Rainbow Ridge Timber Sale

Revised Environmental Assessment and Draft Finding of No Significant Impact

Environmental Assessment Number DOI-BLM-OR-S050-2013-0002a-EA

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

Responsible Agency:	USDI – Bureau of Land Management
Responsible Official:	Tessa Teems, Acting Field Manager Marys Peak Resource Area 1717 Fabry Road SE Salem, OR 97306 (503) 315-5968
For further information, contact:	Stefanie Larew, Project Lead Marys Peak Resource Area 1717 Fabry Road SE Salem, OR 97306 (503) 375-5601

BLM
Salem District

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BLM/OR/WA/AE-15/003+1792

RAINBOW RIDGE TIMBER SALE
ENVIRONMENTAL ASSESSMENT

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1.0 INTRODUCTION

The Bureau of Land Management (BLM) is issuing a revised environmental assessment (EA) to expand the analysis regarding visual resource management. No other substantive changes have been made to the EA, the proposed action, or the supporting analysis[1].

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

Chapter 1 provides a context for what will be analyzed in the EA, describes the kinds of actions we will be considering, defines the project area, describes what the proposed actions need to accomplish, and identifies the criteria that the decision-maker will use for choosing the alternative that will best meet the purpose and need for this proposal.

1.1 PROJECT COVERED IN THIS EA

One project will be analyzed in this EA: the Rainbow Ridge Timber Sale. This project proposes to perform regeneration harvest, commercial thinning, and density management on approximately 144 acres of BLM-administered lands in Benton County, Oregon. Regeneration harvest would occur on approximately 87 acres of 58–67[2] year-old stands within the Matrix (General Forest Management Area) land use allocation. Density management and commercial thinning would occur on approximately 33 acres of 41 year-old stands within the Riparian Reserves and Matrix land use allocations[3].

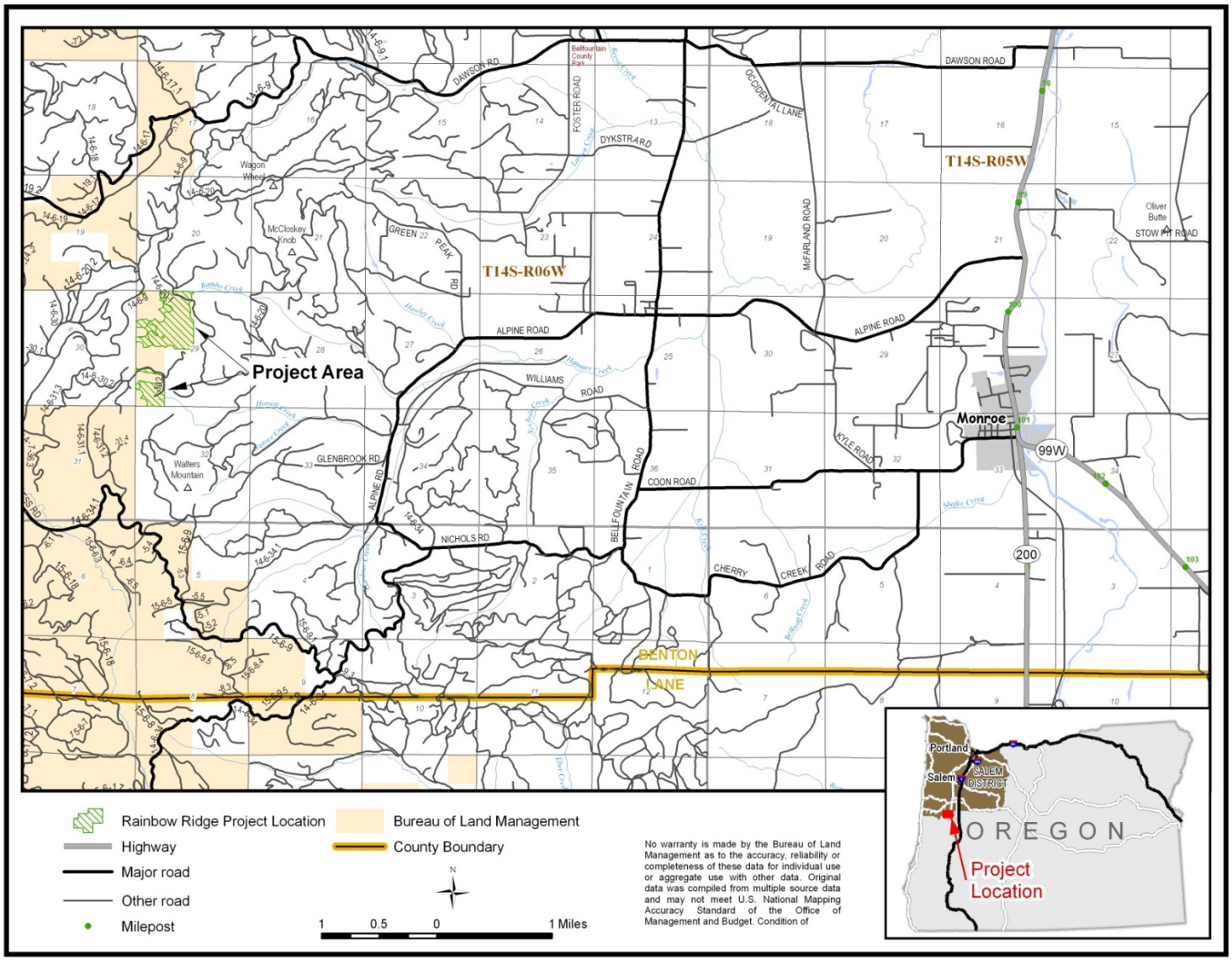
[1] Minor typographical or other edits have been made that are insignificant to the project and its effects.
[2] Ages in 2014.
[3] 9 acres would be treated in the Riparian Reserves and 24 acres would be treated in the Matrix.

1.2 PROJECT AREA LOCATION

The project area is located approximately eight air miles west of Monroe, Oregon, in Benton County on forested land managed by the Marys Peak Resource Area of the Salem District BLM. The project area lies within the Marys River and Upper Alsea River fifth field watersheds[4] in Township 14 South, Range 6 West, Section 29, Willamette Meridian (see Map 1 on the following page). The 240 acres BLM manages in the section is surrounded by privately owned land. The proposed action area is located outside the coastal zone as defined by the Oregon Coastal Management Program.

[4] Impacts to resources may also be analyzed at the subwatershed level in Chapter 3 of this EA. For this project area, there are two sixth-field watersheds (Upper South Fork Alsea and Upper Muddy Creek). A map of the fifth and sixth field watersheds referenced in this EA is located in Appendix B.

Map 1. Vicinity Map



1.3 PURPOSE OF AND NEED FOR ACTION

Purpose of the Project

The BLM designed the Rainbow Ridge timber sale to meet multiple objectives. The first objective is to create complex, early-seral[5] habitat that would function as such for up to 30 years. Such young conditions provide habitat for a variety of species that favor early-seral conditions. Early-seral habitat supports birds that depend on flowering and fruiting plants, provides forage for ungulates (deer and elk), provides habitat for cavity-nesting birds, provides forage for a variety of moths and butterflies, and provides forage and habitat for small mammals (e.g., wood rats, deer mice, rabbits) that may provide greater prey abundance for the northern spotted owl.

This project is also designed to meet the requirements of the 1937 O&C Lands Act. This Act requires that O&C lands be managed for permanent forest production in accordance with the principles of sustained yield (ROD/RMP p. 2). Another objective of the project is to design and offer a timber sale that would provide jobs and contribute timber for manufacturing in local economies. The Rainbow Ridge timber sale is anticipated to provide approximately 8.8 million board feet to local mills, which is 18 percent of the 2015 fiscal year timber target for the Salem District[6].

The Rainbow Ridge timber sale is within the Matrix and Riparian Reserves land use allocations. Specific management direction provides for the following actions in these land use allocations:

Matrix (General Forest Management Area)

The 1995 Salem District Record of Decision and Resource Management Plan (RMP) anticipated that the majority of timber harvest would come from the Matrix land use allocation. The purpose of timber harvest in this land use allocation is defined in the RMP:

- To contribute to the long-term sustainable supply of timber and other forest products which would contribute to local and state economic diversity (RMP pp. 20, 46–48), while maintaining future forest management options and protecting other resource values.

- To perform regeneration harvest to develop a desired age class distribution across the landscape (RMP p. 48).

- To perform commercial thinning on suitable managed timber stands to promote tree growth and survival (RMP pp. 46–48).

Riparian Reserves

The purpose of the density management timber harvest in the Riparian Reserves is as follows:

[5] Seral classes are classified as follows: early-seral (0–39 years of age), mid-seral (40–79 years of age), and late-seral (80 years of age and older).
[6] At the time of this EA, the 2015 timber target for the Salem District was 49 million board feet.

- To restore large conifers in the Riparian Reserves (RMP p. 7)

- To improve stand density and species complexity on a site-specific and landscape level in the long-term (RMP D-6).

Road Management

Direction for road management is provided as follows:

- Provide an adequate transportation system to manage timber resources and serve other management needs on federal, state, and private lands in a safe and environmentally sound manner (RMP p. 62).

Need for the Project

The BLM administers approximately 49,600 acres of forested land in Upper Alsea River (43,000 acres) and Marys River (6,600 acres) fifth-field watersheds. The General Forest Management Area (GFMA), where regeneration harvest may occur, accounts for approximately 17,300 acres (35 percent) of BLM lands in both watersheds.

Since the inception of the Salem District RMP in 1995, less than 400 acres of regeneration harvest has occurred in both watersheds, with only 92 acres of regeneration harvest authorized in the past 10 years[7]. The 92 acres of regeneration harvest would represent the only high quality early-seral habitat creation to occur GFMA lands in the past decade, which is less than one percent of the GFMA lands within these two watersheds.

Within the Matrix (General Forest Management Area)

The need for early-successional habitat is addressed in the following management objectives:

- To provide early successional habitat (RMP p. 20), and to maintain a well-distributed pattern of early-, mid-, and late-successional forest across the Matrix (RMP p. 46).

- Provide for important ecological functions such as dispersal of organisms, carryover of some species from one stand to the next, and maintenance of ecologically valuable structural components such as down logs, snags, and large trees (RMP p. 20).

Through statute and land use planning decisions, there is a need for forest lands administered by the Salem District BLM to provide a predictable and sustainable supply of timber that can be efficiently and economically harvested. Most timber sales offered by the Salem District BLM are purchased by small, independent logging contractors or locally operated mills dependent on Federal timber for a substantial proportion of their raw material needs because they do not own forest lands of their own.

[7] The Rickard Creek timber sale, which consists of 92 acres of regeneration harvest in the Marys River fifth field watershed (Oliver Creek and Beaver Creek sixth field watersheds), is currently being implemented.

Logging and forest products manufacturing also support ancillary industries such as equipment manufacture, sales, and supply, and road construction, and transportation, which in turn support additional jobs that provide wages spent on goods and services in local communities. Further, revenues from timber sales help support local county governments and social services.

The RMP (p. 46) prescribes management direction for timber resources in the Matrix land use allocation to "Maintain a well-distributed pattern of early, mid-seral, and late-successional forest across the Matrix." There is a need to meet this direction by increasing the early-seral age class component within the Marys River and Upper Alsea fifth field watersheds. Currently, less than 4,600 acres (10 percent) of BLM-managed lands in these watersheds are in an early-seral condition, and only 132 acres (0.3 percent) are under 20 years of age. Early-successional habitat on adjacent private lands generally lack ecologically valuable structural components such as down logs, snags, and large trees that are required on BLM-managed lands (RMP p. 20) (see vegetation report in section 3.1).

Within the Riparian Reserves

Trees in these stands are densely stocked and are exhibiting decreasing crown heights and slowing growth. Older overstory trees are declining in vigor and losing lower crown structure as younger trees grow to shade them. There is a need to release the declining older forest legacy and dominant overstory trees that are undergoing encroachment from these densely stocked younger conifers. There is a need to create structural diversity by retaining legacy and dominant overstory trees characterized by their large limbs and deep, wide crowns. In addition, there is a need to create spatial diversity by maintaining legacy and dominant overstory trees on the landscape and introducing early-seral habitat in small gaps within the density management area where understory development vegetation and shade tolerant tree species can establish.

Road Management

Road access is required for harvest operations. There is a need to construct roads to access the timber stands and to renovate the current road system. The current road system is in need of work to correct resource-related issues or deficiencies. To meet current Best Management Practices (BMP) standards, culvert replacements and road draining improvements are needed.

1.4 DECISION TO BE MADE

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

- Meet the purpose and need of the project (section 1.3)
- Be consistent with the Salem District RMP (section 1.5)

- Not have significant impact 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 BLM designed this project to comply with the Salem District Record of Decision and Resource Management Plan (RMP) and related 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)

The following documents provided additional direction in the development of the Rainbow Ridge timber sale:

- *Benton Foothills Watershed Analysis* (1997)

- *South Fork Alsea Watershed Analysis* (1995)

The above documents, along with the interdisciplinary team reports (EA 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 project is available in the Rainbow Ridge Timber Sale analysis file, which is also available at the Salem District office.

Survey and Manage Review

The project is consistent with the 2001 ROD and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines, as incorporated into the District Resource Management Plan.

This project utilizes the December 2003 species list. This list incorporates species changes and removals made as a result of the 2001, 2002, and 2003 Annual Species Reviews (ASR) with the exception of the red tree vole. For the red tree vole, the Ninth Circuit Court of Appeals in *KSWC et al. v. Boody et a*l., 468 F3d 549 (9th Cir. 2006) vacated the category change and removal of the red tree vole in the mesic zone, and returned the red tree vole to its status as defined in the 2001 ROD Standards and Guidelines, which makes the species Category C throughout its range. None of the mollusks on the 2003 list fall within the range of the project area; thus, mollusk

surveys were not required. Details of project surveys for the red tree vole are described in the wildlife section of this EA (section 3.2).

Compliance with the Aquatic Conservation Strategy (ACS)

Chapter 4.0 of this EA addresses how the Rainbow Ridge Timber Sale meets each of the nine objectives of the Aquatic Conservation Strategy. In addition, project design features (PDFs) (section 2.6) would provide protection measures to meet ACS objectives.

1.6 PUBLIC INVOLVEMENT

On October 5, 2012 the BLM sent a scoping letter to 24 potentially affected or interested individuals, groups, and agencies. In addition, the BLM hosted a public meeting and field trip on October 29, 2012. The BLM received 12 responses during the scoping period and used these comments to aid in the identification and analysis of issues described in the following section. The scoping comments are available for review at the Salem District office.

1.7 RELEVANT ISSUES

The 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 action alternatives and the no action 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: *What effects would the various timber harvest treatments have on forest stand health and composition? Section 3.1.2.*

Issue: *How would the proposed actions contribute to meeting objectives for the Matrix land use allocation? Section 3.1.2.*

Issue: *Would the proposed actions have any impacts on Bureau Special Status, including Survey and Manage, botanical and fungal species? Section 3.1.2.*

Issue: *Would the proposed action lead to a substantial increase in noxious weed species on site or would the occurrence of noxious weed species have adverse effects on the project area? Section 3.1.2.*

Issue: *How would the proposed action affect wildlife terrestrial habitats within the project area and across the watershed? Section 3.2.2.*

Issue: *How would the proposed action affect wildlife species, which BLM, by law and policy, is required to protect, maintain, or recover? Section 3.2.2.*

Issue: *What effect would the proposed actions have on resident and anadromous fish and aquatic habitat? Section 3.3.2.*

Issue: *What effects would the proposed action have on Endangered listed fish and their habitat? Section 3.3.2.*

Issue: *What effects would the proposed road construction and renovation have on water quality? Section 3.4.2.*

Issue: *What effects would timber harvest, road construction and/or road renovation have on the soils resource, including soil productivity? Section 3.5.2.*

Issue: *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 visual resources? Section 3.7.2.*

2.0 ALTERNATIVES

2.1 ALTERNATIVE DEVELOPMENT

Pursuant to Section 102 (2)(E) of NEPA (National Environmental Policy Act of 1969, as amended), Federal agencies shall "Study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." Within this EA, the BLM will analyze three alternatives: Alternative 1 (No Action), Alternative 2 (Proposed Action), and Alternative 3 (Regeneration Harvest with Dispersed Green Tree Retention). Alternatives considered but not analyzed in detail are discussed in section 2.7 of this EA.

2.1.1 Planning and Implementation Process

In planning the Rainbow Ridge project, the interdisciplinary team developed criteria using direction in the RMP for selecting stands to be treated, types 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 implementation of the project. 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 Rainbow Ridge 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. Responses to comments would be included in the Decision Record (DR)[8].

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.

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 area 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

[8] At the time of this analysis, the Rainbow Ridge timber sale is scheduled to be offered in August 2015. The DR would be published at the time the notice of sale is published – the month prior to the sale date.

objectives to not be achieved?" The No Action alternative means no timber management actions or connected actions would occur. If this alternative were selected, the following items would not be done in the project area at this time:

- Silvicultural treatments
- Timber harvest
- Road construction, renovation, or improvement
- Fuel reduction treatments

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

2.3 ALTERNATIVE 2 – PROPOSED ACTION

The BLM is proposing to conduct variable retention harvest, commercial thinning, density management, and road construction on 144 acres as described below.

Variable Retention Harvest

Regeneration harvest would be conducted within the Matrix (GFMA) on stands that are approximately 58–67 years of age. Of the 106 acre unit, variable retention harvest would be conducted on approximately 87 acres. The remaining 19 acres within the regeneration harvest units would be aggregated retention areas ("aggregates") that would be reserved from harvest to meet the following objectives:

- minimize the potential deficit of large hard snags and down logs in the post-harvest stand
- provide for structural diversity and wildlife values in the post-harvest stand

Aggregated and Dispersed Green Tree Retention

Approximately 19 acres of aggregates would remain untreated within the regeneration harvest units. Seven aggregates have been delineated, ranging from approximately one acre to six acres in size. These aggregates are shown on Map 2 of this EA. Aggregates are within the Matrix (GFMA) land use allocation, though some are located adjacent to no-harvest Riparian Reserves. Selection criteria for the aggregates can be found in section 2.6 of this EA. Approximately 17 percent (19 acres of 106 acres) of the harvest unit would be in aggregated retention; this

percentage does not account for approximately 35 acres of Riparian Reserves that are immediately adjacent to the aggregates and regeneration harvest units.

In addition to the 19 acres of aggregated retention, dispersed green tree retention would also reserve approximately one green tree per acre.

Commercial Thinning and Density Management Treatments

Unit 29F is comprised of 33 acres of 41 year old forest stands. Of the 33 acres, 24 acres are within the Matrix and 9 acres are within the Riparian Reserves. Typically, the term "commercial thinning" is specific to thinning treatments in the Matrix land use allocation and "density management" is specific to the Riparian Reserves or Late-Successional Reserves. While both are thinning treatments, each are designed to meet different objectives. Commercial thinning treatments may emphasize long-term wood quality and production and treatments tend to be relatively uniform. Density management treatments typically have greater variability and may be designed to improve forest health, to open the forest canopy, or to accelerate the development of late-successional forest structural characteristics.

Within the 33 acres in 29F, 10 acres of Matrix forest would receive a commercial thinning treatment and 23 acres would receive a density management treatment (9 acres of Riparian Reserves and 14 acres of Matrix land on steeper slopes adjacent to the Riparian Reserves).

Yarding Systems

Skyline yarding would occur on approximately 96 acres and ground-based yarding would occur on approximately 29 acres.

Road Work

New road construction (5,100 feet) and road renovation (37,600 feet) on existing roads would occur. Up to five acres[9] in the Matrix land use allocation would be cleared by the proposed new road construction.

Post-Harvest Planting

Reforestation would follow variable retention harvest and ecological forestry concepts, and would utilize both artificial (planting) and natural regeneration. Within 100 feet of aggregates (fully stocked no-harvest areas), only natural regeneration would occur. Outside those areas, a mixture of Douglas-fir, western hemlock, Willamette Valley ponderosa pine, and western red-cedar would be planted at a rate of 150–200 trees per acre (TPA). Natural regeneration would likely supplement stocking over time. The composition of natural regeneration would depend on tree species adjacent to harvested areas, seed bed conditions, timing and abundance of seed crops, seed predation, and weather conditions.

[9] This represents the maximum clearing based on a total clearing width of 40 feet (20 feet on each side of the center line of the road). Due to the placement of roads on gentle topography or ridgetops, the total clearing width would often be much less.

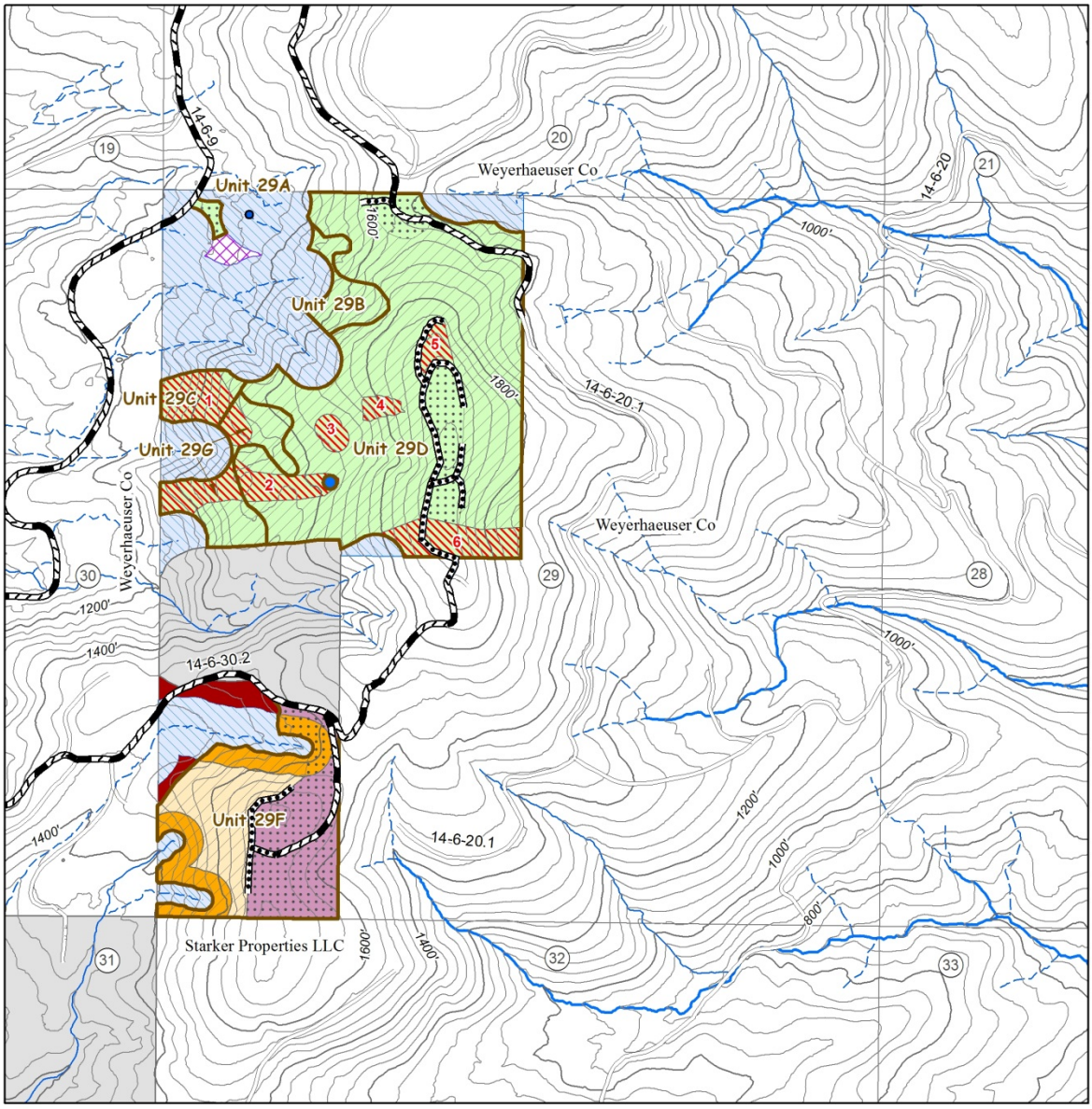
Table 2–1 provides a summary of the components of Alternative 2 and the acres associated with each component.

Table 2-1. Summary of the Components of Alternative 2

Activity	Affected Acres
Regeneration harvest	87
Aggregates	19
Commercial Thinning	10
Density Management	23
Road Construction	5
Total	144

The map on the following page provides an overview of the components of Alternative 2 (the proposed action) of the Rainbow Ridge timber sale, as described on the preceding pages.

Map 2. Alternative 2 – Proposed Action



Contour Interval: 40ft (Lidar)

- EA Units
- Aggregates (19 acres)
- Commercial Thinning (14 acres)
- Density Management (9 acres)
- Density Management in Upland (10 acres)
- Regeneration Harvest (87 acres)
- Ground-Based Yarding
- Skyline Yarding
- Inadequate stocking
- Stream protection zone
- Red Tree Vole protection area
- Other BLM land that will not be treated
- Road to be Constructed
- Road to be Renovated
- Existing Road
- Wet area outside of unit
- Wet area (50' radius)
- Perennial fishbearing stream
- Perennial non-fishbearing stream
- Intermittent non-fishbearing stream

N

0 500 1,000 1,500 Feet

2.4 ALTERNATIVE 3 – REGENERATION HARVEST WITH DISPERSED RETENTION

This project would consist of the more traditional Northwest Forest Plan-style regeneration harvest with dispersed retention. The BLM is proposing to conduct regeneration harvest with dispersed green tree retention, commercial thinning, density management, and road construction on 143 acres as described below.

Regeneration Harvest

Regeneration harvest would be conducted on approximately 78 acres of stands which are approximately 58–67 years of age within the Matrix (GFMA). Within the regeneration harvest units, between 9 and 11 trees per acre would be reserved from harvest to meet the following objectives:

- minimize the potential deficit of large hard snags and down logs in the post-harvest stand
- provide for structural diversity and wildlife values in the post-harvest stand

No aggregated retention areas are planned for this alternative. However, five no-harvest areas have been delineated to serve as fungi protection areas.

Commercial Thinning and Density Management

Unlike Alternative 2, traditional treatment types would be applied to the Matrix and Riparian Reserves. Commercial thinning would occur on approximately 46 acres of forest stands 41 years of age in the Matrix (GFMA) land use allocation and density management would occur on approximately 14 acres of 41 years of age in the Riparian Reserves. No density management treatments would occur in the Matrix.

