest stands aged 40 to 78 years[2]. Projects may be implemented through conventional timber sales (for merchantable timber) and stewardship projects (for areas of insufficient economic viability to support a conventional timber sale).

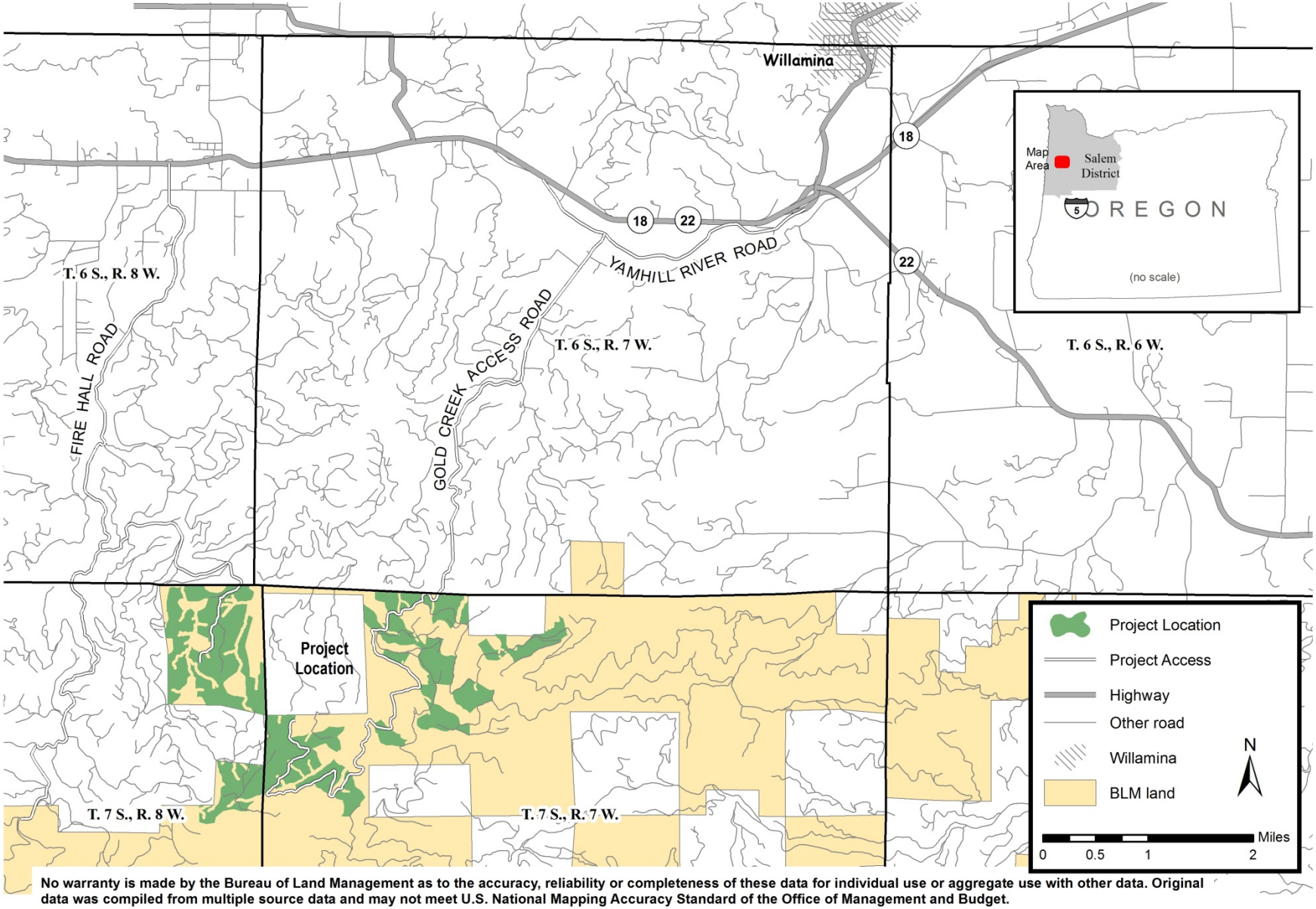
Project 2: Legacy Tree Release and Coarse Woody Debris Creation – The proposal is to conduct legacy tree release and coarse woody debris (CWD) and snag creation within approximately 117 acres of 60 to 80 year old stands in the Adaptive Management Reserve (AMR) and Riparian Reserve land use allocations.

1.2 PROJECT AREA LOCATION

The project areas are located approximately five to seven air miles southeast of Grand Ronde, Oregon, on forested land managed by the Marys Peak Resource Area, Salem District of the BLM. The project areas are within Township 7 South, Range 8 West, Sections 1, 12, 13 and Township 7 South, Range 7 West, Sections 4, 5, 7, and 8, Willamette Meridian (see Map 1 on the following page).

[1] Within the LSR, silvicultural activities may only occur in stands up to 80 years of age. In the AMR, such activities may occur in stands up to the 110 year age class (106 – 115 years).
[2] Ages in 2014. Stand data within the watershed was collected between 2008 and 2011.

Map 1. *Location Map*



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1.3 PURPOSE OF AND NEED FOR ACTION

Project 1 – Mid-Seral Habitat Enhancement

Purpose

Project 1 actions are designed to maintain, enhance, and accelerate the development of late-seral/old-growth (LSOG) forest conditions to benefit terrestrial wildlife and aquatic habitats. Additionally, the sale of timber would help local economies and provide Oregonians with jobs. The interdisciplinary team selected the mid-seral forest stands for management activities to meet the future needs of northern spotted owl, marbled murrelet, and other species dependent upon late-seral/old-growth forest habitats.

The proposed action is to implement a subset of specific management activities in a manner consistent with standards and guidelines described below. The BLM proposes forest management actions on approximately 1,168 acres of forest stands within the South Yamhill-Agency Creek fifth-field watershed. These activities include, but are not limited to, timber harvest, road work (construction, renovation, decommissioning), snag and coarse woody debris creation, and post-harvest fuel reduction treatments.

The Salem District RMP provides direction for managing resources on the land use allocations within the Salem District. The RMP (p. 19) states a portion of the Adaptive Management Area is designated as Late-Successional Reserve. In this EA, it will be referred to as the Adaptive Management Reserves (AMR). Within the AMR, timber harvest may occur in stands up to the 110-year age class (106 to 115 years) to meet Late-Successional Reserve objectives[3]. Proposed actions would also occur within the Riparian Reserves.

Late-Successional Reserves (LSRA p. 2, RMP p. 16):

- Develop, accelerate, and enhance late-successional forest conditions, which serve as habitat for late-successional forest species (LSRA p. 2).
- Plan and implement silvicultural treatments inside Late-Successional Reserves that are beneficial to the creation of late-successional habitat (RMP, p. 16).
- If needed to create and maintain late-successional forest conditions, conduct thinning operations in forest stands up to 80 years of age. This will be accomplished by pre-commercial or commercial thinning of stands regardless of origin (e.g., planted after logging or naturally regenerated after fire or blowdown) (RMP, p. 16).

Adaptive Management Area (RMP, p. 19):

- Restore and maintain late-successional forest conditions which serve as habitat for late-successional forest species, which are consistent with marbled murrelet guidelines.

[3] Within the standard Late-Successional Reserves, silvicultural activities may occur in stands up to 80 years of age.

- Provide a stable timber supply.

Riparian Reserves (RMP pp. 9-15):

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

In addition to meeting the resource objectives outlined above, economic viability is an objective for this project (RMP p. 41):

- Contributions to local, state, and national economies through sustainable use of BLM-managed lands and resources.

Need For Action

There is a need to accelerate the development of LSOG forest conditions in the Agency Creek – South Yamhill River Watershed. Currently, less than two percent of the 89,428 acre watershed provides LSOG habitat for fish and wildlife[4]. Applying density management to existing mid-seral stands is expected to improve conditions for long-term increases in fish and late-successional wildlife species, especially northern spotted owl and marbled murrelet populations.

Current forest stand exam data indicates the managed mid-seral forests in the project areas have declining growth rates and limited structural diversity. These second-growth stands are largely characterized by a single-layered, dense, overstory canopy with little to no large wood (live or dead) remaining from primary-growth stands. Large wood is an important component of aquatic habitat in forested ecosystems and its accumulation within stream channels is necessary for many functions. Large wood provides cover for fish, sediment storage for food supply and spawning grounds, nutrient retention, pool formation, and formation of off-channel habitat. The proposed action would remove some trees so that the retained trees would reach larger diameters sooner, when compared to the no treatment option (See section 3.1 for additional discussion).

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). 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.

Project 2 – Legacy Tree Release and Coarse Woody Debris Creation

[4] See Chapter 5 for a greater breakdown of land owners and age classes in the watershed.

Purpose

The purpose of this project is to release declining larger and/or older forest legacy trees (see Figure 1) that are undergoing encroachment from densely-stocked younger conifer stands and to enhance terrestrial wildlife habitats by creating snags and CWD within such forest stands where this structural component is lacking.

Research has demonstrated the importance of maintaining and enhancing forest legacy features, CWD, and in-stream wood structures. The Northwest Forest Plan, Late Successional Reserve Assessment Oregon Coast Province-Northern Portion, and local watershed analyses have all identified these types of treatments as a key component of restoration efforts within the LSR.

Late Successional Reserves (RMP pp. 35-36):

- Maintain habitat suitable for the northern spotted owl and the marbled murrelet.
- Promote development of habitat suitable for nesting, roosting, and foraging for the northern spotted owl in stands that do not currently meet suitable habitat criteria.
- Promote development of nesting habitat for the marbled murrelet in stands that do not currently meet nesting habitat criteria.

Riparian Reserves (RMP pp. 9-15):

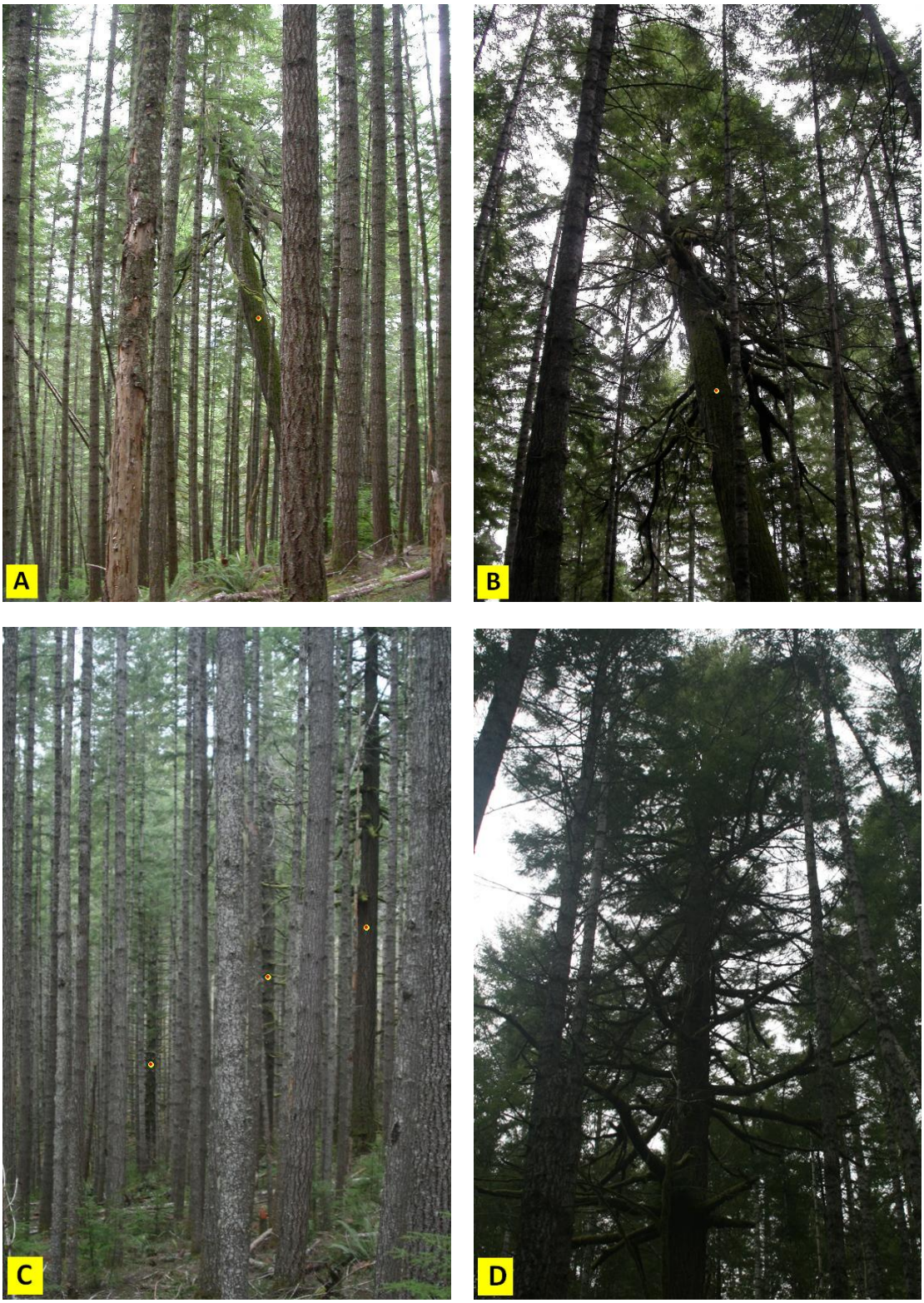
- Provide for conservation of special status fish and other special status aquatic species.
- Provide for riparian and aquatic conditions that supply stream channels with shade, sediment filtering, leaf litter and large wood, and streambank stability.
- Enhance or restore habitat (e.g. CWD, snag habitat, instream large wood) for populations of native riparian-dependent plants, invertebrates, and vertebrate species.
- Improve structural and spatial stand diversity on a site-specific and landscape level in the long-term.

Need for Action

The proposed action would address the immediate need for treatment of declining larger and older forest legacy trees in forest stands where the ascending canopy of densely-stocked younger conifers threatens to shade out and kill these larger or older forest legacy trees (see Figure 1). There is a need to cut, girdle, or top individual trees or trees in clumps (one-quarter acre to one acre in size) which are encroaching on and adversely affecting the survivability of older forest legacy trees. Saving these declining trees and creating high quality CWD is expected 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 Critical Habitat Units (CHUs) that have been designated for this species.

Figure 1 on the following page show examples of declining larger or older forest legacy trees that would benefit from release from encroaching younger conifer forest stands.

Figure 1. (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.



1.4 DECISION CRITERIA AND PROJECT OBJECTIVES

The Marys Peak Resource Area 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 will:

- Best meet the purpose and need of the project (section 1.3).
- Be economically viable and efficient.
- Comply with the Salem District RMP and related documents which direct and provide the legal framework for management of BLM lands within the Salem District (section 1.5).
- Not have significant impacts on the affected elements of the environment beyond those already anticipated and addressed in the RMP EIS.

1.5 CONFORMANCE WITH LAND USE PLANS, POLICIES, AND PROGRAMS

The South Yamhill River Watershed Enhancement projects have been designed to conform to the following documents, which direct and provide the legal framework for management of BLM lands within the Salem District:

- *Salem District Record of Decision and Resource Management Plan*, May 1995 (RMP) as amended.
- *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl*, April 1994 (the Northwest Forest Plan, or NWFP).
- *Record of Decision and Standards and Guidelines for Amendment to the Survey & Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines* (S&M ROD, January 2001).

The following documents provided additional direction in the development of the South Yamhill River Watershed Enhancement projects:

- *Late Successional Reserve Assessment, Oregon Coast Province – Northern Portion* (1998).
- *Mill Creek, Rickreall Creek, Rowell Creek, Luckiamute River Watershed Analysis* (1998).

The above documents, along with the South Yamhill River Watershed Enhancement interdisciplinary team reports (section 7.0), are incorporated by reference in this EA and are available for review in the Salem District Office. Additional information about the proposed

projects is available within the South Yamhill River Watershed Enhancement EA Analysis File, which is also available at the Salem District Office.

1.5.1 Survey and Manage Review

The South Yamhill River Watershed Enhancement projects are consistent with court orders relating to the Survey and Manage mitigation measure of the Northwest Forest Plan, as incorporated into the Salem District RMP.

In December 2009, the District Court for the Western District of Washington issued an order on partial summary judgment in favor of the Plaintiffs finding inadequacies in the National Environmental Policy Act (NEPA) analysis supporting the "Record of Decision to Remove the Survey and Manage Mitigation Measure Standards and Guidelines from Bureau of Land Management Resource Management Plans Within the Range of the Northern Spotted Owl" (BLM et al. 2007)(2007 ROD). The District Court did not issue a remedy or injunction at that time.

Plaintiffs and Defendants entered into settlement negotiations that resulted in the 2011 Survey and Manage Settlement Agreement adopted by the District Court on July 6, 2011.

The Defendant-Intervenor subsequently appealed the 2011 Settlement Agreement to the Ninth Circuit Court of Appeals. The April 25, 2013, ruling in favor of the Defendant-Intervener remanded the case back to the District Court.

On February 18, 2014, the District Court vacated the 2007 RODs. Vacatur of the 2007 RODs resulted in returning the BLM to the status quo in existence prior to the 2007 RODs, which includes the use of the "Pechman" exemptions.

The District Court and all parties agreed that projects begun in reliance on the Settlement Agreement should not be halted. The District Court order allowed for the Forest Service (FS) and BLM to continue developing and implementing projects that met the 2011 Settlement Agreement exemptions or species list as long as certain criteria were met. These criteria include:

> (1) projects in which any Survey and Manage pre-disturbance survey has been initiated (defined as at least one occurrence of actual in-the-field surveying undertaken according to applicable protocol) in reliance upon the Settlement Agreement on or before April 25, 2013;
>
> (2) projects, at any stage of project planning, in which any known site (as defined by the 2001 Record of Decision) has been identified and has had known site-management recommendations for that particular species applied to the project in reliance upon the Settlement Agreement on or before April 25, 2013; and
>
> (3) projects, at any stage of project planning, that the BLM and FS designed to be consistent with one or more of the new exemptions contained in the Settlement Agreement on or before April 25, 2013.

The South Yamhill projects did not rely on any of the new exemptions from the 2011 Settlement Agreement, but applied a 2006 Pechman exemption that was allowed in the agreement. Because the projects include no regeneration harvest and includes thinning only in stands less than 80 years old, this project meets Exemption A of the Pechman Exemptions (October 11, 2006 Order).

Project 2 meets 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 project surveys are included in the wildlife section of this EA.

1.5.2 Relevant Statutes and Authorities

This section is a summary of the relevant statutes and authorities that apply to this project.

- Aquatic Conservation Strategy
- Archaeological Resources Protection Act of 1979
- Clean Air Act (1990)
- Clean Water Act (1987)
- Endangered Species Act (ESA) (1973)
- Federal Land Policy and Management Act (1976)
- Migratory Bird Treaty Act of 1918
- National Environmental Policy Act (NEPA) of 1969
- Oregon and California Act (1937)

1.6 RESULTS OF SCOPING

On April 4, 2012 the BLM sent a scoping letter to 24 potentially affected or interested individuals, groups, and agencies. This scoping letter provided information on the 1,800 acres of BLM-managed land that were originally considered for treatment within this watershed. The BLM received three responses during the 30 day scoping period and used these comments to refine the proposed action and to aid in the identification of issues described below.

1.6.1 Relevant Issues

The Marys Peak Resource Area interdisciplinary team identified relevant issues based on applicable law, management direction contained in the RMP, and information gathered during the scoping and project planning process. Issues are analyzed in detail if the analysis of the issue is necessary to make a reasoned choice between alternatives or if the issue is associated with potentially significant impacts or analysis is necessary to determine the significance of the impacts. Analysis of these issues provides a basis for comparing the environmental effects of the alternative and aids in the decision-making process. The interdisciplinary team considered the following issues as it developed and refined the project alternatives, identified PDFs, and analyzed the environmental effects.

Issue 1: *Would the proposed actions have any impacts on Bureau Special Status, including Survey and Manage, botanical and fungal species? Section 3.1.*

Issue 2: *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? Section 3.1.*

Issue 3: *What effects would density management have on mid-seral forest stand health and composition? Would the effects contribute to Adaptive Management Area, Late Successional Reserve and Riparian Reserve LUA objectives? Section 3.1.*

Issue 4: *How would the proposed action affect terrestrial habitats within the project area and across the watershed? Section 3.2.*

Issue 5: *How would the proposed action affect wildlife species, which BLM, by law and policy, is required to protect, maintain, or recover? Section 3.2.*

Issue 6: *What effects would the proposed actions have on resident and anadromous fish and aquatic habitat? Section 3.3.*

Issue 7: *What effects would the proposed action have on Endangered Species Act listed fish and their habitat? Section 3.3*

Issue 8: *What effects would road construction have on water quality? Section 3.4.*

Issue 9: *What effects would road construction have on soil productivity? Section 3.5.*

Issue 10: *What effects would the proposed actions have on fuel loading, fire risk, and air quality? Section 3.6.*

Issue 11: *How would the proposed projects affect designated and dispersed recreational use of the area? How would the project activities affect the rural interface? What effects would the projects have on the visual resources? Section 3.7.*

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 identified during public scoping and was used to generate an alternative, Alternative 3 – Limited Road Construction. An alternative that minimizes 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 (Limited Road Construction).

2.1.1 Planning and Implementation Process

In planning the South Yamhill River Watershed Enhancement projects, the interdisciplinary team developed criteria using direction in the RMP for selecting stands to be treated, type of silvicultural treatments, boundary locations, logging systems, fuel treatments, and road system design and use.

The interdisciplinary team also developed a set of project design features (PDFs) to guide the implementation of the projects. The actions described in EA section 2.0, analyzed in EA section 3.0, and the PDFs in section 2.6, taken together, form the best management practices (BMPs) for the South Yamhill River Watershed Enhancement projects and are based on site-specific application of the principles contained in the RMP.

The BLM will consider and evaluate comments received in response to public review of this EA and make any necessary changes to the analysis or the proposed action. Such changes and response to comments would be included in subsequent NEPA documentation or project-specific or sale-specific Decision Records[5].

The BLM would implement the selected actions and PDFs analyzed in this EA during project layout (physical delineation of treatment boundaries and road locations) and timber sale contract provisions. The BLM would write and administer the timber sale contract and would require the timber sale operator to accomplish the requirements of the contract in a manner that is consistent with the actions and project design features analyzed in this EA. Trained and authorized BLM employees would oversee the administration of contract provisions.

[5] At the time of this analysis, the first timber sale is scheduled to be offered in fiscal year 2015. Decision Records are published one month prior to sale date or implementation.

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:

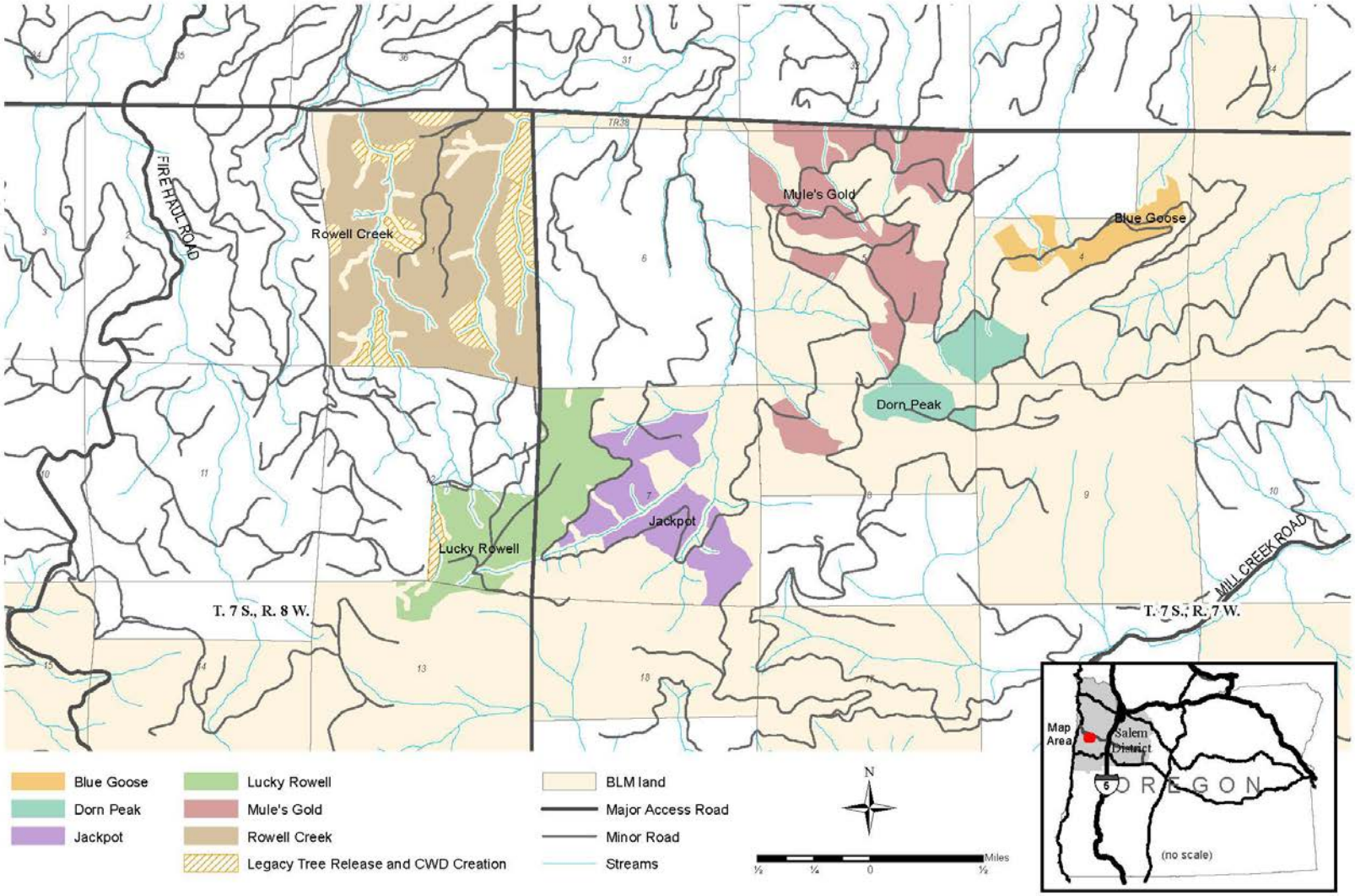
- Silviculture treatments to enhance fish and wildlife habitats
- Timber harvest, which would support local economies
- Road construction, renovation, or decommissioning
- Fuel reduction treatments
- Big game and migratory bird habitat improvement
- Cut, girdle or top-cut individual trees or clumps of trees (0.25 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)

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 these 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

Two projects are proposed under this alternative: Mid-Seral Habitat Enhancement (Project 1) and Legacy Tree Release and Coarse Woody Debris Creation (Project 2). They are described in detail in sections 2.3.1 and 2.3.2. A map of the project areas is on the following page.

Map 2. *Alternative 2 – All Projects*



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2.3.1 Project 1: Mid-Seral Habitat Enhancement

The proposed project consists of density management treatments on BLM lands in the Adaptive Management Reserves and Riparian Reserves. Projects may be implemented through the following six timber sales and stewardship projects: Blue Goose, Dorn Peak, Jackpot, Lucky Rowell, Mule's Gold, and Rowell Creek[6]. Forest stands range in age from 40 to 78 years of age at the time of this analysis.

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. Table 1 below provides an overview of the actions covered under Project 1.

Table 1

Project 1 Activities in Alternative 2

Activity	Alternative 2 – Proposed Action
Density Management (total acres)	1,168
Adaptive Management Reserve	772
Riparian Reserves	396
Ground-based yarding (acres)	298 (276 for density management, 22 for right-of-way construction)
Skyline yarding (acres)	870
Aerial (helicopter) yarding (acres)	0
New road construction (miles)	5.0
Road renovation (miles)	26.4

Maps of the Project 1 timber sales, as analyzed under Alternative 2, are located in Appendix C of this EA. These maps provide draft boundaries, buffers, and logging systems upon which the interdisciplinary team based their analyses. As stated in the previous section, updates or deviations from the planned project boundaries or design would be addressed in project-specific Decision Records.

[6] Silvicultural prescriptions have been prepared for each timber sale and are available for review upon request.

Table 2 provides additional details on the six planned projects, including total acres, acres by land use allocation, unit numbers, and their associated acres and ages.

Table 2

Project 1 Timber Sales as Analyzed in Alternative 2

Timber Sale	Total Acres	Acres by LUA		Unit	Acres[1]	Age in 2014
		AMR	RR			
Blue Goose	**68**	54	14	4A	22	44
				4B	20	46
				4C	24	53
				4D	2	58
Dorn Peak	**92**	79	13	4E	26	45
				5D	25	45
				8D	41	45
Jackpot	**152**	76	76	7B	4	63
				7C	15	44
				7D	25	43
				7E	36	40
				7F	49	48
				7G	23	62
Lucky Rowell	**212**	158	54	7A/12A	139	68
				7B/12B	55	63
				7C	12	44
Mule's Gold	**263**	201	62	5A	138	45
				5B	85	43
				5C	13	43
				8A	26	76
Rowell Creek	**381**	204	177	1A	327	78
				1B	7	72
				1C	32	74

[1]Unit acres listed exclude approximately 22 acres that would be cleared for rights-of-way (new road construction)

2.3.2 Project 2: Legacy Tree Release and Coarse Woody Debris Creation

Older forest legacy trees (mature open-grown trees or old-growth remnant trees) and other large, open-grown trees that occur in densely-stocked conifer stands would be released through the felling, girdling and topping of individual trees or creation of gaps (one-quarter acre to one acre in size). Approximately 117 acres[7] in forest stands aged 60 to 80 years old[8] would be treated within five years of the Decision Record (depending on funding).

Treatments in selected forest stands would release such trees so that their complex crown structure would be released from adjacent tree competition for light, moisture, and growing space. The majority of trees targeted to be felled, topped, or girdled would be 7 to 18 inches DBH (diameter breast height) Douglas-fir trees and none would be greater than 30 inches DBH. 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 may be removed and placed into streams to improve fish habitat.

2.4 ALTERNATIVE 3 – LIMITED ROAD CONSTRUCTION

This alternative was developed in response to concerns regarding road construction. This alternative analyzes a limited amount of road construction to support the proposed timber sales. As a result, some Project 1 timber sales decreased in size (due to logging infeasibility) or were analyzed for aerial harvesting, a more expensive, but less environmentally impactful, harvesting method. Some acres that dropped from Project 1 are included in Project 2 in this alternative. The Team determined that despite no longer being viable as conventional timber sale units, these areas were still suitable for treatments to enhance their structure, diversity, and improve their standing and down coarse woody debris conditions.