Yarding Systems

Skyline yarding would occur on approximately 114 acres and ground-based yarding would occur on approximately 29 acres.

Road Work

Road work is the same under Alternative 3 as described in Alternative 2. New road construction (5,100 feet) and road renovation (37,600 feet) on existing roads would occur. New road construction clearing would total approximately five acres in the Matrix land use allocation.

Post-Harvest Planting

Reforestation would utilize artificial (planting) regeneration. A mixture of Douglas-fir, western hemlock, Willamette Valley ponderosa pine, and western red-cedar would be planted at a rate of approximately 300 trees per acre or more. It is expected that some amount of natural

regeneration would supplement stocking over time. The composition of natural regeneration would depend on tree species adjacent to harvested areas, seed bed conditions, timing and abundance of seed crops, seed predation, and weather conditions.

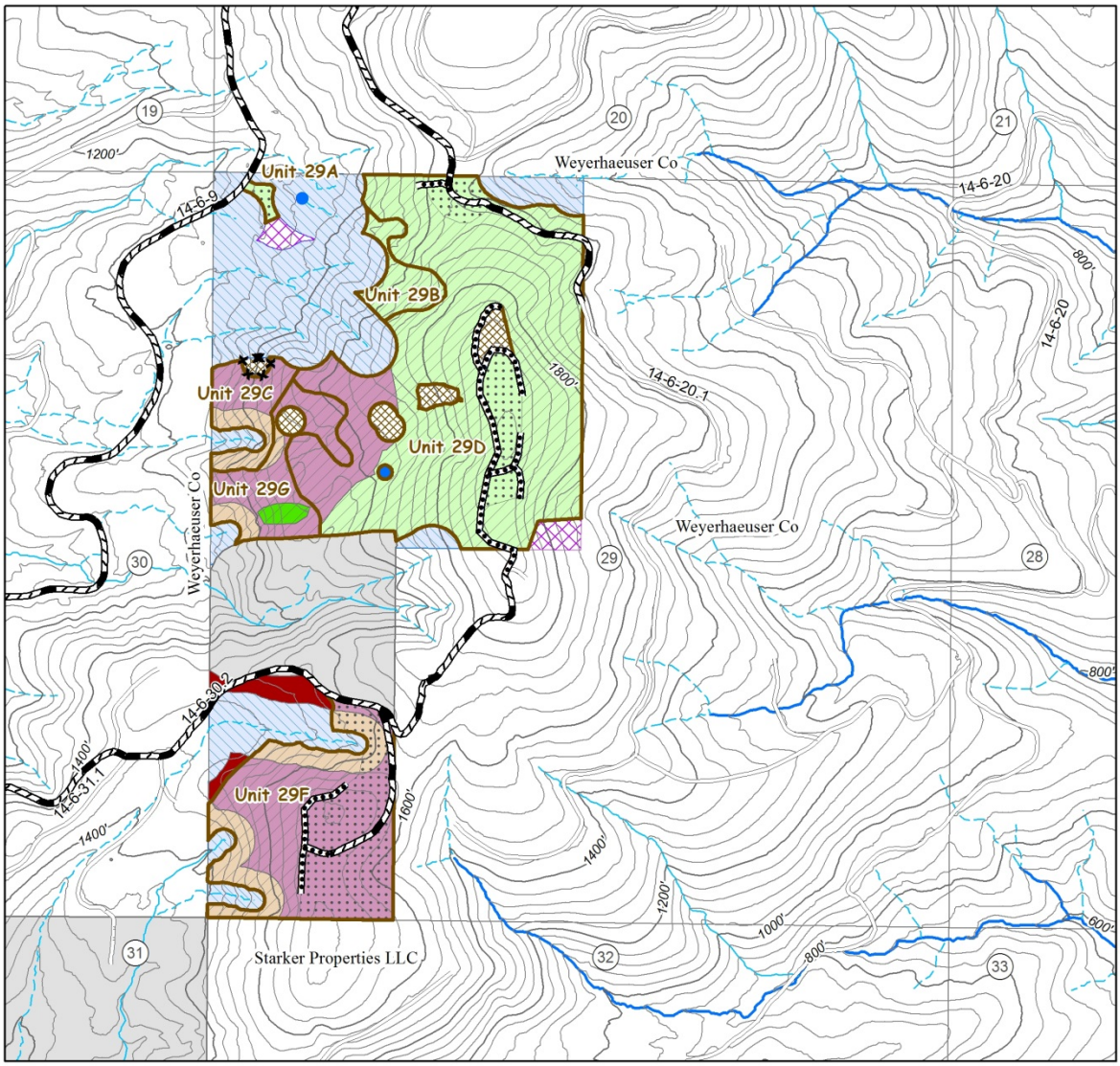
The table below provides a summary of the components of Alternative 3 and the acres associated with each component.

Table 2-2. Summary of the Components of Alternative 3

Activity	Affected Acres
Regeneration harvest	78
Aggregates	0
Commercial Thinning	46
Density Management	14
Road Construction	5
Total	143

The map on the following page provides an overview of the components of Alternative 3 of the Rainbow Ridge timber sale, as described on the preceding pages.

Map 3. Alternative 3 – Regeneration Harvest with Dispersed Green Tree Retention



Contour interval: 40ft. (Lidar)

- Units in Section
- Commercial Thinning (46 acres)
- Density Management (14 acres)
- Patch Cut or Group Select (1 acre)
- Regeneration Harvest (78 acres)
- Ground-Based Yarding
- Skyline Yarding
- Yarding permitted with approval of authorized officer
- Fungi protection area
- Inadequate stocking
- Red Tree Vole protection area
- Stream protection zone
- Other BLM that will not be treated
- Road to be constructed
- Road to be renovated
- Existing Road
- Wet area outside unit
- Wet area with 50' buffer
- Perennial fishbearing stream
- Perennial non-fishbearing stream
- Intermittent non-fishbearing stream

N

0 500 1,000 1,500 Feet

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 Map Accuracy Standards of the Office of Management and Budget. This product was developed through digital means and may be updated without notification. Marys Peak Resource Area, Salem District, BLM

2.5 CONNECTED ACTIONS

Road Work

The planned road construction and renovation are identical for the two action alternatives, as shown on the map in Appendix C. Seven spur roads, totaling approximately 5,100 feet, would be constructed to facilitate safe logging operations and minimize potential negative effects associated with road construction and use. Roads would be positioned primarily on ridgetops and situated to avoid sensitive botanical species known to be in the area.

Roads would be constructed within the Matrix (GFMA); no road construction would occur within the Riparian Reserves. New roads would be left in place post-harvest to facilitate administrative access, monitoring, and future use. Vehicular access to these roads may be limited; one gate would be installed on the 14-6-30.2 road on property managed by an adjacent private landowner.

Fuel Treatments

The BLM would conduct post-harvest fuel hazard surveys and would recommend site-specific treatments a needed for fuel reduction. Fuel treatment strategies would be implemented to reduce both the intensity and severity of potential wildfires in the long term (after fuel reduction has occurred) and for site preparation in regeneration and commercial thinning harvest units, at landings, or along roads and property lines.

Additional information regarding proposed fuel reduction treatments can be found in the following section, Project Design Features and Best Management Practices, and in section 3.6, Air Quality, Fire Risk, and Fuels Management.

2.6 PROJECT DESIGN FEATURES AND BEST MANAGEMENT PRACTICES

The following is a description of the project design features and best management practices (BMPs) common to all action alternatives, unless otherwise stated, that reduce the risk of adverse effects to the environment. These design features would be enforced through a timber sale contract administered by the BLM.

Table 2–3 summarizes the seasonal restrictions, the period in which they apply, and the intended objective of each restriction.

Table 2-3. Table of Seasonal Restrictions

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 and renovation	Minimize soil erosion
During periods of low soil moisture[10], 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 any unsurfaced roads.	Minimize soil erosion and stream sedimentation
July 1 to August 31	In-stream work period (culvert installation)	Minimize soil erosion and stream sedimentation

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

Project activities would utilize the 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

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

wetlands exists (BMPs R 22, 25, 26, 29, 30, 31, 33, 35, 86). Construct waterbars on skid trails using guidelines in the FEIS (Appendix I, Table I-21).

- Scatter debris on disturbed soils and construct waterbars on yarding trails that could erode and deposit sediment in water bodies, floodplains, and wetlands (BMPs 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 to what is operationally necessary for the equipment (approximately 12 foot width) (TH 10).

- Ensure one-end suspension of logs during ground-based skidding (TH 11).

- Restrict ground-based harvest and skidding operations to periods of low soil moisture when soils have resistance to compaction and displacement (TH 12).

- To the extent practicable, limit conventional ground-based equipment to slopes less than 35 percent (TH 14), with the exception described below.

- Ground-based equipment would be allowed to operate on slopes less than 45 percent within the skyline yarding areas. The equipment would be allowed to cut, process, and deck logs only. No yarding of logs with ground-based equipment would be allowed on slopes greater than 35 percent. This activity would take place with the following applied:
    - No new skid trails, landings or temporary roads would be constructed;
    - Ground-based equipment would occur on the contours and would ride over a layer of slash;
    - The range of slopes would not exceed 45 percent slope for a sustained distance of 100 feet or more;
    - Upon completion of the operation of a unit, the Hydrologist and/or Soil Scientist in conjunction with the Authorized Officer would review the unit to ensure that adverse effects to soil quality did not occur. Once that review is certified, the operation could proceed to the next cable unit.

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

- Other ground-based yarding equipment could be utilized as long as it meets best management practices and results in impacts equivalent to or less than the level of impacts analyzed for the project (TH 15).

- Fell harvested trees away from stream channels when possible (TH 17, S 3).

- During periods of rainfall when water is flowing off road surfaces, the 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 73).

- Repair damaged culvert inlets and downspouts to maintain drainage design capacity (R 39, 43).

- Landings should be kept to the minimum size needed to accomplish the job and existing road surfaces should be used as much as possible (TH 13, R 1, 4, 6).

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 (e.g., low-boys and trailers) 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 (e.g., roads to be constructed, skid roads, landings), 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

Within Regeneration Harvest Areas

- No regeneration harvest would occur within Riparian Reserves. On intermittent and perennial non-fish-bearing streams, Riparian Reserves would be one site-potential tree height[11] in width, slope distance, measured from the top of the stream bank.

Within Density Management Areas (Alternative 3 only, adjacent to commercial thinning)

- Stream Protection Zones (SPZs), where no cutting and/or yarding is permitted, would be established along streams and identified wet areas within harvest areas. SPZ width (50–85 feet) would be established through shade sufficiency analysis (TH **7**).

- Stand density would be reduced from the SPZ to the upper edge of the Riparian Reserves, consistent with meeting Aquatic Conservation Strategy (ACS) objectives, but sufficient trees would be left to maintain at least 50 percent canopy cover in the secondary shade zone (S 9).

- To protect water quality, trees within one tree height of SPZs would be felled away from streams. Where a cut tree does fall within the SPZ, the portion of the tree within the SPZ would remain in place (TH 17, S 3).

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

[11] Site-potential tree height is 210 feet.

- Woody material removed from stream crossings for culvert maintenance would be retained in the stream network.

- Hand piling of fuels intended for burning would be prohibited closer than 100 feet from any stream channel.

- Mechanical fuels treatment would be prohibited closer than 200 feet from any stream channel.

To Provide for Green Tree Retention, Snags, and Down Logs

Within Regeneration Harvest Areas (both action alternatives)

- Existing snags of any size and height would be retained where operationally practicable and where they do not pose a safety hazard. Snags that are felled for operational or safety purposes would be reserved on site as down logs.

- Snags 20 inches or greater at diameter breast height (DBH) would receive special consideration for retention, which may include establishing small clumps of green trees around such snags to enhance their likelihood of retention. Green trees would be reserved around large snags (greater than 20 inches DBH and 40 feet in height) to protect them from logging operations and reduce the likelihood of their cutting for worker safety.

- A minimum of 120 linear feet per acre, averaged over the area, of large down wood in Decay Classes 1 and 2 would be provided. Existing down logs in all decay classes would be reserved and remain on site.

Within Variable Retention Harvest Units (Alternative 2)

- *Aggregated and Dispersed Tree Retention:* The Franklin and Johnson (2012) moist forest principles suggest 20–30 percent of project areas remain in aggregated tree retention. Within the boundaries of the approximately 106 acres of variable retention harvest areas, approximately 19 acres would be retained in aggregates (approximately 17 percent). Immediately adjacent are approximately 35 acres mixed conifer and hardwood stands in the Riparian Reserves that would remain untreated. In addition, individual selected trees with complex structure, crown defects, deeply furrowed bark, or minor species, or which have visible nest structures would be retained throughout variable retention harvest areas, at a rate of approximately one tree per acre.

- Candidate areas for aggregates would include:
    - Representative patches of the pre-harvest forest stand;
    - Structurally complex forest;
    - Concentrations of trees that are older and larger than the prevailing stand conditions;
    - Trees with uncommon characteristics (e.g., deformed boles, cavities);
    - Concentrations of large down wood;
    - Concentrations of snags;

- Special habitats such as seeps, rocky outcrops, and areas of high species diversity;
- Known sites of special status species to be protected;
- Proximity to Riparian Reserves; and
- Patches dominated by hardwood trees.

- Aggregates would be distributed throughout the proposed harvest units, although harvest systems, specifically skyline yarding, could constrain the potential locations.

- Yarding would not occur through the designated aggregates.

- Future Snags and Down Logs. Aggregates would meet or replace the need for two conifer trees per acre to minimize the potential deficit of large hard snags and down logs in the post-harvest stand.

- Habitat Diversity. Hardwood trees and minor conifer species would be retained as a component of aggregates. Hardwoods are abundant in the adjacent Riparian Reserves land use allocation as well.

- Reforestation would utilize both artificial (planting) and natural regeneration. Planting would ensure minimum stocking while allowing for an extended period of early-seral forest conditions. Within 100 feet of aggregates, only natural regeneration would be used. Outside those areas, a mixture of Douglas-fir, western hemlock, Willamette Valley ponderosa pine, and western red-cedar would be planted at a rate of 150–200 trees per acre. Natural regeneration would likely supplement stocking over time.

Within Regeneration Harvest Units (Alternative 3 – Dispersed Green Tree Retention)

- Existing snags of any size and height would be retained where operationally practicable and where not a safety concern. Snags that are felled for operational or safety concerns would be reserved on site as down logs.

- At a minimum, an average of 120 linear feet per acre of large down wood in Decay Classes 1 and 2 would be provided. Existing down logs in Decay Classes 3, 4 and 5 would also be reserved and remain on site.

- A target of 10 trees per acre (ranging from 9–11) would be retained within the regeneration harvest units to provide for green tree retention, future snags and down logs, and habitat diversity, as described below:
  - Green Tree Retention. Approximately six to eight conifer trees per acre, representative of the co-dominant and dominant tree strata, would be retained to provide for structural diversity and wildlife values in the post-harvest stand. Preference in green tree selection would be given for those trees located safely away from landings and right-of-ways, and for the oldest trees, or trees with complex structure, crown defects, deeply furrowed bark, or which have visible nest structures. Selected trees may be both clumped and scattered throughout a

unit. Green tree retention required by the ROD/RMP would be met at the individual unit scale by summing qualifying trees.

- Future Snags and Down Logs. Approximately two conifer trees per acre would be retained to minimize the potential deficit of large hard snags and down logs in the post-harvest stand. Site preparation and post-harvest processes (e.g., wind, insect, and disease) would likely convert some or all of this allotment into snags and down logs within the first decade.

- Habitat Diversity. Up to one hardwood tree per acre (primarily large bigleaf maples) would be retained to provide for post-harvest wildlife habitat diversity. Other hardwoods would be felled and could be removed.

- Reforestation would utilize artificial (planting) regeneration. A mixture of Douglas-fir, western hemlock, Willamette Valley ponderosa pine, and western red-cedar would be planted at a rate of approximately 300 trees per acre or more. Some amount of natural regeneration would likely supplement stocking over time.

Within Commercial Thinning and Density Management Harvest Units

- Priorities for tree marking would be based on Marking Guidelines (Appendix D). Marking guidelines do not apply to rights-of-way.

- In Alternative 2, a density management prescription would be applied to both the Riparian Reserves of Unit 29F and the upland (GFMA) portions of Unit 29F. Density management would be applied to Riparian Reserves only in Alternative 3. Density management tree selection would be designed to leave low-density areas sufficient to favor individual crown growth, leave a range of tree diameters, maintain tree species diversity, create variable density of leave trees, and retain legacy and wildlife tree structure while reducing overall tree densities. Small gaps would be created that would allow establishment of understory trees. Additional trees would be cut around the largest diameter trees with the fullest live crowns to maintain their open-grown, wolf- tree structure. A unit-average range of 100–120 square feet basal area of trees would be retained.

- Within commercial thinning areas in Alternative 3, tree selection would be designed to leave approximately 30 percent more trees per acre than density management areas, to favor stand volume growth rather than individual crown development. Legacy and wildlife tree structure would be retained while meeting target densities. A unit-average range of 120–150 square feet basal area of trees would be retained.

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

- Understory conifers less than 7 inches DBH would be excluded from harvest.

- Any Continuous Vegetation Survey plot reference trees would be reserved from harvest to aid in plot relocation for future plot measurements.

- Except in yarding corridors and skid trails, western red-cedar and hardwood tree species would be retained. Thinning would be implemented to maintain current species composition or to increase the proportion of minor species (such as western hemlock) where they are not abundant.

- In areas infected with laminated root rot, symptomatic trees and all Douglas-fir trees (the most susceptible species) would be removed within approximately 50 feet of dead or symptomatic trees. If openings greater than approximately 0.5 acre are created, the need for planting would be evaluated. If needed, seedlings of non-susceptible or immune species would be planted.

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

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

- Green trees would be reserved around large snags (greater than 15inches DBH and 30 feet in height) to protect them from logging operations and reduce the likelihood of their cutting for worker safety.

- Existing snags and coarse woody debris (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 area. Additional trees would be reserved around snags that are greater than 15 inches DBH and 30 feet in height to protect them from logging operations and to reduce the necessity of falling them for safety.

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 botanist and or/ wildlife biologist would be notified if any special status botanical, fungal, or animal species are found within or adjacent to project areas and appropriate mitigation would be applied according to bureau policies.

- Site management of any federal Threatened and Endangered (T&E) or bureau special status, including survey and manage botanical or fungal species, found as a result of additional inventories or incidental findings would be accomplished in accordance with BLM Manual 6840 (12/12/2008, IM-2009-039).

- For any listed botanical species whose characteristics make locating them with field surveys practical, clearances would generally be done by field surveys using intuitive controlled methods, field clearances, field reconnaissance, inventories, database searches, known site maps and records and/or habitat examinations. Clearances for fungi are considered "not practical" and none of the projects occur in old-growth forests. Surveys for fungi are not required. Known sites of *Phaeocollybia olivacea* would be protected by inclusion into reserves.

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

In the Event of Windthrow

Trees may blow down following harvest activities. Windthrown trees within harvest areas may be salvaged without further NEPA analysis under the following conditions:

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

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

- Hazardous fuels surveys would be conducted and site-specific plans for hazardous fuel 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.

- Broadcast burning, swamper burning, or hand, machine, and landing pile construction and burning may be used individually or in combination in any harvest 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).
    - 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 piles or landings would remain on the roads or landings during the construction.
    - In ground-based yarding areas, machine piles would not be constructed within twenty-five (25) feet of property lines or unit boundaries.
    - Piles would be covered with .004 mm 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 slash and/or slash pullback of fuels may be incorporated in areas where the fuel load is light (generally along roads, property lines, and trails) instead of piling and 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 less than six inches in diameter that is accessible from existing roads and landings would be available for removal.

- 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.

Project Design Features applicable to Alternative 2 only

- Hand firelines would be constructed in harvest units for which prescribed broadcast burning is applied. Adjacent to control lines, no new snags would be created, and existing snags identified by the Authorized Officer with the potential to cause spotting would be felled. In addition, where slash accumulations are heavy adjacent to thin barked reserve trees slash would be pulled back or hand-piled to facilitate survival of these trees.

Project Design Features applicable to Alternative 3 only

- Harvest units in which prescribed broadcast burning is applied would have brush greater than two feet in height cut (slashed) following yarding. Hand firelines would be constructed. Adjacent to control lines, no new snags would be created, and existing snags identified by the Authorized Officer with the potential to cause spotting would be felled. In addition, where slash accumulations are heavy adjacent to thin barked reserve trees slash would be pulled back or hand-piled to facilitate survival of these trees.

2.7 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

The BLM is required to include a discussion of a range of reasonable alternatives to the proposed action, alternatives which are technically and economically feasible and which meet the purpose and need, and which have a lesser environmental impact.

In the original proposal, the BLM considered including a portion of a 110-year-old stand in the variable retention harvest units. Due to the advanced age, structure, and likely presence of red tree voles in the mature stand, the BLM elected to exclude it from the proposed action.

The BLM considered, but did not analyze in detail, an alternative with commercial thinning as the primary treatment. While this alternative would partially meet the purpose and need by supporting local economies and providing lumber to mills, it would not meet the primary objective of the project to create high quality early-seral habitat and create a desired distribution of age classes across the landscape.

No additional alternatives were considered but not analyzed in detail.

2.8 COMPARISON OF ALTERNATIVES

The table below provides a side-by-side comparison of the components of the Rainbow Ridge timber sale for the two action alternatives.

Table 2-4. Comparison and Summary of Action Alternatives and Connected Actions

Activity and Unit Measurements	Alternative 2 Proposed Action	Alternative 3 Regeneration Harvest with Dispersed Retention
Total Acres	144	143
Matrix (GFMA)	135	129
Riparian Reserves	9	14
Regeneration harvest (acres)	87	78
No-cut aggregates (acres)	19	0
Residual TPA (dispersed)	1	9–11
Commercial Thinning	10	46
Residual TPA	42–95	42–95
Density Management (acres)	23	14
Residual TPA	Variable 50–100	Variable 50–100
Road Construction (ft.)	5,100	5,100
Construction in acres	5	5
Road Renovation (ft.)	37,600	37,600
Road Decommissioning	0	0
Skyline yarding	96	114
Ground-based yarding	29	29

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS

This section summarizes the physical, biological, and social environments of the affected project area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for comparison of alternatives presented in the previous chapter. The interdisciplinary reports are incorporated by reference in this EA. Reports in their entirety are available at the Salem District Office and upon request.

3.1 VEGETATION

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

What effects would the various timber harvest treatments have on forest stand health and composition?

How would the proposed actions contribute to meeting objectives for the Matrix land use allocation?

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 substantial increase in noxious weed species on site or would the occurrence of noxious weed species have adverse effects on the project area?

3.1.1 Affected Environment

Present Stand Condition and History

The project area consists of six forest stands dominated by Douglas-fir, small sawtimber (11–21 inches DBH) to large sawtimber (larger than 21 inches DBH), fully stocked, originating between the 1940s and the 1960s. A very minor component of western hemlock exists in all stands. All stands contain a substantial hardwood component as well; red alder is found the moist areas and bigleaf maple is found in the drier uplands.

Past fire occurrence has been relatively frequent between 1840 and 1940[12]. Unit 29F originated after clearcut harvest in 1967. It was planted in 1968 and was precommercially thinned in 1990. The older stands originated following mixed severity wildfire (and likely fire salvage), and possibly subsequent clearcut harvest. Stand structure is generally uniform and simple, with little evidence of wildfire or older legacy trees remaining, indicating past clearcut harvest. Because

[12] Fire history in the project area is described in greater detail of section 3.6 of this EA.

these stands are all even-aged, stand age is calculated as a straight average of individual tree ages sampled within each stand.

Inter-tree competition can be described by the concept of relative density index (RDI). Above relative density index of about .55, competition is strong and tree growth and vigor declines, and mortality of suppressed trees begins. Currently the weighted average relative density for all stands is .76. Stand exam data collected in 2012[13] is summarized below in Table 3–1.

Table 3-1. Current stand attributes at Rainbow Ridge (trees greater than 7 inches DBH)

Unit and Forest Operations Inventory	Species	Ac.[1]	Total Age[2]	TPA	Basal area/ ac (ft^2)	QMD[3] (in.)	Tree Height 40[4]	RDI[5]	Canopy Cover[6]	Site Index
29A	Douglas-fir			86	253	23.3				
FOI 931993	Bigleaf maple			5	9	17.8				
Total		**10**	**64**	**91**	**262**	**23.0**	**148**	**.68**	**76%**	**146**
29B	Douglas-fir			54	105	18.8				
FOI 931994	W. hemlock			4	3	11.6				
	W. red cedar			.4	3	38.2				
	Bigleaf maple			10	18	17.7				
Total		**21**	**65**	**128**	**210**	**17.4**	**115**	**.60**	**76%**	**138**
29C	Douglas-fir			189	310	17.3				
FOI 931998	Bigleaf maple			2	10	17.3				
Total		**14**	**62**	**191**	**320**	**17.5**	**139**	**.90**	**87%**	**131**
29D	Douglas-fir			136	285	19.6				
FOI 931995	Bigleaf maple			4	5	14.6				
Total		**91**	**61**	**141**	**290**	**19.4**	**142**	**.79**	**82%**	**134**
29F	Douglas-fir			173	215	15.1				
FOI 932002	W. hemlock			2	5	19.6				
Total		**37**	**39**	**175**	**220**	**15.2**	**106**	**.66**	**81%**	**132**
29G	Douglas-fir			105	171	17.3				
FOI 931999	Bigleaf maple			55	34	10.6				
Total		**13**	**56**	**148**	**203**	**15.8**	**123**	**.60**	**78%**	**121**

[1] Acres sampled in unit/stand type. Not all portions of sampled units are within the Rainbow Ridge timber sale units.
[2] Stand age in 2012. Data collected in 2012, except 29G/M02 in 2003. Ages are average of all sampled trees, except 29E/M1222 that is basal-area weighted age due to two age classes: 50 ft^2 BA >40" DBH, aged 176 years, and 200 ft^2 BA aged 88 years.
[3] Quadratic mean diameter - the diameter at breast height (4.5 feet) of the tree of average basal area.
[4] Average Height of tallest 40 trees, based on stand data analyzed in ORGANON SMC v.9.1 growth model.
[5] Relative Density Index, the density of trees per acre relative to the maximum density possible (Reineke 1933).
[6] Canopy cover from stand data analyzed in Organon, SMC v. 9.1 growth model.

[13] Stands were modeled based on the year of latest data collection (2012). Limitations in the model preclude modelling the data forward two years to the present year. For this reason, ages presented in these tables are 2012 ages. Ages are otherwise presented in the EA as ages in 2014. Modelling statistics are sufficient for analytical purposes.

Coarse Woody Debris

Coarse wood is an important habitat component that is desired for its ecological function. It includes downed wood, snags, and live trees with dead or broken tops or decay. Table 3–2 displays the volume of downed wood and snags per acre, and the density of snags in the project area.

Table 3-2. Coarse Woody Debris Volume (conifer only, downed wood over 20 feet long and 12 inches DBH, snags over 10 inches DBH and 10 feet in height)

Unit	Age in 2012 (yrs)	Total down wood volume[1] (cu ft/ac)	Snag volume[2] (cu ft/ac)	Total volume DWD & Snags[3] (cu ft/ac)	Total snags per acre	Snag Avg Ht (ft)	Snag QMD[4]
29A	64	790	131	921	9.7	22	13
29B	65	651	94	745	2.5	32	26
29C	62	51	242	293	2.2	136	20
29D	61	622	453	1075	21	77	12
29F	39	147	235	382	21	52	12
29G	60	Est. 400	Est. 110	485	6.2	60	12
Weighted Avg.	**60**	**444**	**301**	**744**	**13.7**	**57**	**10.2**

[1] Conifer greater than 12 inches diameter and 20 feet long.
[2] Volume of all standing dead trees greater than 10 inches diameter and 10 feet in height.
[3] Volume of downed wood and snags combined.
[4] Quadratic mean diameter of snags.

Site Conditions

Site class is a measure of site productivity. Site indices range from I (highest productivity) to V (lowest productivity).The average site index (King, 50-year) of stands in the project area is relatively high, averaging Site Index 130 (site II). The project area is in the Western Hemlock/dwarf Oregon grape-DRY plant association. It is the warmest and driest of the western hemlock plant associations, found along the Willamette Valley margin of the Coast Range (McCain and Diaz 2002). Stands in this plant association are typically dominated by Douglas-fir, with components of western hemlock and bigleaf maple. The shrub layer is dominated by dwarf Oregon grape, and contains oceanspray and California hazel.

The BLM's Timber Production Capability Class is a classification that describes soil and site issues that contribute to fragility of lands to management impacts or reforestation failure under even-age (clearcut) harvest. In Unit 29D, an area of approximately 50 acres is classified as limited reforestation survival due to conditions that support strong competition from hardwood and shrub species. The area is classified as suitable, and vegetation management methods are recommended to meet minimum reforestation stocking levels (RLR1).

Forest Health

Laminated root rot, caused by the fungus *Phellinus weirii,* is a native root pathogen that spreads through root to root contact between live, susceptible trees, including Douglas-fir and grand fir. It kills trees by destroying their roots, which then can lead to windthrow. It is a natural part of many forest ecosystems (Thies and Sturrock 1995), and contributes snag and downed wood habitat to affected stands over time. Laminated root rot affects less than five percent of the project area, creating small (0.1 to 0.25 acre) openings. It is most widespread in Units 29D and 29F. These areas have tree mortality dating from the last few decades as well as recent mortality. Infection can be expected to continue to spread outward at a rate of approximately one foot per year.

Laminated root rot, Unit 29F, 2012. Note older snag and recent mortality of Douglas-fir.

Douglas-fir bark beetles are endemic throughout the Coast Range. 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 are 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.

Seral Stage Distribution

Seral stages of forest successional development in western Oregon can be categorized into three coarse groups: early seral, ages 1–39 years, mid seral, ages 40–79, and late seral, ages 80 and older.

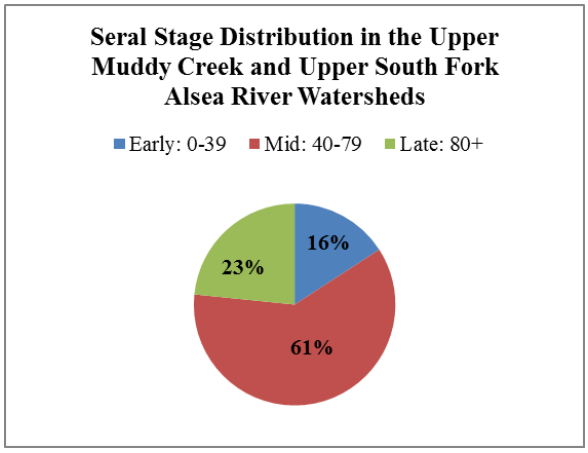
Historic seral stage distribution in the coast range of Oregon was estimated to include about 35 percent early seral (stand establishment phase) in 1850 by Teensma et al. (1991). Wimberly et al. (2000) modeled historic seral stage based on coast range fire regimes and concluded that early- and mid-seral stages, combined, would have totaled 25 percent to 75 percent of the landscape in pre-settlement conditions.

The Rainbow Ridge timber sale lies within a 240-acre parcel of BLM-managed land bounded by private lands. The parcel contains 10 acres of late-seral forest aged about 110–115 years, and the balance is stands in the mid-seral category, ranging from 35 years to 65 years of age. Mid-seral stands make up 96 percent of BLM-managed lands in Section 29, and a majority of BLM-managed lands in the nearest sections to the south, west, and northwest. Large stands (greater than 150 acres) of late-seral forest occur about a mile from the project area on BLM-managed land to the southwest and west.

At the sixth-field watershed level, the Rainbow Ridge timber sale lies in the Upper Muddy Creek and Upper South Fork Alsea watersheds. Within those watersheds, the BLM manages 12,544 acres. The seral stage distribution at the sixth-field watershed level is shown in Table 3–3 and the figure below.

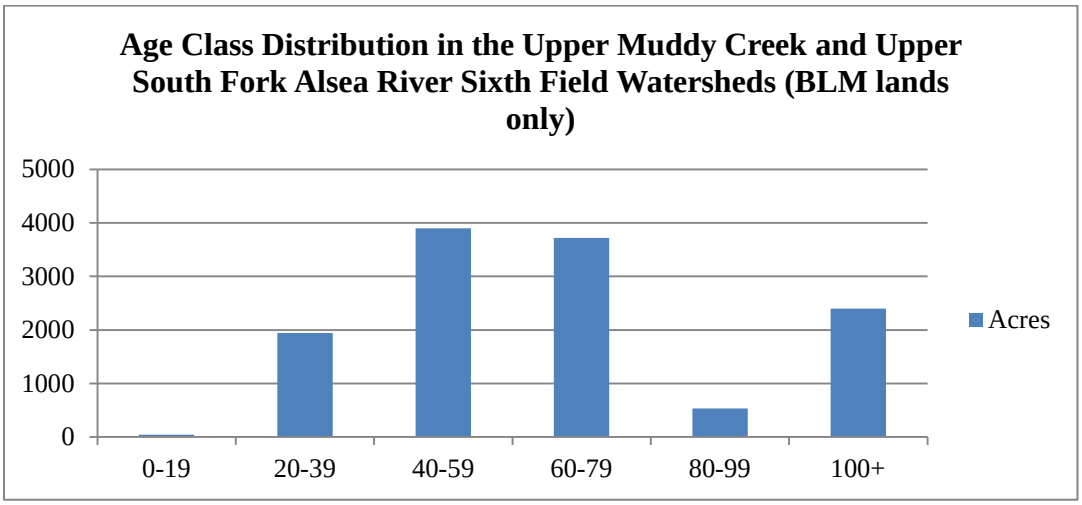
Table 3-3. Seral Stage Distribution of BLM-managed Forest in the Upper Muddy Creek and Upper South Fork Alsea Sixth-Field Watersheds

Seral Stage/Stand Ages	Acres	Percent of Watersheds
Early: 0–39	1,988	16%
Mid: 40–79	7,621	61%
Late: 80+	2,935	23%
Total	12,544	100%



There is relatively little early-seral forest on BLM-managed land in the area, making up 16 percent of the watersheds. Of that, 42 acres (0.03 percent) of the watershed is under age 20. Stands under age 20 generally contain the highest levels of grasses, forbs, and shrubs that contribute forage, flowers, and fruit for wildlife habitat. On clearcut sites in the western Oregon Cascades, Schoonmaker and McKee (1988) identified a peak in cover at stand age 10–20 of ecologically important shrubs and the browse species *Epilobium angustifolium*. After age 20, the majority of stands have become closed forest and ground vegetation is progressively lost due to overstory shade. The 20 year age class distribution, a more detailed look at seral stages, is shown in Table 3–4 on the following page.

Table 3-4. Age Class Distribution of BLM-managed Forest in the Upper Muddy Creek and Upper South Fork Alsea Watersheds



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

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

There are no known threatened and endangered botanical or fungal species known to be within or adjacent to the project area.

Table 3–5 lists all Bureau Special Status fungal and botanical species known to be within or adjacent to the project area. It displays the total number of known sites within the Northwest Forest Plan, Salem BLM, and Marys Peak Resource Area. It also displays the Survey and Manage ranking from the 2001 ROD and 2003 annual species review. Known sites were discovered through field surveys and literature reviews. All data included in the table was obtained through a query in bureau databases (GeoBOB July 2014).

Table 3-5. Summary of Bureau Special Status (Survey and Manage) species known sites

Species name	Total known sites within Forest Plan	Known sites on Salem BLM lands	Known sites on Marys Peak lands	ROD Category	
				2001 ROD	2003 ASR
Lichen Species					
Chaenotheca furfuracea	326	18	8	F	Removed
Fungi Species					
Clavariadelphus occidentalis	106	13	7	B	B
Phaeocollybia attenuata	213	66	60	D	D
Phaeocollybia californica	64	18	12	B	B
Phaeocollybia dissiliens	45	18	16	B	B
Phaeocollybia gregaria	7	6	6	B	B
Phaeocollybia kauffmanii	118	29	13	D	D
Phaeocollybia olivacea	179	57	35	B	Removed in Oregon
Phaeocollbyia piceae	79	24	18	B	B
Phaeocollybia sipei	161	36	35	B	B
Phaeocollybia spadicea	113	39	33	B	B

Noxious weeds

The following noxious weeds occur in the Rainbow Ridge vicinity, mainly along existing rights-of-way: bull and Canadian thistles (*Cirsium vulgare* and *C. arvense*), false brome (*Brachypodium sylvaticum*), Armenian and European blackberry (*Rubus armeniacus, R. vestitus*), herb Robert (*Geranium robertianum*), shining cranesbill (*Geranium lucidum*), meadow knapweed (*Centaurea xmoncktonii*), Scot's broom (*Cytisus scoparius*), St. John's wort (*Hypericum perforatum*), and Tansy ragwort (*Senecio jacobaea*).

3.1.2 Environmental Effects

Alternative 1 – No Action

General Forest Management Area

Without treatment, the current stand would continue to grow to increasing density. Stand growth projections were made using the ORGANON growth and yield computer simulation model, Edition 9.1 (Hann et al. 2006) based on stand plot data collected in 2012. In 30 years, relative density index would be up to 1.0, maximum possible density. Culmination of mean annual increment, when the current growth rate has dropped below the stand lifetime average growth rate, will have occurred in the project area stands (on average) by year 2033 (ranging from 2017 to 2047). Early-seral habitat would occur in small areas comprising 0–5 percent of the area as a result of disturbances such as disease, insects, and wind. Snag and coarse wood levels would have increased as a result of density mortality, predicted to average 22 trees per acre of 11 inches DBH. In 19 years, on average, the stands that make up the proposed regeneration area will have

reached culmination of mean annual increment, a slowing of average stand growth indicating economic rotation age.

Laminated root rot would continue to spread through the stand, creating gaps over time. These gaps would likely become forested over time with hardwood trees and shade-tolerant conifer. The effect would not be detrimental to wildlife habitat, but would not contribute to sustained growth of timber to meet land use allocation objectives of the Matrix.

Under the No Action alternative, the pattern of seral stage distribution within the vicinity of the project would not change; change would occur only from stands aging into later seral stages. In approximately 20 years, only 0.5 percent of the fifth-field watershed would be early-seral habitat aged 0–39, and it would be over 20 years old. The RMP direction to maintain a well-distributed pattern of seral stage distribution would not be met through the No Action alternative.

Riparian Reserves

Without treatment, stand structure would become increasingly uniform, except for gaps created by disturbance such as disease, insects, and wind that would create stand structural diversity and contribute to late-successional structural development in the Riparian Reserves. 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. This alternative does not meet the objectives for speeding development of late-successional forest habitat and creating desired vegetation characteristics needed to attain ACS objectives.

Hardwood tree species would become overtopped and most of them would be lost from the stand. Stand conditions would remain on the current trajectory of increasing density and decreasing individual tree growth rates. In 30 years without treatment, the relative density of stands would increase from the current average of 0.66 to an average of 0.87.

Coarse Woody Debris

The main input of coarse woody debris would come from density mortality, disturbance, and endemic levels of insects and disease, resulting in more snags and downed logs than with treatment. In general, the quantity of mortality would be much greater than if the stands were thinned, but dead trees would be smaller in size. Density mortality predicted (ORGANON model) to average 17 trees per acre of about 11 inches DBH in the next 30 years without treatment, and only one tree per two acres of 17 inches DBH with density management in that same time period.

The modeling provides a basis for comparison but does not include mortality from disturbance and stochastic events. One study of stands aged 14–38 yearsover 22 years showed total annual stem mortality of 1–5 percent; wind damage accounted for 18 percent of the stem mortality, but represented 50 percent of the bole biomass lost because of their relative large size than trees lost to density mortality (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.

Characteristics of stands within Rainbow Ridge for 30 years from present with variable retention harvest treatment under Alternative 2 and without treatment, as projected by ORGANON are compared in Table 3–6.

Table 3-6. Stand Characteristics Treatment vs. No Treatment 30 years in the future (year 2042)[1] – Variable Retention Harvest Units

Unit	Tmt.	Overstory					Understory				
		Age[2] (yrs)	TPA[3]	%DF (TPA)	BA[4] (Sq.Ft.)	QMD[5] (in.)	Age (yrs)	TPA	%DF (TPA)	BA (Sq.Ft.)	QMD (in.)
29D[1]	No Tmt.	91	125	97%	369	23.3					
	Alt 2 VRH[6]	91	1	100%	15	50	30	174	67%	118	11.1

[1] Includes 29A, 29B, 29C, and 29G; all would be treated under the same prescription.
[2] Modeled from stand age in 2012 to 2042.
[3] Trees per acre >7 inches DBH.
[4] Basal area in square feet: cross-sectional area occupied by tree boles on each acre, a measure of density
[5] QMD=quadratic mean diameter, the DBH of tree of mean basal area.
[6] Variable retention harvest, regeneration harvest with aggregated retention.

Stand characteristics for 30 years from present with commercial thinning and density management treatment under Alternative 2 and without treatment, as projected by ORGANON are compared in Table 3–7.

Table 3-7. Stand Characteristics Treatment vs. No Treatment 30 years in the future (year 2042) – Commercial Thinning and Density Management Units

Unit	Tmt.	Age[1] (yrs)	TPA[2]	% DF (TPA)	BA[3] (Sq.Ft.)	QMD[4] (in.)	RDI[5]	Density Mortality		
								TPA	BA	QMD
29F RR	110 BA	69	57	79%	207	25.8	0.52	0.04	0.06	15.6
	No Tmt.	69	158	98%	322	19.3	0.87	17	12	11.4
29F Upland	150 BA	69	94	97%	261	22.6	0.67	0.3	0.5	17.4
	No Tmt.	69	158	98%	322	19.3	0.87	17	12	11.4

[1] Modeled from stand age in 2012 to 2042.
[2] Trees per acre >7 inches 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).

Stand structure in Unit 29F, which is proposed for thinning.

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

This alternative would not affect any threatened and endangered botanical or fungal species because none are known to be within or adjacent to the project area.

Existing known sites for bureau special status species would not be affected and natural succession would continue to shape the area. Some known fungal sites may be lost due to natural succession or they may persist for years. There is little to no data on the longevity of these fungal species due to successional trends.

Dense conifer stands within the project area would not be thinned. Habitat for bureau special status species, particularly lichen and bryophyte species, would not be enhanced through conifer density reduction that increases available sunlight in the understory. The diversity and density of tall and low shrubs and forbs may continue to decline as the canopy remains closed and limits sunlight to these shrub layers. This trend would be reversed in the future. The diversity and density of the shrub layer would increase as suppressed conifers die and the canopy closure recedes allowing for an increase in sunlight to the shrub layers. Small diameter snags and woody debris would increase in the short term as suppressed conifers succumb to suppression mortality.

Noxious Weeds

Road rights-of-way would continue to be maintained by grading roadways and mowing competing vegetation. Existing access routes would continue to be utilized by commercial and recreational vehicles. Oregon listed noxious weeds would continue to be treated within the

watersheds through the implementation of the Marys Peak non-native plant control program. Without the implementation of Rainbow Ridge timber sale, 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.

Alternative 2 – Proposed Action

Early-Seral Habitat

Regeneration harvest would meet the objective of providing early-seral habitat. Early-seral habitat that contains large green trees, hardwood trees, snags, downed wood, and abundant shrub, grass and forb layers that persist more than a decade are uncommon on the landscape. Before crown closure, flowering, fruiting, and forage vegetation species are abundant. Early-seral habitat on privately managed forest lands typically contain very little of these habitat components, and intensive vegetation management practices accelerate the development of closed canopy young stands, abbreviating the period that early-seral habitat is useable to many species.

Currently, the early-seral habitat (age 0–39 years) makes up 16 percent of the 12,544 forested BLM-managed acres in the Upper South Fork Alsea and Upper Muddy Creek (sixth field) watersheds. The youngest (1–20 years of age) early-seral habitat makes up only 0.03 percent. Regeneration of 87 acres would increase early-seral habitat from 16 percent to 17 percent, and the youngest early-seral habitat (age 0–20) from 0.03 percent to 1 percent.

Design features of Alternative 2 would improve the quality and function of early-seral habitat for wildlife species.

- Aggregates, particularly those greater than one acre in size, can function as refugia for low-mobility species such as mollusks, invertebrates, as well as plants, lichen and fungi (Wessell-Kelly 2013).

- Aggregates would provide snag and coarse wood recruitment, as 19 acres of the treatment area would have density mortality projected to average 17 trees per acre of about 11 inches DBH in the next 30 years.

- Aggregates, retained snags, and coarse wood in conjunction with early-seral habitat would provide habitat components that allow greater use, by a wider variety of wildlife species during the stand establishment phase.

- Lower reforestation density (combination of natural reforestation and planting of 150–200 trees per acre), and reduced vegetation control would result in a longer period of stand establishment, providing 20–30 years of conditions that favor forbs, grasses, and flowering and fruiting shrubs.

The tables on the following page provide a summary of the pre-treatment and post-treatment stand characteristics immediately after treatment, as designed and analyzed under Alternative 2. Future values were determined using projections from ORGANON.

Table 3-8. Variable retention harvest in Alternative 2: Average pre-treatment and post-treatment stand characteristics immediately after treatment

Variable Retention Harvest	Pre-treatment (per acres values)								Immediately After Treatment (incl. Hwd.) (per acre)							
	TPA[2]	% DF (TPA)	BA[3]	QMD[4]	RDI[5]	CC[6]	CR[7]	Alt	TPA	% DF (TPA)	BA	QMD	RDI	CC %	CR	Vol/Ac Mbf
29D[1]	141	97%	290	19.4	0.79	82%	27%	all	No Treatment/Aggregate Retention Areas							
Alt. 2	17% clump retention, 83% 1 TPA dispersed							2	25	99%	55	20.3	0.2	16%	0.42	65,788

[1] Includes Units 29A, 29B, 29C, and 29G.
[2] Number of trees per acre, greater than 7 inches DBH.
[3] Basal area 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] Canopy cover: the percentage of the ground shaded by canopy.
[7] Crown ratio: the ratio of tree live crown to total tree height

Table 3-9. Commercial Thinning and Density Management in Alternative 2: Average pre-treatment and post-treatment stand characteristics immediately after treatment

Commercial Thin / Density Management	Pre-treatment (per acre values)								Immediately After Treatment (incl. Hwd.) (per acre)							
	TPA[1]	% DF (TPA)	BA[2]	QMD[3]	RDI[4]	CC[5]	CR[6]	Tmt. BA DF	TPA	% DF (TPA)	BA	QMD	RDI	CC %	CR	Vol/Ac Mbf
29F	175	99%	220	15.2	0.66	81%	39%	150	94	98%	150	17.1	0.43	66%	0.38	12,594
29F	175	99%	220	15.2	0.66	81%	39%	110	62	97%	110	18.0	0.31	54%	0.38	20,580

[1] Number of trees per acre, greater than 7 inches DBH.
[2] Basal area in square feet: cross-sectional area occupied by tree boles on each acre, a measure of density.
[3] Diameter at breast height (4.5 feet) of tree of average basal area (quadratic mean diameter).
[4] Relative Density Index, the density of trees per acre relative to the maximum density possible (Reineke 1933).
[5] Canopy cover: the percentage of the ground shaded by canopy.
[6] Crown ratio: the ratio of tree live crown to total tree height.

Forest Health

Laminated root rot would be reduced by removing susceptible trees from around current infection centers, which would halt the spread of disease. Regeneration harvest would effectively eliminate it as long as infection centers were recognized and tree species of lower susceptibility were replanted. The root rot could remain and spread outward from aggregated leave tree areas. It is also possible that infection centers would be latent or not recognized, allowing continued spread in Douglas-fir regeneration, but harvest would not increase its rate of spread.

Stand and Tree Growth

Regeneration harvest of these mid-seral stands would meet objectives of providing sustained timber yield in the GFMA. Applying variable retention harvest in the moist forest type would allow demonstration of the application of ecosystem restoration principles as developed by Drs. Franklin and Johnson for the BLM Secretarial Pilot projects (Franklin and Johnson 2012).

The stands have not yet reached culmination of mean annual increment, indicating that more volume could be accrued with later harvest. The forest stand comprising the largest unit, 29D, would is projected to grow approximately 35 percent more volume (30 MBF per acre) until reaching culmination in approximately 2032. However, the growth of the subsequent stand is projected to reach 15 MBF in the same period, not including the volume of residual leave trees (ORGANON 9.1), partially off-setting this. Total volume production would be comparable with thinning or regeneration at this time. If Unit 29D, for example, were commercially thinned, the current harvest volume plus 30 years growth would total 79 MBF per acre. The current harvest volume of variable retention harvest plus 30 years growth would total 95 MBF per acre in the regeneration area (82 percent of the treatment area) or 78 MBF per acre averaged over the full treatment area.

After 40 years of growth, the stand in Unit 29D is projected to average 51 MBF (35 MBF in the regeneration areas comprising 82 percent of the acreage, and 129 MBF in the aggregated retention areas comprising 18 percent of the acreage). Growth of planted trees in the regeneration areas would be reduced somewhat by lower initial stocking, but would have very little overstory competition, achieving 11 inches DBH within 30 years. This would result in greater average growth per acre than in Alternative 3.

The young stand in Unit 29F would benefit from the thinning treatment by increasing individual tree growth and increasing tree stability. It would meet the objective of increasing volume growth for the GFMA land use allocation by capturing volume that would occur as density mortality in the stand without treatment.

Risk assessment

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

The potential for windthrow from winter storms would be higher for the first decade following treatment, primarily in the commercial thinning area (Unit 29F) and the edges of leave tree area. The risk would be reduced by selecting leave trees with deep, healthy crowns. Risk is greater near harvest on adjacent private land has occurred, 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 commercial thinning 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. Thinning is not likely to result in a high incidence of windthrow or broken tops due to wind; however, some areas may be more susceptible. In the variable retention harvest area, individual leave trees and trees along the edges of clumps of aggregated leave tree areas would be susceptible to wind.

Skyline and ground-based yarding systems would result in bole and crown damage to a small percentage (estimated 1–3 percent) of the residual trees. Damage may result in greater incidence of stem decays in the future. Restrictions to yarding during the sap-flow period in the spring would be implemented to maintain damage at low levels (<10 percent of trees).

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

This alternative would not affect any threatened and endangered botanical or fungal species because none are known to occur within or adjacent to the project areas.

Special status fungi known sites are protected and included in: riparian reserves, fungi protection areas, or included in aggregates or clumps of wildlife trees. The distribution and size of fungal organisms within the soil is unknown. Fungal fruiting structure locations, known sites, only indicate presence of the organism. Under this alternative, there are no special status species known to be within the proposed commercial or density management treatment areas.

Special status mycorrhizal fungal species not discovered which occur within the boundaries of the regeneration harvest area and located away from any live reserved conifers would likely perish. However, Gordon and Van Norman (2014) detected both *Phaeocollybia attenuata* and *P. spadicea*, both mycorrhizal fungal species at known sites from soil samples from a 12 year old regeneration harvest area. Their study suggests these organisms may be able to withstand a regeneration harvest and persist in the soil, especially if located near a live conifer.

Creating and reserving additional CWD through this project would create future habitat for special status saprophytic fungal and bryophyte species. Commercial thinning and density management treatments would allow for an increase in size and density of the tall shrub layer creating future habitat for epiphytic lichen and bryophyte species.

Noxious weeds

Exposed mineral soil often creates environments favorable for the establishment of non-native plant species. Exposed mineral soil areas (e.g., road construction and maintenance operations,

landing construction, culvert installation sites, and yarding corridors) pose the greatest risk of exposing mineral soil with the implementation of this project.

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

Noxious weeds species that are known to occur within the vicinity of the Rainbow Ridge project area are regionally abundant and are widespread throughout western Oregon, with the exception of false brome. False brome is widespread throughout Benton County, and eastern Lincoln County within the Alsea River watershed. 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.

Any adverse effects from the establishment of Armenian and European blackberry, Canadian and bull thistles, false brome, geranium's, meadow knapweed, Scot's broom, St. John's wort, and tansy ragwort within or near the project area are not anticipated and the risk rating for the long-term establishment of these species and consequences of adverse effects on this project area is low because: 1) Measures have been incorporated into this project to keep the amount of exposed mineral soil minimized, 2) the project is small and localized on the watershed scale, 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 Willamette Valley and Oregon Coast Range Physiographic Province, and control measures generally consist of biological control, 5) generally these species often persist for several years after becoming established but soon decline as native vegetation increases within the project areas, and 6) there are no other Oregon listed noxious weed species that are anticipated to become established with the implementation of this project and design features. In addition, project areas would be monitored to detect for any noxious weed infestations and targeted for removal. Non-native species would be targeted for removal as funding allows.