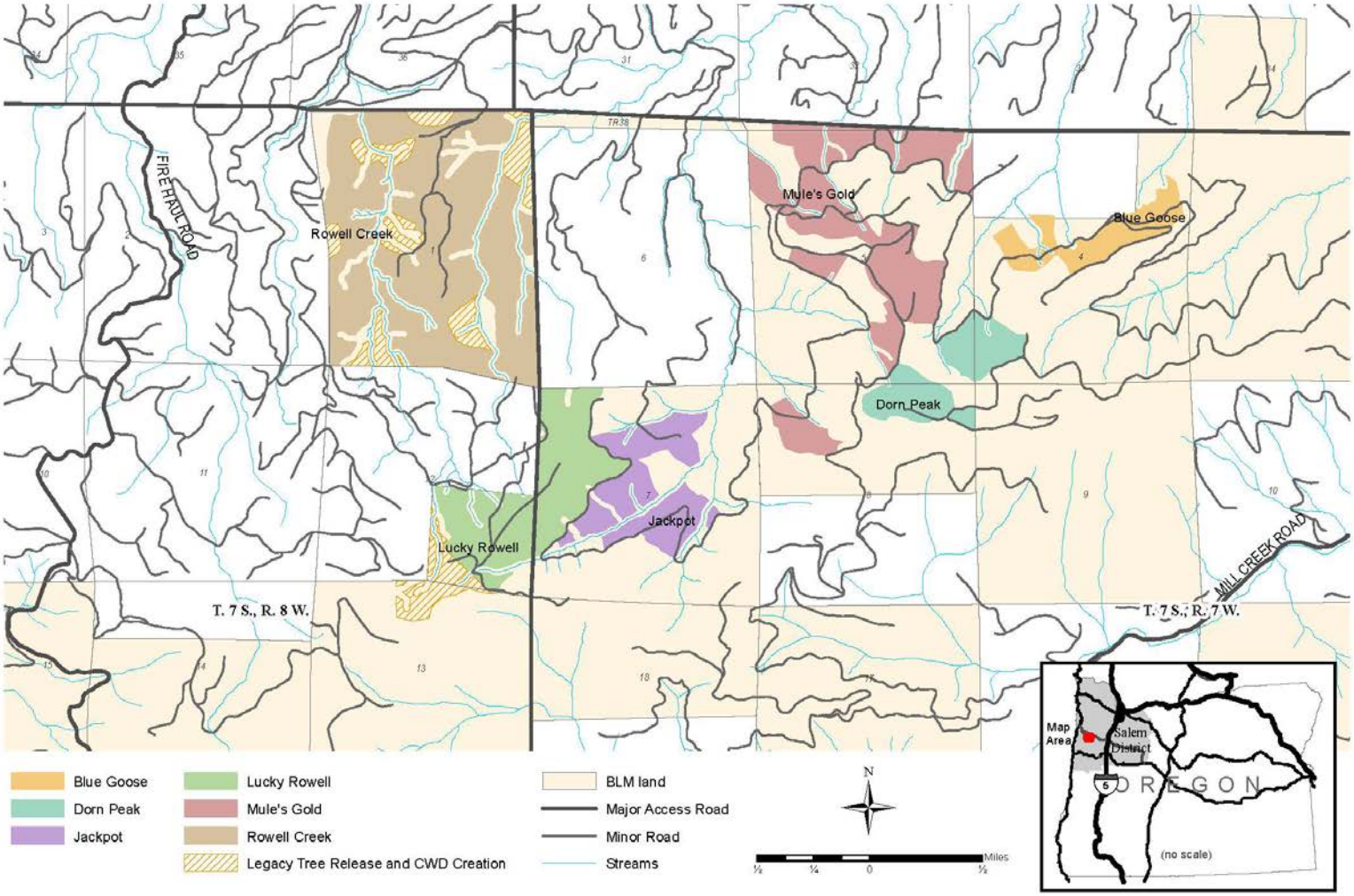
As in Alternative 2, two projects are proposed under this alternative: Mid-Seral Habitat Enhancement (Project 1) and Legacy Tree Release and Coarse Woody Debris Creation (Project 2). They are described in detail in sections 2.4.1 and 2.4.2. A map of the project areas is included on the following page.

[7] Areas selected for inclusion in Project 2 are generally areas dropped from Project 1 boundaries due to logging feasibility or suitability concerns.

[8] Stands are in the general vicinity of project units and overlap some of the same stand boundaries (see Map 2). However, some stands included in Project 2 contain stands up to 80 years of age. All Project 1 units are under 80 years of age.

Map 3. *Alternative 3 – All Projects*

United States Department of the Interior - BUREAU OF LAND MANAGEMENT
SOUTH YAMHILL RIVER WA EA MAP - PROJECT OVERVIEW (ALT. 3)
SALEM DISTRICT - OREGON



No warranty is made by the Bureau of Land Management as to the accuracy, reliability or completeness of these data for individual use or aggregate use with other data. Original data was compiled from multiple source data and may not meet U.S. National Mapping Accuracy Standard of the Office of Management and Budget.

2.4.1 Project 1: Mid-Seral Habitat Enhancement

As in Alternative 2, the project consists of density management treatments involving the following six timber sales and stewardship projects: Blue Goose, Dorn Peak, Jackpot, Lucky Rowell, Mule's Gold, and Rowell Creek.

Trees would be harvested by ground-based, skyline, and aerial harvest systems and would adhere to Project Design Features (section 2.6) to their respective systems. Table 3 below provides an overview of the actions covered under Project 1.

Table 3

Project 1 Activities as Analyzed in Alternative 3

Activity	Alternative 3 – Limited Road Construction
Density Management (total acres)	1,124
Adaptive Management Reserve	729
Riparian Reserves	395
Ground-based yarding (acres)	257 (249 for density management, 8 for right-of-way construction)
Skyline yarding (acres)	640
Aerial (helicopter) yarding (acres)	227
New road construction (miles)	1.76
Road renovation (miles)	24.7

Maps of the Project 1 timber sales, as analyzed under Alternative 3, are included in Appendix D of this EA. These maps provide draft boundaries, buffers, and logging systems upon which the Team based their analyses. As stated in the previous sections, updates or deviations from the planned project boundaries or design would be addressed in project-specific Decision Records.

Table 4 on the following page provides additional details on the six planned projects. As with Table 2 for Alternative 2, this table includes total acres, acres by land use allocation, unit numbers, and their associated acres and ages.

Table 4

Project 1 Timber Sales as Analyzed in Alternative 3

Timber Sale	Total Acres	Acres by LUA		Unit	Acres[1]	Age in 2014
		AMR	RR			
Blue Goose	**68**	54	14	4A	22	44
				4B	20	46
				4C	24	53
				4D	2	58
Dorn Peak	**92**	79	13	4E	26	45
				5D	25	45
				8D	41	45
Jackpot	**118**	52	66	7B	4	63
				7C	15	44
				7D	25	43
				7E	37	40
				7F	37	48
				7G	Dropped in Alt 3	62
Lucky Rowell	**185**	145	40	7A/12A	113	68
				7B/12B	56	63
				7C	12	44
Mule's Gold	**248**	201	62	5A	123	45
				5B	85	43
				5C	13	43
				8A	26	76
Rowell Creek	**413**	210	203	1A	370	78
				1B	7	72
				1C	33	74

[1]Unit acres listed exclude approximately eight acres that would be cleared for rights-of-way (new road construction)

2.4.2 Project 2: Legacy Tree Release and Coarse Woody Debris Creation

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 (one-quarter acre to one acre in size). Approximately 106 acres in forest stands aged 60 to 80 years old[9] would be treated within five years of decision

[9] Stands are in the general vicinity of project units and overlap some of the same stand boundaries (see Map 9). However, some stands included in Project 2 contain stands up to 80 years of age. All Project 1 units are under 80 years of age.

(depending on funding). Treatments in selected forest stands would release the larger or older forest legacy trees so that this complex crown structure would be released from adjacent tree competition for light, moisture, and growing space. The majority of trees targeted to be felled, topped, or girdled would be 7 to 18 inches DBH Douglas-fir trees and none would be greater than 30 inches DBH. 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 may be removed and placed into streams to improve fish habitat.

2.5 CONNECTED ACTIONS

2.5.1 Road Work

The Team has analyzed road work, including construction, renovation, and decommissioning that would occur in support of or part of the planned timber harvests. Table 7 in section 2.7 of this EA provides an overview of estimated road work by alternative at the time of this analysis. Details of the road work are included in the subsequent paragraphs.

Road Construction

Approximately 5.0 miles of new roads would be constructed under Alternative 2 and approximately 1.76 miles under Alternative 3. Roads would be located primarily on ridge tops; no stream crossings would be needed for these new roads. Cross drain culverts and drive thru dips would be installed as needed.

Road Renovation

At the time of this analysis, 25 stream culverts have been identified for possible replacement to meet RMP standards, but this number may increase depending on road conditions at the time of project implementation. Roads would be resurfaced and culverts would be replaced or installed as needed to promote proper water drainage and minimize sediment delivery to streams.

For both action alternatives over 20 miles of existing and generally drivable roads would be renovated to their original design standard. At the time of this analysis, sixty cross drain culverts have been identified for possible replacement, but this number may increase depending on road conditions at time of implementation. Renovation may include blading and shaping of roadway, clearing brush from cut and fill slopes, cleaning or replacing culverts, re-establishing ditches, road realignment, slide and fill failure repair, structure upgrades, and applying rock surfacing material to depleted surfaces.

Road Decommissioning

The interdisciplinary team reviewed the existing and planned roads in the project area and made initial determinations regarding their disposition after completion of harvest operations. At the

time of this analysis, Alternative 2 includes decommissioning on approximately 6.8 miles of roads[10]. Alternative 3 would decommission approximately 3.7 miles of roads[11].

Only 0.7 miles of the 5.0 miles of new road construction, which would be primarily rocked roads on ridgetops, may be left open for future administrative purposes. Some decommissioning would be completed as part of the timber sale operations. Others, such as those temporarily left open for administrative purposes, would be decommissioned by the BLM at a later date.

Road decommissioning can entail many activities and the level is determined on a site-specific basis. Waterbars may be installed, grass seed may be applied to exposed soils on cut or fill slopes, and entrances may be blocked to prevent vehicular traffic.

2.5.2 *Fuel Treatments*

Post-treatment fuels hazard surveys would be conducted and site-specific fuels treatments would be recommended. Fuel reduction treatments would be conducted in selected areas to reduce the potential for human caused wildfire ignition, to reduce the potential for wildfire to cross property lines between BLM and private land, and to reduce both the intensity and severity of potential wildfires in the long term (after fuel reduction has occurred).

Fuel reduction treatments may include pile construction, covering, and burning at landings, within treatment areas, along roads, or along property lines. Other options include slash pullback, slashing, lopping and scattering, and firewood cutting. In lieu of burning, the BLM and operator may remove slash at landing areas to be used as mulch to cover roadbeds during stabilization.

2.6 PROJECT DESIGN FEATURES

The section provides the project design features that would reduce the risk of adverse impact to the affected elements of the environment described in EA Chapter 3.

Project 1 – Mid-Seral Habitat Enhancement

Table 5 on the following page provides a summary of seasonal restrictions that would apply to Project 1.

[10] The 6.8 miles breaks down as follows: 4.3 miles is newly constructed road that would be decommissioned after harvest. The remaining 2.5 miles to be decommissioned are currently existing roads in the project area.
[11] The 3.7 miles breaks down as follows: 1.3 miles is newly constructed road that would be decommissioned after harvest. The remaining 2.4 miles to be decommissioned are currently existing roads in the project area.

Table 5

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, renovation, decommissioning	Minimize soil erosion
During periods of low soil moisture[12], 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
During periods of dry weather and low soil moisture, generally May 1 to October 31	Timber hauling on the following roads: Firehall Road 6-8-13.0, Gooseneck Road 6-6-31.0, and any un-surfaced roads.	Minimize soil erosion and stream sedimentation
July 1 to August 31	In-stream work period (culvert installation)	Minimize soil erosion and stream sedimentation

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

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 (TH 18, 19, S 4).

- Existing and new skid trails would be less than 10 percent of the harvest area (TH 9).

- Limit width of skid trails and skyline corridors 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 (less than 15 percent) 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[13] (TH 14).

- Skid and harvest roads would be blocked where they access main vehicular roads following completion of ground-based yarding (TH 21).

- Ground-based yarding equipment may 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). Any portions of the tree that fall within the SPZ would be left on site.

- During periods of rainfall when water is flowing off road surfaces, the Authorized Officer may restrict log hauling to minimize water quality impacts, and/or require the Purchaser to apply mitigation measures, including but not limited to: installing silt fences, bark bags, or applying additional road surface rock (R 72, R 73).

[13] See exception for Alternative 3 on page 30 of this EA.

- Repair damaged culvert inlets and downspouts to maintain drainage design capacity (R 39, 82).

- 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 89-100).

To Contain and/or Reduce Noxious Weed Infestations on BLM-managed Lands Using an Integrated Pest Management Approach

- Soil disrupting equipment and other heavy equipment or transportation vehicles would be required to be clean and free of dirt and vegetation prior to arriving on BLM-managed lands as directed by the Authorized Officer (SP 1).

- Large areas of exposed mineral soil[14], as determined by the Authorized 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. Prior to applying seed, the contractor would 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. Minimum SPZ width would be established through shade sufficiency analysis[15] (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 percent canopy cover in the secondary shade zone (S 9).

- Except within Section 1 (the Rowell Creek timber sale), no yarding would be permitted in or through any SPZs within the harvest areas. Yarding on approximately 21 skyline corridors within the SPZ would be done with full suspension (TH 7, 16, 17). Trees impairing the function of the corridor could be felled and left on site.

- No refueling would be allowed within 100 feet of any standing or running water (SW 8, 9, SP 1, RST 10).

[14] Large areas may include, but are not limited to, roads to be constructed, cut banks, landings, and skid roads.
[15] SPZ widths range from 55 feet to 100 feet.

- Woody material removed from stream crossing for culvert maintenance would 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. Variable basal area prescriptions, targeting a unit-average range of 100 to 160 square feet basal area of trees would be retained. Marking guidelines do not apply to road rights-of-way.

- 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 (stream protection zones).

- Any plus trees (trees selected for genetic traits) and their reference trees, and bearing trees would be reserved from harvest.

- In most stands, trees less than 7 inches DBH would be reserved from harvest. Selected conifers less than 7 inches DBH may be cut on those units that have greater than 100 trees per acre less than 7 inches DBH. Cut trees less than 7 inches DBH may be left on site, removed to the landing, or otherwise utilized.

- Except in yarding corridors and skid trails, and Dorn Peak Units 4E, 5A, 5D and 8D (where red alder is abundant), hardwood tree species would be retained. Except in yarding corridors and skid trails, western red cedar 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, Pacific yew) where they are not abundant.

- In areas infected with laminated root rot (*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.

- In areas of western hemlock infected with dwarf mistletoe: trees with severe infection (infected in the mid or upper crown) may be removed to reduce the spread of

infection or to reduce stand density. Western hemlock less severely infested with mistletoe may be retained to provide enhanced tree structural habitat.

- 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.

- Live trees with damage (hollow, cavities, dead or broken tops, etc.) would be reserved.

- Additional trees would be cut around the largest diameter trees with the fullest live crowns to maintain their open-grown, wolf- tree structure.

- In Rowell Creek timber sale (T. 7 S., R. 8 W., Sec. 1) three unthinned wildlife connectivity corridors would connect stream buffers to provide connectivity for wildlife movement (see Rowell Creek maps in appendices C and D).

- Patch openings would be sited in areas of existing understory, vigorous shrub understory, existing low tree density and in areas of relatively uniform, high density trees. Gaps would not be placed adjacent to property boundaries and stream buffers. Debris accumulations would be treated to reduce fuels and enhance vegetation development.

- Patch openings would generally be allowed to naturally regenerate to conifer forest, except planting of trees for the purpose of increasing species diversity.

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 DBH 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 DBH 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 Late Successional Reserve Assessment (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 (windthrow, bug kill, etc.) would be conducted within five years of harvest action. Any units or

portions of units that lack the desired CWD input (Table 6) would be available for CWD treatment, dependent upon available funding.

Table 6

Coarse Woody Debris Management Strategies for Project 1

LSRA CWD Strategy[1]	Applicable Units	Desired CWD Input[2]	Acres	Treatment comments
Strategy 1	Rowell-1B, 1C	4-8	39	Provide High CWD levels to supplement moderate volume; Likely last entry into 72-74 year-old stands with sufficient TPA >20 inches.
Strategy 2	Rowell-1A, Lucky Rowell-7A/12A, 7B/12B, Blue Goose-4C, 4D, Jackpot-7G	3-6	582	Stands are 44-78 years old with moderate CWD levels. Sufficient TPA>20 inches to provide moderate level of hard CWD with at least half of input as snags in scattered clusters.
Strategy 3	All remaining Density Management units	1-3	547	Young stands 40-44 years old with small QMD and low to moderate CWD. Provide minimal CWD input and defer CWD recruitment to future.
Strategy 4	All Dropped Units and Stream Protection Zones	N/A	605	Portions of units that were dropped from treatment and not treated by Project 2 would retain natural processes of CWD recruitment.

[1] CWD strategies are described in the LSRA (p. 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 without intervention.

[2] Desired Input includes the number of trees per acre of all CWD that would be newly recruited during or after harvest activities.

Post-Harvest Salvage of Windthrown Trees

If blowdown occurs within or adjacent to the project area following harvest activities, windthrown trees may be salvaged without further NEPA analysis under the following conditions:

1) The Team determines them to be in excess of needs for coarse woody debris, consistent with land use allocation objectives;
2) The Team 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 applicable project design features contained herein. Affected areas would be surveyed for reforestation needs and may be planted with tree seedlings.
5) Utilization of any closed roads would be restored to the condition prior to salvage operations.
6) If windthrown trees occur within Riparian Reserves, trees would be reserved as needed to attain Aquatic Conservation Strategy objectives or maintain public safety. Specifically:
    a. Windthrown trees originating in the Riparian Reserve would be reserved as CWD and left on site.
    b. Windthrown trees originating outside the Riparian Reserves which fall into the Riparian Reserves may be removed; however, the portion of tree that reaches through the Riparian Reserves and enters the SPZ would be left on site as coarse woody debris.

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 or bureau special status 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, felling and yarding operations at Jackpot 7D 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). This would require a seasonal restriction on the following units:

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

- Hazardous fuels surveys would be conducted and site specific plans for hazard fuels reduction treatments would be implemented by the Authorized Officer following harvest operations.

- 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.

- Hand, machine, and landing pile construction and burning may be used individually or in combination in any harvest, restoration, or wildlife habitat enhancement project areas where fuel loading is heavy, the fire risk is determined to be high, or site preparation is required to help facilitate tree planting or other restoration treatments.

- When hand, machine, or landing piles are identified by the Authorized Officer as the specified fuels treatment the following requirements would apply:
    - Piles would be located as far as possible from large snags, green trees, and other reserved trees to minimize damage.
    - Large woody debris greater than six inches in diameter would be retained on site and not piled.
    - Piles would not be constructed on top of stumps or existing coarse woody debris (CWD).
    - Piles would be covered with .004 mil. thick black polyethylene plastic. The plastic shall adequately cover the pile to ensure ignition, and would be placed and anchored to help facilitate the consumption of fuels during the high moisture fall/winter burning periods.

- In skyline yarding areas:
    - Machine and landing piles would only be constructed within 25 feet of designated roads and landings.

    - Equipment used in the construction of machine and landing piles would remain on the roads or landings during the construction.

- In ground-based yarding areas:
    - Machine piles would not be constructed within 25 feet of property lines and unit boundaries, or on slopes greater than 35 percent.
    - Operating techniques would be designed to prevent gouging, soil compaction and displacement, and erosion.
    - Equipment would operate only during periods of low soil moisture on existing roads and skid trails, on top of a slash mat, and/or would be limited to a single pass to protect the soil surface.

- 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 and property lines) 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, and slash greater than six inches in diameter would remain on site.

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. If any cultural and/or paleontological resource (historic or prehistoric site or object) is discovered during project activities all operations in the immediate area of such discovery shall be suspended until an evaluation of the discovery can be made by a professional archaeologist to determine appropriate actions to prevent the loss of significant cultural or scientific values.

Project Design Feature Specific to Alternative 3 Only

Ground-based equipment would be allowed to operate on slopes less than 45 percent within the helicopter 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 percent 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.

PROJECT 2 – LEGACY TREE RELEASE AND COARSE WOODY DEBRIS CREATION

To Protect and Enhance Stand Diversity and Wildlife Habitat Components

- Some trees selected for treatment would be scattered individual trees or in small clusters (up to five 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 (one-quarter acre to one acre in size) that surround or lay adjacent to older forest legacy trees or dominant open-grown 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 larger trees per acre (greater than 18 inches DBH) and up to 20 smaller trees per acre (less than 18 inches DBH) 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 due to encroachment from young conifers.

- To avoid impacts to trees that exhibit complex upper canopy structure, no older forest legacy trees or large conifer trees (greater than 30 inches DBH) 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 felled.

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 1,000 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 Threatened and Endangered or special status botanical, fungal, or animal species are found within or adjacent project areas. These areas would be managed 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 meet the objectives of the Aquatic Conservation Strategy (ACS) Component #1 (Riparian Reserves)

- Stream protection zones would be established along all streams and identified wet areas within the proposed treatment units. As with Project 1, these zones would range between a minimum of approximately 55 feet and 100 feet from the high water mark.

- Scattered individual trees or small clusters of trees (fewer 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 and left in place.

- 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 Air Quality, Reduce Fire Risk, and Manage Fuels

- Hazardous fuels surveys would be conducted and site specific plans for hazard fuels reduction treatments would be implemented by the Authorized Officer following harvest operations.

- 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.

- Hand pile construction and burning or other fuels treatments may be used individually or in combination in any restoration, or wildlife habitat enhancement project areas where fuel loading is heavy, the fire risk is determined to be high, or site preparation is required to help facilitate tree planting or other restoration treatments.

- When hand piling is identified by the Authorized Officer as the specified fuels treatment the following requirements would apply:
  - Piles would be located as far as possible from large snags, green trees, and other reserved trees to minimize damage.
  - Large woody debris greater than six inches in diameter would be retained on site and not piled.
  - Piles would not be constructed on top of stumps or existing CWD.
  - Piles would be covered with .004 mil. thick black polyethylene plastic. The plastic shall adequately cover the pile to ensure ignition, 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 and property lines) and not heavy enough to warrant burning.

2.7 COMPARISON OF ALTERNATIVES

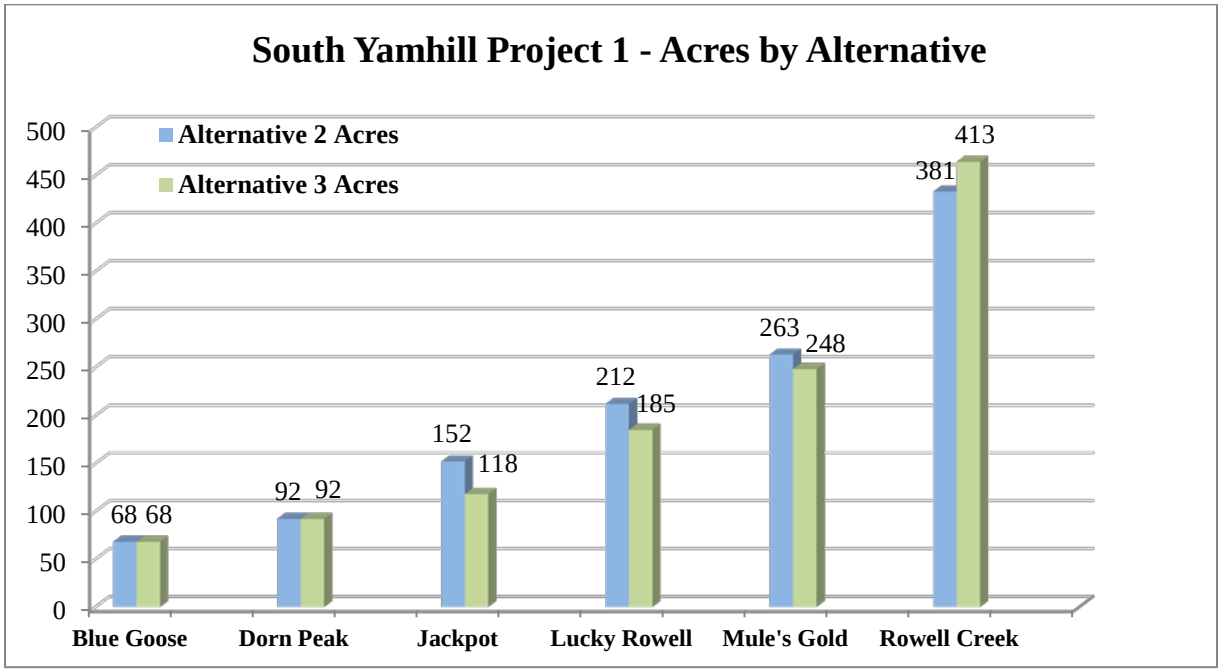
This section provides qualitative and quantitative comparisons between the alternatives described in this EA.

Project 1 may be implemented through a combination of six timber sales or stewardship projects: Blue Goose, Dorn Peak, Jackpot, Lucky Rowell, Mule's Gold, and Rowell Creek. In both alternatives, approximately 65 percent of the acres are within the AMR and 35 percent are within the Riparian Reserves. There are no changes to the Blue Goose or Dorn Peak project between Alternative 2 and Alternative 3.

Figure 2 below provides a visual of the differences in acres by action alternative[16]. Overall, Alternative 2 would treat approximately 44 acres more than Alternative 3. In Alternative 3, acres would be reduced within the Jackpot project (by 34 acres), Lucky Rowell project (by 27 acres), and Mule's Gold (by 15 acres). Rowell Creek is the only project in which treated acres increase (by 32 acres) under Alternative 3. This is due to the use of helicopter logging as a yarding method, which was not analyzed in Alternative 2. This yarding method, while generally producing fewer adverse environmental impacts, is much more expensive than conventional ground-based or skyline yarding methods.

Figure 2

South Yamhill Project 1 - Acres by Alternative



[16] No acres would be treated under Alternative 1 (No Action)

Treatment prescriptions for Project 1 do not differ between alternatives. The differences between alternatives lie in the overall number of acres treated, logging systems, the extent of road work, and associated logging costs. Table 7 below provides a quantitative comparison between the alternatives of each component of the proposed action.

Table 7

Quantitative Comparison of Alternatives and Actions Analyzed within this EA

Activity	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Limited Road Construction
Density Management (acres)	0.0	1,168	1,124
Within the AMR	0.0	772	729
Within the RR	0.0	396	395
Ground-based yarding (acres)	0.0	298 (276: density management, 22: rights-of-way)	257 (249: density management, 8: rights-of-way)
Skyline yarding (acres)	0.0	870	640
Aerial yarding (acres)	0.0	0	227
New road construction (miles[1])	0.0	5.0	1.76
Within the AMR	0.0	4.4	1.64
Within the RR	0.0	0.64	0.08
Road renovation (miles)	0.0	26.4	24.7
Road decommissioning	0.0	6.8	3.7
Within the AMR	0.0	5.8	3.27
Within the RR	0.0	1.0	0.43

[1] Rounded to the nearest 1/10 of a mile.

[2] Includes approximately 2.6 miles of road that would be renovated more than once.

2.8 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

No New Road Construction

The IDT considered an alternative without new road construction. The potential density management areas would either be substantially reduced or would be subject to expensive helicopter logging. The interdisciplinary team completed a cost-analysis in stands that would require extensive helicopter logging and determined that the value of the timber would be unlikely to offset the high logging costs. This would likely result in a no-bid sale. Further, the interdisciplinary team determined that the planned road construction, located appropriately and with relevant PDFs and BMPs applied, is unlikely to result in significant negative resource impacts. Due to these reasons, this alternative was not analyzed in detail.

No other alternatives were considered but not analyzed in detail.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS

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

3.1 VEGETATION

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

3.1.1 Affected Environment

<u>Project 1 – Mid-Seral Habitat Enhancement</u>

Present Stand Condition and History

Site Index is a measure of site productivity. The Site Index (King, 50-year) for the majority of the project area is relatively low. The average Site Index is 107 (low site III) and ranges from 87 to 135.

The Rowell Creek and Jackpot project areas are in the relatively warm and dry grand fir plant associations, at elevations of 800-1,700 feet, as described in the Field Guide to Forested Plant Associations of the Northern Oregon Coast Range (McCain and Diaz 2002). The other four project areas are at higher elevations, up to 2,700 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 South Yamhill 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, 1986).

The project areas consist of forest stands dominated by Douglas-fir, small sawtimber (11-21 inches DBH) to large sawtimber (greater than 21 inches DBH), fully stocked, originating from natural regeneration in the mid-1920s to the mid-1970s after clearcut harvest. Stands in the project area are 40-78 years old (in 2014). Stand structure in the 40-63 year old (in 2014) stands is quite uniform and simple and stands average fewer than 1 tree per acre greater than 30 inches DBH. The stands older than 65 are generally more structurally complex, and contain 2-11 trees per acre greater than 30 inches DBH. Very few older legacy trees remain in the stands, but can be found in limited numbers in Rowell Creek, Blue Goose, and Lucky Rowell. Stands in the Dorn Peak 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 and common in all stands except for Blue Goose where western hemlock is less than three percent of the stocking. Noble fir is found sparsely in the highest elevations of Rowell Creek and Lucky Rowell. Western red cedar is scarce, but a few are found in moist sites throughout the project area except for Dorn Peak and Lucky Rowell. Hardwood components consist of bigleaf maple and red alder found in all project areas. Pacific yew is very rare and is only present in Lucky Rowell.

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) (Reineke 1933). 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 2008, 2009 and 2011, and is summarized on the following page in Table 8.

Table 8

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]
Rowell Creek	77	183	74	287	17.1	0.84	0.28
Blue Goose	47	281	73	221	12.0	0.72	0.36
Mule's Gold	43	267	84	186	11.3	0.63	0.46
Lucky Rowell	67	221	79	288	15.4	0.85	0.35
Jackpot	47	289	82	195	11.2	0.66	0.47
Dorn Peak	46	324	68	199	10.6	0.69	0.39
Weighted Average[7]	**56**	**238**	**78%**	**243**	**14.0**	**0.75**	**0.37**

[1]2014 ages. Stand ages were taken in 2008 for Lucky Rowell/Dorn Peak; 2009 for Rowell Creek; 2011 for Jackpot/ Blue Goose/Mule's Gold.
[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 26 stands, varying in size, between six Timber Sales. Stand values for each were calculated by acre weighted average values.

Forest Health

Several 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-fir in the project area. Laminated root rot, caused by the *Phellinus weirii* fungus, 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 roots, 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 (one-tenth to one-half acre) openings. Dwarf mistletoe is a parasitic plant that infects a western hemlock. Although not noted during stand examination, dwarf mistletoe most likely is present in minimal amounts. It causes growth loss by diverting the tree's photosynthate into formation of brooms, but rarely causes tree mortality. The dense witch's 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 dead (1-2 years) 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.

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 conducted in the summers of 2010 through 2012.

There are no known sites of any bureau special status botanical or fungal species within the Blue Goose, Dorn Peak, Jackpot, Mule's Gold project areas, nor were any found during field surveys. However, one known site of a Survey and Manage category B lichen species (*Chaenotheca chrysocephala*) and one Category F lichen species (*Calicium viride*) were located within the Rowell Creek project area during field surveys. In addition, a category C lichen species, *Platismatia lacunosa* was located in the Lucky Rowell project area. There are no other known sites of any botanical or fungal special status species known from the Lucky Rowell or Rowell Creek project areas.

Noxious weeds

The following noxious weeds occur in the watershed mainly along existing right-of-ways or within young plantations (mostly on private land because the BLM has not implemented any regeneration cuts in recent history): bull and Canadian thistles (*Cirsium vulgare* and *C. arvense*), false brome (*Brachypodium sylvaticum*), Armenian blackberry (*Rubus armeniacus*), herb Robert (*Geranium robertianum*), meadow knapweed (*Centaurea xmoncktonii*), Scot's broom (*Cytisus scoparius*), St. John's wort (*Hypericum perforatum*), and Tansy ragwort (*Senecio jacobaea*).

Project 2 – Legacy Tree Release and Coarse Woody Debris Creation

Similar to Project 1, the stands in Project 2 originated with natural regeneration following harvest. A scattering of Douglas-fir and western hemlock trees originated before the majority, as they are relatively large (greater than 30 inches DBH), full-crowned, and open-grown. These trees are somewhat taller than the majority of the conifer in the stands, and are generally 100 to over 200 years old. They are a small component of these mid-seral stands, but are a very important structural and functional component 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 40-78 (in 2014) years old.

3.1.2 Environmental Effects

Alternative 1 – No Action Alternative

Project 1 – Mid-Seral Habitat Enhancement

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 index of stands would increase from the current average of 0.75 to an average of 0.92.

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 would be greater than if the stands were thinned, but dead trees would be smaller in size. Density mortality is predicted (ORGANON model) to average 43 trees per acre of about 10.5 inches DBH in the next 30 years without treatment, and only 2 trees per acre of 12.4 inches 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 percent (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 0.37 to 0.30 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 South Yamhill project for 30 years from present with and without treatment as projected by ORGANON are compared in Table 9.