Alternative 3 – Regeneration Harvest with Dispersed Green Tree Retention

Early-Seral Habitat

Regeneration meets the objective of providing early-seral habitat. Regeneration of 78 acres would increase early-seral habitat from 16 percent to 17 percent, and the youngest early-seral habitat (age 0–20) from 0.03 percent to 1 percent at the sixth field watershed level.

Design features of Alternative 3 would improve the quality and function of early-seral habitat for wildlife species. Green tree retention, retained snags, and coarse wood in conjunction with early-seral habitat would provide habitat components that allow greater use by a wide variety of wildlife species during the stand establishment phase.

However, Alternative 3 would not include aggregated leave areas that provide coarse wood recruitment and interior closed canopy habitat that would function as refugia for low-mobility species, with the exception of four one-acre fungi protection areas.

Reforestation, by planting of 300 trees per acre, and prompt vegetation control would result in a shorter period of stand establishment than Alternative 2, providing 10–20 years of conditions that favor forbs, grasses, and flowering and fruiting shrubs.

The tables on the following pages provide a summary of the pre-treatment and post-treatment stand characteristics immediately after treatment, as designed and analyzed under Alternative 3. Future values were determined using projections from ORGANON.

Table 3-10. Alternative 3 Regeneration Harvest Units: Stand characteristics before and after treatment

Unit	Pre-treatment									Immediately After Treatment (incl. Hwd.) (per acre)							
	Age (yrs)	TPA	%DF (TPA)	BA[2]	QMD[3]	RDI[4]	CC[5]	CR[6]	Alt	TPA	%DF (TPA)	BA	QMD	RDI	CC	CR	Vol/Ac MBF
29D	61	141	97%	290	19.4	0.79	82%	27%	all	No Treatment/Aggregate Retention Areas							
Alt 3	Regeneration harvest with 11 TPA GTR dispersed								3	11	62%	40	25.4	0.10	18%	0.33	69,359

[1] Number of trees per acre, greater than 7 inches DBH.
[2] Basal area in square feet: cross-sectional area occupied by tree boles on each acre, a measure of density.
[3] Diameter at breast height (4.5 feet) of tree of average basal area (quadratic mean diameter).
[4] Relative Density Index, the density of trees per acre relative to the maximum density possible (Reineke 1933).
[5] Canopy cover: the percentage of the ground shaded by canopy.
[6] Crown ratio: the ratio of tree live crown to total tree height.

Table 3-11. Alternative 3 Commercial Thinning and Density Management: Stand characteristics before and after treatment

Commercial Thinning																	
Unit	Pre-treatment (per acre values)									Immediately After Treatment (incl. Hwd.)(per Acre)							
	Age (yrs)	TPA[1]	%DF (TPA)	BA[2]	QMD[3]	RDI[4]	CC[5]	CR[6]	Tmt. BA	TPA	%DF (TPA)	BA	QMD	RDI	CC	CR	Vol/Ac MBF
29C	62	191	99%	320	17.5	0.90	87%	22%	130	42	95%	140	24.8	0.34	52%	0.32	44,005
29D	61	141	97%	290	19.4	0.79	82%	27%	130	40	88%	135	24.8	0.33	50%	0.34	40,623
29F	39	175	99%	220	15.2	0.66	81%	39%	150	94	98%	150	17.1	0.43	66%	0.38	12,594
29G	56	148	65%	203	15.8	0.60	78%	32%	130	95	52%	162	17.7	0.46	68%	0.35	7,943
Density Management																	
Unit	Pre-treatment (per acre values)									Immediately After Treatment (incl. Hwd.)(per Acre)							
	Age (yrs)	TPA	% DF (TPA)	BA	QMD	RDI	CC	CR	Tmt. BA	TPA	%DF (TPA)	BA	QMD	RDI	CC	CR	Vol/Ac MBF
29C	62	191	99%	320	17.5	0.90	87%	22%	130	42	95%	140	24.8	0.34	52%	0.32	44,005
29F	39	175	99%	220	15.2	0.66	81%	39%	110	62	97%	110	18.0	0.31	54%	0.38	20,580
29G	56	148	65%	203	15.8	0.60	78%	32	130	95	52%	162	17.7	0.46	68%	0.35	7,943

[1] Number of trees per acre, greater than 7 inches DBH.
[2] Basal area in square feet: cross-sectional area occupied by tree boles on each acre, a measure of density.
[3] Diameter at breast height (4.5 feet) of tree of average basal area (quadratic mean diameter).
[4] Relative Density Index, the density of trees per acre relative to the maximum density possible (Reineke 1933).
[5] Canopy cover: the percentage of the ground shaded by canopy.
[6] Crown ratio: the ratio of tree live crown to total tree height.

Stand characteristics for 30 years from present with treatment under Alterative 3 and without treatment, as projected by ORGANON are compared in Table 3–12.

Table 3-12. Stand Characteristics with Treatment vs. No Treatment 30 years in the future (year 2042)[1] for Alternative 3

Regeneration Harvest (GFMA, Upland)											
Unit	Treatment	Overstory					Understory				
		Age[1] (yrs)	TPA[2]	% DF (TPA)	BA[3] (Sq.Ft.)	QMD[4] (in.)	Age (yrs)	TPA	% DF (TPA)	BA (Sq.Ft.)	QMD (in.)
29D*	No Tmt.	91	125	97%	369	23.3					
	Alt 3	91	11	64%	69	33.9	30	245	65%	68	7.1

Commercial Thinning (GFMA, Upland)												
Unit	Treatment Residual BA	Overstory					QMD growth 30 yrs	RDI[5]	CC	Density Mortality		
		Age (yrs)	TPA	%DF (TPA)	BA Sq.Ft.	QMD (in.)				TPA	BA	QMD
29C	No Tmt.	92	146	99%	375	21.7	4.2	0.97	85	45	31	11.2
29C	130BA	92	42	95%	214	30.8	6	0.48	57	0.1	0.5	27
29D	No Tmt.	91	125	97%	369	23.3	3.9	0.93	83	16	13	12.2
29D	130BA	91	40	90%	215	31.4	5.6	0.48	55	0.3	0.4	15.4
29F	No Tmt.	69	158	98%	322	19.3	4.1	0.87	80	17	12	11.4
29F	150BA	69	94	97%	261	22.6	5.5	0.67	75	0.3	0.5	17.4
29G	No Tmt.	86	144	64%	273	18.6	3.3	0.75	80	16	7	8.9
29G	130BA	86	93	54%	231	21.3	3.6	0.6	72	2.2	2	12

Density Management (Riparian Reserves)												
Unit	Treatment Residual BA	Overstory					QMD growth 30 yrs	RDI	CC	Density Mortality		
		Age (yrs)	TPA	%DF (TPA)	BA Sq.Ft.	QMD (in.)				TPA	BA	QMD
29C	No Tmt.	92	146	99%	375	21.7	4.2	0.97	85	45	31	11.2
29C	130BA	92	42	95%	214	30.8	6	0.48	57	0.1	0.5	27
29F	No Tmt.	69	158	98%	322	19.3	4.1	0.87	80	17	12	11.4
29F	110 BA	69	62	97%	211	24.9	6.9	0.52	65	0	0	0
29G	No Tmt.	86	144	64%	273	18.6	3.3	0.75	80	16	7	8.9
29G	130BA	86	93	54%	231	21.3	3.6	0.6	72	2.2	2	12

*Includes 29 A and 29B - all would be treated under the same prescription.
[1] Modeled from stand age in 2012 to 2042.
[2] Trees per acre, greater than 7 inches DBH.
[3] Basal area in square feet: cross-sectional area occupied by tree boles on each acre, a measure of density
[4] QMD=quadratic mean diameter, the DBH of tree of mean basal area.
[5] Relative Density Index, the density of trees per acre relative to the maximum density possible (Reineke 1933).

Forest Health

Laminated root rot would be reduced by removing susceptible trees from around current infection centers, halting the spread of disease. Regeneration harvest would effectively eliminate

it as long as infection centers were recognized and tree species of lower susceptibility were re-planted. The root rot could remain and spread outward from the dispersed green tree retention. Because there would be potentially infected trees distributed throughout the treatment area, there is a somewhat higher risk of carrying the infection to susceptible trees in the new stand. It is also possible that infection centers would be latent or not recognized, allowing continued spread in Douglas-fir regeneration, but harvest would not increase the rate of spread.

Stand and Tree Growth

Regeneration of stands aged 58–67 years old would meet objectives of providing sustained timber yield in the GFMA. The stands have not yet reached culmination of mean annual increment, indicating that more volume could be accrued with later harvest. The forest stand comprising the largest unit, 29D is projected to grow approximately 35 percent (30 MBF per acre) more volume until reaching culmination in approximately 2032. However, the growth of the subsequent stand is projected to meet 30 MBF in the same period, not including the volume of residual leave trees (ORGANON 9.1).

After 40 years of growth, the stand is projected to average 41 MBF, most of it in the remaining 11 mature trees per acre. Establishment of a fully stocked stand would occur about 10 years sooner than in Alternative 2, due to higher planting density (300 trees per acre) and prompt, thorough vegetation control (manual maintenance). Sapling growth would, however, be reduced considerably by the residual trees that would occur on approximately 65 foot spacing in Alternative 3. Because these relatively large trees (25 inches DBH) would shade about 18 percent of the area after harvest, understory trees are projected to grow to only 7 inches diameter in 30 years. As implemented, overstory spacing and the level of overstory competition would vary in the unit, resulting in a range of growth rates, but understory growth would average 25–40 percent less than the regeneration areas in Alternative 2.

Units 29C, 29G, and part of 29D, would benefit from the thinning treatment by increasing individual tree growth and increasing tree stability. It would better meet the objective of increasing volume growth for the GFMA by capturing volume that would occur as density mortality in the stand without treatment. Density mortality is projected to total an average of 5 MBF per acre in these stands without treatment. Average stand volume in 30 years, combined with average current harvest volume for these stands, is projected to be 34 percent greater than untreated stand volume after 30 years. Diameter growth in the 30 years following commercial thinning is projected to be 29 percent greater than without treatment.

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

This alternative would not affect any threatened and endangered botanical or fungal species because none are known to be within or adjacent to the project area.

With the exception of two known sites included in the southeast corner of Unit 29D, bureau special status fungi known sites are protected and included in Riparian Reserves, fungi protection areas, or included in aggregates or clumps of wildlife trees. The distribution and size of fungal

organisms within the soil is unknown. Fungal fruiting structure locations (known sites) only indicate presence of the organism. The effects listed under Alternative 2 apply to Alternative 3 with the following similarities or differences.

The outer project boundaries are the same for both alternatives. Unit 29F and proposed access roads are the same in both alternatives.

The differences in Units 29A-G are as follow:

- Alternative 2 has more acres of regeneration harvest compared to Alternative 3. Effects from regeneration harvests are reduced under Alternative 3 when compared to Alternative 2.

- Alternative 3 includes commercial thinning or density management treatment in locations Alternative 2 proposes for regeneration harvests. Effects from regeneration harvests are reduced under Alternative 3 when compared to Alternative 2.

- Alternative 3 has a one acre patch cut or group select cut included within the commercial thinning area in Unit 29G. Alternative 2 has none because Unit 29G is a regeneration harvest unit. Effects from regeneration harvests are reduced under Alternative 3 when compared to Alternative2.

- Alternative 2 allows for the retention of an aggregate (6) in the southeastern portion of unit 29D, while Alternative 3 includes this area in the harvest boundary. Effects from harvesting within the aggregate would have greater effects under Alternative 3 compared to Alternative 2.

Special status fungal species known sites which occur as islands within the regeneration harvest area in Alternative 2, are provided additional protection under Alternative 3 by including some of the islands within the thinning boundaries. Alternative 3 provides additional microsite protection at these bureau special status species known sites.

If a special status mycorrhizal fungal species host tree or trees are severed during thinning operations, the fungal organism may not survive. However, it is likely the mycorrhizal fungal organism is living in association with several host trees and the species would persist if one of the trees are reserved and protected. Norvell and Exeter (2004) noted light to moderate (200 to 300 trees per hectare) forest thinning appeared to have little effect on the fungi they studied (Ectomycorrhizal epigeous basidiomycetes) which includes the fungal genus *Phaeocollbyia*.

Two separate known sites of the fungal species, *Phaeocollybia spadicea*, are located within the aggregate in the southeastern corner of Unit 29D. These sites would not be protected under Alternative 3. These sites would likely perish as they are included within the regeneration harvest boundary. *Phaeocollybia spadicea* currently (July 2014) has 113 known sites within the range of the Northern Spotted Owl. Thirty-nine (34.5 percent) of these known sites occur within the Salem District BLM. Of these 39 known sites, 33 are located within the Marys Peak Resource Area. This species is well represented and distributed within the Marys Peak Resource Area. It is estimated less than five percent of suitable habitat has been surveyed for this species

within the Marys Peak Resource Area. The majority of known sites occur in reserves and in forested stands less than 80 years of age. There is no concern for persistence for this species within the northern Oregon Coastal Mountains, and it is not closely associated with old growth forests. In addition, soon after the publication of the monograph on the *Phaeocollybia* genus (Norvell and Exeter 2007), DNA analysis indicated *Phaeocollybia tibiikauffmanii* was synonymous with *P. spadicea*. *Phaeocollybia tibiikauffmanii* is not considered rare and is not listed as a species of concern. *Phaeocollbyia spadicea* is a candidate for removal from the list of species of concern due to the number of known sites, distribution pattern and because it is not closely associated with old-growth forests.

Noxious weeds

This alternative proposes to commercially harvest conifers on approximately the same project area as Alternative 2. The outer perimeter of the project areas remain about the same in both alternatives. Unit 29F treatments and access roads remain the same in both alternatives.

This alternative would have fewer effects when compared to Alternative 2. Alternative 3 provides for additional acres included in commercial thinning and density management and fewer acres included in a regeneration harvest. Thinning would maintain an existing conifer forest in a mid-seral forest stage while regeneration harvest would return the project area to an early-seral forest after the site has been planted with conifer trees.

The risk rating for the long-term establishment of noxious weed species and consequences of adverse effects on this project area is considered low, the same rating as Alternative 2.

3.1.3 Cumulative Effects

The Rainbow Ridge project area is situated on a ridge separating two fifth-field watersheds, the Upper Alsea River and the Marys River watersheds. The project area is roughly 140 acres with approximately 50 acres included within the Marys River watershed. Due to the small size of the overall project area, impacts to natural vegetation within these watersheds from the implementation of this project are localized.

Some undiscovered special status species may be lost through regeneration harvest. However, the implementation of the proposed project would not lead to the higher listing of any of the special status species known from the project area. Many of these special status species are candidates for removal from the list of species of concern. The high number of *Phaeocollybia* known sites within the Marys Peak Resource Area (see Table 3–5) is a sampling artifact of a *Phaeocollbia* identification expert working within the resource area. It is estimated less than five percent of suitable habitat for these special status fungal species has been inventoried within the resource area. Future inventories will continue to add new known sites for these species and eventually the species may be de-listed as a species of concern. Any adverse effects from the implementation of this project to these species distribution as a whole would be localized.

Examples of forest management activities and natural events within the project area watersheds that would create soil disturbance, increase available light, and increase soil temperatures, all of which influence the spread of non-native plants are commercial and pre-commercial timber density management projects, young stand maintenance, road construction, maintenance, renovation, landslides, high flow sedimentation deposits, and off highway vehicle (OHV) activities. Activities that do not necessarily create disturbance but influence the spread of weed seeds are recreational hiking, biking, horseback riding, fishing, and hunting. Other sources of seed dispersal are from wildlife movement, water movement, natural dehiscence, and 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. Most non-native plants are not shade tolerant and do not persist in a forest setting as they become out-competed for light as tree and/or shrub canopies close and light to the understory is reduced.

The short-term increase of common and widespread non-native plants would be confined to the project area and considered localized within the watersheds. The risk rating for any adverse cumulative affects to the watershed or any adjacent watersheds would remain low.

3.2 WILDLIFE

The following 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

Watershed analyses were conducted on the Upper Alsea River and Marys River fifth field watersheds over 15 years ago (USDI-BLM 1995, USDI-BLM 1996, USDI-BLM 1997). Those analyses describe the past 150 years since settlement which brought forth extensive timber harvest that has resulted in the loss and fragmentation of late-successional forest conditions on the upland portion of these watersheds. Private forest lands in this part of the Oregon Coast Range are now dominated by early-seral and mid-seral forest stands that are currently being managed on short harvest rotations of 40–60 years (Cohen et al. 2002, Kennedy and Spies 2004, Ohmann et al. 2007). Almost all remaining late-seral and old-growth forest stands (LSOG) in these watersheds are on BLM and Forest Service lands. The proposed action would not affect any of these LSOG forest stands.

At the landscape scale, mid-seral conifer-dominated forest stands are the most prevalent vegetation type on BLM managed lands (Table 3–13), accounting for about 48 percent of BLM-

managed lands. Whereas open, early-seral habitat conditions are limited to a single regeneration harvest unit of 92 acres (<1 percent of BLM lands in both watersheds). The Salem District RMP (p. 20) calls for creation of early successional habitat through regeneration harvests in the GFMA. Early-seral habitats are known to support a high diversity of wildlife species (Swanson et al. 2011, Hagar 2007b, Betts et al. 2010), but they are usually transitional and temporary on the landscape (often <10 years).

Table 3-13. Vegetation Conditions on BLM-managed lands within the Marys River and Upper Alsea Fifth-Field Watersheds

Vegetation Type	Marys River	Upper Alsea	Total
Non-vegetated [1]	28	186	214
Early-seral Open (0–9 years old) [2]	92	0	92
Early-seral Plantation (10–39 years old)	843	3,720	4,563
Mid-Seral Forest (40–79 years old)	2,703	21,030	23,733
Late-Seral Forest (80–129 years old)	2,376	11,141	13,517
Old-growth Forest (130+ years)	443	5,797	6,240
Young Hardwoods (0–39 years old)	0	3	3
Older Hardwoods (40–110 years old)	136	1,148	1,284
Totals	**6,621**	**43,025**	**49,646**

[1] Includes mostly wetland habitats, rocky outcrops, a few meadows, and administrative sites.
[2] Includes regeneration of a single harvest unit implemented after 2004.

Stand Level Conditions

Approximately 208 acres of forest stands were evaluated for the Proposed Action (Alternative 2), and about 68 acres were dropped from treatment consideration due to stream protection zones, poor conifer stocking, and a red tree vole protection area. The 140 acres of forest stands within the Proposed Action are composed of two age-classes (40 and 65 years old) of mid-seral conifer-dominated stands with high tree density, moderate to high canopy cover, and intermingled with scattered hardwoods and some shrub patches. There are no living legacy trees that pre-date the past harvest action, but there are a few scattered open-grown conifers (wolfy-trees) from the dominant mid-seral cohort.

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 (Hagar 2007b, Swanson et al. 2014). There are no recognized (greater than 1.0 acre) special habitat types within the project area, but there is one micro-site wet area (approximately 0.20 acre) that has been buffered within an aggregate green tree retention patch.

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. 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 (Mellen-McLean et al. 2009, Rose et al. 2001).

Mid-seral forests in this region exhibit a wide range in the density of snags and down logs (Mellen-McLean et al. 2009, Rose et al. 2001). Due to past harvest activity and fire history, the project units exhibit low snag density and a low volume of down logs (Table 3–2).

Larger size snags and down logs (greater than 30 inches DBH) that benefit the greatest number of wildlife species are scarce on all units. Suppression mortality processes and small windthrow events have recently contributed additional small diameter snags and down logs in most units. Stand exams surveys did not detect any down logs that meet or exceed the minimum down log retention requirements for GFMA lands (greater than or equal to 20 inches DBH on large end and greater than or equal to 20 feet in length).

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 recent review of an agency databases (GeoBOB, NRIS) and the Oregon Biodiversity Information Center Database found no records of any other Special Status Species or Survey and Manage wildlife species locations within the planned treatment units.

Northern Spotted Owl

The mid-seral forest conditions of the project area may currently provide dispersal habitat for spotted owls since these units lack older forest structure that would provide suitable nesting, roosting, and foraging habitat for this species. BLM and cooperators have conducted spotted owl surveys in this vicinity since 1986. A spotted owl site was located 0.5 mile southeast of the project area in 1993. Surveys done between 1998 and 2009 failed to detect any spotted owls at that site. Currently, there are no active spotted owl sites within 1.5 miles of this project area. Incidental surveys in 2012 detected only barred owls in the older forest stand (reserved from harvest) adjacent to Unit 29F. There is no designated spotted owl critical habitat (USDI-FWS 2012) within the project area.

Marbled Murrelet

Three years of murrelet surveys were conducted on the older forest patch adjacent to Unit 29F (2012–2014) with no murrelet detections. This project area is 32 miles inland from the ocean and the nearest known occupied murrelet is over five miles to the west. The forests stands in the planned treatment units do not contain any potential nesting structure for

murrelets, which is usually composed of older conifer forest stands (>120 years old) having large canopy branches, mossy limbs, and abundance of branch whorl platforms. There is no designated marbled murrelet critical habitat (USDI-FWS 1996, USDI-FWS 2011) within the project area.

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 2011) 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 project area lies within the southern portion of the range of the DPS (south of highway 20; USDI-FWS 2011).

The proposed action has been evaluated for compliance with the 2001 Survey and Manage Record of Decision and the 2011 Settlement Agreement. The forest stand conditions within the proposed treatment units do not trigger the pre-disturbance survey requirement for red tree voles (Huff et al. 2012). But because red tree vole presence was detected within the reserved older forest patch adjacent to Unit 29F, surveys were conducted within the treatment units that are planned for variable retention harvest. Fifteen trees were climbed and three inactive red tree vole nests were detected (12 nest structures had no vole evidence). Because no active red tree vole nests were found, and inactive nest trees do not require protection, none of the planned harvest units were reserved for red tree voles. Since the older forest patch that lies adjacent to unit 29F was found to have evidence of red tree voles (one nest structure visible and resin ducts found at the base of two trees), this patch has been reserved as a red tree vole habitat area, in accordance with current management recommendations (USDA-FS and USDI-BLM 2000a)

Birds of Conservation Concern

All of western Oregon, including this analysis area, 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 (Table 3–14). Twenty-three BCC species have a high

or moderate likelihood of occurring within the planned harvest area. Incidental observations obtained during wildlife related field work within the proposed units have confirmed the presence of 15 of these species during the breeding season.

Table 3-14. 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	17	6	7	3
Other Regularly Occurring Landbirds	55	23	10	13	9
Total bird species	88	40	16	20	12

[1] The likelihood that bird species occur in the project areas based on recent literature review and recent field observations.

Wildlife Associated with Early-Seral Habitats

In the Pacific Northwest, the abundance, structural characteristics, and temporal persistence of early-seral habitat conditions has changed dramatically in the past century due in large part to fire suppression and timber harvest practices (Ohman et al. 2007, Swanson et al. 2011, Swanson et al. 2014). A great variety of wildlife species are known to be associated with early-seral habitat conditions in western Oregon (O'Neil et al. 2001, Hagar 2007b). In this region, game animals, land birds, small mammals and reptiles, and numerous moths and butterflies preferentially utilize early-seral habitat conditions. The affected environment for landbirds (Birds of Conservation Concern) has been addressed in a previous section. Of the numerous wildlife species that are associated with early-seral habitats in western Oregon, only a few selected species or species groups are addressed below because they provide a representative sample that is known to occur or highly likely to occur in the project area.

Game animals

Roosevelt elk and Columbian black-tailed deer are both economically important game animals that are known to occur within the project vicinity, and incidental observations and signs of use have been noted in or adjacent to the project area. This project area lies outside of elk management areas established by the Salem District ROD/RMP. Oregon's Elk Management Plan (ODFW 2003) noted that federal forestlands in western Oregon are increasingly lacking in adequate forage conditions. 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 Oregon Coast Range and even with the numerous scattered clearcuts on private lands, forage quality is often below maintenance level for lactating elk (White et al. 2013). This proposed harvest unit lies within a road network that is open to the public. Current elk use in this project area appears to be low and likely fluctuates seasonally.

Since the 1990s the Columbian black-tailed deer population in western Oregon has been declining in part because of loss of habitat, the introduction of diseases, and an increased presence of predators (ODFW 2008). Like elk, deer often utilize edge habitats where open early-seral patches are intermingled with closed canopy forest stands. Abundant evidence of deer use has been noted in the proposed unit where they appear to find poor foraging habitat, but are selecting for hiding cover located away from foraging areas on adjacent private land.

Small Mammals and Reptiles

In Western Oregon there are numerous species of small mammals and reptiles that are associated with early-seral habitats and the structural features that occur in such habitats (Hagar 2007a, Hagar 2007b, Swanson 2012). In the pre-forest conditions following a forest stand replacement event (harvest or wildfire), the diversity and density of various structural features (snags, down logs, herbaceous cover, shrubs, and hardwoods) are directly related to the diversity and abundance of many early seral associated small mammals and reptiles (Hagar 2007b, Swanson 2012, Swanson et al. 2014). Some of these small mammal species, such as dusky-footed woodrats, western red-backed voles, and brush rabbits are also important prey items for northern spotted owls.

Butterflies and Moths

Over 200 species of butterflies and 2,200 species of moths of the Order Lepidoptera have been identified in the woodlands and forests of the Pacific Northwest (Miller 1995, Miller and Hammond 2000, Miller and Hammond 2007). While only 3 of these species appear to be dependent on late-seral forest conditions, about 30 species of butterflies and moths require open meadow-like habitats (Miller and Hammond 2007). The habitat conditions provided by meadow habitats, wetlands, recent harvest areas, riparian areas, and openings within forest stands can support a diverse variety of forage plants for the caterpillars and nectar-producing plants for the adults. Preferred plants are primarily shrubs, deciduous hardwoods, and flowering herbaceous plants. While forest management practices have largely replaced the natural disturbance regime that used to create and maintain open habitats for early seral associated species, intensive modern forest management practices that utilize herbicides to kill weedy species of hardwoods, herbs, and grasses in recently harvested (open, pre-forest) stands are quite destructive to the butterflies and moths that favor early-seral habitats (Miller and Hammond 2007).

Fisher

The U.S. Fish and Wildlife Service issued a proposal to list the West Coast distinct population segment (DPS) of the fisher as a threatened species under the Endangered Species Act on October 7, 2014. The Rainbow Ridge project area lies in the Oregon Coast Range, and within the proposed DPS, but all existing known populations are more 100 miles south of the proposed action area. The proposed rule acknowledges that while the Oregon Coast Range lies within the historical range of this species, the fisher has likely been extirpated from areas that lie outside of the existing known populations. Because the forest types affected by this action are not

considered suitable habitat for the fisher, and since the fisher has likely been extirpated from the northern Oregon Coast Range, this EA will not address impacts to the fisher.

3.2.2 Environmental Effects

Alternative 1 – No Action

This alternative would not conduct any harvest within the project area. There would be no immediate change to the mid-seral conifer forest conditions on BLM-managed lands in this area. Stand development processes would continue unaltered within the mid-seral forest stands of these planned units. Over the next few decades, barring any stand disturbance events such as windthrow, the continuing process of suppression mortality would contribute snags and down logs to these stands, mostly in the smaller size classes (less than 20 inches DBH). It would take several decades for these stands to accumulate larger snags and down logs (greater than 20 inches DBH) through suppression mortality.

The current pattern of habitat use by forest-associated wildlife species within the project area would be expected to continue unchanged. Dispersal habitat conditions for spotted owls would be unchanged. It would likely take several decades for these forest stands to develop sufficient late-seral forest structure (usually stands > 120 years old) to provide suitable nesting structure for spotted owls or marbled murrelets. These forest stands would not provide any appreciable value to wildlife species associated with early-seral habitats.

This alternative would avoid disturbance and displacement for the existing wildlife community in the project area, though it would also forego the potential benefit of creating high quality early-seral stage habitat conditions that could also benefit numerous wildlife species.

Alternative 2 – Proposed Action

Landscape Level

The proposed harvest action would have a negligible effect (less than 1 percent loss) on the condition of mid-seral forest stands on BLM lands in these two watersheds. Because the commercial thinning and density management treatment would retain greater than 40 percent canopy cover, protect existing snags, and maintain shrub and hardwood diversity, those units would retain their connectivity and habitat functionality at the landscape scale. This alternative would increase the amount of early-seral habitat on the GFMA lands in this watershed to about 180 acres, which is also a negligible increase (less than 1 percent) at the landscape scale.

Stand Level Conditions

The Proposed Action and associated activities would alter the existing forest structure of the planned harvest units. The anticipated changes to stand structure are well described in the vegetation section of this EA. Wildlife species are most likely to be affected by the following direct and indirect changes to forest habitat conditions at the stand level:

- Conversion of 87 acres of a closed canopy mid-seral forest to an open early-seral habitat patch (shrubs, slash, saplings, snags), with green trees retained in a widely dispersed pattern (approximately 1 TPA) and in untreated aggregated clumps (totaling 19 acres).

- The reduction of mid seral forest canopy conditions on 33 acres of the commercial thinning and density management units (while retaining >40 percent closed canopy conditions).

- Disturbance and loss of some existing coarse woody material (snags and down logs) resulting from felling, yarding, road construction, and fuels reduction.

- Recruitment of new coarse woody debris of larger size and higher quality from incidental green tree loss during harvest (at least 240 linear feet per acre would remain), and post-harvest loss of green trees due to harvest damage, disease, and windthrow affecting the aggregate clumps and scattered leave trees.

- A change in the context of CWD habitat conditions from low amounts within a closed canopy mid-seral forest, to moderate amounts within an open early-seral habitat patch.

Many of the wildlife species that may currently use the proposed treatment units would be diminished or displaced to adjacent mid-seral forest stands. Wildlife species that prefer open, early-seral habitats with a diversity of hardwood shrubs, scattered and clumped overstory trees, and moderate levels of snags and down logs would respond favorably to the short-term availability of this habitat, until a closed conifer stand developed (<30 years). The retention of green trees within and adjacent to the variable retention harvest unit would meet or exceed RMP requirements and add would provide considerable structural complexity to the open early-seral habitat created by the harvest.

While some recent clearcut harvests on adjacent private lands also provide open habitat for early-seral wildlife species, these private clearcuts generally lack the biodiversity potential provided by variable retention harvest (Franklin and Johnson 2012). This is because typical clearcut practices on private lands leave few biological legacies (e.g., snags, down logs, broad-leafed shrubs), are quickly and densely reforested, and frequently use herbicides to limit the growth of native shrubs that complete with the desired conifer seedlings (Swanson et al. 2011).

Special Habitats and Special Habitat Components

No special habitats would be affected by the proposed action. The CWD component would get a slight boost within the harvest units since existing snags and logs would be reserved from harvest, and since larger snags and down logs would be recruited from reserved green trees due to post-harvest mortality (Busby et al. 2006). Project design features would ensure retention or creation of at least 240 linear feet/acre of larger sized hard down logs that meet RMP requirements. The aggregate retention patches and the untreated portions of the mid-seral habitat (stream protection zones and low stocking areas) would continue to accumulate suppression mortality CWD into the future and thereby offset the loss of future CWD recruitment potential within the project area.

Special Status and Special Attention Species

Northern Spotted Owl

No suitable spotted owl habitat would be affected. The small amount of thinning treatments are expected to maintain canopy cover (>40 percent) which would retain the current function of dispersal habitat for spotted owls within this project area, and may increase the quality of habitat over time (USDI-FWS 2007). The proposed variable retention harvest would result in a minor loss of current dispersal habitat (87 acres removed) that would have a negligible effect on the abundant dispersal habitat conditions on BLM lands within the two adjoining watersheds (currently 90 percent dispersal on BLM lands).

Variable retention harvest is expected to provide high quality early-seral habitat for up to 3 decades and could boost local woodrat populations while retaining aggregate clusters of trees that function as future legacy trees in the regenerating forest stands. The mosaic of habitat patches created by the proposed action are consistent with Recovery Action 6 of the Spotted Owl Recovery Plan (USDI-FWS 2011). The proposed action is not likely to adversely affect spotted owls. A summary of effects to spotted owls is provided in Table 3–15.

Table 3-15. Effects of Proposed Action on Federally Listed Wildlife Species and their Critical Habitat

Affected Component	Determination[1]	Notes
Northern Spotted Owl		
Noise Disturbance	No Effect	There are no know sites within 1.5 miles of the project area, and surveys in 2013 had no spotted owl detections.
Habitat Modification	NLAA	The minor loss (87 acres) and reduced canopy cover (33 acres) would have a negligible effect on the abundant dispersal habitat conditions on BLM lands (90%). No suitable habitat would be altered and there are no active spotted owl sites affected by this action.
Critical Habitat	No Effect	There is no designated Critical Habitat on BLM lands in the project area.
Future Habitat Conditions	NLAA	Variable retention harvest could boost populations of some spotted owl prey species, while retaining high levels of dispersal habitat on BLM lands within the two watersheds.
Marbled Murrelet		
Noise Disturbance	No Effect	No murrelets were detected on recent surveys in this project area, and there are no known murrelet sites in this vicinity.
Habitat Modification	No Effect	No suitable nesting structure would be affected by this action.
Critical Habitat	No Effect	There is no designated Critical Habitat on BLM lands in this project area.
Future Habitat Conditions	Beneficial NLAA	Variable retention harvest and density management thinning can create large overstory conifer trees which may attain suitable 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 to adversely affect, and No Effect.

Marbled Murrelet

There is no suitable marbled murrelet habitat affected by the proposed action. There are no known occupied murrelet sites within the vicinity of the project area, and no murrelets have been detected in the nearest patch of suitable habitat (adjacent to Unit 29F). Therefore this action would have no effect on marbled murrelets as outlined in Table 4.

Red Tree Vole

The proposed harvest units are within mid-seral forest stands that lack older forest characteristics which could support persistent populations of red tree voles (Huff et al. 2012). A small older forest patch (10 acres, adjacent to Unit 29F) where voles are present has been reserved from harvest consistent with management direction (USDA-FS and USDI-BLM 2000). Surveys within the variable retention harvest units (stand age about 65 years old) found three inactive red tree vole nests that do not require protection. It has been noted that red tree voles are sometimes found in younger forest stands, especially if there are nearby patches of LSOG forests (USDI-FWS 2011). If any active vole nests become established within the proposed harvest units, then the proposed action would likely displace these voles and degrade habitat quality in the short-term (less than 30 years) by removing adjoining trees crowns (thinning units) and creating large openings of unsuitable habitat (variable retention harvest) which would increase vulnerability to predation (Wilson and Forsman 2013). But the retention of aggregate green tree clusters and scattered wolfy trees (variable retention harvest units), and ingrowth of canopy closure and development of deeper live crowns with epicormic branching (thinned units), would likely create suitable habitat conditions in the long-term (greater than 30 years) which would support the existing small patch of occupied habitat that has been reserved.

The proposed action in would likely retain the presence of red tree voles within the BLM administered parcel in Section 29, and would not contribute to the need to list this species under the ESA, because:

- Most of the proposed treatment units are currently unsuitable habitat that is unlikely to support persistent vole populations;
- An occupied patch of LSOG forest has been reserved from harvest to support population persistence; and,
- The recent status review for this species (USDI-FWS 2011) 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.

Bird of Conservation Concern

In the central Oregon Coast Range the majority of birds complete their breeding cycle within the April 15 to July 15 time period, while some birds (eagles, owls, hawks, woodpeckers) begin breeding as early as February or March and others (flycatchers, finches) may not finish breeding until August (Marshall et al. 2003). 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 proposed harvest units would likely destroy some nests and disrupt normal breeding behavior of any BCC species that nest or forage in these units.

The proposed action would result in habitat conditions which would be unfavorable to some bird species, while providing thinned or open habitats that would be favorable to other species (Hagar and Friesen 2009). At the scale of the analysis area, this proposed action is expected to have no discernable negative effects on populations of BCC species because some of the proposed units would retain their habitat value (39 acres in thinning units), only a relatively small amount of closed forest stands would be removed (87 acres in variable retention harvest), and these mid-seral conifer stands that are targeted for this treatment are currently an abundant age-class on BLM-administered lands within the adjoining watersheds.

Wildlife Species Associated with Early-Seral Habitats

Both the thinning and variable retention harvest would create conditions that benefit early-seral associated wildlife species, including some BCC species. In the thinning units, the reduced tree density, small canopy gaps, and temporary road and landing locations would provide openings where flowering plants, shrubs, and hardwood species could flourish. This benefit would affect a relatively small treatment area (33 acres) and would likely diminish in quality over time, as the recovering forest canopy would shade out all but the most shade-tolerant species with 10 to 15 years.

The variable retention harvest would create a mosaic of open habitat (totaling 87 acres) intermingled with scattered retention trees, small aggregate clumps, and adjacent untreated Riparian Reserves patches. Collectively, with the thinning/density management treatment area (33 acres) and road construction (5 acres), these habitat conditions would greatly improve local forage for deer and elk, while maintaining untreated adjacent hiding cover. Decommissioning of temporary roads would further benefit deer and elk by providing foraging and hiding cover that is sheltered from disturbance from frequent human access (McCorquodale 2013, White et al. 2013).

Within the proposed harvest units, the establishment of early-seral plant communities, especially within the openings created by the variable retention harvest would support a variety of flowering plants, shrubs, and hardwood species that would increase local biodiversity by attracting a diverse assemblage of small mammals, reptiles, songbirds, butterflies, and moths (Hagar 2007b, Miller and Hammond 2007, Betts et al. 2010, Swanson et al. 2014).

Sunlight reaching into edges of aggregate retention clumps and Riparian Reserves would promote establishment of tall shrubs and hardwoods that increase the quality of edge-contrast habitats that are important to many wildlife species. Historically, natural disturbance processes (fire, wind, insects, and disease) provided a large legacy of snags and down logs that represented a peak in abundance and quality in early-seral habitats (Franklin and Johnson 2012, Swanson et al. 2014). The proposed action would retain existing snags and down logs to support wildlife species associated with this structure, and the scattered retention trees and aggregate clumps

would contribute to future snags and down logs (Franklin and Johnson 2012, Hagar 2007b, Rose et al. 2001).

Proposed reforestation efforts would allow for natural conifer regeneration to occur in some areas, and modest conifer replanting (less than 200 trees per acre) elsewhere, such that open, shrub-dominated, early-seral habitat conditions are expected to persist for perhaps 30 years before closed canopy, conifer-dominated stand conditions are re-established. Compared to the other alternatives, this alternative provides the greatest benefit to wildlife species associated with early-seral habitats, because if would create a slightly larger effective area of open habitat conditions which would likely persist for up to 30 years.

Alternative 3 – Regeneration Harvest with Dispersed Green Tree Retention

This alternative would have similar impacts as those described for the proposed action (Alternative 2). At both the project scale and at the watershed level, the amount of harvest treatment, and the anticipated change in habitat conditions is nearly identical to the proposed action. The anticipated effects to Special Status and Special Attention Species, and Birds of Conservation Concern would be very similar.

The main difference with Alternative 3 is the size and condition of the open area created by regeneration harvest. This alternative provides a slightly smaller area of open, early-seral habitat (78 acres in harvest unit and 5 acres of road), a greater degree of reforestation effort (up to 300 trees per acre), and a more uniform pattern of green tree retention (average of 10 trees per acre). This in turn would affect the establishment of flowering plants, shrubs, and hardwoods as they compete with a higher density of conifer saplings, such that early-seral habitat conditions would be less robust and would persist for a shorter time span (< 20 years) than the proposed action (Alternative 2). Therefore, this alternative would be less beneficial to wildlife species associated with early-seral habitats (including some BCC species) than the proposed action.

3.2.3 Cumulative Effects

Private lands within these watersheds 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 action, BLM has previously thinned (since 1995) approximately 4,843 acres and cut 415 acres in regeneration harvest units in the two adjoining watershed (see Table 3–16). There is the potential for about 100 acres of foreseeable, future regeneration harvests planned in the Marys River watershed (next five years). The previously completed and currently proposed harvest actions, which span an 18 year period, affected about 20 percent of the available mid-seral forests on BLM-administered lands within these watersheds. While this represents a cumulative modification of one-fifth of the available mid-seral forest, these thinning harvests do not result in a loss of forest function or connectivity across the watershed. This level

of habitat modification would not contribute to the need to list any wildlife species of concern, because mid-seral forest structure is still abundant and is not a limiting factor for any wildlife species of concern. Therefore the proposed action would have no appreciable cumulative negative effects on wildlife species and their habitat.

Collectively, the past, present and future regeneration would result in 3.6 percent of GFMA allocated lands converted to early-seral conditions, with about 1.7 percent in high quality early conditions (less than 10 years old) in both watersheds. This low amount of early-seral conditions is considerably less than that which was anticipated and analyzed for within the Salem District RMP (USDI-BLM 1995).

Table 3-16. Summary of Proposed, Past, and Foreseeable Harvest Acreage on BLM lands

	Marys River Watershed	Upper Alsea Watershed
Baseline Data		
Amount of Mid Seral Forest Stands on BLM	2,703	21,030
Total BLM-administered lands in Watershed	6,621	43,030
Total Forested Watershed Area[1]	138,810	78,180
Proposed Action		
Commercial and Density Management Thinning	27	10
Variable Retention/Regeneration Harvest	73	34
Past Actions on BLM[2]		
Commercial and Density Management Thinning	946	3,897
Variable Retention/Regeneration Harvest	161	254
Foreseeable Future Actions on BLM[3]		
Commercial and Density Management Thinning	525	70
Variable Retention/Regeneration Harvest	100	0

[1] Watershed area includes upland forests and excludes agricultural and residential areas.
[2] Past Actions occurring on BLM-administered lands in this Analysis Area since 1995 (beginning of Northwest Forest Plan implementation), to include all thinning and regeneration harvest actions.
[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 2011). The proposed action (occurring entirely outside of critical habitat), would not appreciably contribute to the cumulative loss of dispersal habitat available for spotted owls in this watershed. There would be no cumulative effects to marbled murrelet since no suitable nesting structure would affected, and there would be no cumulative effects to red tree voles since existing vole sites have been protected and no older forest habitats (which best support population persistence) would be affected.

3.3 FISHERIES AND AQUATIC HABITAT

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

What effect would the proposed actions have on resident and anadromous fish and aquatic habitat?

What effects would the proposed action have on Endangered listed fish and their habitat?

3.3.1 Affected Environment

Major tributaries associated with the project area include the South Fork Alsea River and Hammer Creek. General habitat conditions and fish distribution for the South Fork Alsea River and Marys River are described in the South Fork Alsea Watershed Analysis (BLM 1995) and the Benton Foothills Watershed Analysis Area (BLM 1997). Anadromous fish access to the project area is primarily limited by Alsea Falls, which is considered a full barrier to adult and juvenile salmon migration. Within the Marys River, anadromous fish access and distribution is limited by several man-made barriers and diminishing stream channel flows below the treatment area.

Coastal cutthroat trout (Oncorhynchus clarki) have been documented to occur throughout the South Fork Alsea and Marys River analysis area (BLM 1995, BLM 1997). Sculpin is likely to occur concurrent with cutthroat over much of both watersheds. No fish species were documented in the treatment area of the unnamed tributary draining the west side of the treatment units (Snedaker 2012). Based on slope and stream gradient, no fish are present in east side tributaries. Reduced or limited stream flows and steep slopes are the most common restrictions on distribution in proximity to the project areas. Chinook salmon, coho salmon, steelhead, speckled dace, pacific lamprey, and western brook lamprey also occur within the analysis area watersheds. Resident and anadromous fish species do not occur in proximity to the harvest units. Cutthroat trout, sculpin, and potential western brook lamprey occur in proximity to the haul route.

3.3.2 Environmental Effects

Alternative 1 – No Action

Current forest stand conditions would be untreated. 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. On average, smaller diameter trees within the denser stands would remain. In the long-term, these smaller trees would be expected to create shorter and smaller-diameter snags compared to the action alternatives. These smaller snags are more likely to remain standing within the dense riparian stand, reducing the probability of their contributing to in-stream LWD. 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,

any localized effects resulting from untreated stands and unmanaged roadways in the project area would be unlikely to affect fish.

Alternative 2 – Proposed Action

Sediment

Yarding and Falling – Proposed actions are unlikely to result in any sediment delivery to the surrounding stream network. They would be unlikely to alter aquatic habitat downstream from the project area.

Road Construction – New road construction would not have any effect on sediment delivery at the site. Roads are located more than 375 feet from streams and no impacts would be anticipated to aquatic habitat or fish downstream.

Road Renovation – The majority of proposed renovation including brushing, ditch reconstruction, rocking, and grading are at least one-third mile from fish habitat. The nearest stream crossing replacement to resident fish habitat is at least 660 feet upslope. Due to the distance of road renovation to fish habitat the small increase in turbidity which may be generated by culvert replacement, rocking, ditching, grading at stream crossing sites would be undetectable against background turbidity where fish reside; thus, impacts to fish and aquatic habitat would likely be immeasurable.

Hauling – The potential for timber hauling to generate road sediment is minimized by project PDFs. The majority of the sale area and haul roads are located near the ridge lines and are graveled. Winter haul would occur on rocked road surfaces only. Any native surface roads would be restricted to dry season use only. Table 3–17 shows the proposed haul roads and the distance from fish habitat; sediment transport would be unlikely to reach fish habitat on most haul roads. Wet season haul on roads located more than 100 feet from fish habitat would be unlikely to transport sediment that would reach fish habitat. Buffer distances greater than 100 feet would be expected to capture the 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, Sweeney and Newbold 2014).

Table 3-17. Alternative 2 haul routes and nearest distance of stream crossings to ESA listed fish habitat (LFH) and resident fish

Haul Route	Miles of Haul	Road Type[1]	Season of Use	Number of Crossings Over:				Crossing Distance To Res/LFH[4] (feet)	Road Within 100' of Res. Fish (feet)
				Res[2] Fish		Other Peren.[3]	Inter.[4]		
				Bridge	Culvert				
14-6-9 Weyco 100	3.84	A	Year	1	2	1	8	0/7,860	5,373
14-6-20.1	0.15	A	Year	0	0	0	0	na	0
14-6-30.2	1.02	A	Year	0	1	0	0	0/18,050	350
Unnamed	0.17	A	Year	0	0	0	0	na	0

[1] Road surface types: P=Paved, A=Aggregate, N=Natural Surface
[2] Res = Resident Fish
[3] Peren. = Perennial Stream
[4] Inter= Intermittent stream

The lower segment of Weyerhaeuser 100 Road (14-6-9) is graveled and in proximity to fish habitat, roughly paralleling a fish bearing unnamed tributary of the South Fork for approximately 1.7 miles. Approximately 0.5 mile of road is between 50 and 100 feet from the stream channels, not including four fish bearing crossings. Both roads are generally flat, have vegetated ditches, and drainage conditions appear to be good. Vegetated buffer widths ranging from 40 to100 feet have been found to be efficient in preventing sediment from reaching streams (Burroughs and King 1989, Corbett and Lynch 1985, Swift 1986, Sweeney and Newbold 2014).

The stream crossings over resident fish habitat are located on flat road surfaces with heavily vegetated ditchlines. Low gradient road crossings with heavily vegetated ditchlines have been shown to have limited potential to transport sediment (Luce and Black 1999). Only short segments of road immediately over these fish bearing crossings may have direct short-term connections of road surface runoff with fish bearing stream channels during heavy rainfall events.

Impact to fish and aquatic habitat would be limited to minor short-term site specific effects to short reaches of fish habitat immediately downstream of the crossings due to sediment generated from winter hauling. Generally sediment delivery would occur when background turbidity levels would be elevated, thus minimizing the relative increase in turbidity. Resident 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 measures (silt fences, hay bales, etc.) and cessation of hauling during these heavy rainfall periods, when road surface flows are most likely to be connected to stream channels, would minimize the extent of sediment being disturbed and subsequently available for transport to the stream channel. The duration of sediment reaching stream would be short-term, during and immediately following hauling activities occurring at the same time with the wet season freshets.

Fuel Treatments – Based on the hydrology analysis, SPZs of 70 to 210 feet, and distance to fish habitat, sediment effects to downstream aquatic resources would be highly unlikely.

Large Woody Debris (LWD)

Yarding and Falling – Loss of CWD and LWD due to harvest can alter the stability and quality of aquatic habitat (Chamberlin et al. 1991, Beechie et al. 2000). There are no fish bearing streams adjacent to proposed treatment units; the nearest fish bearing stream is at least 0.2 miles downstream from treatment units. Proposed buffers associated with regeneration activities in units 29A, B, C, D, and G is the full site potential tree height width of 210 feet on all stream channel types: non-fish bearing, perennial, and intermittent channels with evidence of scour/deposition and a defined channel. Effectively all deadwood recruitment to streams occurs within a site potential tree height of the stream channel (Murphy and Koski 1989, Robison and Beschta 1990, Van Sickle and Gregory 1990, McDade et al. 1990, Meleason et al. 2002). Studies on landslides and debris flows found that the small headwater streams are important sources for downstream wood recruitment to larger streams (Reeves et al. 2003). The proposed action would protect wood recruitment in the small headwater source areas with full site potential buffers. The

proposed treatment would avoid areas of instability, to the extent identifiable, thus leaving land movement recruitment zone untreated. Based on proposed buffers widths and distance to fish habitat, more than 0.2 miles downstream, the coarse wood and large wood recruitment rates would not be affected by the proposed actions in units 29 A, B, C, D and G.

The thinning treatment in Unit 29F incorporates stream protection buffers that leave a portion of the stand nearest the stream edge untreated, minimum of 70 feet and increases up to 75 feet based on increasing tree height and hillslope gradient. 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 1990, Van Sickle and Gregory 1990). Based on stand tree height of 106 feet (Unit 29F), no short-term impacts to wood recruitment would be anticipated.

Wood recruitment studies conducted in the Pacific Northwest have also 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 proposed thinning area is less than 80 years of age and the stream protection buffer on the adjacent streams are more than double the 23–36 feet widths that would protect over 70 percent of the wood recruitment area. Treatment would not be expected to affect the source area recruitment zone in the short-term. The percentage of retained trees proposed by thinning outside the stream protection zone would further reduce the probability of wood recruitment loss. With retention of stream protection zones short-term impacts to wood recruitment patterns and rates would not be expected as a result of the proposed action on unit 29F and impacts to fish and aquatic habitat more than one-third of a mile downstream would be highly unlikely.

Proposed thinning in the riparian areas is anticipated to increase the average growth of the remaining trees 68 percent over 30 years compared to not treating the stands (Snook 2014). 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 et al. 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,
- larger diameter branches 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 35 percent of the stand (Snook 2014). Long-term stand growth, including treatment growth response and understory reproduction (Tappeiner et al. 1997,

Bailey and Tappeiner 1998), would be expected to offset woody debris lost as a result of thinning. Overall, in the long-term upslope Riparian Reserves stands enhanced by treatment accelerated growth rates, combined with untreated buffer zone stands, would be expected to result in recruitment of wood across a larger range of sizes. As a result of the increase in the size of trees in treated riparian areas there would be an expected benefit in LWD recruitment to the stream channel. Thus treatment would potentially improve the quality and complexity of aquatic habitat adjacent to the treatment areas in the future.

Road Construction – New road construction would not have any effect on wood recruitment at the site. All roads are located more than 375 feet from streams and no impacts would be anticipated to aquatic habitat or fish downstream.

Road Renovation – Proposed renovation road work would not be expected to impact large woody debris where fish reside more than 2,250 feet downstream. The majority of vegetation clearing conducted along roadways would be of small diameter debris unlikely to alter channel processes. Proposed culvert replacement, at least 660 feet upstream of fish habitat, may remove various diameters of trees in the road fill associated with the crossing; however, no wood removal would occur that meets large wood debris criteria (24 inch DBH by 50 feet long). Any larger material removed from culvert fill slopes would be replaced on the fill slopes or in the stream below the crossing.

Hauling – The proposed hauling has no causal mechanisms to alter LWD recruitment. No effects to fish and aquatic habitat would occur.

Fuel Treatments – Based on timing of burning, incorporation of stream protection zones, and distance to fish habitat impact to LWD where fish reside from proposed pile burning and broadcast burning would be highly unlikely.

Temperature

Yarding and Falling – Treatment in units 29A, B, C, D, and G are adjacent to non-fish bearing streams and have a full site potential tree buffer applied (210 feet), which excludes all of the Riparian Reserves from treatment. No changes in primary or secondary shade zones associate with these streams are anticipated therefore no affect to stream temperature would occur.