Table 9

Stand Characteristics with Treatment vs. No Treatment 30 years in the future (year 2041)[1]
(Note: All values shown are project 1 timber sales weighted average stand values[7]*)*

Unit	Tmt. (Residual BA)	Age[1] (yrs)	TPA[2]	%DF (TPA)	BA[3] (Sq.Ft.)	QMD (in.)[4]	QMD growth (in.)	RDI[5]	CR[6]	Density Mortality		
										TPA	BA	QMD
Rowell Crk	Tmt.	102	45	46	193	27.9	5.3	0.46	0.30	0	0	12.1
	No Tmt.	102	150	70	350	20.8	3.7	0.92	0.23	33	18	12.3
Blue Goose	Tmt.	74	108	60	212	19.1	5.1	0.58	0.30	3	3	13.2
	No Tmt.	74	236	70	309	15.5	3.5	0.91	0.27	44	22	9.4
Mule's Gold	Tmt.	70	125	73	249	19.1	4.8	0.68	0.31	10	6	12.5
	No Tmt.	70	224	89	303	15.8	3.8	0.89	0.30	44	22	10.0
Lucky Rowell	Tmt.	91	53	57	202	26.4	6.1	0.48	0.33	0	0	15.7
	No Tmt.	91	175	73	362	19.5	4.0	0.98	0.30	59	38	6.8
Jackpot	Tmt.	74	99	77	213	19.9	5.9	0.57	0.38	1	1	12.9
	No Tmt.	74	237	81	292	15.1	3.8	0.88	0.34	30	14	9.3
Dorn Peak	Tmt.	69	161	82	257	17.1	5.4	0.73	0.29	10	5	9.8
	No Tmt.	69	263	70	309	14.7	4.1	0.94	0.30	61	29	9.3
Average	Tmt.	91	92	66	230	24.6	5.7	0.56	0.31	4	2	12.4
	No Tmt.	91	210	81	347	19.0	4.0	0.92	0.30	43	22	10.5

[1] Modeled from stand age in: 2008-2038 for Lucky Rowell/Dorn Peak; 2009-2039 for Rowell Creek; 2011-2041 for Jackpot/ Blue Goose/Mule's Gold.
[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 22 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

The *Chaenotheca chrysocephala* known site and any existing potential special status species habitat within the project areas would remain unaffected, positively or negatively, and succession would continue to shape the habitat within the project areas.

Noxious Weeds

Existing right-of-ways within the project areas would continue to be maintained for vehicular use by grading roadways, adding rock and mowing competing vegetation along these access routes. Roads would continue to be utilized by forestry workers and for recreational activities. 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.

Project 2 – Legacy Tree Release and Coarse Woody Debris Creation

Stand Development and Forest Health

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 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 will 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 10.5 inches 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

The existing habitat at the one known bureau special status site would not be affected by the proposed action because it is located in a no-cut stream protection zone. Because habitat around legacy trees would not be manipulated under this alternative, habitat for other bureau special status species would not be accelerated or improved through the reduction of competing trees adjacent legacy trees.

Noxious Weeds

Without project-related soil disturbance, the noxious weed level would likely remain unchanged or be sustained at the current levels.

Alternative 2 – Proposed Action

Project 1 – Mid-Seral Habitat Enhancement

Stand Development

Alternative 2 includes proposed treatments that will result in the following per acre weighted average stand characteristics displayed for the timber sales in Project 1.

Table 10

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

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]
Rowell Creek	72-78	47	42	130	22.5	0.33	0.34
Blue Goose	44-58	110	59	117	14.0	0.36	0.43
Mule's Gold	43-76	122	65	114	13.2	0.36	0.49
Lucky Rowell	44-68	55	56	120	20.0	0.32	0.45
Jackpot	40-63	99	76	107	14.1	0.33	0.57
Dorn Peak	45	171	79	122	11.7	0.42	0.47
Weighted Average[7]		**84**	**58**	**120**	**17.7**	**0.34**	**0.45**

[1] Stand ages in 2014. Total stand ages were taken in 2008 for Lucky Rowell/Dorn Peak; 2009 for Rowell Creek; 2011 for Jackpot, Blue Goose, and Mule's Gold.
[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 25 stands varying in size between six individual projects. 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 9. 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 5.6 inches of diameter growth in 30 years, 30 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 will 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 .31 after 30 years of growth. Without treatment, crown ratios are predicted to average 0.30 in that same period.

Long term increase in quality coarse woody debris recruitment
Thinning reduces the number of snag recruitment that results from inter-tree competition (Carey 1999), and little density mortality (two trees 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.

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 will 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 the spread of disease. It is possible that infection centers will 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 percent of stems, concentrated in topographically vulnerable conditions. The study showed overall level of wind damage resulting from variable density thinning is not statistically greater than unthinned stands, nor uniform thinning.

Skyline and ground-based yarding systems may result in bole and crown damage to an estimated 1-3 percent of the residual trees. Damage may result in greater incidence of stem decays in the future, adding to late-successional structure and function. Yarding restrictions 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 may be harvested or may be left on site to provide coarse woody material.

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

Thinning dense stands of young conifers provide for an increase in secondary growth in the reserved conifers which would also provide for an increase in special status species habitat by promoting lateral branch growth. Thinning would also provide for an increase in size and density of native shrub and forb species, some of which provide habitat for special status lichen and bryophyte species.

The *Chaenotheca chrysocephala* and *Calicium viride* lichen species are generally found on larger (greater than 24 inch DBH) diameter conifer species. Both of these species are known as “pin lichens” and an individual fruiting structure is approximately 1-2 millimeters tall. They are

found on rotting stumps, decorticated snags and the fissured bark on older conifers. They often occur in micro-habitats where they are sheltered from direct rain and in areas without vegetative competition such as moss growth. Thinning around these known sites would provide for additional habitat by increasing the amount of sunlight to the lower forest. Due to the small size and often protected location of these pin lichens the known sites would be protected by reserving the known site tree. Currently there are 114 known sites of *Chaenotheca chrysocephala* and 116 known sites of *Calicium viride* within the range of the Northern Spotted Owl (GeoBOB 2013). Both were once removed from consideration as a bureau special status species through past Annual Species Reviews (ASR). Neither species is under consideration by the State of Oregon for inclusion onto their rare and uncommon species lists.

The *Platismatia lacunosa* known site occurs on tall shrubs in a non-conifer, rocky, open habitat area located in the Lucky Rowell project area. This known site would be protected because there are no trees by its known site. However, this site would be enhanced through thinning around the rocky habitat areas to maintain and provide additional tall shrub habitat. In addition, *P. lacunosa* is often found within riparian areas on red alder in the northern Oregon Coastal Mountains. There are currently 88 known sites of *P. lacunosa* within the range of the Northern Spotted Owl (GeoBOB 2013). This species was also once removed from consideration as a bureau special status species through past ASRs within the northern Oregon Coastal Mountains. *P. lacunosa* is not under consideration by the State of Oregon for inclusion onto their rare and uncommon species lists.

Blown down trees are generally anticipated the first several years after tree density reduction treatments. These blown down trees will provide future special status species habitat for bryophyte species which are currently under represented within the project areas.

This project could affect species that are present in the project areas, but are not practical to survey for and for which there are currently no known sites. 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.

Noxious Weeds

Exposed mineral soil creates environments favorable for the establishment of non-native plant species. All aspects of the proposed project which create exposed mineral soil provide for an increased risk for the establishment of non-native plant species. These activities include but not limited to: road construction and renovation, culvert installation, road maintenance activities, ground-based skidding operations, skyline cable logging corridors, and hauling.

All of the known noxious weed species that occur within and adjacent project areas are classified by the Oregon Department of Agriculture as “B” designated weeds. Category 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 South Yamhill watershed area are regionally abundant and are widespread throughout western Oregon with the exception of False Brome. However, False Brome is widespread in Polk and Benton Counties. 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.

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

1) Mitigation measures have been incorporated into this project to keep the amount of exposed mineral soil minimized,
2) The size of the projects on a landscape scale are localized,
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 South Yamhill watershed, and control measures generally consist of biological control,
5) These species often persist for several years after becoming established but soon decline as native vegetation increases in density and size 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, project areas would be monitored which would provide for the early detection of noxious weed infestations and provide for a rapid response to implement control, if needed. Listed noxious weed 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.

Project 2 – Legacy Tree Release and Coarse Woody Debris Creation

Stand Development

In Alternative 2, Project 2 would consist of up to 117 acres. These areas are outside of stands proposed for density management. In stands proposed for density management, where legacy trees exist, surrounding smaller trees will 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 down 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 will 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 will 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

Thinning around older legacy trees would:

1) Increase the amount of sunlight to the lower stems of the reserved conifers and surrounding tall shrubs.
2) Create and/or enhance special status species habitat for epiphytic species requiring photosynthesis to survive.
3) Provide for an increase in secondary growth on these larger diameter conifers, while providing an increase in special status species habitat by promoting lateral branch growth.
4) Provide for an increase in size and density of native shrub and forb species, while increasing the amount of suitable habitat for special status lichen and bryophyte species.

Not all species are practical to survey for, and thus, may be present and unknown to the BLM. This project could affect such species. These species would mainly include special status hypogeous fungi species. 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.

Noxious Weeds

The implementation of this project would disrupt very little mineral soil. The majority of exposed mineral soil would occur when the tree is severed from the stump and the stem hits the

ground. Any anticipated exposed mineral soil would be localized and occur adjacent the stump. The risk rating for adverse effects due to noxious weed establishment through the implementation of this project is very low because of the minimal amount of mineral soil exposed.

Alternative 3 – Limited Road Construction

Project 1 – Mid-Seral Habitat Enhancement

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 percent of the values shown in Table 9 and Table 10. Average post-treatment stand characteristics immediately after thinning stands in South Yamhill Project 1(trees greater than seven inches DBH), for Alternative 3 are essentially the same as those shown for Alternative 2 in Table 10. South Yamhill 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 9.

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 1,124 acres, 96 percent of the acreage in Alternative 2 (1,168 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 5.6 inch of diameter growth in 30 years, a 30 percent increase from no treatment.

Maintenance of stand health and stability
With treatment, crown ratios are predicted (Organon v. 8.2) to average .31 after 30 years of growth. Without treatment, crown ratios are predicted to average .30 in that same period.

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 4 percent 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 will 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 4 percent fewer acres in Alternative 3.

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

This alternative contains the same known sites of bureau special status lichen species as Alternative 2. The effects listed under Alternative 2 apply here.

Alternative 3 proposes to thin fewer acres than Alternative 2. The reduction in acres treated would reduce the amount of habitat enhanced for late successional species, but also reduces the amount of acres of native vegetation converted into a transportation system. Although the total acres treated are reduced under Alternative 3 when compared to Alternative 2, and the effects of Alternative 3 are reduced from those listed in Alternative 2 because of a reduction in treatment areas and road construction, the differences over a watershed perspective are minor. The effects listed under Alternative 2 apply to this project as well.

Noxious Weeds

Alternative 3 proposes to construct and renovate fewer roads and to thin fewer acres than Alternative 2. The reduction in the amount of native vegetation disturbed under Alternative 3 would likely result in a reduction of acres in which noxious weeds would be established. Like Alternative 2, Alternative 3 effects would be localized within the project areas and transportation routes. For the same reasons listed under Alternative 2, any adverse effects from the establishment of Oregon listed noxious weeds within or near the project areas are not anticipated and the risk rating for the long-term establishment of noxious weed species and consequences of adverse effects on this project area is low.

Project 2 – Legacy Tree Release and Coarse Woody Debris Creation

Stand Development

In Alternative 3, Project 2 would consist of about 106 acres, an overall 11 acre reduction from Alternative 2. As in Alternative 2, all acres are outside density treatment units. Overall, the effects described in Alternative 2 would be very similar in Alternative 3.

Federal Threatened and Endangered and Bureau Special Status (includes survey and manage) Botanical and Fungal Species

The same effects listed under Alternative 2 apply because the overall similar acres treated, but with slightly fewer acres treated under this Alternative. Because Alternative 3 treats fewer acres, the effects would be slightly reduced, when compared to Alternative 2 and the amount of special status species habitat enhanced or created is reduced. The reduction in acres treated under this alternative at a landscape scale when compared to Alternative 2 is minimal.

Noxious Weeds

This alternative would have fewer impacts to native vegetation when compared to Alternative 2 due to the reduction in mineral soil disturbance from fewer acres of road construction or

renovation and a reduction in the amount of acres thinned. The risk rating for the long-term establishment of noxious weed species and consequences of adverse effects on these project areas would remain low, the same as in Alternative 2.

3.1.3 Cumulative Effects

Alternative 2 – Proposed Action

Alternative 2 would create no change in the age class distribution of the South Yamhill Analysis area. The density management would be in mid-seral stands, changing stand structure, but not changing their age class.

Effects to native vegetation are expected to be localized within the project areas and associated timber haul routes and not throughout the South Yamhill watershed or larger watershed scale.

Thinning dense stands could provide habitat for uncommon botanical and fungal species known from forests with larger diameter trees at an earlier age since thinning dense stands can allow for increased secondary conifer growth and allow for increased size and density of the understory and shrub species.

Examples of forest management activities and natural events that create soil disturbance, increase available light, and increase soil temperatures, all of which will influence the spread of non-native plants, are commercial and pre-commercial timber harvest, young stand management, road construction, maintenance, renovation, decommissioning, and culvert replacements, landslides, high flow sedimentation deposits, and off highway vehicle (OHV) activities.

Examples of activities that do not necessarily create disturbance, but influence the spread of weed seeds, are recreational hiking, biking, horseback riding, fishing, and hunting. Other sources of seed dispersal are from wildlife movement, water movement, natural dehiscence, and wind.

Many past and present management and non-management activities tend to open dense forest settings and disturb soils therefore providing opportunities for widespread non-native plant infestations to occur. Many common and anticipated non-native plant species known to Northwestern Oregon are not shade tolerant and generally will not persist in a closed forest setting, because they become out-competed for light as native tree, shrub and forb densities increase and direct sunlight to the ground is reduced. Implementation of this project would likely increase the number of common and widespread non-native plant species within the project areas, but the effects would remain localized. As such, any adverse cumulative effects from the establishment of noxious weeds within the South Yamhill watershed as a whole or any adjacent watershed would remain low.

Alternative 3 – Limited Road Construction

The cumulative effects for Alternative 3 would be slightly reduced to those effects listed under Alternative 2 because of the reduced amount of road construction and a reduction of the total

project area. Because the establishment of NNP's within the project areas would remain localized within the project areas and not on a landscape watershed scale, any adverse cumulative effects from the establishment of noxious weeds within the South Yamhill watershed as a whole or any adjacent watershed would remain low.

3.2 WILDLIFE

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?*

3.2.1 Affected Environment

Landscape Level Conditions

Projects would occur on BLM-managed lands in the Agency Creek-South Yamhill River fifth-field watershed. Because of the very large size of this fifth-field watershed (80,425 acres) and the inclusion of a high proportion of lowland agricultural lands, two smaller seventh-field watersheds (Rowell Creek and Gold Creek, totaling 13,153 acres) were chosen as the appropriate scale for conducting the wildlife effects analysis.

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, and RO807) (LSRA). The LSRA recognizes that BLM lands in the analysis area provide an important corridor with linkages between adjacent blocks of federally managed lands to the south and west. BLM lands in this 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 forest fires have resulted in the loss and fragmentation of late-successional forest conditions (LSRA, Teensma et al. 1991) and the resulting abundance of young conifer-dominated stands within the analysis area (see Table 11).

Table 11

Vegetation Conditions within the Analysis Area [1]

Vegetation Type	BLM	Private	Total	Total%
Open	0	590	590	4.72%
Grass/Forb	0	788	788	6.31%
Shrub/Sapling	13	925	938	7.51%
Early-Seral	680	5,342	6,021	48.20%
Mid-Seral	1,993	1,190	2,430	24.73%
Late-Seral	93	125	877	1.74%
Old-growth [2]	347	0	347	2.78%
Hardwood-Young	0	69	69	0.55%
Hardwood-older	34	397	431	3.45%
Totals	**3,067**	**9,425**	**12,491**	**100.00%**

1. Analysis area includes Rowell Creek and Gold Creek, which are two 7th Field Watersheds that contain all proposed actions. About 660 acres of lowland agricultural/residential lands were excluded from the analysis area.
2. Includes all conifer dominated stands over 200 years old, along with stands aged over 130 years old that have prominent older legacy tree component.

The BLM-administered lands in this analysis area comprise about 3,067 acres (24.5 percent), that is mostly composed of mid-seral and younger conifer plantations. Late-seral and old-growth forests (LSOG) are almost all on BLM lands and amount to less than 5 percent of the analysis area. Private forest lands in this analysis area lack any patches of old-growth forest, and are dominated by mid-seral and younger forest plantations (greater than 93 percent) that are currently being managed on short rotations (40-50 years).

Stand Level Conditions

Approximately 1,824 acres of forest stands were evaluated for Project 1 density management treatments (Alternative 2), resulting in 1,168 acres of proposed treatment units. About 604 acres 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 (40-78 years old as of 2014) with high tree density, moderate to high canopy closure, and are intermingled with hardwoods and some shrub patches. The Project 2 units include several stands that were dropped from Project 1 and some have scattered legacy trees or open-grown wolfy trees.

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. Units 7A and 7B in Lucky Rowell have small exposed rocky areas. 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 or larger, while about one third of these species prefer snags 30 inches in diameter or larger. The larger diameter hard snags and hard down logs (Decay Class 1 and 2) will, 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 most of the Project 1 treatment units (Table 12) 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). Two units (within the Jackpot timber sale) have very high CWD levels (greater than 4,000 cubic feet per acre). The past harvest events and fire history within this watershed have resulted in a net loss of the largest size classes of snags and down logs over time.

Table 12

Coarse Woody Debris Conditions in Proposed Project 1 Treatment Units

Project 1 Treatment Units	2013 Stand age (yrs)	Down Log Volume (ft^3/ac) [1]	Snag Volume (ft^3/ac) [2]	Snag Density (#/ac)	Snag Diameter (QMD) [3]	Total CWD Volume [4]
Rowell Creek 1A	77	790	245	4.7	24.4	1,035
Rowell Creek 1B	71	2,528	418	24.8	17.2	2,946
Rowell Creek 1C	73	296	129	0.4	13.0	425
Blue Goose 4A	43	0	0	0.0	0.0	0
Blue Goose 4B	45	2,508	0	0.0	0.0	2,508
Blue Goose 4C	52	789	282	7.9	12.7	1,071
Blue Goose 4D	57	1,135	317	12.8	12.2	1,452
Mule's Gold 5A	44	0	0	0.0	0.0	0
Mule's Gold 5B	42	1,388	0	0.0	0.0	1,388
Mule's Gold 5C	42	1,509	0	0.0	0.0	1,509
Mule's Gold 8A	44	1,170	0	0.0	0.0	1,170
Lucky Rowell 7A/12A	67	0	471	3.8	24.0	471
Lucky Rowell 7B/12B	62	0	1521	4.6	42.7	1,521
Jackpot 7C	43	1,529	41	3.4	11.6	1,570
Jackpot 7D	42	4,167	21	3.4	14.2	4,188
Jackpot 7E	39	6,583	116	2.8	21.1	6,699
Jackpot 7F	47	1,289	109	8.2	12.3	1,398
Jackpot 7G	61	2,302	142	2.0	30.7	2,444
Dorn Peak 8D/5D/4E	44	0	68	4.2	10.9	68

1). Down log volume in cubic feet/acre for pieces 5 inches in 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.
4). Units with zero volume were not sampled.

Larger size snags (greater than 30 inches DBH) that benefit a greater number of wildlife species are rather scarce on Project 1 units, except Rowell Creek, Lucky Rowell, and Jackpot 7G which have a scattered component of large legacy snags. Suppression mortality processes and small windthrow events have recently contributed additional small diameter snags and down logs in many of the Project 1 units. Project 2 units show similar stand characteristics and CWD conditions as the Rowell Creek units.

The presence of live legacy trees within mid-seral forest can boost the diversity and abundance of wildlife species (Mazurek and Zielinski 2004, Hagar 2007). Portions of Rowell Creek and Lucky Rowell have a component of scattered live old-growth legacy trees. There are also scattered live old-growth legacies within the Project 2 units.

Special Status and Special Attention Species

Special Status Species that may occur within this project vicinity and which may be affected by the proposed action include the northern spotted owl, marbled murrelet, and red tree vole. A review of an interagency database (GeoBOB) and the Oregon Natural Heritage Database found no records of any other Special Status Species or Survey and Manage Species locations within the planned treatment units.

Northern Spotted Owl

Most of the planned treatment units 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. Project 1 units that have very high stem density and lack of sub-canopy flying space (<40 years old) may not provide dispersal habitat conditions. Portions of Rowell Creek units that have scattered large open-grown trees or an older cohort of legacy trees may provide foraging habitat for owls.

The BLM and cooperators have conducted spotted owl surveys in the Rowell Creek, Gold Creek, and adjacent watersheds since the mid-1980s. Only one active owl site has ever been found in this vicinity. The Rowell Creek owl site was established in 2005 by the location of an unbanded male owl that was confirmed to be non-nesting. In 2006 a previously banded female joined the male. This female had previously been a resident at an owl site in Mill Creek in 2005. This pair was confirmed non-nesting each year, including 2013. Owl surveys have also been conducted in the adjoining BLM sections in 2012 and 2013 with no other spotted owl detections outside of the known owl site location. Several barred owls have been detected near the known owl site and in the vicinity of the following treatment units: Rowell Creek, Lucky Rowell, Jackpot, and Mule’s Gold.

Within the median provincial home range (1.5 mile radius, USFWS 2011a) of the Rowell Creek owl site there is very little suitable nesting habitat (617 acres or 14 percent), while dispersal habitat is abundant (2,883 acres or 64 percent) (see Table 13). The remaining patches of suitable habitat are high quality older forest on BLM lands (> 250 years old). The abundant dispersal habitat provides corridors of connectivity to adjacent patches of suitable habitat and may also provide for foraging opportunities for the resident owl pair.

Table 13

Habitat Conditions at the Rowell 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		
Rowell Creek - 0211	103	329	70	514	2,554	953	617 (14)	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.

Recently revised spotted owl Critical Habitat (USDI-FWS 2012) overlaps about 174 acres of Project 1 units and none of the Project 2 units. A Reserve Pair Area designation (RPA; USDA-FS and USDI-BLM 1994 ROD, page D-16; cite ROD, USDA-FS and USDI-BLM 2000b) overlaps a small portion of the young stands in Project 1 units only. Proposed harvest units that overlap designated next-best habitat in the RPA must be surveyed to determine if resident spotted owls are present. Two years of survey efforts in 2012 and 2013 did not detected any spotted owl presence in these stands.

Marbled Murrelet

There is only one known occupied murrelet site within the analysis area which lies within an LSOG forest patch adjacent to Jackpot units. The Rowell Creek units (Table 14) 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 the Rowell Creek proposed Project 1 and Project 2 units 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 (USDI-FWS et al. 2011). Surveys for marbled murrelets were conducted in Rowell Creek in 2011 and 2012 and failed to detect any murrelets. All Project 1 and Project 2 units lie within designated marbled murrelet Critical Habitat Unit OR-02-D (USDI-FWS 1996).

Table 14

Marbled Murrelet Habitat Conditions in Proposed Projects

Project Areas	Critical Habitat	Habitat Conditions
Project 1 Units		
Rowell Creek	Yes	Scattered legacy trees; Surveyed with no detections
Jackpot	Yes	No suitable structure, but lies adjacent to suitable patches
All other Areas	Yes	No suitable structure within or adjacent to units
Project 2 Units		
Rowell Creek	Yes	Scattered legacy trees; Surveyed with no detections
Lucky Rowell	Yes	No suitable structure within or adjacent to units

Red Tree Vole

The red tree vole is the only Bureau Sensitive Species and Survey and Manage mammal species (USDA-FS and USDI-BLM 2001, Huff et al. 2012) that may be affected by the proposed action. The red tree vole is a small arboreal rodent that feeds primarily on Douglas-fir needles and has been found to be closely associated with late-seral and old-growth forests (LSOG). This species appears to have limited dispersal capabilities and there is concern for isolation of populations due to fragmentation of LSOG habitat. The life history and current status of red tree voles has been well described in the Final Supplement to the 2004 FSEIS To Remove or Modify the Survey and Manage Mitigation Measure (USDA-FS and USDI-BLM 2007). In 2011, the U. S. Fish and Wildlife Service published a 12-month finding (USDI-FWS 2011b) which evaluated the status of a Distinct Populations Segment (DPS) of the red tree vole in the northern Oregon Coast Range. The Service decided that listing this DPS as threatened or endangered was warranted but precluded by higher priority listing actions. This DPS of the red tree vole is now a Candidate Species for listing. BLM policy requires that Candidate Species are to be treated as Bureau Sensitive Species. The analysis area and adjacent watersheds lie within the northern portion of the range of the DPS (north of U.S. Highway 20; USDI-FWS 2011b).

Project 1 and Project 2 units have been evaluated for compliance with the 2001 Survey and Manage Record of Decision. Because all of these units are less than 80 years old they are exempt from pre-disturbance surveys or management of known sites (Pechman Exemption). However, because the red tree vole is also a Bureau Sensitive species, and there is heightened concern for red tree vole populations on the more fragmented federal lands north of Highway 20, surveys were conducted in portions of the Rowell Creek Units 1A and 1B which show the highest potential for red tree vole presence (having clusters of large wolfy trees lying adjacent to small LSOG patches). Additionally, a portion of Project 2 treatment unit in Section 1 (outside of Project 1 units) was also

surveyed as part of a long-term monitoring program to track red tree vole distribution and persistence within the resource area.

Red tree voles were found in portions of Rowell Creek units 1A and 1B. Red tree voles were also found in a portion of Project 2 units. All of the trees that were found to have evidence of red tree voles (both active and inactive nests) have been excluded from the proposed harvest units and will be managed in a reserved habitat area as specified in the Survey and Manage recommendations (USDA-FS and USDI-BLM 2000a; Biological Evaluation). Elsewhere in the watershed, red tree voles have been found in several LSOG forest patches that were surveyed in 2006 (GeoBOB data, Salem BLM unpublished data). Red tree voles have also been documented as prey remains collected from spotted owl nest sites in adjoining watersheds (Forsman 2004).

Birds of Conservation Concern

All of western Oregon, including the Agency Creek-South Yamhill River Watershed, lies within the Northern Pacific Forests Bird Conservation Region (USDI-FWS 2008). 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 2008, Rich et al. 2004, USDI-FWS 2008). Thirty-three of the 88 landbird species that regularly occur in the Marys Peak Resource Area are considered BCC species (see Table 15). Sixteen BCC species have a high likelihood of occurring within project units. Incidental observations obtained during wildlife related field work have confirmed the presence of 15 of these species during the breeding season.

Table 15

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 Biological Evaluation)

Locally Important Wildlife – Roosevelt Elk.

The 1995 Salem District RMP provides management direction concerning Roosevelt Elk (USDI-BLM 1995, page 24-26) which includes creating or improving elk forage areas, reducing or restricting open road miles, and avoiding new road construction in areas with high elk value. Many of the South Yamhill project units receive only occasional sporadic use by elk. But a few of the units (Rowell Creek 1A, 1B, 1C and Lucky Rowell 12A, 12B) which are behind gated roads or in unroaded areas, provide important secure habitat for elk. The Rowell Creek units in particular lie within Section 1 which has very low road density and is behind a lock gate. This

area is also at a relatively low elevation which stays free of snow during the winter and shows consistent use by resident elk herds from late fall through early spring.

Recent elk modeling research (White et al. 2013), found that distance away from open roads, and nutritional quality of forage during the summer are critically important factors that support healthy elk herds. Nutritional resources for elk are relatively poor in the Coast Range and even with numerous scattered clearcuts on private land, forage quality is often below maintenance level for lactating elk (White et al. 2013). The BLM forest stands in Section 1 and 12 currently provide escape cover that receives very little human disturbance. But these BLM parcels also provide very low quality foraging habitat which is surrounded by private lands that are mostly regenerating young plantations with low quality foraging habitat.

3.2.2 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). There would be no immediate change to the mid-seral and late-seral conifer forest conditions on BLM-managed lands in the analysis area. Stand development processes would continue unaltered within the mid-seral forest stands of these 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 mostly 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 percent and 20 percent 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 to down logs and snags.

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

Landscape Level

The proposed density management thinning in Project 1 units would affect about 1,168 acres (61 percent) of existing mid-seral stands on BLM lands in this analysis area. Creation of snags, down logs, and small gaps to release legacy trees in Project 2 would affect about 117 acres of mid-seral and late-seral stands (<80 years old). Because the thinning treatments retain >40 percent 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 percent canopy cover, the treated units would retain their connectivity and habitat functionality at the landscape scale.

Stand Level Conditions

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

Short-term (less than 10 years)

- light to moderate reduction of canopy cover (resulting canopy >40 percent) 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 minor conifer species, hardwood trees, and shrub diversity.

Long-term (greater than 10 years)

- a significant recovery of overstory canopy cover 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 minor conifer species, hardwood trees, and shrub cover.

Project 1 treatment units would result in altered forest stand conditions, such that expected use by some wildlife species may decline while other species would increase or stay the same (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 the 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 large wolfy trees and legacy trees within the small patch cuts would extend the persistence of the legacy trees and maintain the live crown structure of the large wolfy trees, which would thereby 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 will 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.

Special Habitats and Special Habitat Components

There are no special habitat types within or adjacent to any treatment unit that would need to be protected by buffers to maintain their existing habitat value.

The special habitat component of CWD would improve in quality as a result of the proposed projects. As described above (Stand Level Conditions), the loss of future 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 three times as many trees as abiotic mortality; however, the total mass of dead wood created by abiotic agents was more than four 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 would incorporate small skipped patches where stand conditions will proceed unchanged;
- Stand development processes would not be altered on over 600 acres of BLM lands which have similar stand conditions as Project 1 and 2 units, but were deferred from treatment;
- Project 1 units lie adjacent to Project 2 units where no harvest would occur and where creation of CWD as individual trees or in small patches will immediately boost CWD conditions without an appreciable decrease in recruitment potential;
- Dense mid-seral forests on non-federal lands in the watershed are currently abundant.

Special Status and Special Attention Species

Northern Spotted Owl

A summary of potential effects to spotted owls resulting from the proposed action is provided in Table 16. Project 1 units would affect 30 percent and Project 2 units would

affect 15 percent of dispersal habitat within this analysis area. The proposed treatments are expected to maintain canopy closure (greater than 40 percent in Project 1, greater than 60 percent in Project 2) which would retain the current function of dispersal habitat for spotted owls within this analysis area and may increase the quality of habitat over time (USDI-FWS 2007). Within 10 years the amount of dispersal habitat within the watershed will increase dramatically, due to ingrowth of the large acreage of conifer plantations on private lands.

Survey efforts within the project area have confirmed the presence of one active owl site that may be disturbed by Project 1 harvest activities that occur within 0.25 miles of the owl site center. A seasonal restriction on harvest actions within 300 meters of the site center (to include: Jackpot 7D, 7F, 7G, and Mule's Gold 8A) during the critical owl breeding period (March 1 to July 15), would ensure that the proposed action is "not likely to adversely affect" resident owls.

Within the provincial home range (1.5 mile radius) of the resident owl site, about 830 acres of dispersal habitat would be treated in Project 1, and 29 acres in Project 2. No suitable habitat would be affected within this home range. Most of the proposed treatment units lie toward the outer half of the home range radius and likely receive little if any use by resident owls. But portions of some Project 1 treatment units (Jackpot 7D, 7F, 7G, and Mule's Gold 8A) fall within a corridor of dispersal habitat that resident owls likely move through as they travel to other patches of suitable habitat within their home range. During the past 9 years of owl site monitoring there have been no owl detection locations in any of the planned treatment units. The proposed thinning harvest would retain >40 percent canopy closure within the treated stands and thereby retain the dispersal habitat condition within the home range of this owl site. Meiman et al. (2003) found that spotted owl use in commercial thinned stands near their core area was significantly less immediately following operations compared to the pre-harvest period. Due to the close proximity of planned treatments to the active owl site, the proposed action may affect, but is "not likely to adversely affect" resident owls.