Site level project designs for treatment unit 29F include a standard design feature SPZ of at least 70 feet or 75 feet. Protection of stream shade is the critical component in protecting stream temperature regimes (Brazier and Brown 1972, Beschta et al. 1989, Belt et al. 1992, Johnson 2004, Moore et al. 2005). According to the stream shading sufficiency analysis done for the proposed treatment units, the proposed SPZ of 70 to 75 feet was sufficient to protect critical shade in the primary shade zone (solar path between 10 a.m. and 2 p.m.), based on topography and average tree height (Snook 2014, USFS &BLM 2010). The proposed vegetation treatment in the secondary shade zone (full day solar path; approximately one tree height from the stream) would not result in canopy reduction of more than 52 percent. Stream shading would be maintained and no change to water temperature from the activities proposed in this project would be anticipated (Wegner 2014). 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 not have any effect on stream temperature at the site, all roads are located more than 375 feet from streams, and no impacts would be anticipated to aquatic habitat or fish downstream.

Road Renovation – Based on small scale, dispersion of potential impact sites, and distances to fish habitat changes to stream temperature where fish reside would not be expected.

Hauling – The proposed hauling has no causal mechanisms to alter stream temperatures. No effects to fish and aquatic habitat would occur.

Fuel Treatments – Based on timing of proposed burning, incorporation of stream protection zones, and distance to fish habitat impact to stream temperature where fish reside from proposed pile burning broadcast burning would be highly unlikely.

Flow

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

Road Construction – New road construction would have no detectable effect on stream flows, all roads are located more than 375 feet from streams, and no impacts would be anticipated to aquatic habitat or fish downstream.

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 – The proposed hauling has no causal mechanisms to alter flows. No effects to fish and aquatic habitat would occur.

Fuel Treatment – With incorporation of project design features the project would not be expected to alter stream flows and would not be expected to impact fish and aquatic habitat.

Alternative 3 – Regeneration Harvest with Dispersed Green Tree Retention

Sediment, LWD, Temperature, and Flow Effects

Yarding and Falling – Units 29C and 29G would be commercially thinned on the upland instead of regeneration harvested. Unit 29D would be primarily regeneration harvested, except the southwest corner where 10 acres would instead be commercially thinned. As a result of the changes under Alternative 3, approximately 15 additional acres would be commercially thinned. Project design features, including SPZ buffers for all units including 75 foot buffers associated

with riparian treatments in units 29C and 29G, 70 to 75 foot buffers on Unit 29F, and full site potential tree height widths of 210 feet on units 29A, 29B, and 29D.

Sediment effects of the proposed actions under Alternative 3 are similar to Alternative 2, and would not be expected to measurably alter sediment characteristics at the treatment sites, therefore would be unlikely to alter aquatic habitat downstream from the project area.

Effects of proposed treatments on LWD recruitment for Units 29A, B, D, and F would be similar under Alternative 3 as Alternative 2. Proposed stream protection buffers are similar under both alternatives and effects to fish and aquatic habitat would be the same. Alternative 3 proposed thinning would treat an additional 5 acres within the Riparian Reserves compared to Alternative 2. Short-term impacts to wood recruitment patterns and rates would not be anticipated as a result of Alternative 3 proposal including the additional give acres of thinning in units 29C and 29G and impacts to fish and aquatic habitat more than one-third of a mile downstream would be highly unlikely. Treatment under Alternative 3 in Riparian Reserves over the long-term would potentially improve the quality and complexity of aquatic habitat adjacent to the treatment areas in the future, similar to Alternative 2.

Proposed thinning treatments under Alternative 3, including the 5 additional Riparian Reserve acres, would incorporate SPZ buffers that were found unlikely to alter temperature and stream flows under Alternative 2. Alternative 3 activities would not be anticipated to impact fish and aquatic habitat one-third miles downstream.

Road Construction and Renovation – Alternative 3 road construction and renovation would be identical to Alternative 2. The proposed road construction and renovation treatments would be similar in distribution, duration, and magnitude of sediment movement from the site to stream channels for both alternatives. Due to distance to fish habitat, these localized effects would be unlikely to impact fish habitat.

Hauling – The proposed hauling activities are the same under both alternatives. The nature and magnitude of effect to fisheries would be the same to flow, temperatures, woody debris recruitment, and sediment regimes to stream channels compared to Alternative 2.

Fuel Treatment – No changes in fuel treatment area would occur under this alternative. The nature and magnitude of effects to fisheries and aquatic habitat from proposed burning under Alternative 3 would be similar as described under Alternative 2.

3.3.3 Cumulative Effects

Based on the fisheries analysis hauling was predicted to have short-term site level effects, sediment delivery to several stream channel crossings may occur during the wet season. Over the long-term wood recruitment may be affected by proposed falling treatment as treated zones within stand reach heights potentially capable of reaching stream channel. All other project activities were determined to have no more than immeasurable or highly unlikely effects on

sediment delivery, LWD recruitment, stream temperature, and stream flows and thus would not contribute towards cumulative effects.

Oregon Department of Environmental Quality (ODEQ) regulates sediment delivery to stream channels for all forest related activities. ODEQ mandates no more than a 10 percent increase in turbidity below a source area (OAR 340-041-0036). The proposed action would not generate sediment beyond this standard. Project design features incorporated into the timber sale contract would require cessation of hauling where the road surface is deeply rutted or covered by a layer of mud and where runoff is causing a visible increase in turbidity to adjacent streams. Other private and public activities, except those permitted or exempted, in both watersheds are required to comply with the 10 percent regulation. Impacts of other hauling activities, from both the private and public 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.

Approximately 12 percent of the land base within the Marys River Watershed and 53 percent of the Upper Alsea Watershed is federally administered. Public lands in both watersheds are predominately administered by the BLM. The trend in LWD recruitment on federal lands is increasing as the stands mature within the Northwest Forest Plan designated Riparian Reserves (Reeves et al. 2006). Analysis conducted under the FEIS Revision of the Resource Management Plans of Western Oregon indicated trends of LWD recruitment on all Western Oregon and Washington BLM administered Riparian Management Areas. Overall, LWD recruitment was considered likely to continue to improve over the next 100 years (BLM 2008). 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 LWD recruitment, is projected to increase substantially (Spies et al. 2007).

3.4 HYDROLOGY

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

What effects would the proposed road construction and renovation have on water quality?

3.4.1 Affected Environment

Water Quantity

The project area lies in headwaters of the Upper South Fork of the Alsea River sixth-field watershed (HUC# 171002050101) and Upper Muddy Creek sixth field watershed (HUC# 170900030206). Tributaries in the western section of the project area discharge into an un-named second order tributary of the South Fork of the Alsea River, while the small portion of the project

area on the east side of the divide drains towards Howell and Rambo Creeks but there are no channels present in the project area.

The project area receives approximately 75–80 inches of rain annually and has a mean 2-year precipitation event of 3.0 inches in a 24-hour period (N.O.A.A.). Most runoff is associated with winter storm events that result from low pressure fronts moving inland from the southwest off the Pacific Ocean. Peak stream flow events are concentrated in the months of November through March when Pacific Storm fronts are strongest. As a result of little or no snow pack accumulation and infrequent rainfall, stream flow in the summer is typically a fraction of winter levels and many headwater channels retreat to subsurface flow. At a distance of over 30 miles from the ocean, and east of the Coast Range, fog and fog drip are not major contributors to watershed hydrology in the project area.

Elevation in the project area sixth-field watersheds ranges from approximately 1,200 to 1,900 feet; the Rainbow Ridge project area is located on a single ridge top with activities that would occur on both side of the ridge. The entire project area is located below the 2,000 foot elevation, which is considered the transient snow zone in the Oregon Coast Range (USDI 1995). The area is not vulnerable to extreme storm events that may lead to large flood events (USDI 1996).

Using data from the 2008 WOPR analysis, the predicted amount of "open acres" (lands with less than 30 percent crown cover) in each watershed for 2016 was 17.1 percent in the Upper Muddy Creek watershed and 16.6 percent in the South Fork Alsea watershed. The analysis determined that both watersheds were at a low risk for peak flow increases due to the existing level of harvest in the rain dominated watersheds. Grant et al. (2008) developed a process to help determine potential effects to peak flows from forest practices. His process differs between rain-dominated and transient snow zone dominated watersheds. Both of the watersheds in this analysis are rain-dominated. Using his envelope curve for rain dominated watersheds, Grant determined that if the change in peak flow was less than 10 percent it would be undetectable due to natural variability. His analysis determined that a rain-dominated watershed needed to have over 45 percent of its land base in an "open" condition to result in a peak flow increase above the detection limit of 10 percent.

Using LiDAR flight information from 2009–2013, and Google Earth photos from 2013, Upper Muddy Creek was found to have 39 percent and South Fork Alsea was found to have 11 percent of their watersheds in "open" conditions. This information will be used to help predict potential changes to peak flow increases based on the proposed regeneration harvest in this project.

Project Area Streams

The project area includes numerous perennial and intermittent first order tributaries to the Upper South Fork of the Alsea basin and no tributaries to the Upper Muddy Creek basin. These tributaries are Rosgen type-A, intermittent source channels with 4–10 percent gradient, low width/depth ratio, and low sinuosity. Dominant channel bed materials are cobbles and large gravels. Channels are typically narrow with moderate to steep side slopes. The project area also contains two small (less than one acre) wet areas, which are surrounded by conifers and have no direct connection downstream channels.

Water Quality

Within the analysis area all the project watersheds are listed by the Oregon Department of Environmental Quality (ODEQ) on the Clean Water Act 303(d) list (ODEQ 2010) for exceeding year around stream temperature for fish. Table 3–18 displays the watersheds and their listed parameters and area of listing extent.

Table 3-18. Project Area Watershed Listings

Watershed	303(d) Listed parameters (2010 List)	Extent of Listing
South Fork Alsea River	Biological Factors, Sediment, and Temperature (spawning)	Includes BLM Lands Mile 0.0 to 17.2
Muddy Creek	Various Parameters including: Dissolved Oxygen, PH, Sediment and Temperature	Includes BLM Lands Mile 0.0 to 33.4

In 2006, the ODEQ completed the Willamette Basin Total Maximum Daily Load (TMDL) which was approved by the U.S. Environmental Protection Agency in September, 2006 and placed on the 319 List of approved TMDL's. Approved actions in this basin include implementation of federal land management activities provided that Best Management Practices and project design features are implemented to prevent exceedance of the TMDL. As of July 2014, the ODEQ is still in the process of developing the Mid-Coast TMDL, which will cover the Alsea River Basin.

Fine Sediment and Turbidity

During field review of stream channels in the project area, the perennial channels were observed to be mostly stable and functional with sediment supplies in the range expected for their stream type. Channel substrates were typically cobbles and gravels. Some channel reaches contained large amounts of coarse woody debris. The remaining channels contained sections of discontinuous flow where water either went subsurface or no flow was observed in the channel. Average road density is 5.76 miles per square mile in the South Fork Alsea watershed and 5.5 miles per square mile in the Upper Muddy Creek watershed. Assuming an average right-of-way width of 45 feet, roads in all ownerships occupy less than five percent of each project watershed.

Stream Temperature

No stream temperature data was available for this analysis. The only channels that display perennial flow characteristics are located on the southwest boundary of Unit 29F, which is a proposed thinning unit. Another perennial channel was located on the northwest boundary of section 29. This channel is located on private lands and is next to the large riparian protection zone where no harvest is proposed. The remaining intermittent channels are generally shaded by alder, conifer, ferns, and brush.

Stream shading varies between dense canopy cover by conifers to open canopy at flatter reaches. Streams in the project area are classified by the watershed analysis as having a "low" risk of

detrimental changes in water temperature based on stream bank vegetation shading (USDI 1997). Based on field observations and aerial photo reviews of streams in the project area, current streamside vegetation and valley topography appears adequate to shade surface waters during summer base flow and it is likely that stream temperatures consistently meet the Oregon state standard (18 degrees Celsius) for these waters.

Beneficial Uses

There are no known municipal or domestic water users in the project area or within five miles downstream of the project area. Additional recognized beneficial uses of the stream-flow in the project area include resident fish, anadromous fish, recreation, and aesthetic value.

Best management practices, as described below under Environmental Effects and listed in Appendix E, would be implemented to help eliminate and/or minimize any potential impacts to beneficial uses of the project watersheds.

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.

Alternative 2 – Proposed Action

Water Quantity

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. None of the project area acres lie within a potential rain-on-snow zone which equates to very low risk for these events to occur.

Using the peak flow estimation method developed by Grant (2008) and adding in the proposed harvest acres to each sixth field watershed, the percent of the watersheds in an open condition increased slightly for each watershed. The predicted project specific and cumulative peak flow increase for each watershed is listed in Table 3–19 on the following page. The new values all remain under 10 percent which is below the detection level established by Grant. The peak flow range For Upper Muddy Creek does extend up to 14 percent based on the regression line data shown in the envelope curve developed by Grant, but the high gradient channel types near the

project area are not prone to changes in stream morphology from increased flow levels. Increases in peak flow can also occur when roads and other impermeable areas occupy more than 12 percent of a catchment scale watershed (Harr et al. 1979).

This analysis assumes no recovery of past harvest stands, that the current level of harvest activity on private lands remains the same, and that all the acres in the sale are resulting in less than 30 percent crown cover when completed. The LiDAR based acres also include all agricultural lands in the lower portions of the watersheds. Based on these side boards, it is still expected that the addition of the proposed harvest activity in each of the sixth-field watersheds would fall into the unmeasurable level for peak flow increases based on the Grant envelope curve.

Table 3-19. Harvest Related Peak Flow Predictions by Sixth-Field Watershed Using LiDAR-based Information

Watershed	Size (Acres)	Existing Regeneration Harvest LiDAR Acres	Proposed Regeneration Harvest Acres	Project Related Increase in Peak Flow	Cumulative Percent change in Peak Flow[1]
South Fork Alsea River	18,904	2,109	70	<1	<10
Muddy Creek	13,735	5,397	31	<1	< 10

[1] Grant determined that levels below 10% were undetectable from natural processes.

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.

Water Quality

Fine sediment and Turbidity

Nine acres of Riparian Reserves would experience some level of density management to improve the characteristics of the remaining stand. Regeneration harvest is proposed for 91 acres and commercial thinning is proposed on approximately 8 acres. The creation of temporary roads, yarding corridors and the mechanical removal of trees are unlikely to substantially increase sedimentation into project area streams. 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 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 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 overland flow and sediment before reaching 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.

Temperature

For the protection of stream channels and aquatic resources, riparian buffers or no-treatment zones were applied to all stream channels and "high water table areas" (small wet areas, ponds, marshes, etc.) in the project area. These zones were determined in the field by BLM personnel following the protocol outlined in the *Northwest Forest Plan Temperature Implementation Strategies* (2005). Stream buffers in the thinning units extend a minimum of 70 feet from stream channels and to the extent of the riparian vegetation around wet areas. The streams near the regeneration harvest units have 210 foot no-cut buffers to protect aquatic resources. 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.

Fuels Treatment

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. The nine acres of pile burning proposed in this alternative 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.

The proposal includes broadcast burning of 90 acres of the regeneration harvest units. These burned areas would be expected to reestablish vegetation entirely within one to two growing seasons. No burning from either treatment would occur within established no cut buffers to protect water resources and the remaining vegetation would filter out any sediment delivered from upslope areas. Broadcast burning is completed at a time of the year when soil moistures are higher and the soil is not likely to be impacted by the low intensity heat generated from the burning. This lower heat type of burn does not kill the shallow roots of shrubs and forbs and the short-term flush of nutrients from the ash helps to generate a healthier understory component in the unit. It is not expected that any additional erosion would occur from these units and thus there should be no impact to sediment generation or nutrient levels available to the remaining vegetation which would maintain the productivity of the stand.

Road Work and Hauling

New road construction is proposed on or near ridge top locations. The proposed new constructions would occur on moderate to low gradient slope, with no stream crossings. All of the road construction is located outside the riparian reserve. The risk of impacts to water quality due to road construction would be limited by restricting work to periods of low rainfall and runoff. Construction would employ techniques to reduce concentration of runoff and sediment to

a minimum, such as out sloping, ditch lines, and water-bars on steeper sections of road. These new roads would be closed to traffic after their use. The proposed final road system is located in a stable geologic landform and there is no risk of road related landslides. The placement of the road locations are on topographic divides where any road generated water or sediment would have no impact on drainages in the project area. Road construction and use would result in no expected additions of sediment to stream channels in the project area.

Drainage on existing roads would be improved where needed, including adding rock surfacing on project haul roads. The 14-6-9 road would also see two perennial stream culverts and two intermittent stream culverts replaced to improve crossing stability. Two cross drains would be installed on Road 14-6-30.2 to improve road stability and reduce ditch flow lengths in the road segments. Road maintenance and renovation activities would be unlikely to measurably impact channel morphology or water quality over the long term (beyond the renovation period). Drainage improvements would improve water quality over existing conditions.

Timber hauling would be permitted year-round on rock-surfaced roads. 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 – Regeneration Harvest with Dispersed Green Tree Retention

Water Quantity

Using the peak flow estimation method developed by Grant (2008) and adding in the proposed harvest acres to each sixth-field watershed, the percent of the watersheds in an open condition increases slightly for each watershed. The predicted project specific and cumulative peak flow increase for each watershed is listed in Table 3–20. These values all remain under 10 percent, which is below the detection level established by Grant. The peak flow range For Upper Muddy Creek does extend up to 14 percent based on the regression line data shown in the envelope curve developed by Grant, but the high gradient channel types near the project area are not prone to changes in stream morphology from increased flow levels.

Table 3-20. Harvest Related Peak Flow Predictions (Grant 2008) by Sixth-Field Watershed Using LiDAR-based Information

Watershed	Size (Acres)	Existing Regeneration Harvest LiDAR Acres	Proposed Regeneration Harvest Acres	Project Related Increase in Peak Flow	Cumulative Percent change in Peak Flow1
South Fork Alsea River	18,904	2,109	48	<1	<10
Muddy Creek	13,735	5,397	32	<1	< 10

[1] Grant determined that levels below 10% were undetectable from natural processes.

Water Quality

Fine sediment and Turbidity

Predicted effects or impacts would be similar or less than those discussed in Alternative 2.

Temperature

Predicted effects or impacts would be similar or less than those discussed in Alternative 2.

Fuels Treatment

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. The twelve acres of pile burning proposed in this alternative 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. The proposal includes broadcast burning of 82 acres of the regeneration harvest units. Expected effects are similar to those discussed in Alternative 2.

Road Work and Hauling

The proposed road work and hauling activities are the same for both Alternatives. See the discussion under Alternative 2 for more information on this topic.

3.4.3 Cumulative Effects

Water Quantity

The cumulative water yield increases for both watersheds remain under 10 percent which is below the detection level established by Grant. The peak flow range For Upper Muddy Creek does extend up to 14 percent based on the regression line data shown in the envelope curve developed by Grant, but the high gradient channel types near the project area are not prone to changes in stream morphology from increased flow levels. Increases in peak flow can also occur when roads and other impermeable areas occupy more than 12 percent of a catchment scale watershed (Harr et al. 1975). Please see the roads and hauling discussion below for predicted changes in peak flows due to the expansion of the road network.

Water Quality – Sediment

This project is unlikely to affect stream channel stability and function as all field identified streams and wet areas would be protected with a no cut buffer of 210 feet. No yarding would occur across streams. No bank stabilizing vegetation would be removed. Tree removal is not proposed on steep, unstable slopes where the potential for mass wasting adjacent to streams is

high. Therefore, increases in sediment delivery to streams due to mass wasting are unlikely to result from this action.

Water Quality – Temperature

Stream buffers extend a minimum of 70 feet from stream channels and to the extent of the riparian vegetation around "wet areas" in the thinning units. The streams near the regeneration harvest units all have 210 foot no cut buffers established to protect aquatic resources. 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.

Fuels Treatment

Observations over 3 decades of burning piled slash (both hand and machine piles) in this portion of the Marys Peak Resource Area has resulted in no evidence of surface erosion from areas where piled slash has been burned. Based on this local experience, no increase in surface erosion is expected from this proposed activity. Broadcast burning completed within the prescription does not kill the existing roots and the nutrient release is expected to result in a healthier understory.

Road Densities

Average road density is 5.8 miles per square mile in the South Fork Alsea watershed and 5.5 miles per square mile in the Upper Muddy Creek watershed. With the addition of approximately 5,100 feet of new road for the project, evenly between the two watersheds, the road densities would remain the same for both watersheds. Roads in all ownerships occupy less than five percent of the analysis areas. Because the road densities are below the 12 percent level in each watershed, it is not expected that any increases in peak flow would occur when roads are constructed. (Harr et al. 1975).

3.5 SOILS

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

What effects would timber harvest, road construction and/or road renovation have on the soils resource, including soil productivity?

3.5.1 Affected Environment

Klistan-Harslow and Hemcross are the predominant soil series on and around the project area. The Klistan-Harslow series consists of moderately deep, well-drained soils formed in loamy colluvium and residuum from basalt and other igneous and volcanic rock types. Harslow soils occur on summits, shoulder slopes, back slopes, and foot slopes of mountains. The Hemcross series consists of very deep, well-drained soils that formed in colluvium and residuum from basalt, coarse-grained igneous rock, and other volcanic materials. Hemcross soils occur on

summits, foot slopes, and toe slopes of mountains.

Slopes on most of the skyline yarding areas vary from 35–50 percent; a few included areas have slopes up to 60 percent for short distances. Slopes on the ground-based yarding areas vary from 5–35 percent. Less than 1 percent of the proposed project area is occupied by distinguishable skid trails. Trees and brush are growing within old skid trails, indicating they have partially recovered. The skid trails and old haul roads are generally less than 12 feet in width so the timber stands are fully occupied by tree canopies. The existing rocked road surfaces within the proposed project area are stable. A few sections of natural surfaced roads show signs of limited surface erosion where surface water accumulates and runs down the compacted road surface. No areas were found that had a high risk of contributing large amounts of sediment to streams through surface erosion or mass failure.

The primary management concern with these soils is their low resistance to compaction when moist or wet and their subsequent reduction in infiltration rate when compacted. The off-trail erosion hazard and soil rutting hazard ranges from slight to severe based on ground slope. The majority of the higher hazard areas are located on the South Fork Alsea side of the project area. The steeper slopes in the project area (greater than 35 percent) are poorly suited for ground-based equipment as the harvest type. The proposed new road segments are located on soils and slopes that are moderately suited to road construction which means that some maintenance would be needed to keep the roads in good condition. Proposed harvest activities are located on soils that have a moderate infiltration rate with no layers that imped the downward movement of water.

3.5.2 Environmental Effects

Alternative 1 – No Action

This alternative would result in no change to the affected environment. Existing road densities in both watersheds are in the 5.5 miles per square mile range and have maintenance needs to reduce road surface erosion. Short-term impacts to soils would be avoided.

Alternative 2 – Proposed Action

Compaction, disturbance, and displacement of soil

Following completion of this proposed action, the majority of understory vegetation and root systems would remain, along with surface soil litter and slash from harvested trees. Expected amounts of surface soil displacement, surface erosion, and dry ravel resulting from harvest operations should be minimal in the skyline yarding areas. Some additional soil displacement and compaction may be expected in the ground-based yarding area, but overall the aerial extent and degree would remain below the established RMP guidelines (12 percent or less). Aggregates inside the regeneration harvest unit would account for 16.7 percent of the unit layout.

Roads and Trails

Constructing approximately 5,100 feet of new spur roads would result in loss of top soil and compaction of sub-soil on up to approximately five acres (less than three percent of the total project area). The current forest land would be converted to non-forest land. The roads to be constructed are on gentle topography so the total clearing width would be less than 40 feet. The majority of new road construction is located within the proposed regeneration harvest unit. New construction would be blocked to vehicle traffic following harvest, so some recovery back to a forested condition would occur in this area over time.

Renovation work on the existing road network would result in no change in amount of current non-forest land. Some encroaching vegetation along these older roads would be removed and surface rock may be added. The improvements would provide better drainage and road surface conditions, resulting in less road surface erosion into the surrounding area. The improvement work is expected to result in some minor short-term roadside erosion where established vegetation in the ditch and culvert catchment areas are removed (during the cleaning and reshaping or culvert installment operations). Litter fall accumulations and growth of vegetation generally re-establishes within two seasons and erosion rates return to near natural levels thereafter. The addition of new cross drain culverts and the road surface reshaping would reduce the volume of water flowing on the road surfaces and should result in less future erosion.

Logging

Compaction, disturbance, and displacement of soil

Following completion of the proposed action, the majority of the understory vegetation and root systems would remain, along with surface soil litter and slash from the harvested trees. Two acres of hand piling slash and seven acres of machine piling of slash is also proposed. Expected additional amounts of surface soil displacement, surface erosion, and dry ravel resulting from harvest operations should be minimal. Additional soil compaction can be expected to result from this project. Approximately 2.2 acres in landings (half of this area is located on the road surface), and 0.7 acres in skid trails would be needed. Assuming that all seven acres of machine piling would result in detrimental disturbance, this would result in a cumulative disturbance level of 9.8 percent (1 acre existing disturbance, 1.1 acres in landings, 0.7 acres in skid trails, and 7 acres of machine piling). The aerial extent and degree of disturbance would remain within accepted RMP guidelines of less than 12 percent disturbance.

The estimated reduction in growth rate for trees on moderate to severely impacted areas is 15–30 percent during the first 10–20 years of growth. As trees age and become established, the negative effect on growth from soil compaction and displacement becomes less pronounced and growth rates may approach that of trees on similar, undisturbed sites. This is especially true where the area of compaction and displacement tend to be in narrow strips as is the case with skyline yarding corridors and small landings. If topsoil loss, displacement, and compaction are severe or more broadly based in aerial extent, then the negative effects would be more pronounced and longer lasting.

Approximately 22 landings would be needed to facilitate harvest. Eighteen landings would be used for cable yarding and four landings would be used for ground-based yarding. About half of the surface area used for landings would be on the existing road surface. Some additional ground adjacent to the road surface is used to turn equipment around and to sort and deck logs until transport. Areas where equipment turns or backs around multiple times would experience heavy compaction and disturbance to the top soil layer.

Skyline yarding corridors usually result in light compaction of a narrow strip less than four feet in width. This is especially true for this type of project where logs are relatively small and there would be adequate slash on the ground in the corridors to yard over. Measurable long term effects on site productivity from this type of disturbance are minimal to none.

Ground-based yarding impacts would vary depending on whether a harvester/forwarder system or crawler tractors are used, how dry the soils are when heavy equipment operates on them and how deeply covered with slash, the soils in the yarding trails are. In ground-based skid trails, expect a moderate amount of top soil displacement approximately 12 feet wide and moderate to heavy soil compaction to occur depending on the amount of use. In harvester/forwarder yarding trails, soil displacement is generally minimal to none and soil compaction is light to moderate.