Table 16

Effects of Proposed Action on Federally Listed Wildlife Species and their Critical Habitat

Affected Component	Determination [1]	Notes
Northern Spotted Owl		
Noise Disturbance	NLAA	Jackpot units 7D, 7F, 7G and Mule's Gold 8A would have a seasonal restriction from March 1 to July 15 to avoid disruption to resident spotted owls.
Habitat Modification	NLAA	Dispersal habitat conditions within treated stands would be retained but likely be diminished in quality for the short-term (<10 years).
Critical Habitat	NLAA	About 174 acres of Project 1 units lie within designated critical habitat. Treated stands are 37-59 years old and would retain dispersal habitat conditions post treatment.
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	NLAA	Portions of three units (Jackpot 7E, 7F, and 7G) lie adjacent to an occupied murrelet sites and would follow a seasonal restriction on harvest activities. Surveys elsewhere in Rowell Creek had no murrelet detections.
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	All Project 1 and Project 2 units fall within designated critical habitat unit OR-02-D. Harvest actions would not remove any suitable nesting 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 adverse affect, NLAA= not likely adverse affect, and No Effect.

Mid-seral conifer stands that provide for dispersal or foraging are considered a primary constituent element of the recently designated spotted owl critical habitat (USDI-FWS 2012). About 174 acres of dispersal habitat would be affected by Project 1 thinning units. But since the proposed treatments would maintain sufficient canopy closure (greater than 40 percent), retain existing habitat function, and accelerate the development of nesting structure over the long term, the proposed action is "not likely to adversely affect" critical habitat 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 (greater than 10 years).

Marbled Murrelet

Table 16 provides a summary of effects to marbled murrelets and their habitat. All of the proposed treatment units lie within 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). Portions of the Rowell Creek units that contain scattered legacy trees would be considered PCE-1, while some of the remaining units (greater than 50 years old) likely have sufficient canopy height to be considered PCE-2. Surveys for marbled murrelets were conducted in the Rowell Creek units in 2011 and 2012 with no detections. 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 critical habitat unit.

An occupied murrelet site exists adjacent to Jackpot units 7E, 7F, and 7G. Murrelet presence was first detected in 1989 and occupancy behavior was first observed in 2003. Monitoring surveys conducted since 2003 have consistently found low levels of murrelet activity, with some years having no murrelet detections. A seasonal restriction to conduct harvest activities outside of the critical breeding period (April 1 to August 5) would minimize potential disturbance to murrelets if they are present. The proposed action may affect, but is “not likely to adversely affect” marbled murrelets.

Overall, Project 1 and 2 treatments are likely to accelerate the development of late-seral forest structure over the long-term (greater than 10 years), which would promote development of potential nesting structure sooner than if left untreated.

Red Tree Vole

Most of the proposed action areas are young mid-seral forests that lack older forest characteristics which could support persistent populations of red tree voles (Huff et al. 2012). Portions of Project 1 and Project 2 units in Rowell Creek have a scattered component of open-grown wolfy trees and legacy trees (nearly two per acre) that could provide suitable habitat for voles. These areas have been surveyed according to protocol (Huff et al. 2012) which resulted in climbing 84 trees to search for active vole nests. A total of 16 active and 5 inactive vole nests have been found. Four Habitat Areas have been established to retain existing forest conditions that would protect all active vole nests and 3 of the 5 inactive nests (USDA-FS and USDI-BLM 2000a, Appendix C). These Habitat Areas are of sufficient size (10 to 79 acres) and are connected by corridors of untreated forest, such that they are likely to ensure the long-term persistence of red tree voles is this vicinity.

Voles are sometimes found in younger forest stands, especially if they include clusters of legacy trees or are adjacent to patches of older forest (USDI-FWS 2011b). If additional

red tree vole nests are present elsewhere in Project 1 units, then the proposed thinning harvest would likely displace these voles and degrade habitat quality in the short-term (less than 20 years) by removing adjoining trees crowns and potentially increasing vulnerability to predation (Wilson and Forsman 2013). But the retention of the scattered wolfy trees and legacy trees, along with ingrowth of canopy closure and development of deeper live crowns with epicormic branching, would likely improve habitat conditions for red tree voles in the long-term (greater than 20 years).

The proposed action is 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 in unsuitable habitat that does not currently support persistent vole populations;
- Any active and most inactive red tree vole nests have been protected in habitat areas in accordance with current protection recommendations;
- The existing patches of LSOG forest on federal lands in this watershed are known to provide for population persistence, and these stands are not be affected by this action; and
- The recent status review for this species (UDSI-FWS 2011b) concluded that existing regulatory mechanisms on Federal land are adequate to provide for the conservation of the North Oregon Coast DPS of the red tree vole.

Birds of Conservation Concern

In the central Oregon Coast Range the majority of birds complete their breeding cycle within the April 15 to July 15 time period, while some birds (eagles, owls, hawks, woodpeckers) begin breeding as early as February or March and others (flycatchers, finches) 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 an abundant age-class within this analysis area.

Locally Important Wildlife – Roosevelt Elk

The Rowell Creek project area and portions of the Lucky Rowell project area are behind a locked gate and currently provide important secure escape cover for elk. The proposed Project 1 thinning units would create temporary new roads and would increase human activity in these two

areas. Since elk tend to avoid open roads with regular traffic (McCorquodale 2013), harvest operations could disturb current patterns of elk use for the duration of the harvest activities. But elk use would likely return to pre-harvest levels once the temporary roads are removed/blocked to prevent any unauthorized use. The thinning harvest in these two areas would also increase the forage quality for elk in the short-term (10 years).

Alternative 3 – Limited Road Construction

This alternative would result in a small net reduction in the amount of density management thinning (Project 1) to 1,124 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 difference in percentage of mid-seral forest stands treated is negligible (about 1 percent) between Alternative 2 and Alternative 3. The risk of negative effects to special status species would be nearly identical. Alternative 3 would result in a slight decrease of about 35 acres of dispersal habitat within the home range of the resident spotted owl site that would be thinned (<1 percent net decrease from Alternative 2). The potential for disturbance to marbled murrelets would be unchanged in this Alternative. The potential impacts to red tree vole and Birds of Conservation Concern would be nearly identical to Alternative 2.

This alternative substantially reduces the amount of road construction while only minimally reducing the potential thinning treatments (Project 1) that are intended to benefit late-successional forest associated species. Project 2 units would have a negligible net change in treatment acres. Alternative 3 would provide a slightly greater benefit to a wider variety of wildlife species because it could be accomplished with less road construction, while maintaining a nearly identical level of thinning harvest (Project 1) and legacy release and CWD creation (Project 2). Alternative 3 also would benefit big game species, particularly elk, by maintaining a lower road density and providing more BLM land in secure habitat condition beyond 0.25 miles of open roads.

3.2.3 Cumulative Effects

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 percent to 25 percent of the current area of mid-seral forests are expected to be harvested over the next decade. This private harvest will 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 of 1,168 acres (Project 1), BLM has previously thinned (since 1995) about 130 acres of mid-seral forests within the analysis area (see Table 17). There are no other foreseeable future (next five years) timber harvests planned. These past and proposed thinning harvests, which span a 23 year period, affect about 68 percent of the available mid-seral forests on BLM within this analysis area. While this represents a cumulative modification of 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 will retain their existing function, and there have been no previous treatments of this type within this analysis area.

Collectively, both Project 1 and 2, along with previous BLM density management thinnings (130 acres) contribute to the cumulative beneficial enhancement of forest structure and stand diversity on BLM-administered lands within the affected watersheds.

Table 17

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

Rowell Creek and Gold Creek	
Baseline Data	
Total Watershed Acres	12,491
BLM-administered lands in Watershed	3,067
Proposed Action	
Project 1 – Density Management of Mid-Seral Stands	1,168
Project 2 – Legacy Tree Release and CWD Creation	117
Past Actions on BLM [2]	
Density Management Thinning	130
Legacy Tree and CWD treatments	0
Foreseeable Future Actions on BLM [3]	
Density Management Thinning	0
Legacy Tree and CWD treatments	0

1). All BLM lands within the Rowell Creek and Gold Creek watersheds (Analysis Area) are considered.
2). Past actions occurring on BLM-administered lands in this Analysis Area since 1995 (beginning of Northwest Forest Plan implementation).
3). Foreseeable future actions on BLM-administered lands 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 2007, USDI-FWS 2011a). The Project 1 units, which would thin about 1,168 acres (174 acres lie in critical habitat), 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.

3.3 FISHERIES AND AQUATIC HABITAT

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

- *What effects would the proposed actions have on resident and anadromous fish and aquatic habitat?*
- *What effects would the proposed action have on Endangered Species Act listed fish and their habitat?*

3.3.1 Affected Environment

Major tributaries associated with the project area in the Agency Creek-South Yamhill River watershed include Rock Creek, Rowell Creek, Little Rowell Creek, LaFollet Creek, Mule Tail Creek, and Gold Creek. General habitat conditions and fish distribution for the South Yamhill are described in the Mega Watershed Analysis (BLM 1998). In the Agency Creek-South Yamhill River watershed anadromous fish distribution is limited by multiple waterfalls and diminishing stream channel flows below the treatment area.

Coastal cutthroat trout (*Oncorhynchus clarki*) have been document to occur throughout the watershed (BLM 1998). Cutthroat trout are documented as present in tributaries of Rowell Creek, Little Rowell Creek, Gold Creek, and Gooseneck Creek[17] (Snedaker 2009). Fish have not been documented as being present adjacent to Lucky Rowell, Mule's Gold, or Dorn Peak timber sale areas. Limiting stream flows and increasing slopes are the most common limits on distribution in proximity to these sale areas. Resident fish are present in association with the Firehall and Gold Creek haul routes.

Mill Creek is the other major river system for the tributaries draining from the project. General habitat conditions and fish distribution for Mill Creek and its tributaries Camp Creek, Gorge Canyon Creek and Gooseneck Creek is described in the Mill Creek Watershed Assessment (YBC 1999) and Mega Watershed Analysis (BLM 1998). Anadromous fish distribution is precluded from most of Mill Creek by a steep cascade waterfall on Mill Creek, at least 11 miles downstream from treatment areas.

Resident fish are not present in the Mill Creek portion of the timber sale project area. Resident fish are present in association with the Gooseneck haul route.

Rare, Threatened, and Endangered Species

Upper Willamette River (UWR) evolutionary significant unit winter steelhead are listed as threatened under the ESA, as amended, in the Willamette basin (64 FR 14517 – 14528). Project

[17] Legal description: Township 7 South, Range 8 West, Section 1 and Township 7 South, Range 7 West, Sections 4, 5, and 7, Willamette Meridian.

haul routes along Rock Creek are adjacent to listed UWR steelhead. Distribution of UWR steelhead is generally more than 1.25 miles downstream of the treatment area, except for haul routes where proximity is generally closer. Within Mill Creek this species occurs approximately 11 miles downstream from the nearest unpaved stream crossing (Streamnet 2009).

The proposed hauling on Firehall Road associated with a portion of the projects may cause short-term affects to the listed fish or listed critical habitat in the watershed. Proposed culvert replacement on Gold Creek Road near the confluence of Gold Creek may cause short-term affects to listed fish or listed critical habitat in the watershed. For these reasons, a May Affect determination was indicated for UWR steelhead and UWR steelhead critical habitat and consultation may be required.

Upper Willamette River Spring Chinook and Oregon Chub are listed as threatened under the ESA, as amended, in the Willamette basin (64 FR 14308-14328 & 75 FR 21179-21189). UWR Chinook are 25 miles downstream from project activities in the South Yamhill River (Streamnet 2009). Oregon chub is not known to occur within the project area and is no longer known to occur within the South Yamhill River. A No Affect determination was made for UWR Chinook salmon and Oregon chub primarily due to the distance of listed habitat from the proposed action. No consultation would be required for UWR spring Chinook or Oregon chub species.

Consultation requirements are discussed in section 7.0 of this EA.

3.3.2 Environmental Effects

Alternative 1 – No Action

Project 1 – Mid-Seral Habitat Enhancement

Current forest stand conditions would be maintained. Expected benefits of thinning riparian stands, accelerating the growth rates of retained trees and 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 implementation of the No Action alternative. Due to distance to fish habitat these localized effects would be unlikely to affect fish.

Project 2 – Legacy Tree Release and Coarse Woody Debris Creation

Current late-seral and old-growth stand conditions would be maintained. Expected protection of mature riparian trees through thinning of 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 to 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 in the

long-term including increased channel complexity, increased sediment retention, and improved water quality.

Alternative 2 – Proposed Action

Project 1 – Mid-Seral Habitat Enhancement

Based on field surveys resident fish are known to be within one site potential tree (210 feet) of six project units (4A, 7D, 7F, 1A, 1B, and 1C). Based on analyses of BLM geographic maps resident fish are known or suspected to be less than a half mile from 24 of the 26 proposed treatment units.

Flow Effects

Falling and Yarding – As no discernible changes in peak and base flows within the treatment area are anticipated, no alterations to fish habitat would be anticipated.

Road Construction – Impacts to aquatic habitat downstream would not be anticipated.

Road Renovation – Due to the limited amount of cross drain work anticipated, proposed renovation is highly unlikely to have any detectable impact on flows. No impacts are anticipated to fish and aquatic habitat.

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

Pile Burning – With incorporation of project design features for buffers and fuels, 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 – 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 – Based on location of new roads and seasonal restrictions, road construction is unlikely to increase sediment (which could alter stream channels and fish habitat).

Road Renovation – The small increase in turbidity which may be generated by road renovation (blading, ditch cleaning, and culvert replacement) would be undetectable against background turbidity where fish reside; thus, impacts to fish and aquatic habitat would 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 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 18).

Table 18

Alternative 2: Project Haul Routes and Nearest Distance to ESA Listed Fish Habitat (LFH), Essential Fish Habitat (EFH), and Resident Fish

Haul Road	Season of Use	Miles of Haul	Road Surface	Number of Crossings			Distance to LFH (ft.)	Distance to EFH (ft.)	Distance to Resident Fish (ft.)
				Fish	Per[1]	Inter[2]			
Rowell Creek	Year-round	13[a]	Gravel	3	1	9	50	50	0
Blue Goose	Year-round	6.65[b]	Paved/ Gravel	1	9	4	300	300	0
Dorn Peak	Year-round	6.6	Gravel	1	2	6	1,625	0	0
Jackpot	Year-round	11.9[b,c]	Paved/ Gravel	1	11	14	300	300	0
Lucky Rowell	Year-round	11.5[a]	Gravel	3	3	23	50	50	0
Mule's Gold	Year-round	8.93[b,c]	Paved/ Gravel	1	9	3	300	300	0

1. Per = Non fish bearing perennial streams.
2. Inter = Non fish bearing intermittent streams
a. 5.14 miles of Firehall Road shared between Rowell Creek and Lucky Rowell.
b. 2.96 miles of Gold Creek Road (paved) shared between Blue Goose, Jackpot, and Mule's Gold.
c. An additional 2.32 miles of Gold Creek Road (paved) and 1.7 miles of 7-7-5 road is shared between Jackpot and Mule's Gold

Potential impacts to fish and aquatic habitat would be limited to minor short-term site specific effects to short reaches of fish habitat downstream of the crossings on Firehall Road due to sediment generated from year round hauling. Resident and anadromous fish may experience short-term direct negative effects as a result of proposed wet season hauling due to localized increase in turbidity in the stream channel. Generally fish would be expected to move away from high turbidity to areas of low turbidity or reducing activity during periods of elevated turbidity (Bjornn and Reiser 1991). Application of sediment control project design features (silt fences, hay bales, etc.) and cessation of haul during heavy rainfall would minimize the magnitude of sediment reaching streams. The duration of sediment reaching stream would be short-term, occurring during the wet season freshets and during and immediately following hauling activities.

The haul route for Jackpot, Mule's Gold, and Blue Goose (6-7-28, Gold Creek Road) is predominately within the Gold Creek drainage and in Rowell Boulder Creek. The lower 5.28 miles of the road is paved. The road segment crosses a small fish bearing tributary to Rowell Creek and several other non-fish bearing streams. Drainage conditions appear to be good and include vegetated ditches. Sediment transport from the road surfaces through a vegetated ditchline to stream crossings would not occur on the paved surfaces of Gold Creek Road.

The primary haul route for Dorn Peak is a gravel road (6-6-31) predominately within the Gooseneck Creek drainage and includes a small segment in the Gold Creek drainage. The road segment crosses a small fish bearing tributary to Gooseneck Creek. The approaches on either side of the fish bearing crossing are not ditched and the road surface is flat at the crossing. There is no evidence of sediment delivery from the road edges. Sediment transport from the road surfaces and the vegetated flat areas adjacent to the crossing would be considered unlikely on this segment.

Pile Burning – The project design feature requiring 100 feet between streams and any piles combined with SPZs associated with the project (55 foot minimum) would be expected to provide sufficient distance of undisturbed soils and vegetation to capture any surface erosion from pile burning treatments.

Temperature

Falling and Yarding – Site level project designs for treatment units included a standard design feature SPZ of at least 55 feet. 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, the proposed SPZs would be sufficient to protect critical shade in the primary shade zone, based on topography and average tree height (Snook 2013, Roux 2013). 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 2013). 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 – 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 – Based on small scale and dispersion of potential impact sites, changes to stream temperature where 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.

Pile Burning – With incorporation of project design features for buffers and fuels, 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 CWD and large woody debris (LWD) from harvest can alter the stability and quality of aquatic habitat (Chamberlin et al. 1991, Beechie et al. 2000). The treatment incorporates stream protection buffers that leave a portion of the stand nearest the stream edge untreated, minimum of 55 feet and increases up to 100 feet based on increasing tree height and hillslope gradient. This stream protection zone includes all stream channels: fish bearing, non-fish bearing, perennial, and intermittent channels with evidence of scour, deposition and a defined channel. Existing snags within the stand would be retained to the extent practical; though safety concerns may result in felling of some snags. In addition, multiple channels upstream of, and outside of, the treatment units would remain unthinned. Thus, adjacent recruitment zones and wood recruitment source areas in tributary channels would be left untreated leaving an abundance of standing material for future instream LWD and CWD recruitment. The proposed treatment would avoid areas of instability, to the extent identifiable, thus leaving land movement recruitment zone untreated.

To minimize potential impacts to wood recruitment at the site scale from proposed thinning, the project incorporates SPZs that leave a majority of the recruitment zone unaffected in the short-term and utilizes thinning prescriptions that leave large diameter trees that are more likely to provide functional value in the long-term. Wood recruitment studies conducted in the Pacific Northwest have shown the majority (70 percent) of woody debris recruitment in stands less than 80 years of age, or of mixed species, occurs within 23 to 36 feet of the stream edge (McDade et al. 1990, Van Sickle and Gregory 1990, Meleason et al. 2002). The treatment areas are less than 80 years of age and the stream protection buffer on the adjacent streams are generally double the 23-36 feet widths that would protect over 70 percent of the wood recruitment area. The percentage of retained trees proposed by thinning outside the stream protection zone would further reduce the probability of wood recruitment loss. Treatment would only be expected to affect a small percentage of the potential source area and have no more than undetectable effects on wood recruitment. With retention of stream protection zones, impacts to wood recruitment patterns, and rates, would not be expected as a result of the proposed action on the units. Impacts to fish and aquatic habitat would be highly unlikely. Due to greater tree heights in units 1A, 1B, and 1C additional analysis was conducted in the Rowell Creek timber sale.

Proposed treatments in Section 1 include trees heights over 140 feet tall in proximity of the stream network: units 1A was 140 feet, 1B was 144 feet, and 1C was 140 feet. For stands with uniform heights of 131 and 164 feet tall, the majority (70 percent) of recruitment occurs within 72 and 89 feet of the stream channel (McDade et al. 1990, Van Sickle and Gregory 1990). The proposed stream protection buffers in this section are a 75 feet minimum, which incorporates the majority of the recruitment zone. The area likely affected within this recruitment zone (unit area within 89 feet) in Section 1 is 14 acres in narrow slivers located between the SPZ and 89 feet of the stream and are dispersed over approximately 4.7 miles of stream length. Within the 14 acres the treatment proposes to reduce stem density to approximately 38-47 trees per acre (TPA). The tallest 40 trees, average 140 feet tall, would generally be retained as leave trees, thus only shorter

stature trees would be felled and removed. These smaller trees have a low probability of reaching the stream, and the smaller diameters on tree bole from the tips that could reach the stream would have a lower probability of altering stream character. With retention of larger diameter trees and implementation of stream protection buffers short-term impacts to wood recruitment patterns and rates would not be expected as a result of the proposed action. Impacts to fish and aquatic habitat would be highly unlikely.

Proposed thinning in the Riparian Reserves is anticipated to increase the average growth of the remaining trees between 17 to 80 percent over 30 years compared to not treating the stands (Snook 2013, Roux 2013). As the stand matures over time, between 80 and 200 years of age, the predicted source distance wood recruitment zone would be expected to increase to 85 feet, which incorporates 90 percent of the cumulative input (Meleason 2002; McDade 1990). Based on this expansion of potential recruitment area as the stand matures, the strip of timber outside the stream protection zone would be expected to benefit from proposed treatment over the next several decades. Treatment would be expected to improve wood recruitment characteristics of individual trees such as:

- increased survival of the total number of live limbs on the bole which would increase total CWD pieces and per tree volume that could be recruited to the stream,
- larger diameter branches on the bole that could function as future coarse debris,
- larger diameter tree boles overall, and
- potentially greater tree height.

A potential long-term impact of thinning may occur as the stand matures into the 80-200 years recruitment widths by proposed tree removal; however, the impact would be very limited by nature of the prescription retaining 22 to 57 percent of the stand. Thinning impacts on woody debris recruitment is very difficult to estimate as previously stated; over the long-term growth, both from treatment and reproduction, would be expected to partially or fully offset debris lost as a result of thinning. Meleason (2003) noted that over long timeframes the piece rate of wood recruitment typically goes down but the volume of debris recruitment rate increases. Overall, upslope zones enhanced by treatment accelerated growth rates, combined with untreated buffer zones, would be expected to result in wood with a larger range of sizes that could be recruited into streams over the long-term. In the long-term the increase in the size of trees in treated riparian areas would be expected to benefit LWD recruitment to the stream channel. Thus treatment would potentially improve the quality/complexity of aquatic habitat adjacent to the treatment areas in the future.

Road Construction – Except for two spur roads within Rowell Creek, proposed road construction would not be anticipated to impact LWD recruitment in the short-term at these sites. The total area of road within the riparian impacted within one site potential height of streams is very small, less than 1.6 acres. Proposed roads are located on or near ridge tops, all of which are located on low gradient slopes. 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.

On spur of newly to be constructed road in Rowell Creek would be a minimum of 111 foot distance to the stream channel, a incorporating nearly 99 percent of wood recruitment zone (McDade et al. 1990, Van Sickle and Gregory 1990). Construction of another spur within that

sale would remove trees through the riparian; however, there is no definable channel at the point of crossing and the area is flat. Therefore, the proposed actions are not expected to cause any short-term effects to aquatic habitat at the site or downstream.

Road Renovation – 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. No impacts to fish or aquatic habitat would be anticipated.

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

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.

Project 2 – Legacy Tree Release and Coarse Woody Debris Creation

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 2013). Minor site specific soil disturbance may occur; however, the disturbance would be highly unlikely to affect streams. No 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 trees, which could also provide LWD material, would be reduced.

Alternative 3 – Limited Road Construction

Project 1 – Mid-Seral Habitat Enhancement

Flow, Sediment, Temperature, and LWD

Falling and Yarding – Alternative 3 would reduce the amount of drainage and watershed area affected approximately 3.7 percent. Alternative 3 would change forest cover between 0.0003 and 12.5 percent in any of the affected seventh field drainages and between 0.01 and 1 percent of any affected fifth field sub-watershed. Dorn Peak and Blue Goose timber sales would be unchanged from Alternative 2. Jackpot, Lucky Rowell, and Mule's Gold would incorporate a net reduction in the total number of acres treated; however, proposed thinning prescription would be the same as proposed under Alternative 2. An additional 31 acres of proposed treatment in Rowell Creek timber sale would occur as a result of helicopter yarding. Flow, sediment, temperature, and LWD effects would be similar in scope and nature as described under Alternative 2.

Road Construction and Renovation – Alternative 3 would reduce new road construction and renovation compared to Alternative 2. Within one site potential tree heights of stream channels a reduction of 0.56 miles of new construction and 0.37 miles of renovation compared to

Alternative 2 would not occur under Alternative 3. Due to distance to fish habitat these localized effects would be unlikely to affect fish habitat.

Hauling – No changes in the major haul routes would occur. Elimination of tributary haul routes to Firehall and Gold Creek would occur in Rowell Creek, Lucky Rowell, Jackpot, and Mule's Gold Timber Sales under this alternative. Alternative three would eliminate a crossing over a potential fish bearing stream, 7-8-11 road in section 11. In addition, one perennial and seven intermittent non-fish bearing stream crossings would be eliminated under the proposed haul routes in Alternative 3. Elimination of the haul roads from proposed year round hauling would be expected to eliminate any risk of potential impacts to fish habitat at the stream crossings. With the exception of these stream crossings, the nature and magnitude of effects to fisheries and aquatic habitat from proposed hauling would be the same as described under Alternative 2.

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

Legacy Tree Release and Coarse Woody Debris Creation (Project 2)

Environmental impacts for these projects under Alternative 3 are anticipated to be similar to those analyzed under Alternative 2.

3.3.3 Cumulative Effects

All Action Alternatives

The cumulative effects of the proposed actions on vegetation, hydrology, and soil resources were assessed under the hydrology report (Wegner 2013) and the silvicultural prescriptions (Snook 2013, Roux 2013). 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 2013) changes in flows were considered unmeasurable at the site level and are unlikely to contribute to cumulative effects, subsequently no cumulative effects are anticipated on aquatic resources.

The Hydrology report indicated that the proposed treatments were considered unlikely to have detectable effects on stream temperatures and not expected to result in any cumulative effects to temperature (Wegner 2013). No cumulative effects are anticipated for peak flows, streambanks, and instream structure which could also affect temperature. As no cumulative effects were anticipated for these project activities on temperature, streambank conditions, and peak flows these treatments would not result in cumulative effects for fisheries resources.

The proposed stand treatments are not expected to alter LWD recruitment, stream bank stability, and sediment supply to channels at the fifth 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.

Between 19 and 36 percent of the land base within the Agency Creek-South Yamhill Watershed and Mill Creek Watershed is federally administered. Mill Creek is predominately administered by the BLM. Agency Creek-South Yamhill federal ownership is mixed with holdings of the Confederated Tribes of the Grande Ronde the dominant. 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 ridgetops with a limited number of stream crossings. Portions of the haul route within the effected drainages may occur in close proximity to fish habitat; however, site level impacts were expected to be very minor.

Turbidity associated with year round timber hauling would be episodic, generally associated with rain events. The impacts would be of short duration during project implementation and thru the first heavy rains of the wet season. Rock Creek, adjacent to the Firehall Road haul route, is predominately cobble, boulder, and bedrock and channel gradients indicate any sediment entering this stream would likely be rapidly transported out of the watershed during winter freshets and is unlikely to cause substantial local affects to aquatic habitat. Cow Creek, adjacent to Firehall Road haul route prior to conversion to paved road, is much gentler in gradient and consists of a higher percentage of gravels and fines. Increases in sediment reaching this stream could have direct cumulative impacts to the quality of fish habitat. However, the segment of road adjacent to Cow Creek is very mild in gradient, generally around one percent with short segments up to five percent, and the magnitude of sediment entering the stream channel is expected to be low. Following project completion, turbidity and sediment yield would be expected to return to background levels on Firehall Road.

Extensive road work has occurred on BLM managed lands and adjacent industrial forest over the last decade in the Agency Creek-South Yamhill and Mill Creek Watersheds. 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 fifth 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 fifth 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.

3.4 HYDROLOGY

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

- *What effects would road construction have on water quality?*

3.4.1 Affected Environment

Project Area Precipitation and Basin Hydrology

Project areas are located south and east of Grand Ronde, Oregon in the coast range at elevations ranging from 1,100 – 2,700 feet[18]. The general project area receives approximately 80-100 inches of rain annually and has a mean two-year precipitation event of 5.5 inches in a 24-hour period[19]. Ninety-five percent of the project area lays below the transient snow zone (TSZ), an elevation zone (generally between 2,000 and 2,400 feet) subject to rain-on-snow events (ROS) that have the potential to increase peak flows during winter or spring storms. Project areas located primarily at lower elevations where snow accumulation is rare are in rain-dominated zones. Catchments within this zone are typically hydrologically flashy because of frequent rainstorms during the winter. Changes in peak flows in the 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 (Ziemer and Lisle 1998). The typical extent of effect is the occurrence of peak flow events slightly earlier in the fall than in untreated watersheds.

Little Rowell, Rowell, Gold, Mule Tail, and Carter Creeks are tributaries of the South Yamhill River which eventually flows into the Willamette River near Newberg, Oregon. The Yamhill

[18] Within proposed treatment units. Elevation in the fifth field watershed extends up to 3,450 feet. Unless otherwise indicated, geographic information is an estimate derived from the BLM's GIS database.
[19] 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

River is gauged by the U.S. Geological Survey (USGS) downstream from the project areas[20]. There is no known streamflow monitoring on the project drainages.

The project areas are located in two sixth field watersheds, Gold Creek and Rouge River. The two watersheds are tributary to the South Yamhill River, which ultimately drains to the Willamette River. There are no BLM key watersheds in the project areas, although Rowell Creek is considered by the State of Oregon an Anchor Watershed for water quality.

Project Area Stream Flow

The project areas are located in two smaller seventh field watersheds (Rowell Creek and Gold Creek). There are potentially 85 stream crossings that may require upgrades to meet current BMP guidelines for water quality concerns and culvert sizing. All potential culvert replacements are on first order streams except one which is on a second order channel below unit 5C of the Mule's Gold timber sale.

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 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[21].

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 event. Changes in peak flows are harder to determine as the watershed size becomes larger. Seventh field and sixth field watersheds are appropriate size watersheds to review impacts of predicted changes in peak flows 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.

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[20] Gage data can be found at http://waterdata.usgs.gov/nwis/
[21] Estimates can be found at http://www.wrd.state.or.us/surface_water/flood/index.shtml.

Potential for Peak Flow Augmentation Due to Forest Harvest: Current Condition

A rigorous analysis of peak flow potential for both rain-dominated and rain-on-snow dominated sixth field watersheds 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 two sixth field watersheds in this analysis are the Rogue River and Gold Creek Units. Because the FEIS was completed using data from 2004, all the analyses were updated using 2011 stand and vegetation modeling data. Both sixth field units were below 30 percent open area which is below the 40 percent threshold of concern from the FEIS analysis.

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 percent of cut banks near stream channels may intercept groundwater and rout it through road ditches to the streams (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 and shorten the timing of the increase 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 0.05 miles (less than 270 feet) of new road construction (spur into unit 12A in the Lucky Rowell timber sale) would occur in the Riparian Reserve area crossing above the stream inception points of the channel. Also included in the proposal is up to 26.4 miles of road renovation work that includes 85 potential stream culvert upgrades to meet BMP standards in the RMP. New drain dips and cross drains would also be installed where needed in the road surfaces to help improve watershed function by reducing the roads influence on hill slope hydrology.

Project Area Stream Channels

The mainstems of Rowell Creek and Little Rowell Creek flow through or near two of the thinning project areas (sections 7-8-1 and 7-7-7). The project areas in the Rowell Creek watershed are classified as transport reaches and are generally unconfined with cobble substrates but also have areas of exposed bedrock. The stream gradients are in the two to five percent range except where there are woody debris jams where the gradient is below one percent. The mainstem of Gold Creek is similar but does not have the same levels of LWD. All the mainstem channels are third order, complex stream channels.

Stream channels in the upper project areas are primarily small first and second order headwater streams; these are "source" reaches, following the classification of Montgomery and Buffington (1997). On steeper gradient streams (10-20 percent), these have developed into confined, step-pool channels. All of these smaller 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 percent shade. Hazard trees cut in the SPZ would be left as long as they do not pose a threat to safety of existing structures.

The remaining channels in the project areas are small with intermittent or ephemeral flow. All stream channel source points were field identified and marked on the ground for protection. These small tributary channels are formed in the silt and 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's 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 (less than 5 percent) with small substrates (gravels, sands and silts) reflecting the adjacent soils.