If crawler tractors were used for yarding the entire ground-based area, moderate to heavy soil compaction and a moderate amount of top soil displacement may be expected to occur in skid trails and at landings. If a harvester/forwarder system were used for the entire ground-based area, very little top soil loss or displacement may be expected.

Some of the potentially impacted acreage listed above includes already existing skid trails from previous logging in the late 1930s and 1940s. Where practical, portions of these existing roads would be reused for skid trails for this project.

Site Productivity

With the application of project design features, soil impacts in skyline corridors are expected to experience light compaction in narrow strips (less than four feet in width). The trees in the project area have ample crowns, so there should be adequate slash on the ground to yard over. The effect on overall site productivity from light compaction is expected to be low (no measurable reduction in overall yield for the project area).

For harvester/forwarder systems, with the application of project design features, soil impacts in skid trails are expected to result in light to moderate compaction. The trees in the project area have ample crowns and may provide adequate slash on the ground to yard over. The effect on overall site productivity from light to moderate compaction would be no measurable reduction in overall yield for the project area.

With the application of project design features, soil impacts from tractor yarding are expected to result in moderate to heavy, fairly continuous compaction within the landing areas and the main skid trails. Impacts would be light to moderate and less continuous on less traveled (two trips) portions of skid trails. Worst case expected reduction in productivity for the acres of landings

and skid trails would be a permanent 20 percent reduction in yield. The effect on overall project site productivity resulting from the impacted acres is expected to be less than 3 percent reduction in overall yield for the project area.

These estimates in reductions of overall yield are based on studies and observations done in western Oregon and Washington and are by no means conclusive. Observation and study results vary widely. Studies completed by Weyerhaeuser Company (Miller et al. 1996) and USDA Pacific Northwest Research Station (Ares et al. 2007) indicate that negative effects from compacted soil on growth of young trees become negligible within 8–12 years of planting. Effects from top soil loss or displacement may have more long-term concern than the associated compaction.

The initial severity of compaction and the amount of soil displacement can be reduced when slash and small logs are left in the skid trails and the total number of passes is low (less than 10). With tractor skidding, slash and debris are often displaced from the skid trails upon repeated passes, so additional effort may be needed to ensure slash is adequately placed and replaced onto skid trails. Operating only when soils are dry and soil strength is high would help to reduce the amount of crushing of individual soil aggregates and resulting depth of compaction. Multiple passes on moist or wet soil usually results in heavy compaction.

In ground-based harvest areas, skid trails would be decompacted (if needed), water barred, and have slash placed over them. To avoid damage to existing tree roots, ripping skid trails, as a means to reduce action-relate compaction, would not be done. Soil disturbance and compaction would be limited by yarding on top of slash to the extent practicable, minimizing yarding trails, and authorizing ground-based yarding during periods of low soil moisture.

No measurable amounts of surface erosion are expected from the forested lands treated under this proposed alternative. With timber hauling restricted to periods when no water is flowing on road surfaces, the amount of sediment produced from roads would be negligible to nonexistent. There would be no measurable cumulative impact to soils outside the project area.

Water-barring, blocking, and placing debris on skid trails in the ground-based unit would promote out-slope drainage and prevent water from accumulating in large quantities, running down the trail surface and causing sediment inputs to streams. After several seasons, the accumulated liter fall on the closed surfaces would further reduce the surface erosion potential.

Fuels Treatment

Observations over three decades of burning piled slash (both hand and machine piles) in this portion of the Marys Peak Resource Area has resulted in no evidence of surface erosion. Based on this local experience, no increase in surface erosion is expected from this activity. Burning conditions would be established to ensure that fuel conditions were met that would lead to a low to moderate burn intensity of these areas. With a low to moderate intensity burn these areas would be expected to reestablish vegetation entirely within one to two growing seasons. No burning from either treatment would occur within SPZs to protect water resources and the remaining vegetated buffer would filter out any sediment delivered from upslope areas.

Broadcast burning is completed at a time of the year when soil moistures are higher and the soil is not likely to be impacted by the low intensity heat generated from the burning. This lower heat type of burn does not kill the shallow roots of shrubs and forbs and the short-term flush of nutrients from the ash helps to generate a healthier understory component in the unit. It is not expected that any additional erosion would occur from these units and thus there should be no impact to sediment generation or nutrient levels available to the remaining vegetation which would maintain the productivity of the stand. With slash and existing undergrowth being left on nearly all of the area no measurable amounts of surface erosion are expected from the forested lands treated under this proposed action.

Placement of water bars and blocking off skid trails would promote out-slope drainage and prevent water from accumulating and running down the skid trail surfaces in large enough volumes to cause erosion that could reach streams. A small amount of localized erosion can be expected on some of the tractor skid trails the first year or two following yarding. Eroded soil is not expected to move very far from its source and would be diverted by the water bars or out sloping to spread out in the vegetated areas adjacent to the trails and infiltrate into the ground. After several seasons, the accumulated liter fall on the skid trails would reduce the impact of rain fall droplets on the soil surface further reducing the potential erosion of the skid trails.

Alternative 3 – Regeneration Harvest with Dispersed Green Tree Retention

Compaction, disturbance, and displacement of soil

Following completion of the harvest activities, the majority of understory vegetation and root systems would remain, along with surface soil litter and slash from harvested trees. Expected amounts of surface soil displacement, surface erosion, and dry ravel resulting from harvest operations should be minimal in the skyline yarding areas. Some additional soil displacement and compaction can be expected in the ground-based yarding area, but overall the aerial extent and degree would remain below the established district guidelines (12 percent or less).

Roads and Trails

The proposed road package is identical to those activities in Alternative 2. Refer to the previous section for more information.

Logging

Compaction, disturbance, and displacement of soil

Following completion of this alternative, the majority of the understory vegetation and root systems would remain along with surface soil litter and slash from the harvested trees. Broadcast burning is proposed on the regeneration harvest acres. Five acres of hand piling slash and seven acres of machine piling of slash is also proposed. Expected additional amounts of surface soil displacement, surface erosion, and dry ravel resulting from harvest operations should be minimal. All riparian harvest activities would be completed by the skyline harvest method. Soil compaction levels beyond the existing condition can be expected to result from this project.

Approximately 2.2 acres in landings (half of this area is located on the road surface), and 0.7 acres in skid trails would be needed.

Site Productivity and Fuel Treatments

Impacts are expected to be similar to those described for Alternative 2. Refer to the previous section for more information.

3.5.3 Cumulative Effects

Soil Compaction

Assuming that all seven acres of machine piling would result in detrimental disturbance, this would result in a cumulative detrimental disturbance level of 9.8 percent (1 acre existing disturbance, 1.1 acres in landings, 0.7 acres in skid trails, and 7 acres of machine piling). The aerial extent and degree of disturbance would remain within accepted RMP guidelines of less than 12 percent disturbance.

Road Density

Proposed new road construction is almost split evenly between the two watersheds; the average road density in the South Fork Alsea would remain at 5.8 miles per square mile and average road density in the Upper Muddy Creek watershed would remain at 5.5 miles per square mile.

Site Productivity

The effect on overall project site productivity is expected to be less than three percent reduction in overall yield for the project area. There would be no measurable cumulative impact to the soils resource outside the project area.

Fuels Treatment

Observations over three decades of burning piled slash (both hand and machine piles) in this portion of the Marys Peak Resource Area has resulted in no evidence of surface erosion. Based on this local experience, no increase in surface erosion is expected from this proposed activity. Broadcast burning completed within the prescription does not kill the existing roots and the nutrient release is expected to result in a healthier understory.

3.6 AIR QUALITY, FIRE RISK, AND FUELS MANAGEMENT

3.6.1 Affected Environment

Air Quality

The major source of air pollutants within the project area would come from smoke associated with wildfire starts and resource management activities including prescribed burning (broadcast, hand, machine, and landing piles), logging, log hauling, fossil fuel combustion, and dust from the use of natural-surfaced roads.

The Willamette Valley experiences periods of air stagnation. When this occurs cold air often becomes trapped near the valley floor with slightly warmer air aloft, creating conditions known as temperature inversions. These conditions result in trapping and concentrating air pollutants near the ground. Wintertime temperature inversions contribute to high particulate levels, often due to wood burning for home heating and fossil fuel combustion. Stagnant periods contribute to increases in ozone levels, causing the local air quality to deteriorate. Under the State of Oregon Smoke Management Plan, the Willamette Valley has been classified for the highest level of protection, and has been designated as a Smoke Sensitive Receptor Area.

Fire Hazard and Risk

Northwest Oregon has a temperate marine climate. It is mild and wet in late fall, winter, and early spring. In the Oregon Coast Range Mountains, snowfall accumulation remains at higher elevations (approximately 2,500 feet and above) for an extended period of time, but does not persist for long periods at lower elevations. Summers are warm with periods of dry weather during the months of July, August, and September. Summer mean temperatures during this period average approximately 55–60 degrees Fahrenheit for lows and 75–80 degrees Fahrenheit for highs. Extreme high temperatures reaching into the mid to upper 90s, and occasionally topping 100 degrees Fahrenheit are common, but infrequent and occur for short durations. During average weather years, the conditions under the forest canopy remain relatively moist.

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

Wildfires within the project area have been primarily human-caused. Wildfire risk from humans is higher than compared to lightning because the analysis area is accessible to the general public via paved and rocked roads year around. Dry lightning (lightning that has no accompanying moisture) is uncommon in Northwest Oregon. Over the last ten years, an average of two fires per year were attributed to lightning while seven fires per year were human caused. The average size of lightning fires is approximately one quarter of an acre while the average size of human caused fires is approximately six acres (ODF 2014).

Fire Regime and Condition Class (FRCC)

The Fire Regime classifies the role fire would play across the landscape in the absence of recent human intervention. The Condition Class classifies the degree of departure from the natural fire regime. The modeling predictions for fire regime and condition class are modeled from the LANDFIRE Rapid Assessment Vegetation Model (USDA Forest Service 2007).

According to this model, the analysis area occurs within the Pacific Northwest Forested landscape and the potential natural vegetation groups are Douglas-fir-western hemlock (dry mesic), and Douglas-fir-western hemlock (wet mesic), and falls within two different Fire Regimes. Fire Regime III is characterized by a moderate to low fire return interval with a mixed severity and is associated with south and west facing slopes. More than 75 percent of fires are characterized as mixed or low severity. Fire Regime V is characterized by a low fire return interval with a high severity and is associated with north facing slopes. More than 70 percent of fires are characterized as stand replacement.

The timber stands in the analysis area 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 adjacent to the Rainbow Ridge analysis area affects the Condition Class to such an extent that actions are unlikely to change the Condition Class rating across the landscape.

Timber Stand and Fire History

The pre-settlement fire history of the project 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 Coast Range foothills and up the river corridors is not specifically known. Just to the west of the project area within the South Fork Alsea River watershed, during the period between 1846 and 1853, at least two large wild fires collectively burned through approximately 1,280,000 acres of the central Coast Range. One fire, or more likely a series of fires, burned approximately 800,000 acres of the central Coast Range between the Siuslaw and Siletz Rivers and has been referred to as the Siletz Fire. Another large burn called the Yaquina Fire, burned 480,000 acres in the area between near present day Corvallis to Yaquina Bay. Historical accounts of these fires conflict somewhat but indicate that at least two or three very large fires occurred sometime between 1846 and 1853. During this period it is likely that new starts or holdover fire from the previous year broke out anew in the summer and burned additional acreage, the net effect being that over a million acres of forest in the central Coast Range was burned during the period. Most of the South Fork Alsea watershed area was included in the Yaquina Fire area.

Post-settlement fire history in the analysis area does not document any wildfire occurrence. In the analysis area the 1950 aerial photo shows scattered older trees remaining from pre-1950s harvests. In 1953 the entire northwest corner of the section was resold and the majority of these legacy trees were salvaged. The purchaser was also required to cut all trees less than eight inches

DBH for fire hazard reduction. The oldest stand origination in the section is 1905, which could indicate that a wildfire might have occurred during the late 1800s or early 1900s.

Fire plays a major role as a natural disturbance agent, as do people. Past forest management has shaped the analysis area. Many of the proposed harvest units were previously harvested between the 1940s and late 1970s. In addition, many areas adjacent to the analysis area on private timber land have also been harvested during this time to the present. Harvest areas on BLM-managed land during this period often had been broadcast burned or had spot burning associated with them. Burning primarily occurred for site preparation prior to tree planting but also to reduce the fuel load and limit the potential of a future wildfire.

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

3.6.2 Environmental Effects

Alternative 1 – No Action

Air Quality

Much of the project area would remain open to the general public. Exhaust fumes and dust created from existing vehicle traffic on gravel or natural-surface roads would contribute effects to air quality. These effects would be localized to the immediate vicinity of the project areas.

Under the No Action alternative, there would be no variable retention or regeneration harvest, commercial thinning, density management, road construction or road renovation, log hauling, or any need for prescribed burning and, therefore, no localized effects to air quality. However, as the timber stands continue to grow, the high stocking density and fuel loading would cause the stands to become more susceptible to a stand replacement fire event. In the event of a wildfire, poor air quality would be expected due to the high volume of smoke produced.

Fire 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 (greater than three inch diameters)), and in the smaller size fuel classes, 1 hour fuels (less than 0.25 inch diameter), 10 hour fuels (0.25 to 1 inch diameter), and 100 hour fuels (1 inch to 3 inch diameter)) in these timber stands as stress-induced mortality within the stands increases. The hours correspond to the amount of time it takes the moisture content of individual fuels to reach equilibrium with changes in relative humidity. Ladder fuel densities would increase as additional 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

An increase in vehicle traffic would occur over access roads during the implementation of this project. The increases would be considered short-term while the project is implemented. Fossil fuel combustion and 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 in the project area would increase following timber harvest activities. Post treatment fuels surveys would be conducted and the Stereo Photo Series for Quantifying Forest Residues in Coastal Oregon (Ottmar and Hardy 1989), or the Stereo Photo Series for Quantifying Forest Residues in the Douglas-fir Type of the Willamette National Forest (Ottmar et al. 1990), would be used to help identify areas with increased fuel loads. If these methods determine that an increased fire hazard exists or that fuel reduction is required for site preparation, prescribed burning would be conducted and smoke would be generated.

Broadcast burning, hand and/or machine pile construction and burning in the project areas and logging debris (slash) located near landings, and especially along roads or property lines would be targeted for fuel reduction treatments because these areas have the highest risk of an unplanned ignition or would need site preparation for tree planting. Variable retention harvest areas could be treated with prescribed fire (broadcast burning). This would remove approximately 35 tons of slash per acre or approximately 3,400 total tons from the project area. Within the commercial thinning and density management units, approximately 10 acres of the highest risk areas within the project could be treated with prescribed fire. This would remove approximately 25 tons of slash per acre or approximately 250 total tons from the highest risk areas within the project.

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 Fire Management Plan for the Eugene District BLM, Salem District BLM, Siuslaw National Forest, and the Willamette National Forest (2009). 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 to minimize or eliminate the potential for smoke intrusions. The potential for smoke intrusion would be further reduced by burning under atmospheric conditions that favor good vertical mixing so that smoke and particulate matter is dispersed by upper level atmospheric 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 project units. None of the

treatment units are sufficiently close to any major highways that motorist safety would be affected. The overall effects of smoke on air quality would be local and of short duration. Activities would comply with the provisions of the Clean Air Act.

Fire Hazard and Risk

The fuel load and risk of a fire start would increase and would be greatest during the first year following treatment when needles dry but remain attached to tree limbs. The ability to control a fire would decrease during this period. The modeling predictions for fire behavior (Anderson 1982) based on the National Fire Danger Rating System (NFDRS) fuel models would move the variable retention stands from a Fuel Model 8 (Closed timber litter) to Fuel Model 11 (Light logging slash), or Fuel Model 12 (Medium logging slash). The commercial thinning and density management stands would move from a Fuel Model 8 (Closed timber litter) to Fuel Model 11 (Light 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.

Timber harvest would decrease both the amount of potential ladder fuels and the available fuel density in the canopy (canopy bulk density). The average relative density of the timber stands in project area is approximately 66 percent; the post-harvest relative density is predicted to range between 12 and 31 percent. A relative density of 35–45 percent or lower has been identified as the point where canopy bulk density is unlikely to sustain a high intensity crown fire (Agee 1996). The silviculture analysis for all of the units in the area indicates that relative densities would fall 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 areas that require site preparation for tree planting. Surface fuels would be reduced in variable retention areas and in strategic locations within commercial thinning and density management areas along roads, property lines, and at landings. The treatments would result 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 all of the treatment areas, however due to decreased crown density, a reduction in ladder fuels, and hazardous fuels reduction treatments, containment of wildfires at less than 10 acres in size should continue to be attainable during initial attack.

At the completion of harvest operations, fuels surveys would be conducted and project locations identified as containing hazardous fuel loads, or areas needing site preparation may be targeted for hand or machine slash piling and burning, or broadcast burning. Hand or machine piles may be constructed along roads or property lines, and at landings. If fuel loads are relatively light along roads and property lines, slash pullback may be incorporated as the desired fuels treatment.

Alternative 3 – Regeneration Harvest with Dispersed Green Tree Retention

Air Quality

The effects to air quality under Alternative 3 would be similar to those identified above for Alternative 2.

An increase in vehicle traffic would occur over access roads during implementation. Fossil fuel combustion and dust created would contribute short-term (during project work) effects to air quality.

Logging debris (slash) located near landings, along roads or property lines, within regeneration harvest units, in commercial thinning, density management, and patch cut harvest areas, would be broadcast burned, or hand or machine piled and targeted for fuel reduction treatments because these areas have the highest risk of an unplanned ignition or would need site preparation for tree planting.

Following treatments, the fuel load would increase. Post treatment fuels surveys would be conducted, and if these surveys determine that an increased fire hazard exists, or that site preparation for tree planting is required, prescribed burning would be conducted and smoke would be generated. The increases would be considered short-term while the project is implemented. These effects would be localized to the immediate vicinity of the operations.

Within the regeneration harvest area, approximately 85 acres could be treated with prescribed fire (broadcast burning). This would remove approximately 35 tons of slash per acre or approximately 3000 total tons from project area. Within the commercial thinning and density management unit approximately 15 acres of the highest risk areas within the project could be treated with prescribed fire. This would remove approximately 25 tons of slash per acre or approximately 375 total tons from the highest risk areas within the project.

Fire Hazard and Risk

Following treatments the fuel load and risk of a fire start would increase and would be greatest during the first year following treatment when needles dry but remain attached to tree limbs. The ability to control a fire would decrease during this period as a result of the proposed action. The modeling predictions for fire behavior (Anderson, April 1982) based on the National Fire Danger Rating System (NFDRS) fuel models would not change from the current Fuel Model 8 (Closed timber litter). All treatment areas would see a short-term (0–5 year) increase in fire ignition potential because of the increase in fine dead fuels.

The project proposes to reduce the risk of a fire by decreasing the fuel load around released wildlife trees. 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 areas where wildlife trees are released, but containment of wildfires at less than 10 acres in size should continue to be attainable during initial attack.

At the completion of the project, fuels surveys would be conducted and project locations identified as containing hazardous fuels may be targeted for handpiling. Handpiles may be constructed adjacent to released wildlife trees. If fuel loads are relatively light, slash pullback may be incorporated as the desired fuels treatment.

3.6.3 Cumulative Effects

There would be no cumulative effects to air resources, as the direct and indirect effects from the projects would be local and of short duration. No other effects in the project areas affecting this resource are anticipated. Based on past experience with broadcast burning and pile burning within this habitat type and 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 (0–5 years). In the timber management areas, the hazard and risk of fire would be minimized by the use of fuels reduction treatments. The localized increase in fire risk would diminish 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 treatment of approximately 144 acres of forest habitat would have very little effect on fire intensity or starts. However, due to reduced canopy density and ladder fuels, the potential for the stand to carry a crown fire would be reduced in the long term (greater than five years).

3.7 RECREATION, RURAL INTERFACE, VISUAL RESOURCE MANAGEMENT

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

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 visual resources?

3.7.1 Affected Environment

Recreation

Recreational opportunities within the project area consist of hunting, shooting, small forest product collection (primarily mushrooms), forest driving, and camping during the hunting seasons. Use takes place primarily in the fall for hunting activities and early spring for

mushroom collection. The project area does not reflect extensive recreational use. However, landing sites on private lands that have been recently harvested are receiving noticeable use in the form of target shooting. This is apparent with the number of targets, shell casings, and other objects left behind following the activity.

Visual Resource Management

Visual resources consist of the land, water, vegetation, structures and other features that make up the scenery and physical features visible on a landscape. All Salem District BLM-administered lands have been classified under a Visual Resource Management (VRM) class system that was established by BLM during the last planning effort in the early 1990s. In 2014 the BLM Salem District re-inventoried for current scenic values and categorized BLM lands into Visual Resource Inventory (VRI) classes derived from individual visual resource components. A VRI class is determined by overlaying the ratings of scenic quality (A, B, or C), public sensitivity to changes in visual character (H, M, or L), and distance zones as seen from major viewing platforms or travel routes (foreground-middle ground, background, or seldom seen). The foreground-middle ground zone includes areas seen from less than 3 miles away. Visible areas beyond 3 miles but usually less than 15 miles away are in the background zone. Areas either hidden from view or beyond 15 miles are in the seldom-seen zone (BLM Handbook H-8410).

BLM Salem District Resource Management Plan Guidance for Visual Resource Management provides the following specific guidance:

Lands within the project area fall under VRM Class IV, as assigned in the existing RMP. As visual contrasts in line, form, color and texture under this class may be strong; no specific visual management constraints would apply to management actions. However, mitigation of visual impacts would be incorporated where consistent with efficient timber harvest and other management activities (RMP pp. 36–37)

VRM Class IV objectives provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention (RMP p. 37). Regeneration harvest is an example of an allowable management activity in VRM Class IV that may dominate the landscape.

The RMP states that every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements of line, form, color, and texture (RMP p. 37). These objectives do not apply on private residential lands or commercial timber land. The environmental effects section of this report describes how the Rainbow Ridge timber sale meets RMP direction for VRM class IV and how it would affect the visual quality of the landscape as seen from locations frequently visited and traveled by the public. Project Design Features that help minimize the visual impacts of the harvest are also discussed.

Rainbow Ridge project area

Situated approximately eight air miles west of Monroe, Oregon, in Benton County, the area is characterized as rural with small communities separated by agriculture lands and managed forests. The landscape exhibits extensive forest management on the rolling hills of the eastern slopes and hilltops of the Coast Range. The Willamette Valley is located east of the project area. The overall VRI Class rating for the project area is Class IV. This rating resulted from the overlap of a Scenic Quality Rating of B, which factors in the timber management landscape, coupled with low Visual Sensitivity to change and the foreground-middle ground and background Distance Zones from the nearest Inventory Observation Points.

Views of the project area are primarily available when traveling west on Alpine Road near the hamlet of Alpine, Oregon, when traveling south along Highway 99W, and when recreational users travel to the South Fork Alsea Falls National Back Country Byway and Alsea Falls Recreation Areas. The viewable landscape from this area covers approximately 38 acres on the eastern side of the Rainbow Ridge timber sale; however, roadside trees, buildings, dips, and rises in the valley bottom can hide the harvest site from view.

The foreground and middle ground is predominately agricultural fields bordered by deciduous trees and shrubs, and as the lands become less flat within the middle ground, the vegetation includes conifer species. The background landscape consists of forest lands managed for timber harvest. The background landscape could be described as a quilt-like pattern with each parcel consisting of a different-aged stand defined by straight lines that may run vertically on facing slopes creating unnatural contrast of color and texture or may create horizontal patterns that flow with the landforms. The varying stand ages and heights provide various textures and colors to the landscape from browns of freshly harvested units to a wide range of greens as planted parcels age.

Key Observation Points

The BLM identified seven Key Observation Points (KOPs), where the project area is viewable to the casual observer, to analyze the potential effect of the project on the characteristic landscape (Appendix F, Table 3–21). The BLM determined that KOPs 4 and 5 provided the longest duration and most direct view of the project area. With the exception of KOP 3, the project area was located outside the travelers' field of view and not substantially noticeable from the remaining KOPs. The BLM completed visual contrast rating worksheets for KOPs 4 and 5. These worksheets document the basic elements of color, form, line, and texture that characterize the view of a landscape, and are used to describe impacts and plan mitigation measures.

Table 3-21. Key Observation Point Summary

KOP Number	Distance between KOP and Project	Remarks
1	12 mi	Initial view of agricultural field bordered by deciduous trees. Colors include browns, shades of green, and gray of roadway. Approximately 30-40 degrees off of travel path outside average view scape of traveler. Views interrupted within 1 to 2 minutes depending on rate of travel.
2	9.5 mi	Agricultural field bordered by deciduous trees on relatively flat landscape. Project area considered background view mosaic patterned landscape due to extensive logging activity. Approximately 20-30 degrees off of travel path on edge of travel view scape. Views interrupted within 1 to 2 minutes depending on rate of travel.
3	7.6 mi	Pull out/stockpile area near railroad tracks. Project area in immediate line of sight while traveling roadway. Gray roadway, brown and green grasses, varying shades of green for shrubs, trees, and view of hillside showing extensive timber production. While traveling, initial view for 30 seconds then viewable for approximately 1 minute intervals every few minutes.
4	4.4 mi	Intersection of Alpine Road and Bellfountain Road. Highly modified with power lines, signs, and manicured lawns. Direct views of project area with power lines crossing the hillside in numerous locations. Colors include gray of roadway, green and silver of signs, mailboxes, greens and browns of grasses and freshly mowed fields. A strong line is across the landscape formed by lighter green of private forestland boundary and the BLM managed harvest area. Additional strong line features where power lines dissect the view of the project area. Residential area, views of project area may be constant. Views while traveling would be approximately 5 minutes, depending on rate of travel.
5	2.5 mi	Intersection of Alpine Road and Green Peak Road. If traveling west on Alpine Road views would be 10 to 20 degrees off from center of roadway. Same background scene as KOP 4 but closer proximity shows hillside landscape is mottled with various aged forest stands showing extensive forest and timber management throughout the area. Ridge line has multi-level appearance with varying tree heights and different shades of greens and browns with different age classes of trees. Foreground is brown and green for agricultural and farming fields. Residences in area, views may be constant. Views while traveling would be approximately 3 minutes, depending on rate of travel.
6	5.1 mi	Bellfountain Road and Reese Creek. Views to the project area broken by tall vegetation along the roadway and well outside the normal sight line of the traveler. Foreground is agricultural fields surrounded by deciduous trees, backed by conifers and the mosaic of lands managed heavily for forest production. The management activities are obvious with strong lines a shapes formed by numerous stand ages from freshly harvested to older more established forest lands. Ridgelines are stepped as different stand ages appear at different levels on the horizon. Varying shades of green and brown in association with timber harvest activities, the older the stand the darker green appearance, young stands are a lighter green. Intermittent views due to vegetation and topography. Residents may have views depending on house position in comparison to vegetation and topography.
7	8.2 mi	Dawson Road and Hwy 99W. Initial view of farmland and red barn with silver roof backed by greens of deciduous trees. Background shows a number of harvest units defined by straight lines and different degrees of vegetative growth. The barn and roadway catch the travelers' attention; the background hillside is seen but does not draw attention.