Project Area Wetlands

Numerous small wetland and wet areas were identified the initial project areas boundaries. The areas have been removed from harvest units. These types of sites mostly coincide with high water tables identified in the BLM GIS Timber Production Capability Classification. 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[22] is a compilation of streams which do not meet the state's water quality standards. Rowell Creek and Gold 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; however, all are listed for temperature concerns. Gold Creek Creek: temperature, mile 0 to 5.5, South Yamhill River: sediment, temperature, and various water quality parameters, mile 0 to 11.0. These areas range from as close as 55 feet to more than 5 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 Agency Creek-South Yamhill River watershed is currently undergoing a data collection phase and data analysis by the DEQ to determine what parameters (if any) and what subwatersheds (if any) should be listed as needing a Total Maximum Daily Load (TMDL) completed to correct water quality or habitat related problems.

[22] http://waterquality.deq.state.or/wq/303dpage.htm

Beneficial Uses

There are no known municipal or domestic water users in the specific project areas. Instream domestic water rights exist in the Rowell and Gold Creek watersheds, approximately two miles below project activities. Further downstream in the South Yamhill River, the city of Sheridan holds a water right for municipal water use. Additional recognized beneficial uses of the stream-flow in the project area include anadromous fish, resident fish, recreation, and aesthetic values.

3.4.2 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 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

Direct and Indirect Effects

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

For Project 1 activities, approximately 9 percent (93 acres) of the harvest activities in the Rowell Creek watershed project areas and 2 percent (5 acres) of the harvest activities in the Gold Creek project areas lies within the potential rain-on-snow zone. For the Rowell Creek and Gold Creek watersheds this level of acreage (1 percent and 0.1 percent of the basins) 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 basins are located at elevations below the ROS zone and would dampen any ROS generated flow from any specific event. Project 1 activities also include

the establishment of connectivity corridors between three tributary areas in section 1 of the Rowell Creek timber sale area and two tributary areas in section 13 of the Lucky Rowell timber sale area. These connectivity corridors would require a slightly larger amount of timber to be left in the corridor areas to facilitate travel between drainages for numerous species. After the sale activities are completed, additional trees would be felled within and parallel to the corridors to facilitate species transfer between basins.

Peak Flow Cumulative Effects

A rigorous analysis of peak flow potential for both rain-dominated and rain-on-snow dominated sixth field watersheds in the Project 1 areas (Rogue River and Gold Creek sixth field watersheds) 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 Rogue River and Gold Creek watersheds were below the threshold for being able to display impacts from increases in water yields. The 2008 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 South Yamhill Watershed Enhancement Cumulative Effects Analysis which is summarized below.

Using information based on a recent report by Grant (2008), an additional analysis was completed that totaled up the existing amount of open lands in the two seventh field watersheds in the project area. This includes Rowell Creek and Gold Creek. Table 19 displays the information with the amount of change contained in parenthesis. An “open” condition means that the lands were either recently harvested and currently had less than 30 percent crown closure or were naturally open (meadows, rock slopes, etc.).

Table 19

Watershed Activity Data (Implementation phase of Alternative 2)

Watershed	Size (acres)	Open Acres (Alt 2 acres)	Percent of basin in open condition	Road Density (mi/mi2)	Road Density Post Project (mi/mi2)
Rowell Creek	8,170	2,661 (+973)	32.6	6.63 (+0.4)	6.20
Gold Creek	4,984	1,238 (+195)	24.8	5.65 (+.01)	5.52

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 peak flow detection level at 10 percent 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 percent crown closure when completed, this results in a worst-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 or 3 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 unmeasurable level for peak flow increases based on the Grant envelope curve and the updated WOPR analysis.

Water Quality

Fine sediment and Temperature

For Project 1 harvest areas, appropriate SPZs have been designed following the RMP direction to 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 sixteen of the project units. Table 20 describes the potential harvest areas (approximately 356 acres) and their relationship to landscape position and stream channels. The existing condition of the areas show no sign of mass wasting on BLM lands except in Blue Goose (Unit 4A), which was excluded from the proposed action.

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 harvest activity will trigger any mass wasting or slumping in the project areas. Therefore, increases in sediment delivery to streams due to mass wasting are unlikely, but not impossible, when the amount of steep harvest areas (356 acres) is considered.

Table 20

Steep Portions of Harvest Areas and their Landscape Position

Project 1 Name	Unit	Approximate Acres of Skyline harvest	Landscape position
Blue Goose	4A 4C	10 8	Split by channel, below road, 100 foot buffer Above tributary, below road, 100 foot buffer
Dorn Peak	4E 8D 5D	13 20 24	Mid slope, between roads, 60 foot buffer Upper slope, between roads Mid slope, between roads, 55 foot buffer
Jackpot	7C 7E 7F 7G	15 36 25 12	Mid slope, below road, 60 foot buffer Lower slope, below road, 60 foot buffers Lower slope below road, 85 foot buffers Upper slope, below road
Lucky Rowell	7A 7B 12A 12B	25 33 20 11	Upper slope, below road, 75 foot buffer Mid slope, below road, 85 foot buffer Upper slope, below road, 75 foot buffer Lower slope above creek, 85 foot buffer
Mule's Gold	5A 5B	60 4	Mostly mid, below roads, avg 75 foot buffer Mid slope between roads, 55 foot buffer
Rowell Creek	1A	40	All slope positions and along 2,000 feet of perennial channel, 75 foot buffer

In the less steep portions of the project areas, the no-harvest SPZs in riparian areas have high surface roughness, which will 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. Skyline yarding is not projected to increase sediment production in the project areas based on previous project observations.

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" (wet areas in Unit 1A – Rowell Creek) in the project area. Stream buffers extend a minimum of 55 feet from stream channels (average is 75 feet) and to the extent of the riparian vegetation around "wet areas." As stated above, a former slide area in Unit 4A of the Blue Goose timber sale area was also excluded from treatment. These no-treatment zones will maintain the existing geomorphic conditions in the stream corridors including the stream banks and bottoms from project related impacts. There is an active headwall slump in the headwaters of Rowell Creek where harvest would occur on both sides of the area which could lead to an increase in the activity of this erosive feature.

Sediment and Temperature Cumulative Effects

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 will maintain a minimum of 80 percent shade for the streams. Because stream shading will be maintained there are no anticipated changes to stream temperature from the implementation of these projects.

Rowell Creek: The 1,025 project acres located in the Rowell Creek watershed equates to approximately 12.5 percent of the lands in the 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 will filter out potential sediment that might enter the buffer. This alternative proposes 4.85 miles of new road construction in the Rowell Creek watershed, but no new stream crossings are proposed. Approximately 10 miles of road renovation would also occur. This includes 45 culvert replacements in the project areas and associated haul routes. Some of the same roads will be used for haul between the Rowell Creek sales and the Gold Creek sales, which makes listing the proposed stream culvert replacements tricky depending on the sale of interest. In all there will be a potential of 25 stream crossing upgrades between the two watersheds. These actions would follow standard BMPs and occur during the dry season and in-stream work window (if the streams are running water in the summer work window).

Gold Creek: The 195 acres located in the Gold Creek watershed equates to 3.9 percent of the lands in the 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 will filter out potential sediment that might enter the buffer. This alternative proposes 0.13 miles of new road construction in the Gold Creek watershed, but no new stream crossings are proposed. Approximately 13 miles of road renovation would also occur. This includes 40 culvert replacements in the project areas and associated haul routes. These actions would follow standard BMPs and occur during the dry season.

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. BMPs 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.

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 (average width is 75 feet). For the majority of the skyline harvest, yarding would not occur across streams except for 21 skyline corridors in the east portion of Unit 1A in the Rowell Creek timber sale area. Approximately 2,000 feet of channel would be crossed. Based on previous projects, this many corridors will undoubtedly result in some tree loss in the riparian corridor and along the stream. The trees would be left where they fall and are 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 2 activities would not be located near stream channels and would not have any impacts to stream morphology.

Burning

The majority of slash generated in the ground-based 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 will maintain the productivity of the stand.

Road Work and Hauling

Approximately five miles of new road construction is proposed on or near ridge top locations. The proposed new construction would occur on moderate to low gradient slopes, with no stream crossings. Approximately 500 feet of new road construction (Unit 12A spur, Lucky Rowell) is located within 1 site potential tree of stream channels (see fisheries report), this road crosses a riparian zone with no stream channel. There is another new section of road in the south portion of Unit 12A that is located on two ridges that are in very close proximity to an existing active headwall slump in the headwaters of Rowell Creek. These road segments just through their location on the landscape could lead to an increase in the activity of the slumping of this stream. The road crossing below the slump area has been washed out due to the amount of material that has eroded from this area. This crossing would be available for restoration through this analysis, but funding would have to be found from outside the timber sale process. There are no new stream crossings proposed on any of the new road segments.

Beyond the discussion above, 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 BMPs to reduce concentration of runoff and sediment to a minimum, such as outsloping, and rock placement. Most new roads (4.3 miles) would be decommissioned after their use. In fact, as seen in Table 19, there would be an overall reduction in road densities in the Rowell Creek and Gold Creek watersheds after the sale activities were completed. Approximately 0.3 miles of existing road in the Rowell Creek watershed would be available for decommissioning but funding for the work would need to be found from outside the timber sale activities.

The proposed final road system is located in a stable geologic landform and there is no risk of road related landslides from the roads on BLM lands. The placement of new roads on the

landscape averages greater 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. New road construction, use, and decommissioning would not be expected to result in additions of sediment to project area stream channels. The Rowell Creek watershed is considered an anchor watershed for water quality in the Upper Yamhill basin.

Road renovation work includes 85 potential culvert replacements (25 on streams) to meet BMP standards. New drain dips and cross-drains would also be installed where needed 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 on all project haul roads. Drainage improvements would likely improve water quality over existing conditions in all project watersheds.

Project design features describe limitations on project activities including timber yarding activities, road construction and renovation activities, timber hauling, and instream work (culvert replacements). 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 less than 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.

Alternative 3 – Limited Road Construction

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 there has been documented increases in runoff because 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 would have the same effects as previously discussed.

For Project 1 activities, approximately 7.5 percent (81 acres) of the harvest activities in the Rowell Creek watershed project areas and 2 percent (5 acres) of the harvest activities in the Gold Creek project areas lies within the potential rain-on-snow zone. For the Rowell Creek and Gold Creek watersheds this level of acreage (1 percent and 0.1 percent of the basins) 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 basins are located at elevations below the ROS zone and

would dampen any ROS generated flow from any specific event. Project 1 activities also include the establishment of connectivity corridors between three tributary areas in section 1 of the Rowell Creek timber sale area and two tributary areas in section 13 of the Lucky Rowell timber sale area. These connectivity corridors will require a slightly larger amount of timber to be left in the corridor areas to facilitate travel between drainages for numerous species. After the sale activities are completed, additional trees will be felled within and parallel to the corridors to facilitate species transfer between basins.

Peak Flow Cumulative Effects

A rigorous analysis of peak flow potential for both rain-dominated and rain-on-snow dominated sixth field watersheds in the Project 1 areas (Rogue River and Gold Creek sixth field watersheds) 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 Rogue River and Gold Creek watersheds were below the threshold for being able to display impacts from increases in water yields. The 2008 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).

Using information based on a recent report by Grant (2008), an additional analysis was completed that totaled the existing open lands in the two seventh field watersheds in the project area. This includes Rowell Creek and Gold Creek. Table 21 displays the information. An “open” condition means that the lands were either recently harvested and currently had less than 30 percent crown closure or were naturally open (meadows, rock slopes, etc.).

Table 21

Watershed Activity Data (Alternative 3 Implementation Phase)

Watershed	Size (acres)	Open Acres (Alternative 2 acres)	Percent of basin in open condition	Road Density (mi/mi^2)	Road Density Post Project (mi/mi^2)
Rowell Creek	8,170	2,660 (+934)	31.9	6.38 (+0.09)	6.20
Gold Creek	4,984	1,229 (+189)	24.6	5.65 (+.01)	5.52

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 percent 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 percent 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 3 would result in a measurable impact to water yields. Based on these side boards, it is expected that the addition of the Alternative 3 harvest activities in all the project watersheds would fall into the unmeasurable level for peak flow increases based on the Grant envelope curve and the updated WOPR analysis.

Water Quality

Harvest generated slash would be maintained in the yarding corridors to minimize the need for machines to travel on bare soil, and ground-based yarding equipment would only be allowed on slopes less than 35 percent. Depending on contractor preference, mechanical tree felling and bunching would be allowed on the helicopter harvest areas on slopes between 35 and 45 percent. The PDF would require the equipment to travel on slash mats and no skidding of logs would be allowed. Field surveys by the contractor administrator and soil resource specialist would be required after each harvest area to ensure ground disturbance remains below the 10 percent level allowed in the RMP.

Tree removal is proposed on some steeper slopes (greater than 70 percent) in sixteen of the project units. Table 22 on the following page describes the potential harvest areas (approximately 384 acres) and their relationship to landscape position and stream channels. The existing condition of the areas show no sign of mass wasting on BLM lands except in Unit 4A (Blue Goose) which was excluded from the proposed action. 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 will trigger any mass wasting or slumping in the project areas. Therefore, increases in sediment delivery to streams due to mass wasting are unlikely but not impossible when the amount of steep harvest areas (384 acres) is considered.

Table 22

Steep Portions of Harvest Areas and their Landscape Position

Project 1 Name	Unit Number	Acres of Skyline harvest	Landscape position
Blue Goose	4A 4C	10 8	Split by channel, below road, 100 foot buffer Above tributary, below road, 100 foot buffer
Dorn Peak	4E 8D 5D	13 20 24	Mid slope, between roads, 60 foot buffer Upper slope, between roads Mid slope, between roads, 55 foot buffer
Jackpot	7C 7E 7F	15 36 15	Mid slope, below road, 60 foot buffer Lower slope, below road, 60 foot buffers Lower slope below road, 85 foot buffers
Lucky Rowell	7A 7B 12A 12B	25 33 20 11	Upper slope, below road, 75 foot buffer Mid slope, below road, 85 foot buffer Upper slope, below road, 75 foot buffer Lower slope above cr., 85 foot buffer
Mule's Gold	5A 5B	60 4	Mostly mid slope, below roads, avg 75 foot buffer Mid slope between roads, 55 foot buffer
Rowell Creek	1A	30 – skyline 60 – helicopter	All slope positions and along 2,000 feet of perennial channel, 75 foot buffer

In the less steep portions of the project areas, the no-harvest SPZs in riparian areas have high surface roughness, which will 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. Skyline yarding is not projected to increase sediment production in the project areas based on previous project observations. This alternative reduces the new road construction in section 1 of the Rowell Creek timber sale and uses helicopter harvest to reach the isolated timber stands on 250 acres.

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" (wet areas in Unit 1A – Rowell Creek) in the project area. Stream buffers extend a minimum of 55 feet from stream channels (average is 75 feet) and to the extent of the riparian vegetation around "wet areas." A former slide area in Unit 4A of the Blue Goose timber sale area was also excluded from treatment. These no-treatment zones will maintain the existing geomorphic conditions in the stream corridors including the streambanks and bottoms from project related impacts. The active headwall slump area in upper Rowell Creek would be avoided in this alternative.

Sediment and Temperature Cumulative Effects

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 will maintain a minimum of 80 percent shade for the streams. Because stream shading will be maintained there are no anticipated changes to stream

temperature from the implementation of these projects.

Rowell Creek: The 934 project acres located in the Rowell Creek watershed equates to approximately 11 percent of the lands in the 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 will filter out potential sediment that might enter the buffer. This alternative proposes 1.61 miles of new road construction in the Rowell Creek watershed, but no new stream crossings are proposed. Approximately 15 miles of road renovation would also occur. This includes 45 culvert replacements in the project areas and associated haul routes. Some of the same roads will be used for haul between the Rowell Creek sales and the Gold Creek sales, which makes listing the proposed stream culvert replacements tricky depending on the sale of interest. In all, there will be a potential of 25 stream crossing upgrades between the two watersheds. These actions would follow standard BMPs and occur during the dry season and in-stream work window (if the streams are running water in the summer work window).

Gold Creek: The 189 project acres located in the Gold Creek watershed equates to approximately 3.8 percent of the lands in the 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 will filter out potential sediment that might enter the buffer. This alternative proposes 0.15 miles of new road construction in the Gold Creek watershed, but no new stream crossings are proposed. Approximately 11 miles of road renovation would also occur. This includes 40 culvert replacements in the project areas and associated haul routes. These actions would follow standard BMPs and occur during the dry season.

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. BMPs 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.

Channel Morphology

Projects 1and 2 are unlikely to affect stream channel stability and function as all field identified streams and wet areas would be protected with a minimum 55-foot SPZ. No yarding would occur across streams. No bank stabilizing vegetation would be removed.

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 will maintain the productivity of the stand.

Road Work and Hauling

New road construction (approximately 1.4 miles) is proposed primarily on or near ridge top locations. The proposed new construction would occur on moderate to low gradient slopes, with no stream crossings. There are no new stream crossings 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 BMPs to reduce concentration of runoff and sediment to a minimum, such as outsloping, and rock placement. Most new roads (approximately one mile) would be decommissioned after their use, as as seen in Table 21, there would be an overall reduction in road densities in the Rowell Creek and Gold Creek watersheds after the sale activities were completed. The failed road crossing near unit 12A in the Lucky Rowell sale area would be renovated and decommissioned after use, leaving it in a better condition than it is currently. This work would be funded by the timber sale. Approximately 0.3 miles of existing road in the Rowell Creek watershed would be available for decommissioning, though funding would come from outside sources (independent of the timber sale).

The proposed final road system is located in a stable geologic landform and there is 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. New road construction, use, and decommissioning will result in no expected additions of sediment to stream channels in the project area. The Rowell Creek watershed is considered an anchor watershed for water quality in the Upper Yamhill basin.

Road renovation work includes 85 potential culvert replacements (25 on streams) to meet BMP standards. New drain dips and cross-drains would also be installed where needed 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 on project haul roads. Drainage improvements would likely improve water quality over existing conditions.

Project design features in Section 2.6 of this EA describe limitations on project activities for timber yarding activities, road construction and renovation activities, timber hauling and instream work (culvert replacements). 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 less than 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.

3.4.3 Cumulative Effects

All Action Alternatives

The South Yamhill Watershed Enhancement Project falls within two seventh field watersheds (catchments): Rowell Creek and Gold Creek. This paper documents the procedures and assumptions for determining potential increases to water available for runoff in the sixth field Rogue River and Gold Creek, rain-dominated watersheds using the methodology developed in the Western Oregon Plan Revision (WOPR, 2008). That analysis which was based on vegetation data from 2004 has been updated for this analysis. The original analysis used many assumptions (Appendix I, WOPR) to come to the conclusion that the watersheds were below the threshold for displaying impacts from cumulative activities to water yields in the basin (29 percent of the basin in a harvested condition).

Rogue River

The 2004 data reported 5,420 acres in the basin had less than a 30 percent crown closure (recent harvest). This equated to 22.8 percent of the watershed in a harvested condition. The Alternative 2 proposed action would thin an additional 1,003 acres in the basin plus build an additional 5 miles of new road which would equate to approximately 22 additional acres of clearing, for a total of 1,025 acres.

The Alternative 3 proposed action would add 979 acres of thinning plus 1.4 miles of new road construction, roughly 6.5 acres of new clearing for a total of 986 acres. Assuming that the level of open acres has remained the same on private lands since 2004, the maximum total acres proposed under Alternative 2 results in 27.5 percent value of open lands in the watershed. This level is approaching, but still below, the threshold of concern for displaying cumulative impacts in the Rogue River sixth field based on the WOPR model and assumptions in the analysis.

Gold Creek

The 2004 data said 3,243 acres in the basin had less than a 30 percent crown closure (recent harvest). This equated to 19.3 percent of the watershed in a harvested condition. The proposed action would thin an additional 194 acres in the basin and build an additional 0.13 miles of new road. This would equate to approximately 0.5 additional acres of clearing, for a total of 195 acres.

The Alternative 3 proposed action would add 188 acres of thinning plus 0.15 miles of new road construction, roughly 0.5 acres of new clearing for a total of 189 acres. Assuming that the level

of open acres has remained the same on private lands since 2004, the maximum total acres proposed under Alternative 2 results in 20.5 percent value of open lands in the watershed. This level is well below the threshold of concern for displaying cumulative impacts in the Gold Creek sixth-field watershed based on the WOPR model and assumptions in the analysis.
Using information based on a recent report by Grant (2008), an additional analysis was completed that totaled the existing open lands in the two seventh field watersheds in the project area. This includes Rowell Creek and Gold Creek. Table 23 displays the information. An "open" condition means that the lands were either recently harvested and currently had less than 30 percent crown closure or were naturally open (meadows, rock slopes, etc.).

Table 23

Watershed Activity Data (Assuming Implementation of Alternative 2)

Watershed	Size (acres)	Open Acres (Alt 2 acres)	Percent of basin in open condition	Road Density (mi/mi2)
Rowell Creek	8,170	2,713 (1,025)	33.2	6.63 (0.4)
Gold Creek	4,984	1,238 (195)	24.8	5.65 (.01)

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 percent 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 percent crown closure when completed, this results in a worst 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 or 3 would result in a measurable impact to water yields. Based on these sideboards, it is expected that the addition of the Alternative 2 harvest activities in all the project watersheds would fall into the unmeasurable level for peak flow increases based on the Grant envelope curve and the updated WOPR analysis.

3.5 SOILS

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

- *What effects would road construction have on soil productivity?*

3.5.1 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 level of instability. Soil Map Units[23] 39F, 71F and 80F which lie on 50 to 90 percent side slopes are considered to be shallow soils and are 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. Three hundred and forty three acres or approximately 26 percent of the lands contained within the treatment units have soils with a depth to weathered bedrock of less than 20 inches deep.

The remaining 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 on mid slopes, in valley bottoms and on floodplain terraces. The project areas are all previously disturbed sites and would remain as disturbed sites when the work is completed. The dominant soils within the treatment units are identified in Table 24 on the following page.

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

Table 24

Dominant Soils in the Project Area

Soil Map Unit	SMU Description	Timber Sale	Shallow soil (<20" deep)	Ground-based harvest capability
10D	Bohannon gravelly loam, 3-25 percent slopes	Rowell Creek	No	Yes
10E	Bohannon gravelly loam, 25-50 percent slopes	Rowell Creek	No	Yes, below 35 percent slope
23E	Cruiser gravelly loam, bedrock substratum, 25-50 percent slopes	Dorn Peak	No	Yes, below 35 percent slope
23F	Cruiser gravelly loam, bedrock substratum, 50-70 percent slopes	Mule's Gold	No	No
32D	Hembre gravelly silt loam, 3-25 percent slopes	Mule's Gold	No	Yes
32E	Hembre gravelly silt loam, 25-50 percent slopes	Mule's Gold	No	Yes, below 35 percent slope
39F	Kilchis-Klickitat complex, 60-90 percent slopes	Blue Goose Rowell Creek	Yes	No
41D	Klickitat gravelly clay loam, 3-30 percent slopes	Dorn Peak Mule's Gold Blue Goose	No	Yes
44D	Lurnick gravelly loam, 3-30 percent slopes	Lucky Rowell	No	Yes
44E	Lurnick gravelly loam, 30-50 percent slopes	Lucky Rowell	No	Yes, below 35 percent slope
69D	Trask shaly loam, 3-30 percent slopes	Rowell Creek	No	Yes
69F	Trask shaly loam, 30-90 percent slopes	Rowell Creek	No	Yes, below 35 percent slope
71F	Valsetz-Yellowstone complex, 50-90 percent slopes	Dorn Peak Mule's Gold Blue Goose Lucky Rowell Jackpot	Yes	No
80F	Yellowstone stony loam, 30-90 percent slopes	Jackpot Lucky Rowell	Yes	Yes, below 35 percent slope

3.5.2 Environmental Effects

Alternative 1 – No Action

Without active management, this alternative would result in no change to the affected environment. 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

All Projects

Direct and Indirect Effects to Soil Quality and Site Productivity

Under this action alternative 276 acres would be harvested by ground-based equipment and 872 acres would be harvested by skyline operations. The ground-based harvesting would follow established project design features as listed in section 2.6 of this EA.

The most critical project design feature would be slope limitation for mechanical activity and season of operation. 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 harvest activity (thinning) would occur on slopes of 35 percent or less and based on past experience, the majority of understory vegetation and root systems would remain, along with surface soil litter and slash from harvested trees. This would help protect the surface soil from unacceptable levels of surface erosion. The ground-based harvesting activity would occur when soils have low moisture (dry season) and the potential for unacceptable levels of soil compaction would be at a minimum. The amount of compaction from necessary timber harvest related infrastructure (e.g. skid trails and landings) would be kept to less than 10 percent of the unit. Those portions of the treatment units that are ground-based harvested are expected to recover over time and it is not expected that the impact on soil quality or site productivity would be long term or result in a long term adverse impact to the soils resource.

Based on past timber sales, the 872 acres of skyline harvest are not expected to result in negative impacts to soil compaction or soil productivity. The disturbed area from the harvest process would remain below the 10 percent disturbance level allowed in the RMP.

Approximately 22 acres of new roads will be constructed within the treatment units. When this is combined with existing roads within the treatment units it is approximately 4 percent 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.

Slope Stability

There is a historic slump area in Unit 4A of the Blue Goose timber sale where skyline harvest is proposed in both alternatives. This slump area has been given a 100 foot buffer from harvest

activities and should remain in its present vegetated-stable condition. There is an active headwall slump area in Unit 12A of the Lucky Rowell timber sale that under Alternative 2 would have two new spur roads constructed and then decommissioned on the ridges above the headwall area. For the long term stability of this headwall slump, the construction of spur roads above it is likely to lower the stability of the area. The road crossing below this slump area has failed due to past material delivery to the crossing and would be approved for decommissioning but funds from outside the timber sale would need to be found to complete the work. All newly constructed roads are proposed to be decommissioned under this alternative. The new road decommissioning work would be paid for through the timber sale. Also proposed under this alternative, approximately 1.8 miles of renovated roads would be decommissioned which would leave the project watersheds in a better condition than the existing condition. Approximately 0.3 miles of existing road in the Rowell Creek timber sale that would not be used for the project activities would be available for decommissioning but funding from outside the timber sale would need to be found to complete this work.

Burning

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 creation of hydrophobic soils. However, since they would be considered to be less than 10 percent 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 past monitoring of these burning activities, only localized effects (runoff and weeds) have been seen at these locations with no delivery of sediment to streams.

Project 2 – Legacy Tree Release and Coarse Woody Debris Creation

Project 2 activities would also include the felling, girdling, or topping of trees as scattered individuals or in gaps up to one-half acre in size would have no visible or detectable effect on soil physical properties such as bulk density. Over time the material left on site would breakdown and add to the organic matter content of the soil and this could slightly alter some soil chemical properties (i.e., increased supplies of soil carbon and organic acids). Small disturbances to the soil surface (compaction and displacement) from foot traffic and removal or repositioning of some material would occur during project operations. These effects would be dispersed across the treatment area and would not result in a loss of soil productivity or function.

Alternative 3 – Limited Road Construction

All Projects

Direct and Indirect Effects to Soil Quality and Site Productivity

Under this action alternative 271 acres would be harvested by ground-based equipment, 654 acres by skyline operations, and 250 acres by helicopter. The ground-based harvesting would follow established project design features as listed under section 2.6 of this EA. Projected

impacts from ground-based and skyline harvest activities are discussed under alternative 2. The projected impacts form the helicopter harvest is expected to be lower than the skyline harvest method because it does not require the use of skyline corridors. Based on past helicopter harvest units the level of soil disturbance is generally less than 3 percent of the harvest unit, which is well below the 10 percent level allowed by the RMP. Depending on contractor preference, mechanical tree felling and bunching would be allowed on the helicopter harvest areas on slopes between 35 and 45 percent. The project design feature would require the equipment to travel on slash mats and no skidding of logs would be allowed.

Field surveys by the contractor administrator and soil resource specialist would be required after each harvest area to ensure ground disturbance remains below the 10 percent level allowed in the RMP. There would be approximately 1.8 miles of new road constructed under this action alternative. Within the lands to be treated under this action alternative there are approximately 24.4 miles of existing roadways that would be renovated. Approximately 1.4 miles of new roads would be constructed of which 0.5 miles would be decommissioned after use. The failed road crossing near unit 12A in the Lucky Rowell timber sale would be renovated and decommissioned after use, leaving it in a better condition than it is currently. This work would be funded by the timber sale. Approximately 0.3 miles of existing road in the Rowell Creek timber sale that would not be used for the project activities would be available for decommissioning, but outside funding (independently of the timber sale) would be required to complete this work.

There would be less new road construction (1.8 fewer miles), fewer acres treated by ground-based harvesting (51 fewer acres), fewer acres treated by skyline harvesting (244 fewer acres), but additional acres treated by helicopter harvesting (250 more acres) which means Alternative 3 has fewer harvest acres (45 fewer acres) than Alternative 2 and fewer project impacts from road construction. The same project design features and BMPs as described under Alternative 2 would be applied. This alternative would not construct the spur roads on both sides of the headwall slump in Unit 12A and reduce the likelihood of aggravating the erosional properties of the active slump area. Therefore, it is likely that the implementation of Alternative 3 would result in less direct, indirect, and cumulative effects to soil quality or site productivity than Alternative 2. Project 2 activities and impacts are anticipated to be similar to those described in Alternative 2. Refer to the effects analysis as described in detail under Alternative 2.

3.5.3 Cumulative Effects

Alternative 2 – Proposed Action

Cumulative Effects to Soil Quality and Site Productivity

Under this action alternative 298 acres would be harvested by ground-based equipment and 872 acres would be harvested by skyline operations. The ground-based harvesting would follow established project design features and BMPs as listed under the description of alternatives. There would be approximately 5 miles of new road constructed and 26.4 miles of renovation of existing roadway. In total, approximately 6.6 miles of road would be decommissioned when the timber sale work is completed.

The new road construction would equate to approximately 22 acres of new cleared ground. The new road mileage is proposed to be decommissioned after use and the areas are expected to revegetate quickly based on previous decommissioning activities.

Approximately three percent of the project area has soils that have been disturbed by roads that are restricted and no longer drivable. Many of these roadways when left alone over time naturally recover. Field reviews of project area confirms that with the exception of the heavily travelled corridors, many of the roadways have shown that they 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, 22 acres of new roads are proposed to be constructed, 93.4 acres of the existing road ways are proposed to be renovated. Of these roadways approximately 26.4 acres are proposed to be decommissioned following project activities, the majority of these activities would occur in section one of the Rowell Creek timber sale where the final road mileage in the section would be reduced from the existing condition by approximately 0.6 miles. The stream crossing failure near unit 12A of the Lucky Rowell timber sale would not be repaired, but could be completed when funding was obtained through other means.

Therefore, it has been determined that the project level activities associated with the implementation of Alternative 2, excluding the spur road construction in Unit 12A of the Lucky Rowell timber sale is unlikely to result in adverse effects to soil quality or site productivity.

Alternative 3 – Limited Road Construction

Cumulative Effect to Soil Quality and Site Productivity

Alternative 3 would result in fewer impacts to soils than Alternative 2. The analysis for cumulative effects based on Alternative 2 activities was found to not have a detrimental cumulative effect to the soils resource. While both action alternatives will meet the RMP guidelines for soil protection, the projected level of activities associated with the implementation of Alternative 3 would result in a lower level of cumulative impacts to soil quality or site productivity than the Alternative 2 activities.

3.6 AIR QUALITY, FIRE RISK, AND FUELS MANAGEMENT

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

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

3.6.1 Affected Environment

Air Quality

The major source of air pollutants within the South Yamhill River project area would come from fire starts and from associated resource management activities including prescribed burning (hand, machine, and landing piles), and dust from the use of natural-surfaced roads.

The Willamette Valley experiences periods of air stagnation. When this occurs during winter months, cold air often becomes trapped near the valley floor with slightly warmer air aloft. This creates temperature inversion conditions and causes air pollutants to become trapped near the ground. Wintertime temperature inversions contribute to high particulate levels. Stagnant periods in the summertime contribute to increases in ozone levels, causing the local air quality to deteriorate. The State of Oregon has designated the Willamette Valley as a Smoke Sensitive Receptor Area.

Fire Hazard and Risk

The climate in Northwest Oregon is generally mild and wet in the winter. In the North Oregon Coast mountain range, 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 degrees Fahrenheit with high temperatures reaching the mid to upper 90s, and occasionally topping 100 degrees Fahrenheit for short periods of time. During average weather years, the conditions under the forest canopy remain relatively moist.

Fire is a natural disturbance process in the project area. Fire effects on forested areas are influenced by fire frequency, duration, and intensity (Van Wagner 1965). These factors vary with forest type, depending on fuel type and structure, topography, and weather variables. Fire can influence vegetation, nutrient cycling, successional pathways, fish and wildlife habitat, vegetative species composition, age, structure, and insect and disease susceptibility.

Wildfires within the project area are primarily human-caused. Dry lightning (lightning without accompanying moisture) that occurs during the summer months is rare in northwest Oregon. Within the Oregon Department of Forestry's Northwest Oregon Area - West Oregon District - Dallas Unit over the last ten years, two fire starts are attributed to lightning and eleven are human-caused. The average size of the lightning fires is approximately three acres. The average size of the human caused fires is approximately eight acres.[24]

Fire Regime and Condition Class

The Fire Regime classifies the role fire would play across the landscape in the absence of modern human intervention. The Condition Class classifies the amount of departure from the

[24] Source: http://oregon.gov/ODF/FIRE/HLCause.pdf.

natural fire regime. The modeling predictions for fire regime and condition class come from the LANDFIRE Rapid Assessment Vegetation Models[25].

The model identifies the project area as falling within the Pacific Northwest Forested landscape. The area's potential natural vegetation group is listed as Douglas-fir-western hemlock (dry mesic) and Douglas-fir-western hemlock (wet mesic), and it falls within two different Fire Regimes[26].

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. More than 80 percent of fires are characterized as mixed or low severity.

The timber stands generally fall within Condition Class 2 or 3 with species composition and structure functioning outside their natural (historical) range due to overstocking and past harvest treatments.

Management of the surrounding private land affects the Condition Class to such an extent that actions within the South Yamhill River project area are unlikely to change the Condition Class rating across the landscape.

Timber Stand and Fire History

The early fire history of the analysis area is not well documented, although it is known that Native Americans burned within the Willamette Valley. To what extent this burning extended into the valley foothills and up the river corridors is not specifically known. Fire does play a major role as a natural disturbance agent, as do people.

It is likely, as evidenced by the diameter and decay class of remnant snags, that the Nestucca Fire of the mid-1840s burned through at least part of the project area. This fire extended from the Nestucca-Trask basins divide south to Siletz Bay; however, the exact boundaries have not been identified. Other large fires have burned within Polk County including a 12,785 acre fire in 1945, two fires, the 1,100 acre Shady Lane fire, and the 5,000 acre Rockhouse Fire burned in 1987, and in 2007 the 1500 Road fire burned 360 acres.

The area has experienced other forestry related management activities in the past. The majority, if not all, of the proposed project areas were previously harvested beginning in the 1940s and continuing through the 1980s. Many harvest units of this time period had broadcast burning or spot burning associated with them, both for hazard reduction and for site preparation prior to tree planting. Tree cores and fire scars collected throughout the Willamette Province from trees harvested from 1950 to 1980 provide evidence that historic fire return intervals in the analysis area range from 50-150 years in the lower elevations and south facing aspects, and up to 300 years in the higher elevations and north aspects.

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[25] For fire regimes see: http://www.fs.fed.us/database/feis/fire_regime_table/fire_regime_table.html
[26] For descriptions of Fire Regimes and Condition Class: http://www.nwcg.gov/teams/wfewt/archive/message/FrccDefinitions.pdf

The average fire return interval increased following the advent of fire suppression in 1910. It has been decades since the most recent man-caused disturbance (logging) occurred. Although fire has been excluded from the landscape, the analysis area is still well within the range of a normal fire return.

3.6.2 Environmental Effects

Alternative 1 – No Action

Air Quality

Under the No Action alternative there would be no commercial thinning, road construction, log hauling, legacy tree release or snag and coarse woody debris enhancement, or any need for prescribed burning and, therefore, no localized effects to air quality. However, as the timber stands continue to grow, the increased stocking density would cause the stands to become more susceptible to a stand replacement fire event. In the event of a wildfire, poor air quality is expected due to the high volume of smoke produced.

Fire Hazard and Risk

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 (1,000 hour fuel class) and in the smaller size fuel classes, (1, 10, and 100 hour fuels) in these timber stands as stress-induced mortality within the stands increases. Ladder fuel densities would increase as trees are suppressed in the understory, shade tolerant species seed in, and dominant trees grow larger. The potential for these stands to eventually succumb to a wildfire would continue to increase as they near the maximum fire return interval and the condition class departs further from the natural fire regime.

Alternative 2 – Proposed Action

Air Quality

Travel 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 (during project work) effects to air quality. These effects would be localized to the immediate vicinity of the operations.

Following variable density thinning, legacy tree release and snag and coarse woody debris treatments, the fuel load would increase. Post treatment fuels surveys would be conducted and the Stereo Photo Series for Quantifying Forest Residues in the Douglas-fir Type of the Willamette National Forest (General Technical Report PNW-GTR-258, Ottmar, Hardy, Vihnanek May 1980) or the Stereo Photo Series for Quantifying Forest Residues in Coastal Oregon Forests (General Technical Report PNW-GTR-231, Ottmar, Hardy) would be used to

help identify areas with increased fuel loads. If these methods determine that an increased fire hazard exists, prescribed burning would be conducted and smoke would be generated.

Fuels generated from Project 1 would be targeted for treatment with hand, machine, and landing pile construction and burning because human activity and the risk of ignition is greatest in these areas. Activity generated fuels in the legacy tree release project areas would be targeted for treatment with hand pile construction and burning because the objective in these areas is to maintain legacy trees as a part of the landscape. Increased fuel loads in these areas would increase the risk that these trees would be destroyed in a fire.

Approximately 600 acres could be treated with prescribed fire. This would remove approximately 44 tons of slash per acre or approximately 26,400 total tons from the highest risk areas.

All prescribed burning would require a project level Prescribed Fire Burn Plan that adheres to smoke management and air quality standards, meets the objectives for land use allocations, and maintains or restores ecosystem processes or structure. The burn plan would comply with the Northwest Oregon (NWOR) Fire Management Plan for the Eugene District BLM, Salem District BLM, Siuslaw National Forest, and the Willamette National Forest dated May 20, 2009. All burning would be coordinated with the local Oregon Department of Forestry office in accordance with the Oregon State Implementation Plan and Oregon Smoke Management Plan.

Burning would be conducted when the prevailing winds are blowing away from Smoke Sensitive Receptor Areas (SSRAs) in order to minimize or eliminate the potential for smoke intrusions. The potential for a 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.

Prescribed burning would cause short-term impacts to air quality that would persist for one to three days within one-quarter to one mile of units. Motorist safety is unlikely to be affected, as none of the treatment units are close to any major highways. 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 Hazard and Risk

Following treatments 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, and would be greatest during the first season following treatment when needles dry but remain attached to tree limbs. The modeling predictions for fire behavior (Anderson, April 1982) based on the National Fire Danger Rating System (NFDRS) fuel models would move the project units from a Fuel Model 8 (Closed timber litter) to Fuel Model 11 (Light logging slash), or Fuel Model 12 (Medium logging slash). Treatment areas would see a short-term (0-5 year) increase in fire ignition potential because of the increase in fine dead fuels.

Thinning would decrease both the amount of potential ladder fuels and the available fuel density in the canopy (canopy bulk density). A relative density of 35 percent-45 percent basal area or lower has been identified as the point where canopy 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.

The project proposes to reduce the risk of a fire by decreasing the fuel load in areas that are accessible to people or where the fuel load could damage resources. Surface fuels would be reduced in within project units, along roads, and property lines. The treatments would reduce surface fuels resulting in lower fire intensity, rates of spread and flame lengths.

The Oregon Department of Forestry has responsibility for fire protection on BLM managed land in western Oregon. Their ability to successfully control wildfires in the fuels treatment areas as small, low intensity, ground fires would remain high. For the short-term (0-5 years), the fire risk would increase in the variable density thinning and legacy tree release treatment areas, however due to decreased crown density and reduction in ladder fuels, containment of wildfires at less than 10 acres in size should continue to be attainable during initial attack.

When harvest has been completed, fuels surveys would be conducted and project areas that are identified as containing hazardous fuels may have hand or machine piles constructed within areas containing dense slash.

Upon completion of harvest operations, the BLM would conduct fuel surveys and identify site-specific treatments. Hand or machine piles may be constructed within areas containing hazardous fuels or dense slash.

Machine piles may be constructed along roads, or property lines, and landing piles may be constructed where logs are hauled to roads. If fuel loads are relatively light along roads and property lines, slash pullback may be incorporated as the desired fuels treatment.

Alternative 3 – Limited Road Construction

Air Quality

Less travel would occur over BLM and other roads under this alternative. Dust created from vehicle traffic from proposed project activities on gravel or natural-surface roads would contribute short-term (during project work) effects to air quality. These effects would be localized to the immediate vicinity of the operations.

Fuel loading would increase as a result of the proposed project. The BLM would conduct post-treatment fuels surveys and the Stereo Photo Series for Quantifying Forest Residues in the Douglas-fir Type of the Willamette National Forest (General Technical Report PNW-GTR-258, Ottmar, Hardy, Vihnanek May 1980) or the Stereo Photo Series for Quantifying Forest Residues in Coastal Oregon Forests (General Technical Report PNW-GTR-231, Ottmar, Hardy) would be used to help identify areas with increased fuel loads. If these methods determine that an

increased fire hazard exists, prescribed burning would be conducted and smoke would be generated.

Hand, machine, and landing pile construction and burning in the variable density thinning, and legacy tree release project areas, would be targeted for treatment because human activity and the risk of ignition is greatest in these areas. Fewer acres would be treated with prescribed fire than under Alternative 2.

Fire Hazard and Risk

Although approximately 45 fewer acres would be treated, the effects of the proposed project on fire risk would be similar to Alternative 2. See Projects 1 and 2 for a detailed description of the environmental effects of fire.

3.6.3 Cumulative Effects

All Action Alternatives

There would be no cumulative effects to air resources, as the direct and indirect effects from the project would be local and of short duration, and there would be no other uses in the project area affecting this resource. Based on past experience with pile burning in this and other similar areas, confirming the short duration of smoke and effectiveness of adherence to smoke management plans, there are no expected cumulative effects on air quality from the planned fuels treatment under this proposal.

There would be an increase in fuel loading and resultant fire hazard in the short-term (0-1 year). In the commercial thinning areas, along roads, and property lines, the hazard and risk would be minimized by the use of fuels reduction treatments. The localized increase in fire risk would diminish to background levels over time as slash decomposes. There would be positive benefits to the thinned stands in the longer term due to the wider spacing between tree crowns and the removal of most of the ladder fuels that are conducive to the spread of fire into the tree canopy. At a watershed scale, the thinning of approximately 1,168 acres (Alternative 2) or 1,124 acres (Alternative 3) of forest habitat would have very little effect on fire intensity or starts. However, due to reduced bulk density and ladder fuels, the potential for the stand to carry a crown fire would reduce in the long term (greater than 5 years).

3.7 RECREATION

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

Recreation, Rural Interface, and Visual Resource Management

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

- *How would the project activities affect the rural interface?*

- *What effects would the projects have on the visual resources?*

3.7.1 Affected Environment

Recreation

The project area is primarily accessed via gravel surfaced roadways with portions of the project area gated, limiting vehicle access to administrative use and foot travel. Evidence of man-made modifications (such as roads and timber harvest activity) are visible throughout the project area. There are no developed recreation sites within the project area; dispersed recreation in the forms of camping and OHV use is evident within and near the project area. The project area is not considered a destination point for recreational users.

Recreational opportunities within the project areas include hunting, dispersed camping, target shooting, collection of special forest products and OHV use primarily during big game hunting seasons. Target shooting and dispersed camping would be the most common recreational activity within the area; remnants of these activities are present at old landing sites and road closures.

Recreational OHV use has risen progressively over the last few years primarily due to closure of private lands to motorized use and limitations placed on public lands. The project area is within reasonable travel distance from major metropolitan areas and within close proximity to urban communities which enables OHV users to schedule day trips to the area as opposed to multi-day trips required for many public land locations that allow for OHV use. The majority of the proposed project area is if designated as “open” for OHV use. “Open area” means an area where all types of vehicle use is permitted at all times, anywhere in the area subject to the operating regulations and vehicle standards set forth in 43 CFR subparts 8341 and 8342 of this title.

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 the proposed projects. The project area is not considered to be within rural interface boundaries. Roads surrounding the proposed project area have historically been used for logging activities. Homes near haul routes may notice an increase in truck traffic during hauling operations.

Visual Resource Management (VRM)

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 view shed. 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. The project area is rated as VRM 4 (RMP p. 37): “Manage visual resource management class 4 lands for moderate level of change to the characteristic landscape. Management activities may dominate the view and may be the major focus of view attention. However, every attempt should be made to minimize effect of these activities through careful location, minimal disturbance and repeating the basic elements of for, line, color, and texture.”

Other Resources

There are no designated Wild and Scenic Rivers or wilderness within the project area.

3.7.2 Environmental Effects

Alternative 1 – No Action

With the exception of unexpected changes due to a natural catastrophic event, the proposed project area would continue to provide dispersed recreation opportunities in a forested environment. Timber management activities would continue on both private and public lands in the vicinity. No modifications to the landscape character within the project area would be expected to occur. Modifications to the neighboring landscapes are expected to continue as harvest rotations progress.

Alternative 2 – Proposed Action

Recreation and Rural Interface

Recreational activities within the project area would be limited during periods of operation. During this time, recreational use may be distributed or displaced to other nearby locations. Motorized or OHV use within the project area would be further limited for one year following harvest operations or red needle stage.

Following harvest activities, current recreational activities would continue with potential of increased hunting opportunities due opening canopy cover in areas providing the possibility of more browse material. OHV activity is currently limited to existing roadways due to the natural landscape. Though there is little evidence of user-created OHV trails, harvest activities would likely obliterate any such unauthorized trails. No reconstruction of unauthorized trails would be conducted or allowed. Post-harvest OHV activity level should be similar to present levels due to road decommissioning following activities; no new roads would be available for OHV use.

VRM

The proposed projects may be visible in the distance when looking from major public travel routes but will likely be unobservable since the rolling hills, remaining trees and vegetation block much of the view. Lands managed by the BLM are, for the most part, unidentifiable from other lands when looking at the landscape from any vantage point.

The proposed project would comply with VRM Class 4 management outlines. Visual disturbance of the project area would be associated with modifications to vegetation and other ground disturbing activities from timber sale operations. Harvest activities would remove a portion of trees form the proposed units leaving undergrowth vegetation crushed. Logging debris and crushed undergrowth would continue to turn brown to red as it dies. Fuel treatment of logging debris, if burned 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. 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 a large part of the canopy would remain.

Alternative 3 – Limited Road Construction

Recreation and Rural Interface

Project impacts would be similar to those for Alternative 2. Recreational activities within the project area would be limited during periods of operation. During this time, recreational use may be distributed or displaced to other nearby locations.

Following harvest activities, current recreational activities would continue with potential of increased hunting opportunities due opening canopy cover in areas providing the possibility of more browse material. OHV activity is currently limited to existing roadways due to the natural landscape. OHV activity level should remain at present levels due to road decommissioning following activities; no new roads would be available for OHV use.

VRM

Project impacts would be similar to those for Alternative 2. The proposed projects may be visible in the distance when looking from major public travel routes but will likely be unobservable since the rolling hills, remaining trees, and vegetation block views. BLM lands are, for the most part, unidentifiable from other lands when looking at the landscape from any vantage point.

The proposed project would comply with VRM Class 4 management outlines. 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 a large part of the canopy would remain.

3.7.3 Cumulative Effects

All Action Alternatives

Current recreation use of the project area would be restricted in the short-term during harvest activities. OHV use within the area would be further limited for one-year following operations during the red-needle stage of the downed wood. Additional road closures may occur upon

completion of harvest activities. This project would have minimal to no impact on recreational uses as these opportunities are available within a short distance of the project area.

Residential development along haul routes are routinely presented with log truck traffic from timber management activities on private and public lands. With the exception of a temporary minor increase in traffic, there would be little affect to the residential land owners.

Upon project completion, recreational activities would be expected to return to current use levels with the possible increase in hunting use following any harvest activities, largely in part to the opening of units providing more browse material for large game animals. Timber management activities would continue on both public and private lands resulting in short term effects to visual resources while logging debris and crushed undergrowth vegetation dies and once again flourishes.

3.8 CARBON SEQUESTRATION AND CLIMATE CHANGE

The South Yamhill River 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 conducted project-level analysis of carbon storage emissions on several projects in recent years. 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 EA, 2010, and Green Peak Density Management Project EA, 2010).

In Table 25 on the following page, the stands analyzed in the South Yamhill Watershed Enhancement EA are compared to the four projects listed above.

Table 25

Comparison of South Yamhill River Watershed Enhancement Project Stands to Similar Projects

Project	South Yamhill 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]	58	68	55	57	70
Prescription BA[2]	120	139	115	126	92
Prescription TPA[3]	84	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 at time of their respective NEPA analysis, 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 of stands and treatments between previous analyses and those of South Yamhill River Watershed Enhancement EA, 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, 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 percent of the net storage of carbon over 50 years that would occur under the No Action alternative.
- 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 percent higher than average historic conditions (576 million tonnes, WOPR, 3-224).
- 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.

3.8.1 Cumulative Effects

All Action Alternatives

Because of the similarity between previous analyses and the similarity in stands and treatments analyzed in the South Yamhill River 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, five percent higher than average historic conditions (576 million tonnes, WOPR, 3-224).

4.0 COMPLIANCE WITH THE AQUATIC CONSERVATION STRATEGY

EXISTING WATERSHED OWNERSHIP AND VEGETATION PATTERNS

Within the Agency Creek-South Yamhill River Fifth Field Watershed

This watershed encompasses 89,428 acres. Approximately 19 percent is managed federally (totaling 17,212 acres: 4 percent BLM, 15 percent other federal agencies) and 80 percent is managed privately. Less than one percent is managed by the state or other local entities. Approximately 31 percent (or 1,125 acres) of BLM land in the watershed is over 80 years of age. Approximately 47 percent (or 1,697 acres) of BLM lands are within the Riparian Reserves.

Within the Gold Creek Seventh Field Watershed

This watershed encompasses nearly 5,000 acres. Approximately 16 percent (or 792 acres) is managed by the BLM and 84 percent (or 4,191 acres) is managed privately. Approximately 32 percent (or 253acres) of BLM land in the watershed is over 80 years of age. Approximately 44 percent (or 346 acres) of BLM lands are within the Riparian Reserves.

Within the Rowell Creek Seventh Field Watershed

This watershed encompasses over 8,000 acres. Approximately 30 percent (or 2,387 acres) is managed by the BLM and 70 percent (or 5,781 acres) is managed privately. Approximately 40 percent (or 955 acres) of BLM land in the watershed is over 80 years of age. Approximately 49 percent (or 1,169 acres) of BLM lands are within the Riparian Reserves.

REVIEW OF AQUATIC CONSERVATION STRATEGY COMPLIANCE

The project is in compliance Aquatic Conservation Strategy. The following discussion illustrates how the projects would comply with the four components of the Aquatic Conservation Strategy.

Component 1 – Riparian Reserves: 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 RMP. Construction of a maximum of 3,376 feet (0.64 miles) of temporary new road within the Riparian Reserves and renovation of 6.7 miles of existing road would occur outside of one site potential tree height of stream channels (220 feet). Approximately 1,300 total feet of renovation would occur within 110 feet of any stream within the watersheds in the analysis area. The proposed road construction is unlikely to increase the drainage network in the watersheds 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. Because of the dispersed nature of the road work, impacts to aquatic habitat downstream would not be anticipated.

Component 2 – Key Watershed: the South Yamhill River 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 (MEGAWA)* (1998) describes the events that contributed to the current conditions in the watersheds such as early hunting and gathering by aboriginal inhabitants, road building, agriculture, wildfire, and timber harvest. The following are watershed based analyses findings that apply to or are components of this project:

Mill Creek, Rickreall Creek, Rowell Creek, and 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 (MEGAWA. SI&MR-12).

- 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 (MEGAWA. SI&MR-19&23).

- Prioritize density management treatments in stands, including those in Riparian Reserves, to benefit wildlife and aquatic habitat. (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-21).

- 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. Locations for treatment should occur with the oldest stands first. (MEGAWA. SI&MR-18&23).

- Activities in the Riparian Reserves should promote older forest characteristics, attain ACS Objectives, and move the Riparian Reserves on a trajectory toward older forest characteristics including: diverse vegetation and age classes, mature conifers where they occurred in the past, dead standing and down wood, stream connection to its floodplain, and stream bank vegetation maintaining stable banks (MEGAWA. SI&MR-11).

- Using the LSRA and recommendations of biologist, design management activities in the Riparian Reserves which will provide for down wood and snags in all decay classes over

the life of the stand (MEGAWA. SI&MR-11).

- Treatments in the LSR would be both inside and outside the Riparian Reserve boundaries, since many objectives are shared, these include: thinning to control density and produce desirable results, underplanting with shade tolerate species, selection for both species and structural diversity, developing prescriptions that are ecologically based, creation or maintenance of snags and coarse woody debris (MEGAWA. A-25).

- Silvicultural prescriptions of CWD in managed plantations should determine whether the managed area is on the upward or downward trajectory of recruitment. Numbers or volume of down wood is less important than understanding the dynamics of CWD. Managing CWD of plantations is to provide continuity (MEGAWA. A-25).

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 reasons stated in Table 26 on the following pages.

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

Alternative 2

Approximately 396 acres (34 percent) of Project 1 is within the Riparian Reserves. 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. The information below reaffirms and supplements information contained in Table 26 later in this section. 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 will remain at 50 percent 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, 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, 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.

Alternative 3

Approximately 395 acres (35 percent) of South Yamhill Project 1 in Alternative 3 is within Riparian Reserve boundaries. However, the habitat conditions within these Riparian Reserves (outside the 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 same manner as Alternative 2. These effects will occur on 395 acres in Alternative 3 and 396 acres as in Alternative 2. On one untreated acre in Alternative 3, the effects described in the No Action Alternative would occur, compared to Alternative 2.

Table 26

Project Consistency with the Nine Aquatic Conservation Strategy Objectives

Aquatic Conservation Strategy Objectives (ACSOs)	South Yamhill River Watershed Enhancement and Associated Actions
1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations, and communities are uniquely adapted.	Does not prevent the attainment of ***ACSO 1***. Addressed in Text (*EA sections 3.7*). 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. **<u>Project 1</u>** **Alternative 2 (Proposed Action):** Treatments include variable density thinning, creation of small gaps around "wolf" trees, and retention of small clumps. This would increase spatial and structural diversity of the forest. Heavy thinning areas on a micro-scale would allow development of a younger cohort of trees, likely including a high proportion of shade-tolerant species. 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 grown and causes shade loss of lower limbs. With treatment, trees would reach large diameters earlier compared to the no treatment option, creating opportunities for high quality LWD recruitment to the stream channel (Snook 2013, Roux 2013). Large amounts of smaller wood could continue to fall from within the untreated SPZs, and larger wood would begin to be recruited from farther up the slopes as the treated stands reach heights of 200 feet. Thus, wood with a larger range of sizes would potentially be recruited into streams over the long term in treated stands. **Alternative 3 (Limited Road Construction):** This alternative would have similar actions to Alternative 2, but would result in approximately 5 miles less road construction and approximately 45 fewer acres of harvest. This reduction in activities is expected to result in similar conditions represent in the analysis but at fewer locations.

Aquatic Conservation Strategy Objectives (ACSOs)	South Yamhill River Watershed Enhancement and Associated Actions
	<u>Project 2</u> **Both Action Alternatives:** This project would mimic natural forest processes (windthrow) in the creation of both CWD and LWD in the project watersheds.
2. Maintain and restore spatial and temporal connectivity within and between watersheds.	Does not prevent the attainment of ***ACSO 2***. Addressed in Text (*EA sections 3.2*). In summary: **No Action Alternative:** The No Action alternative would have little effect on connectivity except in the long term within the affected watershed. **<u>Project 1</u>** **Alternative 2 (Proposed Action):** Long term connectivity of terrestrial watershed features would be improved by enhancing conditions for stand structure development. In time, the Riparian Reserve LUA would improve in functioning as refugia for late successional, aquatic, and riparian associated and dependent species. Both terrestrial and aquatic connectivity would be maintained, and over the long-term, as the Riparian Reserve LUA develops late successional characteristics, lateral, longitudinal and drainage connectivity would be restored. No stream crossing culverts would be used that would potentially hinder movement of aquatic species; therefore no aquatic barriers would be created. Both terrestrial and aquatic connectivity would be maintained, and over the long-term, as Riparian Reserves develop late successional characteristics, lateral, longitudinal and drainage connectivity would be restored. Renovation of the transportation system would not affect spatial connectivity. **Alternative 3 (Limited Road Construction):** This alternative would have similar actions to Alternative 2, but would result in approximately 5 miles less road construction and approximately 45 fewer acres of 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. **<u>Project 2</u>** **Both Action Alternatives:** This project would mimic natural forest processes (windthrow) in the creation of both

Aquatic Conservation Strategy Objectives (ACSOs)	South Yamhill River Watershed Enhancement and Associated Actions
	CWD and LWD in the project watersheds. The addition of these structures is expected to improve the connectivity for ground-based organisms as it will provide increased security for movement. Three connectivity corridors are proposed in the Rowell Creek timber sale area and two proposed in the Lucky Rowell Creek timber sale area that have been designed and will be monitored with the help of OSU (Dede Olson) to facilitate organism passage between watershed areas. See the hydrology write-up for a detailed discussion of these corridors.
3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.	Does not prevent the attainment of ***ACSO 3***. Addressed in Text (*EA section 3.3*). In summary: **No Action Alternative:** It is assumed that the current condition of physical integrity would be maintained. **<u>Project 1</u>** **Alternative 2 (Proposed Action):** This project is unlikely to affect stream channel stability and function as all field identified streams and wet areas would be protected with at least a 55-foot SPZ. No yarding would occur across streams. No bank stabilizing vegetation would be removed. No tree removal is proposed along fish bearing streams in either alternative. However, thinning is proposed to produce larger trees over time that would fall into the streams adding additional structure and complexity to the channel and a minimum of 55 feet of unharvested stream buffer would remain along the streams. **Alternative 3 (Limited Road Construction):** This alternative would have similar actions to Alternative 2, but would result in 5 miles less road construction and approximately 45 fewer acres of 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. **<u>Project 2</u>** **Both Action Alternatives:** This project would not have any impact on the physical integrity of the aquatic system.
4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and	Does not prevent the attainment of ***ACSO 4***. Addressed in Text (*EA section 3.3*). In summary: **No Action Alternative:** It is assumed that the current condition of the water quality would be maintained.

Aquatic Conservation Strategy Objectives (ACSOs)	South Yamhill River Watershed Enhancement and Associated Actions
wetland ecosystems.	**<u>Project 1</u>** **Alternative 2 (Proposed Action):** For the protection of stream channels and aquatic resources, riparian buffers or no-treatment zones were applied to all stream channels and "high water table areas" (small wet areas, ponds, marshes, etc.) in the project areas. These zones were determined in the field following the protocol outlined in the *Northwest Forest Plan Temperature Implementation Strategies* (2005). Stream buffers extend a minimum of 55 feet from stream channels and to the extent of the riparian vegetation around "wet areas." This zone would be extended upslope during field surveys as far as deemed necessary to protect aquatic resources (the average width of the stream buffer is 75 feet). These determinations were based on site features such as floodplains, slope breaks, slope stability, water tables, vegetation heights, etc. Stream shading would exceed the widths recommended to maintain a minimum of 80 percent effective shade resulting in no change to water temperature from the activities proposed in this project. **Alternative 3 (Limited Road Construction):** This alternative would have similar actions to Alternative 2, but would result in 5 miles less road construction and approximately 44 fewer acres of 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. **<u>Project 2</u>** **Alternatives 2 and 3:** This project would not have any impact on the water quality of the aquatic system.
5. Maintain and restore the sediment regime under which aquatic ecosystems evolved.	Does not prevent the attainment of ***ACSO 5***. Addressed in Text (*EA section 3.6*). In summary: **No Action Alternative:** It is assumed that the current levels of sediment into streams would be maintained. **<u>Project 1</u>** **Alternative 2 (Proposed Action):** The creation of temporary roads, skidding corridors, and the mechanical removal of trees are unlikely to significantly increase sedimentation into area streams because harvest generated slash would be maintained in the skidding corridors, minimizing the need for machines to travel on bare soil. Tree

Aquatic Conservation Strategy Objectives (ACSOs)	South Yamhill River Watershed Enhancement and Associated Actions
	removal is not proposed on steep, unstable slopes where the potential for mass wasting adjacent to streams is high. Therefore, increases in sediment delivery to streams due to harvest activities and mass wasting are unlikely to result from this action. In addition, SPZs in riparian areas have high surface roughness, which can function to trap any potential overland flow and sediment before reaching streams. Ground-based skidding would occur during periods of low soil moisture (less than 15 percent) with little or no rainfall, in order to minimize soil compaction and erosion. **Alternative 3 (Limited Road Construction):** Included in this proposal is the use of ground-based equipment to fell and bunch logs on slopes between 35 and 45 percent in the skyline and some helicopter harvest units. The use of ground-based equipment machinery would take place on harvest generated slash and no skidding of the trees would be allowed by ground-based machinery in these areas. This alternative would have similar actions to Alternative 2, but would result in 5 miles less road construction and approximately 45 fewer acres of 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. **<u>Project 2</u>** **Both Action Alternatives:** This project would not have any impact on the sediment regime that the aquatic systems evolved under.
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	Does not prevent the attainment of ***ACSO 6***. Addressed in Text (*EA section 3.4*). In summary: **No Action Alternative:** No change in in-streams flows would be anticipated. **<u>Project 1</u>** **Both Action Alternatives:** Vegetation would intercept and evapotranspire precipitation that would otherwise become runoff. Thus, it can be assumed that the action considered under this proposal would likely result in some

Aquatic Conservation Strategy Objectives (ACSOs)	South Yamhill River Watershed Enhancement and Associated Actions
routing.	small increase in water yield (including a small increase in summer base flow) which correlates with the removal of a portion of the conifer overstory in the watershed. Based on the amount of harvest in this proposal, the level of water yield increase would be well below 10 percent and would not be able to be detected from the natural range in variability in flow levels on a year to year basis. The risk of increases to peak flows based on the proposed management activity falls well below the potential risk of peak flow enhancement from the Oregon Watershed Assessment Manual Analysis., and below the level determined by Grant (2008) to be measurable beyond the range of natural variability in peak flows on a year to year basis. **<u>Project 2</u>** **Both Action Alternatives:** This project would not have any measurable impact on the water yield or instream flows in the project watersheds. The amount of canopy reduction from this activity is similar to natural windthrow and would not have a measurable detection (compared to natural variability) on water yields.
7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.	Does not prevent the attainment of ***ACSO 7***. Addressed in Text (*EA section 3.3*). In summary: **No Action Alternative:** No change in in-streams flows would be anticipated. **<u>Project 1</u>** **Both Action Alternatives:** For the protection of stream channels and aquatic resources, riparian buffers or no-treatment zones were applied to all stream channels and "high water table areas" (small wet areas, ponds, marshes, etc.) in the project areas. These zones were determined in the field following the protocol outlined in the *Northwest Forest Plan Temperature Implementation Strategies* (2005). Stream buffers extend a minimum of 55 feet from stream channels and to the extent of the riparian vegetation around "wet areas". This zone would be extended upslope during field surveys as far as deemed necessary to protect aquatic resources (the average width of the stream buffer is 75 feet). These determinations were based on site features such as floodplains, slope breaks, slope stability, water tables, vegetation heights, etc.

Aquatic Conservation Strategy Objectives (ACSOs)	South Yamhill River Watershed Enhancement and Associated Actions
	<u>Project 2</u> **Both Action Alternatives:** This project would not have any measurable impact on the timing, variability, or duration of water table changes in the project watersheds. The amount of canopy reduction from this activity is similar to natural windthrow and would not have a measurable detection (compared to natural variability) on these processes.
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 3.7*). 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. **<u>Project 1</u>** **Alternative 2 (Proposed Action):** Greater species richness was found when prescriptions include gaps and leave islands as part of a variable thinning treatment. Increased overstory variability encouraged development of multiple layers of understory vegetation. From research on the BLM Western Oregon Density Management Study, (Ares et al. 2009, Olson and Rugger 2007) thinning affects vegetation structure by increasing cover of grasses and forbs and increasing species richness, a measure of diversity. **Alternative 3 (Limited 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. **<u>Project 2</u>** **Both Action Alternatives:** This project would not have any measurable impact on the species composition in wetlands or riparian areas in the project watersheds. The amount of canopy reduction from this activity is similar to natural windthrow and would not have a measurable detection (compared to natural variability) on these communities.

Aquatic Conservation Strategy Objectives (ACSOs)	South Yamhill River Watershed Enhancement and Associated Actions
9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.	Does not prevent the attainment of ***ACSO 9***. Addressed in Text (*EA section 3.3*). In summary: **No Action Alternative:** Habitats would be maintained over the short-term and continue to develop over the long-term with no known impacts on species currently present. **<u>Project 1</u>** **Both Action Alternatives:** Buffers of widths defined by the transition from riparian to upland vegetation or topographic slope breaks appear sufficient to mitigate the impacts of upslope thinning on the microclimate above headwater streams. Because the microclimate, as well as the structure and composition of the forest stand and understory vegetation are protected within the untreated buffer, habitat elements seem to be protected. Native plants were found to persist and increase in coverage after density management. Research (Ares et al. 2009, 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 thirty meters wide serve as refuge for both forest-upland and forest-riparian arthropod species. **<u>Project 2</u>** **Both Action Alternatives:** This project would not have any measurable impact on the species composition in the project watersheds. The amount of canopy reduction from this activity is similar to natural windthrow and is expected to create minor openings for native species that need more sunlight than those found in the understory of the older forest to thrive. While it is expected that there would be a small increase in these native plants, it is not expected that there would be a measurable change (compared to natural variability) in these communities.

5.0 LIST OF PREPARERS

Interdisciplinary Team Member	Resource
Steve Cyrus	Engineer
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Hugh Snook	District Silviculturist
Susan Sterrenberg	GIS Specialist
Bruce Stevens	Forester – Silviculture
Heather Ulrich	Archaeologist
Steve Wegner	Hydrologist and Soil Scientist

6.0 CONTACTS AND CONSULTATION

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

U. S. Fish and Wildlife Service (USFWS)

Due to potential affects to spotted owls, marbled murrelets and their designated critical habitat, as outlined in Table 6, 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 a Biological Assessment (BA) that analyzed all projects that may modify the habitat of listed wildlife species on federal lands within the Northern Oregon Coast Range during fiscal years 2013 and 2014. This proposed action has been designed to incorporate all appropriate design standards included in the BA. A Letter of Concurrence (#01EOFW00-2012-I-0124) was received from the Service confirming their concurrence that the projects within this proposed action are not likely to adversely affect any listed wildlife species or their critical habitat.

National Marine Fisheries Service

Upper Willamette River ESU Winter steelhead are listed as threaten under the ESA, as amended, in the Willamette basin (64 FR 14517 – 14528). Project haul routes along Rock Creek are adjacent to listed UWR steelhead. Distribution of UWR steelhead is generally more than 1.25 miles downstream of the treatment area, except for haul routes where proximity is generally closer. Within Mill Creek this species occurs approximately 11 miles downstream from the nearest unpaved stream crossing (Streamnet 2009).

The proposed hauling on Firehall Road associated with a portion of the projects may cause short-term affects to the listed fish or listed critical habitat in the Agency Creek-South Yamhill Watershed. Proposed culvert replacement on Gold Creek Road near the confluence of Gold Creek may cause short-term affects to listed fish or listed critical habitat in the watershed. For these reasons a May Affect determination was indicated for UWR steelhead and UWR steelhead critical habitat and consultation may be required.

Upper Willamette River (UWR) Spring Chinook and Oregon Chub are listed as threaten under the ESA, as amended, in the Willamette basin (64 FR 14308-14328 & 75 FR 21179-21189). UWR Chinook are 25 miles downstream from project activities in the South Yamhill River (Streamnet 2009). Oregon chub is not known to occur within the Project area and is no longer known to occur within the South Yamhill. A No Effect determination was made for UWR Chinook salmon and Oregon chub primarily due to the distance of listed habitat from the proposed action. No consultation would be required for UWR spring Chinook or Oregon chub species.

Protection of EFH as described by the Magnuson/Stevens Fisheries Conservation and Management Act and consultation with NOAA NMFS is required for all projects which may

adversely affect EFH of Chinook and Coho Salmon. The proposed timber sales addressed in the South Yamhill Watershed Enhancement EA, specifically year round hauling on Firehall Road, may adversely affect EFH due to proximity to occupied habitat in Agency Creek-South Yamhill Watershed. Project activities which result in adverse impacts to EFH require consultation with NOAA NMFS.

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.

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

On April 4, 2012 the BLM sent a scoping letter to 24 potentially affected or interested individuals, groups, and agencies. The BLM received three responses during the 30 day scoping period and used these comments to aid in the identification of issues as described section 1.6.1 of this EA.

Further, a description of the project has been included in the quarterly BLM publication “Project Update” since Spring 2012.

30-DAY PUBLIC COMMENT PERIOD

The EA and FONSI will be made available for public review May 14, 2014 to June 12, 2014. The notice for public comment will be published in a legal notice by the *Polk County Itemizer Observer* newspaper. Comments received by the Marys Peak Resource Area of the Salem District Office, 1717 Fabry Road SE, Salem, Oregon 97306, on or before June 12, 2014 will be considered in making the final decisions for this project.

7.0 MAJOR SOURCES

Interdisciplinary Team Reports

The reports listed below are incorporated by reference into this EA. Acres or figures within these reports may be similar to, but not necessarily identical to, those in this EA. These differences are often due to rounding or inclusion or exclusion of portions of projects which may overlap. These differences are minor and not considered significant in terms of requiring a new analysis. The figures utilized in this EA are considered up to date and correct.

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Appendix A – Glossary of Terms, Acronyms, and Abbreviations

ACS – Aquatic Conservation Strategy.

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

Anadromous fish – Fish that are born and reared in freshwater, move to the ocean to grow and mature, and return to freshwater to reproduce.

Area of Critical and Environmental Concern (ACEC) – Lands where special management attention is needed to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish, and wildlife resources or other natural systems or processes or to protect life and provide safety from natural hazards..

Basal area (BA) – The cross-sectional area of a tree at breast height (4.5 feet) measured in square feet.

Beneficial use – In water use law, reasonable use of water for a purpose consistent with the laws and best interest of the people of the state. Such uses include, but are not limited to, the following: instream, out of stream, and ground water uses, domestic, municipal, industrial water supply, mining, irrigation, livestock watering, fish and aquatic life, wildlife, fishing, water contact recreation, aesthetics and scenic attraction, hydropower, and commercial navigation.

Best Management Practices (BMPs) – Methods, measures, or practices designed to prevent or reduce water pollution. Usually, BMPs are applied as a system of practices rather than a single practice.

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

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

Board foot (BF) – Lumber or timber measurement term. The amount of wood contained in an unfinished board 1 inch thick, 12 inches long, and12 inches wide.

Bureau Sensitive Species – Plant or animal species eligible for federal listed, federal candidate, state listed, or state candidate (plant) status, or on list 1 in the Oregon Natural Heritage Data Base, or approved for this category by the BLM State Director. Species included under agency species conservation policies.

Canopy closure – The proportion of sky hemisphere obscured by vegetation when viewed by a single point.

Canopy cover – Percentage of ground covered by a vertical projection of the tree canopy.

Consultation – A formal interaction between the U.S. Fish and Wildlife Service and another federal agency when it is determined that the agency's action may affect a species that has been listed as threatened or endangered or its critical habitat.

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

Crown – Upper part of a tree or other woody plant that carries the main system of branches and the foliage.

Cumulative effects – The impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time.

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.

DBH – Diameter at breast height (4.5 feet).

Density management – The cutting of trees for the primary purpose of widening their spacing so that growth of remaining trees can be accelerated. Density management may be designed to improve forest health, to open the forest canopy, or to accelerate the attainment of late-successional forest structural characteristics.

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.

Epicormic branching – Vegetative growth from buds located on the main stem of a tree, usually resulting in fan shaped branching below the live crown of a conifer.

Endangered species – Any species of plant or animal defined through the Endangered Species Act as being in danger of extinction throughout all or a significant part of its range, and published in the Federal Register.

Fifth-field watershed – Individual watershed within a Hydrologic Unit as defined by the U.S. Geological Survey; it typically averages 87,000 acres in size.

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.

Helicopter logging – Use of helicopters to transport logs from where they are felled to a landing.

Heterogeneous – Consisting of dissimilar elements. Implied here to indicate diversity among a forest stand.

Homogenous – Uniform throughout in structure or make-up.

Hypogeous – Below the surface of 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 species – A non-native species whose introduction does, or is likely to, cause economic or environmental harm or harm to human health.

Key Watershed – A land use allocation used in the Northwest Forest Plan. A watershed containing: (1) habitat for potentially threatened species or stocks of anadromous salmonids or other potentially threatened fish, or (2) greater than 6 square miles with high-quality water and fish habitat.

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 – Uses that are allowed, restricted, or prohibited for a particular area of land, as designated in the Northwest Forest Plan.

Large woody debris (LWD) – Woody material found within the bankful 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).

Monitoring – The review on a sample basis, of management practices to determine how well objectives are being met, as well as the effects of those management practices on the land and environment.

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.

ODEQ – Oregon Department of Environmental Quality.

Off-Highway Vehicle (OHV) – Any motorized track or wheeled vehicle designed for cross-country travel over any type of natural terrain.

Off-highway vehicle designation – Designation of lands made in a land use plan for use of off-highway vehicles:

- Open: All types of vehicle use is permitted at all times, anywhere in the area subject to certain operating regulations and vehicle standards.
- Limited: Restricted at certain times, in certain areas, and/or to certain vehicular use.
- Closed: Off-road vehicle use is prohibited.

ORGANON – A computer-based program used to model projected tree growth, stand density, and crown ratio using existing stand tree species and size.

Peak flow – The highest amount of stream or river flow occurring in a year, or from a single storm event.

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

Riparian area – A geographic area containing an aquatic ecosystem and adjacent upland areas that directly affect it.

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 Improvement – Improvement includes work to be done that will improve a road to a higher standard than its original design. Improvement can include adding an aggregate surface to a natural surfaced road. It can include adding a drainage system of ditches, cross-drains, or drain dips to an outsloped road surface. It can also include re-alignments or repairs of road failures that improve a road to a better state than its original design.

Road Reconstruction – Retired terminology, now categorized by the terms Renovation and Improvement. Previously, Reconstruction described restoring a damaged or deteriorated road to a usable condition, and possibly to a higher standard than the original design. It could have included re-alignment, repairing a slide or fill failure, and/or structure improvements or replacements. It generally involved a higher degree of disturbance than Improvement or Renovation work. Roads were generally not drivable prior to Reconstruction.

Road Renovation – Renovation includes work to be done that will bring a road back to it's original design standard. Renovation covers a large array of low to high disturbance activities performed on existing roads. It may include blading and shaping, cutting brush from slopes, ditches and shoulders, cleaning out ditches and catch basins, cleaning out or replacing culverts, replacing aggregate surfacing, and compaction of sub-grade and/or surfacing material.

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 stages – The series of relatively transitory plan communities that develop during ecological succession from bare ground to the climax stage.

Silvicultural practices (or treatments or system) – The set of field techniques and general methods used to modify and manage a forest stand over time to meet desired conditions and objectives.

Silvicultural prescription – A plan for controlling the establishment, composition, constitution, and growth of forests.

Site class – A forest management term denoting site productivity and measured in productivity classes (example: Site Class I – highest productivity).

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

Skyline cable system (yarding) – Harvesting timber using a machine that reaches out a long distance to lift logs off the ground (wholly or partially) and move them via a cable to a landing where they are hauled away.

Snag – Any standing dead, partially dead, or defective (cull) tree at least 10 inches diameter at breast height and at least 6 feet tall. A hard snag is composed primarily of sound wood, generally merchantable. A soft snag is composed primarily of wood in advanced stages of decay and deterioration, generally not merchantable.

Soil compaction – An increase in bulk density (weight per unit volume) and a decrease in soil porosity (particularly macropores) 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.

Special status species – Plan or animal species in any of the following categories:

- Threatened or endangered species
- Proposed threatened or endangered species
- Candidate species
- State-listed species
- Bureau sensitive species

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 slope 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.

TES –Threatened, Endangered, Sensitive.

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) – The inventory and planning action to identify values and establish objectives for managing those values and the management actions to achieve those objectives.

Visual resource management classes – Categories assigned to public lands based on scenic quality, sensitivity level, and distance zones. There are four classes. Each class has an objective that prescribes the amount of change allowed in the characteristic 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.

Wolf tree – A live conifer tree which likely developed in an open stand, usually in full sunlight and larger in diameter and older than the stand average. These trees often have multiple tops or upper stems and larger diameter branches often extending downward to over three-quarters the height of the tree or otherwise described as having a complex live-crown structure.

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 South Yamhill River Watershed Enhancement EA is based on the site-specific application of Best Management Practices (BMPs) and disclosed as Project Design Features (PDFs).

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). Best Management Practices 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 South Yamhill 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.

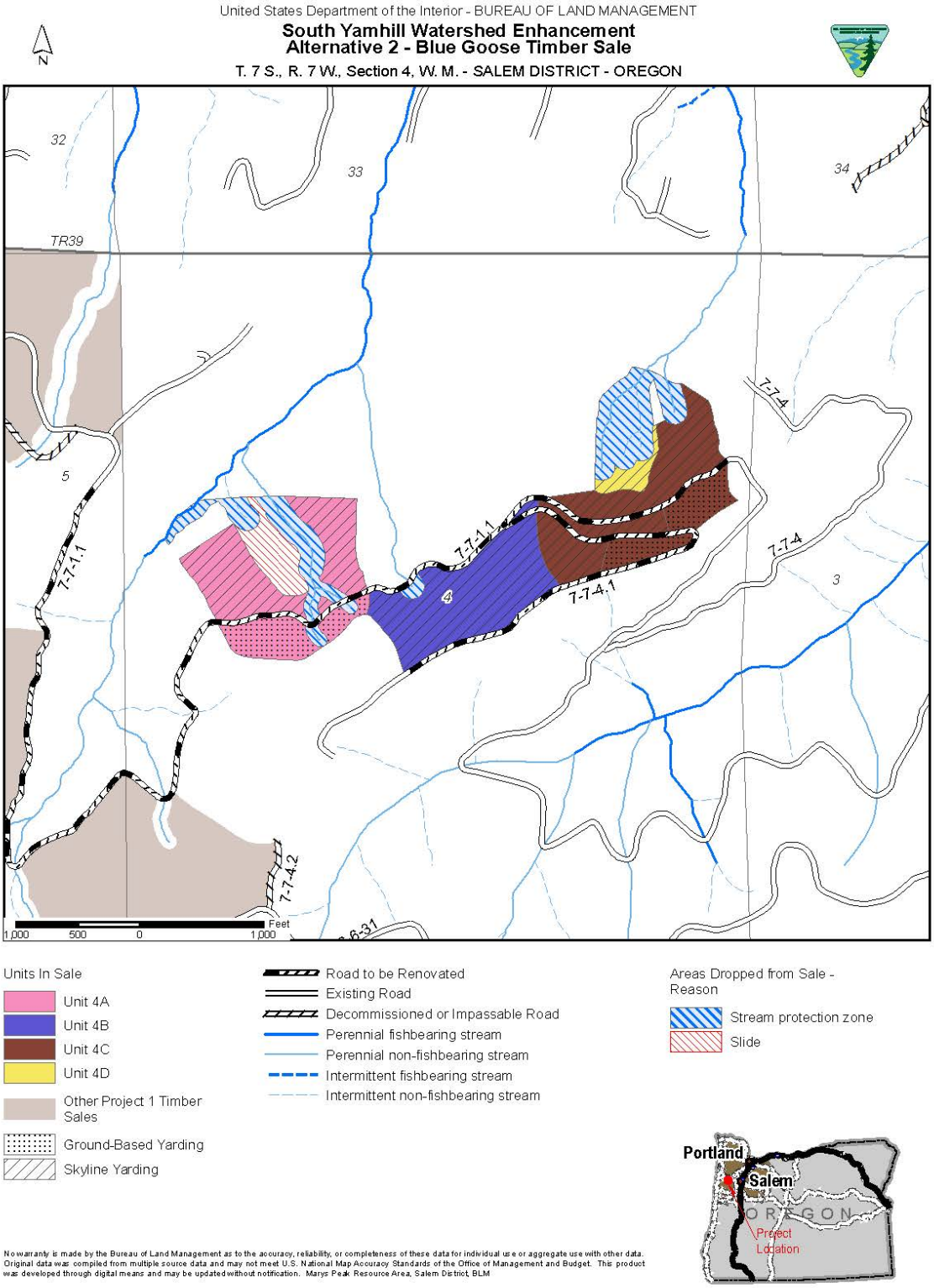
R30	Shape landings to spread surface water runoff to well vegetated, stable ground.
R31	Prevent diversion of water from streams into road ditches or upon road surfaces.
R33	Locate cross drains such that runoff and sediment is not discharged to a stream. Use measures such as ditchline settling basins, 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.

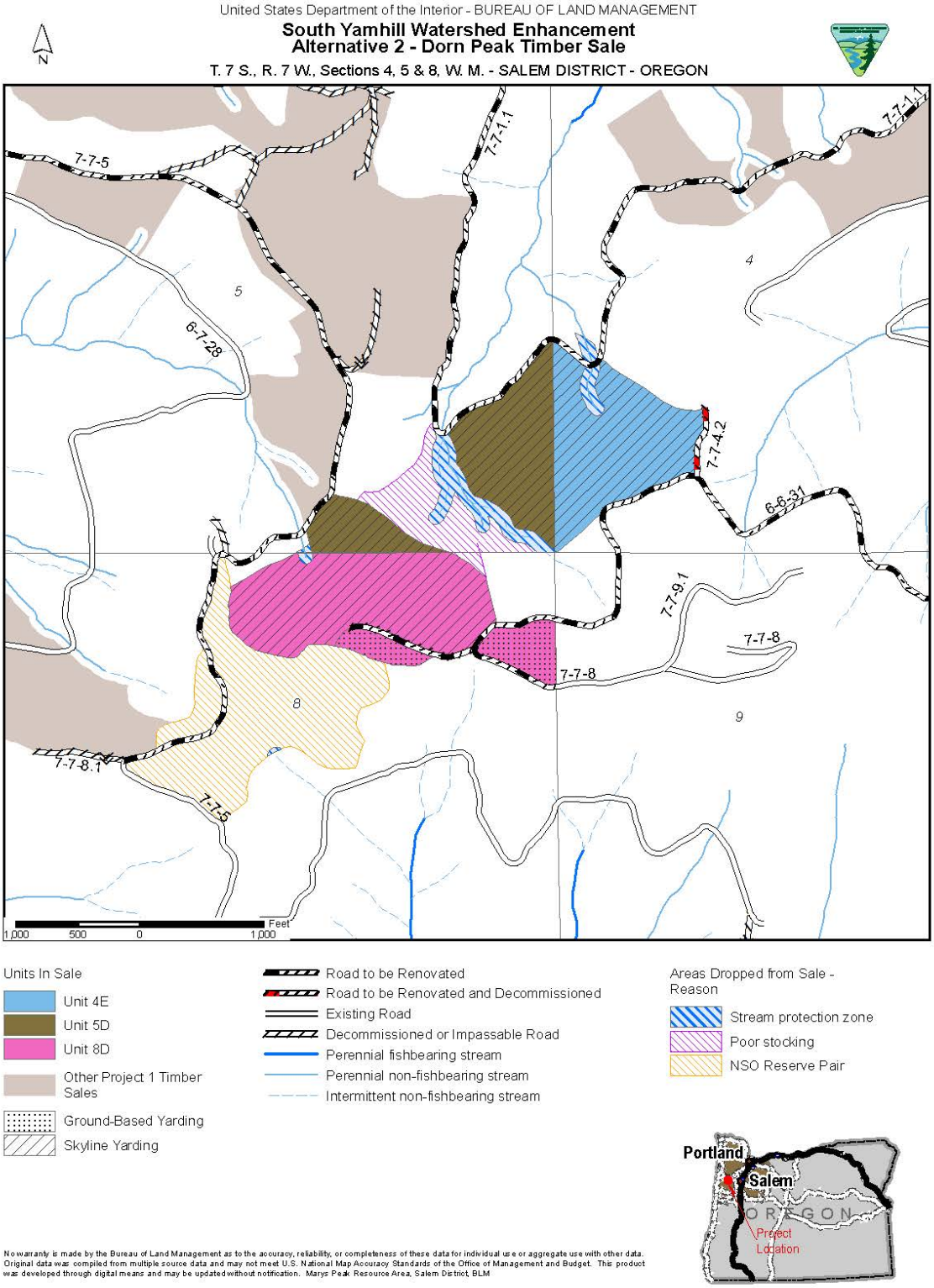
TH21	Block skid trails that intersect haul routes at the end of season use.
BMP No.	**Silvicultural Activities**
S3	Fell thinned trees away from stream channels when possible. If not possible that portion of the tree within the buffer must be left on the ground.
S9	Within Riparian Reserve Areas, design 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 Prevention 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.

Appendix C – Project Maps for Alternative 2

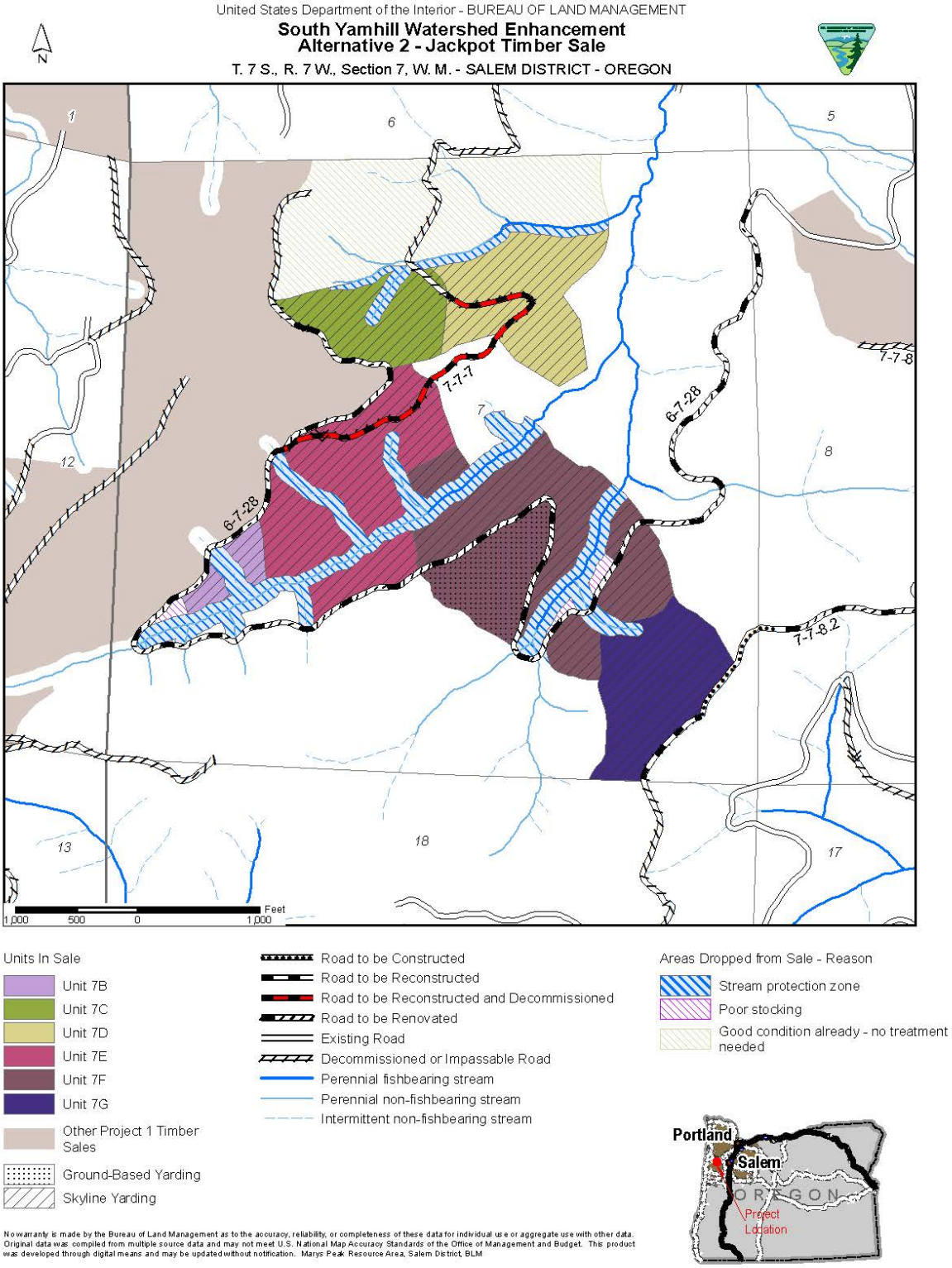
Map C-1: Blue Goose Timber Sale



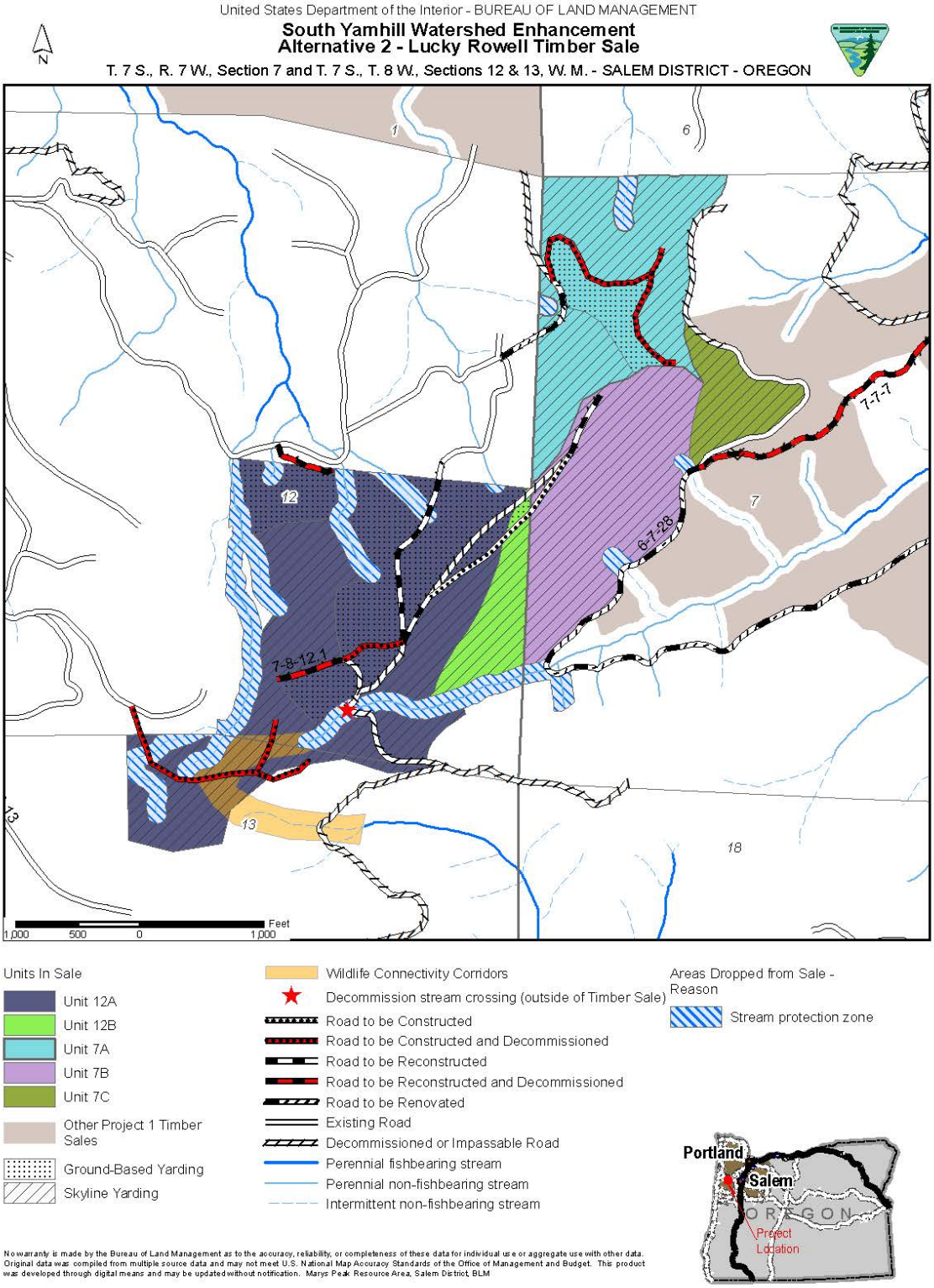
Map C-2: Dorn Peak Timber Sale



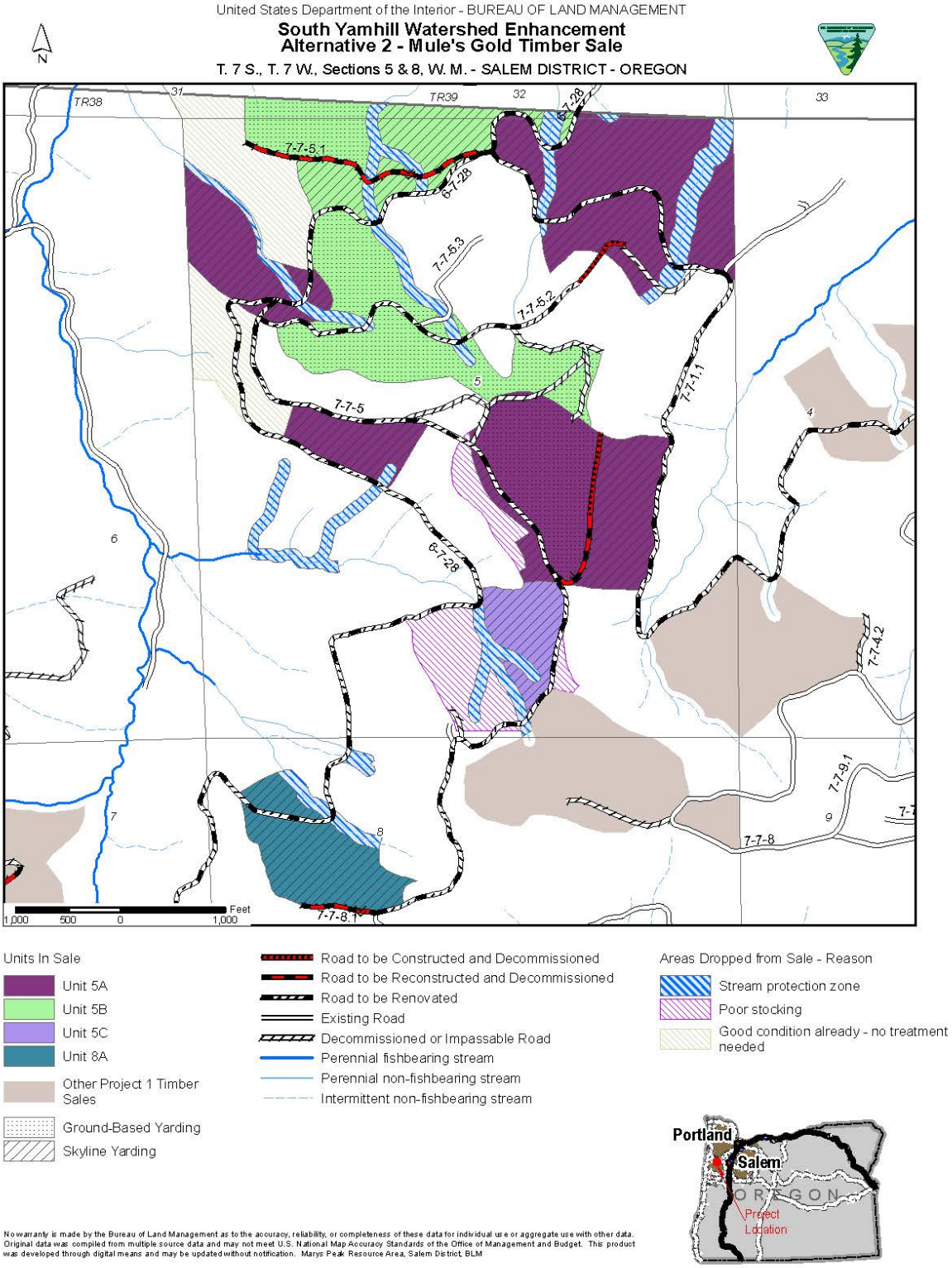
Map C-3: Jackpot Timber Sale



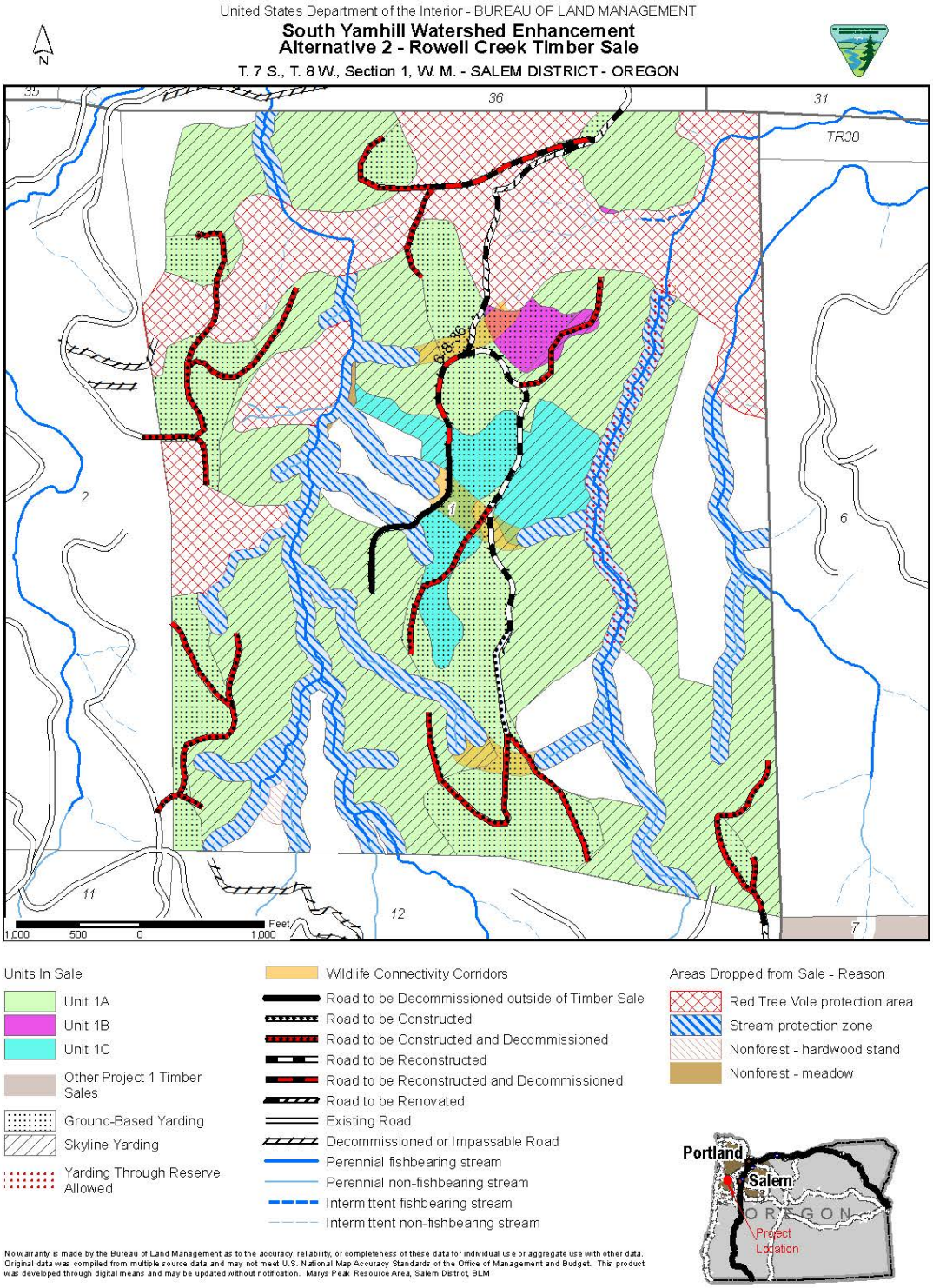
Map C-4: Lucky Rowell Timber Sale



Map C-5: Mule's Gold Timber Sale

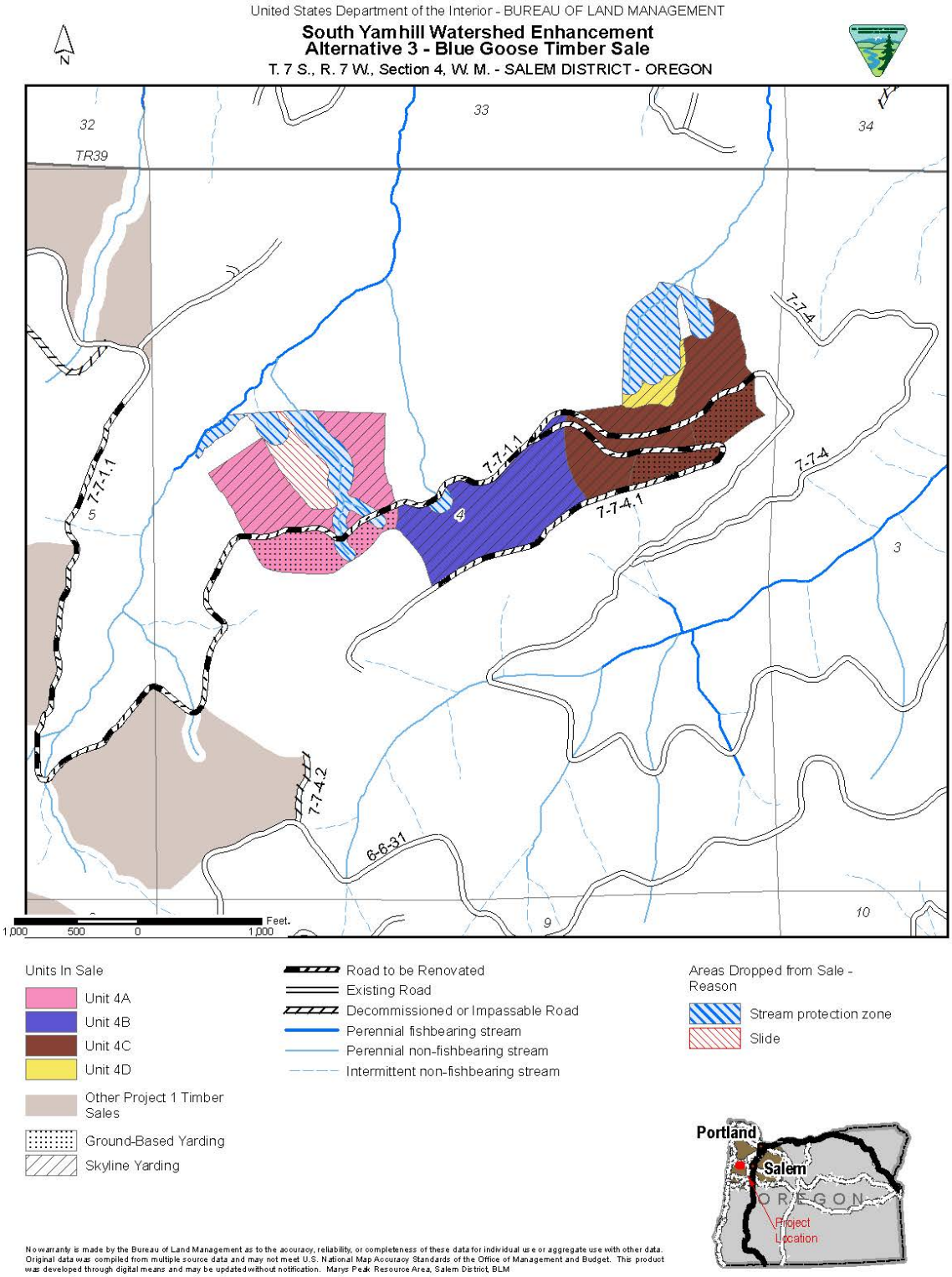


Map C-6: Rowell Creek Timber Sale

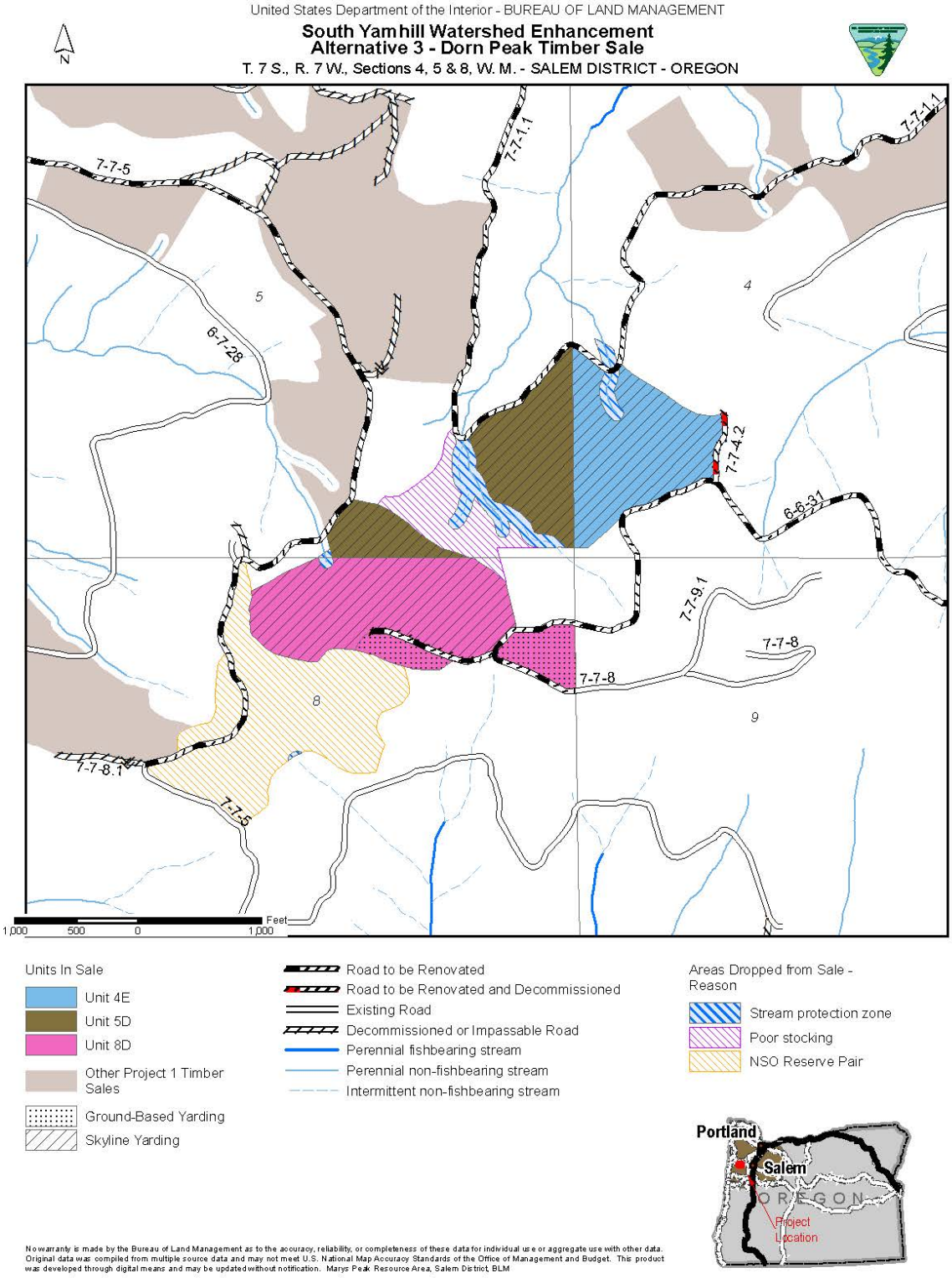


Appendix D – Project Maps for Alternative 3

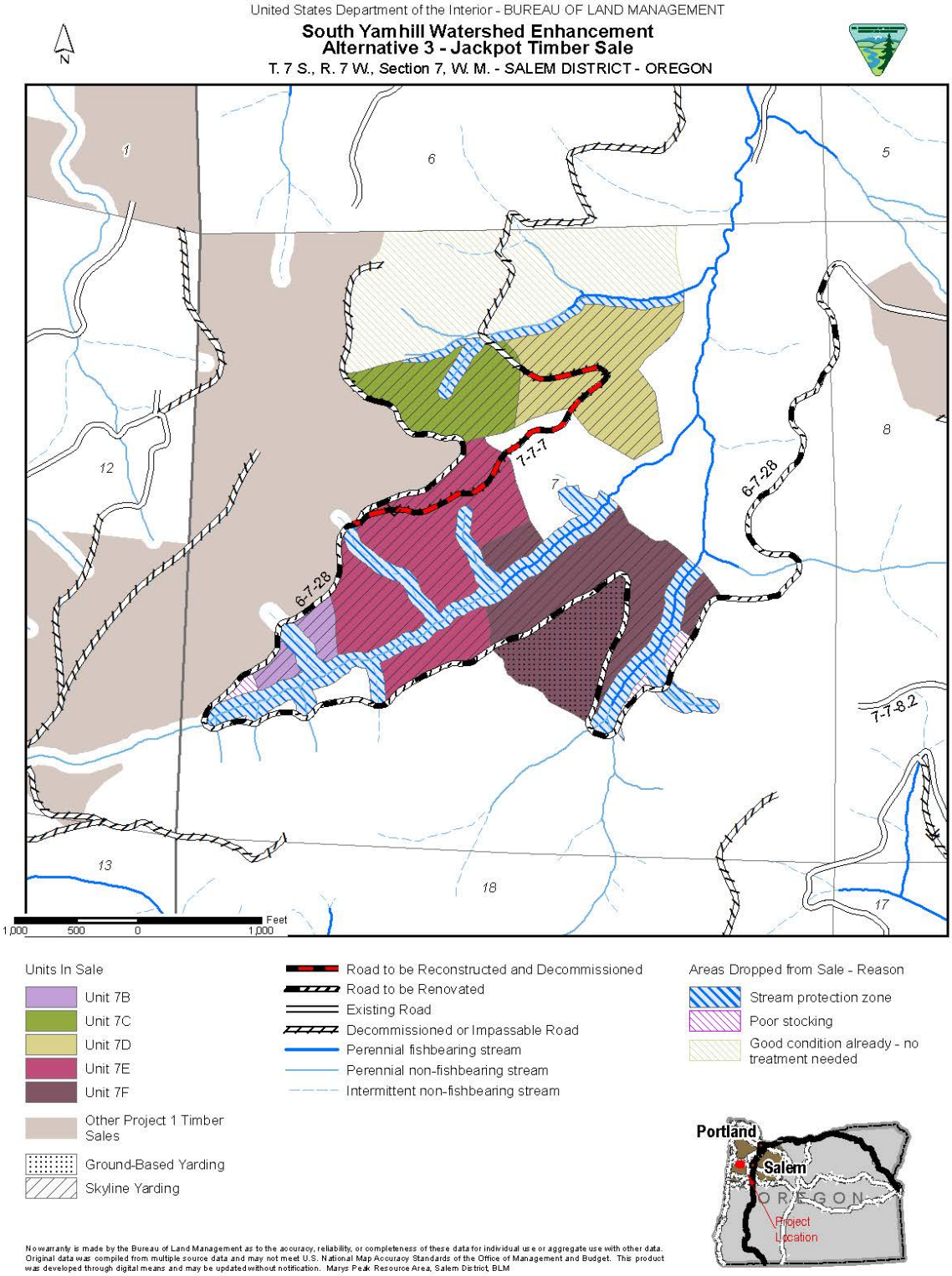
Map D-1: Blue Goose Timber Sale



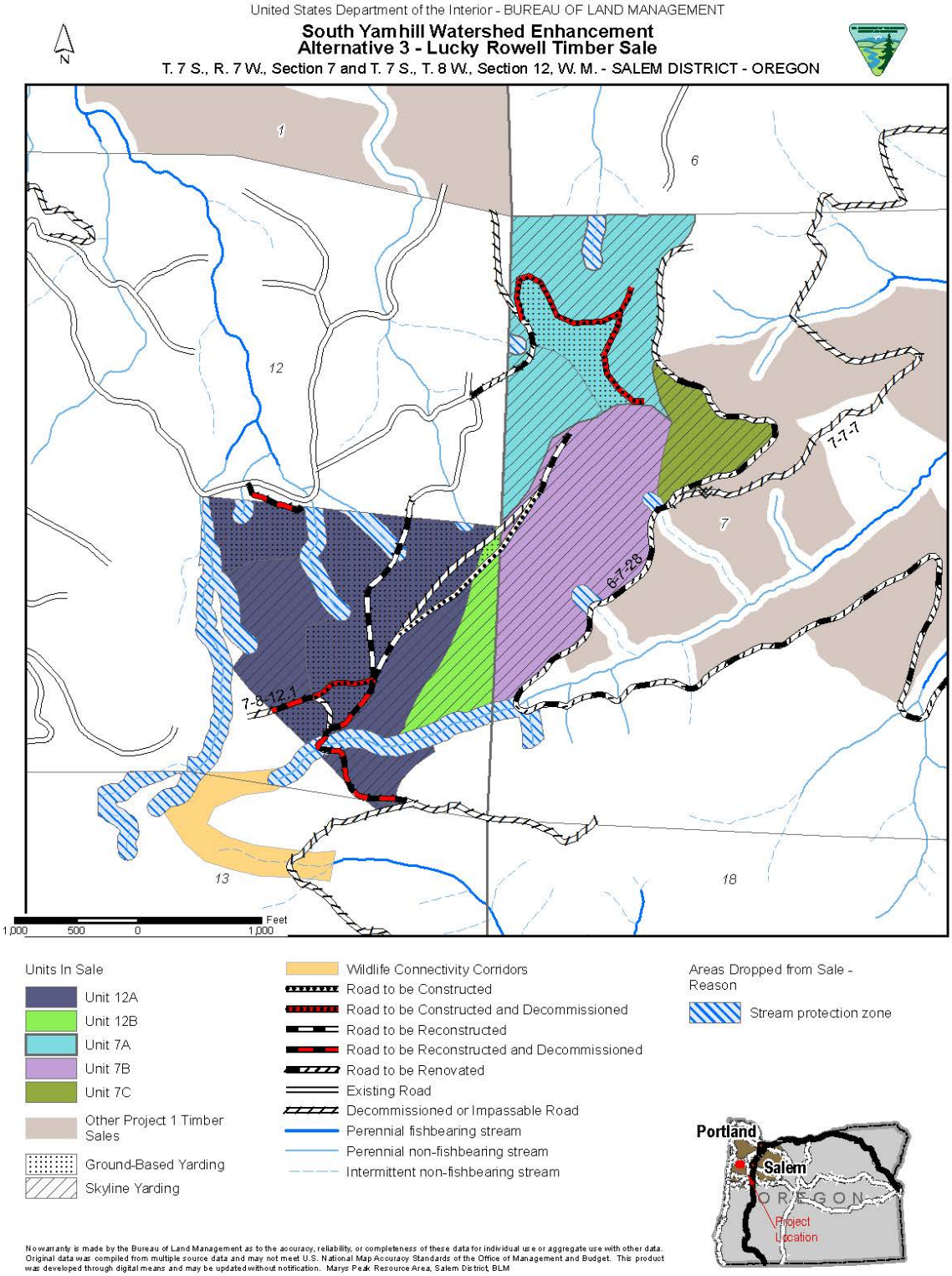
Map D-2: Dorn Peak Timber Sale



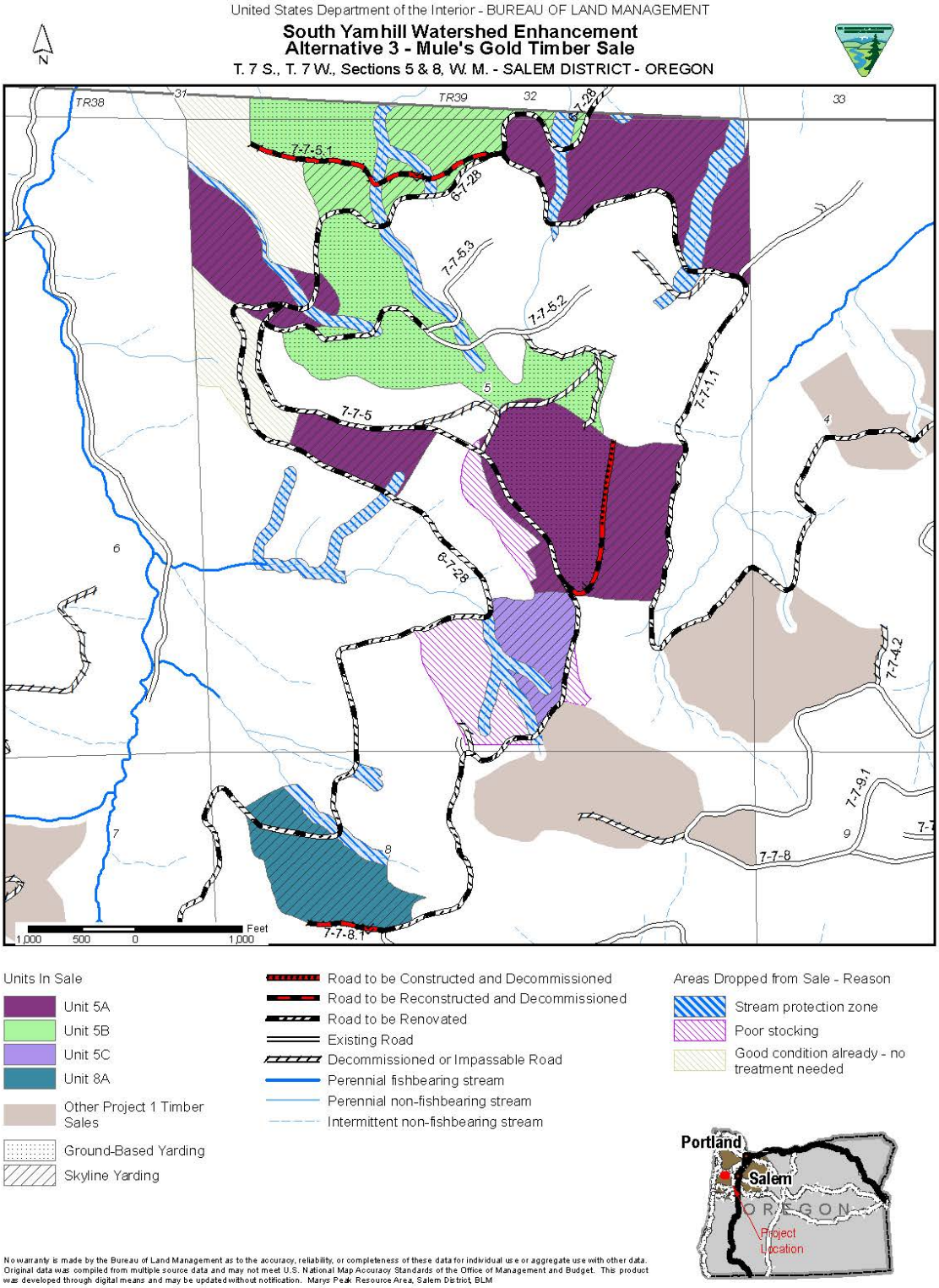
Map D-3: Jackpot Timber Sale



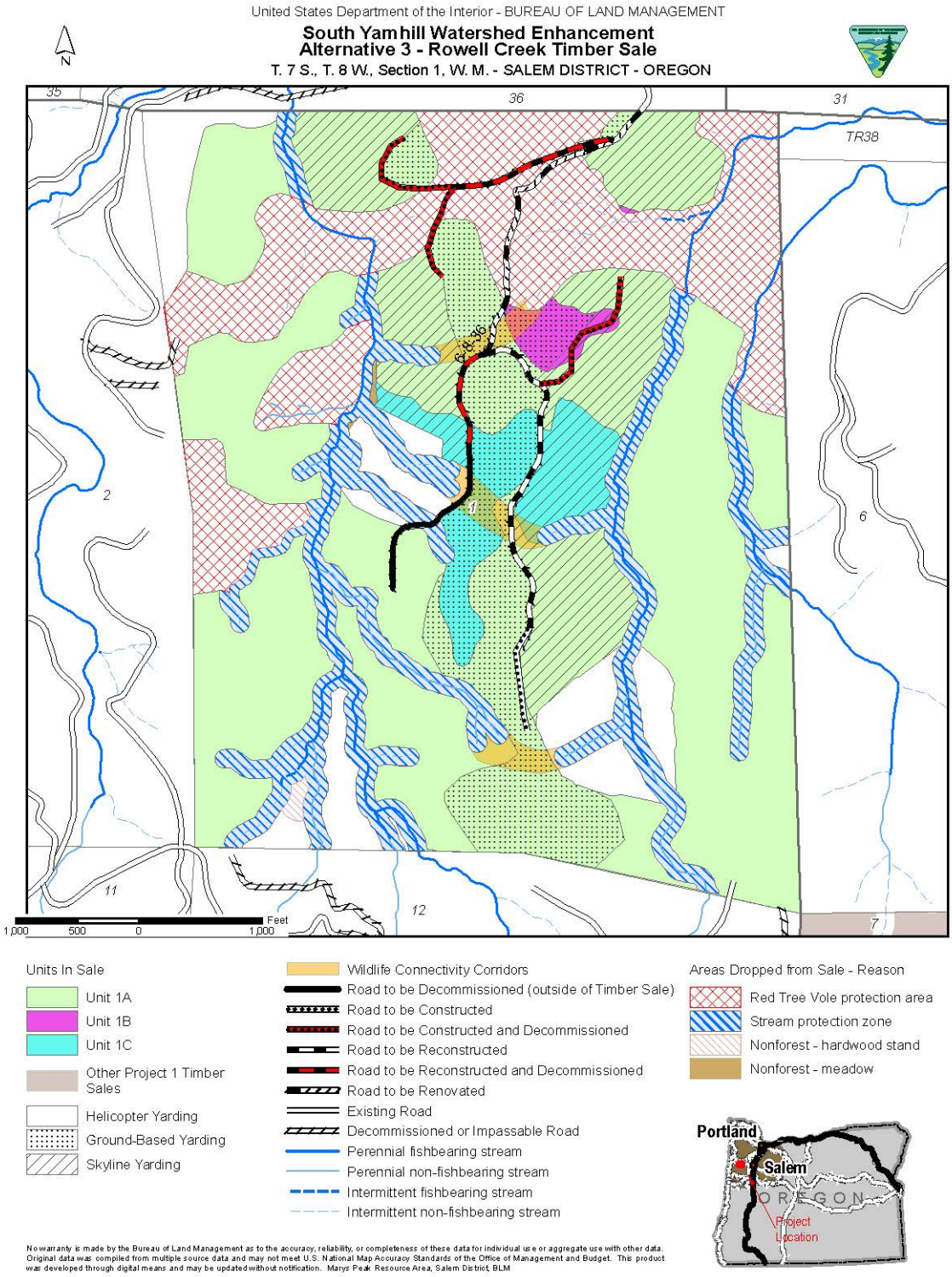
Map D-4: Lucky Rowell Timber Sale



Map D-5: Mule's Gold Timber Sale



Map D-6: Rowell Creek Timber Sale



DRAFT FINDING OF NO SIGNIFICANT IMPACT

Introduction

The Bureau of Land Management (BLM) has conducted an environmental analysis (Environmental Assessment Number DOI-BLM-OR-S050-2012-0001-EA) for a proposal to implement two projects as follows.

- Project 1, Mid-Seral Habitat Enhancement, is a proposal to perform density management on approximately 1,168 acres of Adaptive Management Reserve (AMR) and Riparian Reserve land use allocations (LUAs).

- Project 2, Legacy Tree Release and Coarse Woody Debris (CWD) Creation, is a proposal for older forest legacy tree release, and snag/CWD creation on approximately 117 acres of AMR and Riparian Reserve LUAs.

The project areas are within BLM-managed lands in Township 7 South, Range 8 West, Sections 1, 12, 13 and Township 7 South, Range 7 West, Sections 4, 5, 7, and 8, Willamette Meridian (EA Map 1) within the South Yamhill River and Agency Creek fifth field 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 1.5*). 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 draft FONSI will be made available for public review May 14, 2014 to June 12, 2014. 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 June 12, 2014 will be considered in making the decisions for these projects.

Finding of No Significant Impact

Based upon review of the South Yamhill River 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 South Yamhill River and Agency Creek fifth field watershed. The proposed action would occur on approximately 1,285 acres of BLM-managed land (1,168 acres for Project 1 and 117 acres for Project 2), encompassing less than one percent of the forest cover with the South Yamhill River and Agency Creek fifth field watersheds[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 section 3.1):* 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 and rapid control of non-native plant species. 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. 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.

Wildlife *(EA section 3.2)*: 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.

Fisheries, Hydrology, and Soils *(EA sections 3.3, 3.4, 3.5)*: 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.

Air Quality, Fire Risk, and Fuels Management *(EA section 3.6)*: The 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 section 3.8)*: The South Yamhill River 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.

   - 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

   - 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)]

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 3.0). 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 6, 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 a Biological Assessment (BA) that analyzed all projects that may modify the habitat of listed wildlife species on federal lands within the Northern Oregon Coast Range during fiscal years 2013 and 2014. This proposed action has been designed to incorporate all appropriate design standards included in the BA. A Letter of Concurrence (#01EOFW00-2012-I-0124) was received from the Service confirming their concurrence that the projects within this proposed action are not likely to adversely affect any listed wildlife species or their critical habitat.

National Marine Fisheries Service (NMFS)

UWR ESU Winter steelhead are listed as threaten under the ESA, as amended, in the Willamette basin (64 FR 14517 – 14528). Project haul routes along Rock Creek are

adjacent to listed UWR steelhead. Distribution of UWR steelhead is generally more than 1.25 miles downstream of the treatment area, except for haul routes where proximity is generally closer. Within Mill Creek this species occurs approximately 11 miles downstream from the nearest unpaved stream crossing (Streamnet 2009).

The proposed hauling on Firehall Road associated with a portion of the projects may cause short-term affects to the listed fish or listed critical habitat in the Agency Creek-South Yamhill Watershed. Proposed culvert replacement on Gold Creek Road near the confluence of Gold Creek may cause short-term affects to listed fish or listed critical habitat in the watershed. For these reasons a May Affect determination was indicated for UWR steelhead and UWR steelhead critical habitat and consultation may be required.

Upper Willamette River (UWR) Spring Chinook and Oregon Chub are listed as threaten under the ESA, as amended, in the Willamette basin (64 FR 14308-14328 & 75 FR 21179-21189). UWR Chinook are 25 miles downstream from project activities in the South Yamhill River (Streamnet 2009). Oregon chub is not known to occur within the Project area and is no longer known to occur within the South Yamhill. A No Effect determination was made for UWR Chinook salmon and Oregon chub primarily due to the distance of listed habitat from the proposed action. No consultation would be required for UWR spring Chinook or Oregon chub species.

Protection of EFH as described by the Magnuson/Stevens Fisheries Conservation and Management Act and consultation with NOAA NMFS is required for all projects which may adversely affect EFH of Chinook and Coho Salmon. The proposed timber sales addressed in the South Yamhill Watershed Enhancement EA, specifically year round hauling on Firehall Road, may adversely affect EFH due to proximity to occupied habitat in Agency Creek-South Yamhill Watershed. Project activities which result in adverse impacts to EFH require consultation with NOAA NMFS.

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 1.5).

Approved by: _____ _____

Rich Hatfield Date

Marys Peak Field Manager