Other Resources

There are no federally designated Wild and Scenic Rivers, wilderness, or rural interface lands within the project area.

3.7.2 Environmental Effects

Alternative 1 – No Action

Recreation

Hunting, forest driving, dispersed camping, and harvesting of special forest products are the primary recreational activities found within the project area. Under the no action alternative, these activities would continue to take place within the project area. Any changes in recreational use would be dependent upon factors other than BLM land management activities therefore there would be no effects to the recreational users under this alternative.

Visual Resource Management

Visual effects associated with the No Action alternative would include the continuance of existing BLM management activities in the project area. The BLM would expect the project area to remain in the current condition of continued stand progression unless natural or catastrophic events were to occur. The BLM anticipates landscape changes which may affect visual qualities within the project area to persist following timber management activities on patchwork, privately owned forest lands.

Alternative 2 – Proposed Action

Recreation

The proposed action applies the concept of ecological forestry which includes commercial thinning, density management and regeneration harvest prescriptions to increase stand diversity within the project area. Providing a more ecologically diverse stand would increase recreational values within the project area. Stand diversity could provide for additional opportunities such as watchable wildlife and bird watching.

Hunting activities in the analysis area would not be substantially affected by the proposed action. Regeneration harvest and thinning operations would alter the understory shrub layer providing for additional early-seral habitat and reduce overstory canopy which would provide additional light to the understory, operations would conceivably improve forage conditions for deer and elk. However, forage for deer and elk is not limiting and these animals move considerable distances so whether they are in a given area during hunting season or not would not be affected by the proposed project.

Dispersed camping typically occurs on older landings or along little traveled roads such as logging spurs from previous harvests and is usually done in association with hunting. Some of these spurs or roads may be reused for harvest operations which may deter some users. These camping places are common and would only be unavailable for a few weeks during harvest (most of which would occur during the summer and fall months before and during large game hunting seasons). The overall amount and quality of camping opportunities would not be appreciably diminished by the proposed action.

Heavy truck traffic along the South Fork Alsea Back Country Byway associated with the proposed action could potentially cause conflicts with the motoring public, especially near the Alsea Falls Campground. Most pleasure driving and camping occurs on weekends during good weather. However, during the summer months there is more recreational activity mid-week than during other times of the year. The level of conflict is expected to be low; generally nothing beyond short-term inconvenience occurs in the vicinity of log truck traffic.

Visual Resource Management

Within 5 years after harvest

Immediately after harvest, landscape appearance would consist of aggregated green tree retention (or clumps) along the ridgeline with additional green tree retention scattered at a density of approximately one tree per acre (roughly 200 feet apart) throughout project area. The visible green tree clumps comprise approximately 11 acres (5 acres along the northern boundary, 1.2 acres in the area of the ridge top and the 5 acres within a no-cut area) of the 38 visible acres. The ridge line would become jagged in appearance due to the aggregate clumps and scattered green tree retention on the remaining visible acres against the skyline. There would be treatment on approximately 27 viewable acres.

Initially following harvest activities slash, excess limbs and tree tops, would be scattered across the landscape. This material will quickly change from the initial greens and greys of the living tree to browns and reds as the plant material dries and decomposes. As a means to reduce fuel loading within the harvested units, it is expected that broadcast burning would occur. Broadcast burning would be conducted when the moisture levels of the downed material and surrounding environment are at the appropriate levels to ensure a low intensity burn. Maintaining the low intensity fire promotes the consumption of the slash material while limiting the potential of causing damage to the seed bed of the grasses and shrubs currently existing. The broadcast burning is considered a means of site preparation for planting of seedlings within the unit.

Initially following site-preparation for planting (broadcast burning) the viewable area would consist of darker browns to black across the burned area for a short period of time (generally less than five years). As discussed in Section 3.6 of this EA, a burn plan would be completed prior to any burning and would comply with applicable rules and regulations. As lower intensity burning promotes development of native grasses and vegetation, the area will begin sprouting and ground coloration would move from the brown and black to the brighter green of new growth and continue to progress as the planted saplings develop.

It is expected the project area would have a medium contrast line as the neighboring landscape consists of freshly harvested stands and young stands of varying age classes. Color variations of brown and green following harvest activities are common on the landscape. Following harvest, the ridge line would have a bumpy or jagged appearance due to remaining taller trees. The taller trees would contrast with neighboring units that have been completely harvested and replanted; the single aged stand structure in each unit maintains the smooth appearance of the ridge line.

The proposed action would not cause any change in the overall VRI Class rating or any of its components. The area would retain the features of the surrounding landscape which is comprised of a patchwork pattern with harvested and intact conifer stands of varying stand ages. The project area has been previously graded as possessing low visual quality; the proposed action would not contribute to heightened sensitivity levels or cause the scenic quality of the overall landscape to change.

5 years after harvest

After five years, naturally regenerated trees and those seedlings planted after harvest would provide additional texture to the landscape as tree and shrub species continue to develop.

Project Design Features

Project design features include leaving green tree aggregates, retaining one per acre on the remaining regeneration acres, and replanting to a density of 150–200 trees per acre, which would help to minimize visual impacts for the long term. Leaving green trees across the visible area contributes to texture and color by more closely mimicking a natural disturbance than adjacent intensively managed private forestland. Planting following harvest would accelerate stand progression in comparison to natural seeding, creating a multi-storied stand and lessen the timeline for the project area to gain structure as the seedlings grow.

Alternative 3 – Regeneration Harvest with Dispersed Green Tree Retention

Recreation

The effects within Alternative 3 are the same as those described in Alternative 2 with the exception of fewer open areas. This alternative would likely not increase additional opportunities for watchable wildlife or bird watching potential.

Visual Resource Management

Within 5 years after harvest

Instead of favoring aggregated retention, this alternative would favor dispersed green tree retention at a rate of 9 to 11 trees per acre across the visible area. The remaining trees would be scattered, somewhat retaining the dome shape of the hilltop. The ridge line would become more

bristly in appearance than Alternative 2 due to the profile of the remaining dispersed trees against the skyline.

5 years after harvest

The strong line between the private harvested land and the BLM managed land would be softened over time as the young stand in front of the project area grows. The texture of the slope facing KOP 5 would become blotchy, but closure of the canopy would be accelerated because of the additional growing space between trees and less competition, and the color would become more consistent.

The proposed action would not cause any change in the overall VRI Class rating or any of its components. The area would retain the features of the surrounding landscape which is comprised of a patchwork pattern with harvested and intact conifer stands of varying stand ages. The project area has been previously graded as possessing low visual quality; the proposed action would not contribute to heightened sensitivity levels or cause the scenic quality of the overall landscape to change.

3.7.3 Cumulative Effects

Driving for Pleasure and Sightseeing

The scope considered for pleasure driving and sightseeing includes those lands within the analysis area. Travel through the analysis area consists of paved roadways and highways used for commuting, leisure travel, and accessing communities and recreational opportunities.

Past, present and reasonably foreseeable future actions that affect pleasure driving and sightseeing would consist of continued forest management on private and public lands. It is expected that travelers will continue to see harvested, newly planted, and varying aged stands across the landscape within the analysis area.

Special Forest Product Collection

There are no past, present, or reasonably foreseeable actions that would affect special forest product collection within the analysis area.

Dispersed Recreation Use

Dispersed recreation use within the analysis area would consist primarily of hunting and dispersed camping in association with hunting activities.

Past actions within the analysis area consist of timber harvest on private land holdings. Actions have provided landings and open areas that are currently being used as dispersed camping sites, primarily during big game hunting seasons, and areas where target shooting is taking place.

There are no present or reasonably foreseeable future actions that would substantially affect hunting or dispersed camping opportunities within the analysis area.

Visual Resource Management

The area analyzed for cumulative effects includes the entire view of the ridge from KOPs 4 and 5. KOPs 4 and 5 were determined to reflect the views of the remaining KOPs and were chosen to represent the overall visual analysis. Approximately 38 acres of the proposed harvest area would be visible from these KOPs. The entire viewshed from all seven KOPs repeats the same elements as those present in KOP 4 and 5 and did not provide a meaningful scale for comparison of cumulative visual effects (see Table 1).

The cumulative effect of either alternative would change the color and texture of approximately one-third of the ridgeline, more closely resembling the existing two-thirds visible from KOP 5 and the entire visible ridgeline from KOP 4. The cumulative effects to the form of the landscape, lines between ownerships and harvested areas will be softened. Texture of the harvested area within the first 3-5 years would be mottled until the understory and early-seral vegetation fills the gaps. Various landowners with varying land management objectives (e.g., timber harvest and agriculture) and natural events such as fires and high winds will maintain the ever-changing, patchwork pattern on the landscape over time, thus maintaining the overall VRI Class IV rating.

Past, present and reasonably foreseeable future actions across the landscape consist of extensive forest management and agricultural practices, creating a mosaic of colors, patterns, and textures on hillsides and the valley floor. The Rainbow Ridge timber sale is a forest management activity that fits within this mosaic pattern. The project would not substantially change the appearance of the larger landscape because it is similar to the type and size of forest management activities that occur in the area. Many of these hillsides have recently been harvested and replanted. Replanted stands tend to consist of brighter green colors that darken as the stand ages.

The project would not cause any change in the overall VRI Class rating or any of its components. The area would retain the features of the surrounding landscape which is comprised of a patchwork pattern with harvested and intact conifer stands of varying stand ages. The project area has been previously graded as possessing low visual quality; the project would not contribute to heightened sensitivity levels or cause the scenic quality of the overall landscape to change.

3.8 CARBON SEQUESTRATION AND CLIMATE CHANGE

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

The Rainbow Ridge timber sale contains both regeneration harvest and thinning harvest components. 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), and Bottleneck Late Successional Reserve Enhancement (2010)). In the table below, the stands analyzed for thinning in the Rainbow Ridge EA are compared to the projects listed above.

Table 3-22. Comparison of Rainbow Ridge stands proposed for thinning to Projects with Project Level Carbon and Climate Change Analyses

Project	Rainbow Ridge	Bottleneck LSR	Upper Siletz Watershed	Upper-Lower Alsea Watershed
Stand Type	Douglas-fir	Douglas-fir	Douglas-fir	Douglas-fir
Stand Age[1]	41	68	55	57
Prescription BA[2]	110–150	139	115	–
Prescription TPA[3]	42–100	56	43	44
C Storage, No Action[4]	Not Analyzed	260	110	256
C Storage, Proposed Action[5]	Not Analyzed	60	32	58
C Storage, Proposed Action, percent of No Action	Not Analyzed	23%	29%	23%

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

In 2012, the BLM completed a site-specific analysis for a regeneration harvest project (the Rickard Creek timber sale). Attributes of the Rainbow Ridge timber sale and the Rickard Creek timber sale are compared on the following page in Table 3–23.

Table 3-23. Comparison of Rainbow Ridge Stands to the Rickard Creek timber sale

Project	Rainbow Ridge	Rickard Creek
Stand Type	Douglas-fir	Douglas-fir
Stand Age	58–67	80
Acres of regeneration harvest	87	92
Initial BA	290	305
Initial TPA	141	131
C Storage, No Action[1]	Not Analyzed	26,500
C Storage, Proposed Action[5]	Not Analyzed	22,000
C Storage, Proposed Action, percent of No Action	Not Analyzed	83%

[1] 80 year analysis period, in tonnes

Because of the similarity between previous analyses and their similar stands and treatments analyzed in the Rainbow Ridge Timber Sale 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.
- 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 less 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.

4.0 COMPLIANCE WITH THE AQUATIC CONSERVATION STRATEGY

Project Area Watersheds

The project area lies in headwaters of the Upper South Fork of the Alsea River sixth-field watershed (HUC# 171002050101) and Upper Muddy Creek sixth-field watershed (HUC# 170900030206). Tributaries in the western section of the project area discharge into an unnamed second order tributary of the South Fork Alsea River, while the small portion of the project area on the east side of the divide drains towards Howell and Rambo Creeks, but there are no channels present in the project area.

Review of Aquatic Conservation Strategy Compliance

Review of this analysis indicates that the project meets the Aquatic Conservation Strategy (ACS). The following shows how the project complies with the four components of the ACS.

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. Proposed activities within the Riparian Reserves are intended to enhance riparian condition. No new road construction would occur within Riparian Reserves.

Component 2 – Key Watershed: The Rainbow Ridge timber sale is not within any key watersheds.

Component 3 – Watershed Analysis: The Benton Foothills Watershed Analysis (1997) describes the events that contributed to the current condition such as early hunting and gathering by aboriginal inhabitants, road building, agriculture, wildfire, and timber harvest. The following are watershed analysis findings that apply to or are components of this project:

- Historically, landslide frequency has been low. Although harvest activities are expected to increase due to the land use allocation, substantial increases in land sliding rates are not expected (p. 4).

- Surface erosion is accelerated when low growing ground cover and/or duff layer are removed. Thinning, regeneration harvest, and spring burning for site preparation leave the majority of the soil surface protected or undisturbed (p. 4).

- Riparian Reserves in the project area watersheds lack older forest characteristics. Approximately three-quarters of the Riparian Reserves are in early and mid-seral age stands. Many of these stands tend to be overstocked and lack vertical structure. Density management would benefit structural diversity (p. 7).

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

- Water quality conditions in the forested uplands appear to be generally good, but there is little data to verify this. The parameter of greatest concern is turbidity and suspended sediment, particularly chronic inputs of fine sediments from road and trail surfaces (p. 12).

- Dispersal by highly mobile wildlife species and habitat to allow dispersal to adjacent areas is not a significant issue within the analysis area (p. 13).

- The watershed analysis identified regeneration harvest as a tool for forest management in this watershed. A high amount of acreage currently in the 60 year age class is moving into the 70 year age class next decade and would be potentially available for regeneration harvest. More than a decade has passed since completion of the watershed analysis and the stand age for the regeneration harvest has moved into the 70 year age class (p. 14).

- Drainage structures on many of the BLM-controlled roads are deteriorating and/or are inadequately sized for 100-year flood events (p. 16). Replacement of failing culverts is included in the Rainbow Ridge timber sale.

- New road construction is avoided in Riparian Reserves to meet ACS objectives (p. 17). The current planning process for new road construction requires the involvement of affected resource specialists, including the hydrologist, soils scientist, botanist, wildlife biologist and/or aquatic biologist, and road engineer. At the present time, the BMPs are being used to assist in determining road locations, general road design features, design of cross drains and stream crossings, as well as the actual road construction.

Component 4 – Watershed Restoration:

Road renovation would improve habitat conditions for native fish species and assist in restoring and improving ecological health of watersheds and aquatic systems by replacing failing culverts and reducing road related impacts for the long-term restoration of the aquatic system.

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

Attainment of Aquatic Conservation Strategy Objectives within the Riparian Reserves

Approximately nine acres (six percent) of Alternative 2 project area is within the Riparian Reserves boundaries. From the SPZ to the upper edge of the Riparian Reserve, stand density

would be reduced using a prescription for wider and more variable thinning than that used on the adjacent ground-based upland forest. Habitat for aquatic and riparian dependent species would be maintained or enhanced in Riparian Reserves in the following ways:

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

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

Maintenance of stream temperature through shading

Stream shading would not be affected by the proposed treatments. Stream Shading Sufficiency Analysis (USDA, USFS et al. 2004) 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. Additional criteria required for shade sufficient to maintain stream temperatures include high vegetation density that would benefit from thinning and vegetation treatment in the secondary shade zone (from the primary shade zone to approximately one tree height from the stream) would not result in canopy reduction below 50 percent.

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

From research on the BLM Western Oregon Density Management Study (Ares et al. 2009 and Olson and Rugger 2007), thinning affects vegetation structure by increasing cover of grasses and forbs and increasing species richness, a measure of diversity. Richness increased because forest floor herb species typically found under forest canopies remained and flourished, and were joined by open-site herbs and grasses not typically found under forest canopies. In the six year period following treatment plant communities transitioned from an increased cover of species associated with open sites and early-seral stages, to a greater proportion of shade-tolerant forest floor species. Davis and Puettman (2009) analyzed data from the Young Stand Thinning and Diversity Study on the Willamette National Forest. They found that thinning resulted in initial declines of bryophytes and shrubs, but recovery within five years. Herbs displayed little initial response, but a release of early-seral species was evident in the thinned stands by 5–7 years post treatment.

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

Research (Ares et al. 2009, 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. 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.

Consistency with the Nine Aquatic Conservation Strategy Objectives

1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

Does not prevent the attainment of ***ACSO 1***. Addressed in Text (*EA section 3.3 and 3.4*). In summary:

No Action Alternative: The No Action alternative would maintain the development of the existing vegetation and associated stand structure at its present rate. The current distribution, diversity and complexity of watershed and landscape-scale features would be maintained. Faster restoration of distribution, diversity, and complexity of watershed and landscape features would not occur.

Action Alternatives: Density management through the creation of small gaps around dominant overstory and legacy trees would create stand structural diversity. Cutting trees adjacent to legacy trees would be designed to restore available light and growing space to the declining live crown of the legacy trees while maintaining existing snags, minor tree species, and shrubs sooner than would result from the No Action Alternative.

Woody debris would continue to fall from within the untreated SPZ, and short-term recruitment of the existing CWD is expected to be largely maintained. Therefore, the proposed actions are not expected to cause any short term effects to aquatic habitat at the site or downstream.

Proposed density management is anticipated to increase the average size of the remaining trees by up to three inches (or 68 percent) within 30 years post-treatment (Snook 2014). As the treated stands reach heights of 200 feet, the larger diameter wood could be recruited from farther up the slopes to stream channels. In the long-term, beneficial growth in the size of trees in eastside Riparian Reserves could beneficially affect LWD recruitment to the stream channel, thus potentially improving the quality/complexity of aquatic habitat adjacent to the treatment areas.

Since Riparian Reserves provide travel corridors and resources for aquatic, riparian dependent and other late-successional associated plants and animals, the increased structural and plant diversity would ensure protection of aquatic systems by maintaining and restoring the distribution, diversity, and complexity of watershed and landscape features.

1. Maintain and restore spatial and temporal connectivity within and between watersheds.

Does not prevent the attainment of ***ACSO 2***. Addressed in Text (*EA sections 3.3 and 3.4*). In summary:

No Action Alternative: The No Action alternative would have little effect on connectivity except in the long term within the watersheds.

Action Alternatives: Long-term connectivity of terrestrial watershed features would be improved by enhancing conditions for stand structure development. In time, the Riparian Reserves 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 Reserves develops late-successional characteristics, lateral, longitudinal and drainage connectivity would be restored.

2. 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 3.4*). In summary:

No Action Alternative: It is assumed that the current physical integrity would be maintained.

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 area. These zones were determined in the field by BLM personnel following the protocol outlined in the RMP and the Northwest Forest Plan Temperature Implementation Strategies (2005). No cut stream buffers extend a minimum of 70 feet on thinning treatments and 210 feet on variable retention harvest units from all stream channels and to the extent of the riparian vegetation around "wet areas". This zone would be extended upslope during field surveys as deemed necessary to protect aquatic resources. This determination was based on site features such as floodplains, slope breaks, slope stability, water tables, vegetation heights, etc.

Road construction, renovation, and maintenance activities (brushing, blading, spot rocking) are unlikely to measurably impact channel morphology or water quality over the long term because the activities all take place on established roads that are elevated above stream channels.

3. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems.

Does not prevent the attainment of ***ACSO 4***. Addressed in Text (*EA section 3.4*). In summary:

No Action Alternative: It is assumed that the current condition of the water quality would be maintained.

Action Alternatives: Stream temperature: Stream shading would exceed the widths recommended to maintain a minimum of 80 percent effective shade, resulting in no change to water temperature. Based on field observations (current streamside vegetation that is overhanging the stream and valley topography that blocks the sun in the hottest part of the day appear adequate to shade surface waters during summer base flow), it is likely that stream temperatures consistently meet the Oregon state standard (18 degrees Celsius) for these waters.

4. Maintain and restore the sediment regime under which aquatic ecosystems evolved.

Does not prevent the attainment of ***ACSO 5***. Addressed in Text (*EA section 3.4*). In summary:

No Action Alternative: It is assumed that the current levels of sediment into streams would be maintained.

Action Alternatives: The creation of new ridgetop roads, yarding corridors, and the mechanical removal of trees are unlikely to substantially increase sedimentation into project area streams because harvest-generated slash would be maintained in the yarding corridors, minimizing the need for machines to travel on bare soil. Also, ground-based yarding would only occur on slopes less than 35 percent (limited ground-based operations of cutting, processing, and decking may occur on slopes up to 45 percent). Tree removal is not proposed on steep, unstable slopes where the potential for mass wasting adjacent to streams is high. Therefore, increases in sediment delivery to streams and mass wasting are unlikely to result from the proposed action.

In addition, SPZs in riparian areas have high surface roughness, which can function to trap any overland flow and sediment before reaching 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.

The proposed no cut buffers, operating on residual slash, and use of existing skid trails would keep sediment movement to a minimum. As the proposed action is not likely to measurably alter water quality characteristics at the treatment sites, it would be unlikely to affect aquatic habitat downstream from the project area.

The potential for timber hauling to generate road sediment is minimized by PDFs that restrict winter haul to rocked road surfaces and any native surface roads would be restricted to dry season use only. Also, hauling operations would be suspended if weather or environmental conditions pose an imminent risk of road sediment flowing in ditches.

5. Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing.

Does not prevent the attainment of ***ACSO 6***. Addressed in Text (*EA section 3.4*). In summary:

No Action Alternative: No change in in-streams flows would be anticipated.

Action Alternatives: The risk of increases to peak flows falls well below the potential risk of peak flow enhancement based on the Grant (2008) process. The risk of peak flow enhancement based on the proposed management activity was determined to be fall below the level of natural channel responses and is not expected to be measurable either in the project watersheds or downstream of the project watershed.

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". Stream buffers extend a minimum of 70 feet on thinning treatments and 210 feet on variable retention harvest units from stream channels and to the extent of the riparian vegetation around "wet areas". This zone would be extended upslope during field surveys as deemed necessary to protect aquatic resources.

6. 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 3.4*). In summary:

No Action Alternative: No change in in-streams flows would be anticipated.

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) in the project area. These zones were determined in the field by BLM personnel following the protocol outlined in the RMP and the Northwest Forest Plan Temperature Implementation Strategies (2005). Stream buffers extend a minimum of 70 feet on thinning treatments and 210 feet on variable retention units from stream channels and to the extent of the riparian vegetation around "wet areas". This zone would be extended upslope during field surveys as deemed necessary to protect aquatic resources. This determination was based on site features such as floodplains, slope breaks, slope stability, water tables, and vegetation heights.

7. 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 3.4*). 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.

Action Alternatives: Riparian areas closest to streams would be excluded from treatment during the project by designating SPZs, and only the upslope portions of the Riparian Reserves would be included in the density management treatment. Riparian Reserves would be excluded from the regeneration harvest and commercial thinning treatment.

8. 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 3.4*). 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.

Action Alternatives: Habitat to support well distributed riparian-dependent and riparian associated species would be restored by reducing overstocked stands, moderating tree species diversity, altering forest structural characteristics, and amending CWD conditions.

5.0 CONTACTS AND CONSULTATION

5.1 ESA SECTION 7 CONSULTATION

United States Fish and Wildlife Service (USFWS)

Due to potential affects to marbled murrelets and their designated critical habitat, consultation is required in accordance with Section 7(a) of the Endangered Species Act. Consultation for the proposed action has been addressed by inclusion 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 2015 and 2016. This proposed action has been designed to incorporate all appropriate design standards included in the BA. The BLM received A Letter of Concurrence (01EOFW00-2014-I-0234) from the Service on September 23, 2014, 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)

No effects are anticipated to UWR Spring Chinook salmon, UWR steelhead, Oregon chub, and OC coho salmon in either watershed due to distance to occupied habitat; therefore, no ESA consultation is warranted.

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 treatment area is at least 1.5 miles from nearest habitat utilized by coho salmon in the South Fork Alsea River and 26 miles from nearest habitat utilized by chinook and coho in the Marys River (Streamnet 2009). Based on distance of vegetation treatment activities from occupied habitat proposed Project 1 would have no effects on EFH. Consultation with NOAA NMFS on EFH is not required for these projects.

5.2 CULTURAL RESOURCES – SECTION 106 CONSULTATION

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 assesses the significance of the discovery.

5.3 PUBLIC SCOPING AND NOTIFICATION

For information on project scoping early in the project planning process, see EA section 1.6.

The Revised EA and draft FONSI will be available for public review from July 8, 2015 to July 22, 2015 and posted at the Salem District website at http://www.blm.gov/or/districts/salem/plans. The notice for public comment will be published in a legal notice in the Benton County Gazette-Times newspaper. Written comments should be addressed to Tessa Teems, Field Manager, or Stefanie Larew, Project Lead, 1717 Fabry Road SE, Salem, Oregon, 97306. Comments may also be e-mailed to blm_or_sa_mail@blm.gov or faxed to (503) 375-5622.

6.0 MAJOR SOURCES

6.1 LIST OF PREPARERS

Name	Resource
Debra Drake	Outdoor Recreation Specialist
Ron Exeter	Botanist
Scott Hopkins	Wildlife Biologist
Stefanie Larew	NEPA Coordinator
Kent Mortensen	Air Quality, Fire Risk, and Fuels Management
Mellissa Rutkowski	Engineering Technician
Scott Snedaker	Fisheries Biologist
Hugh Snook	District Silviculturist
Susan Sterrenberg	GIS Specialist
Heather Ulrich	Cultural Resources
Steve Wegner	Hydrologist and Soil Scientist

6.2 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 do not require a new analysis. The figures utilized in this EA are based on the best available information at the time of publishing.

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APPENDIX A – Glossary of Terms and Acronyms

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.

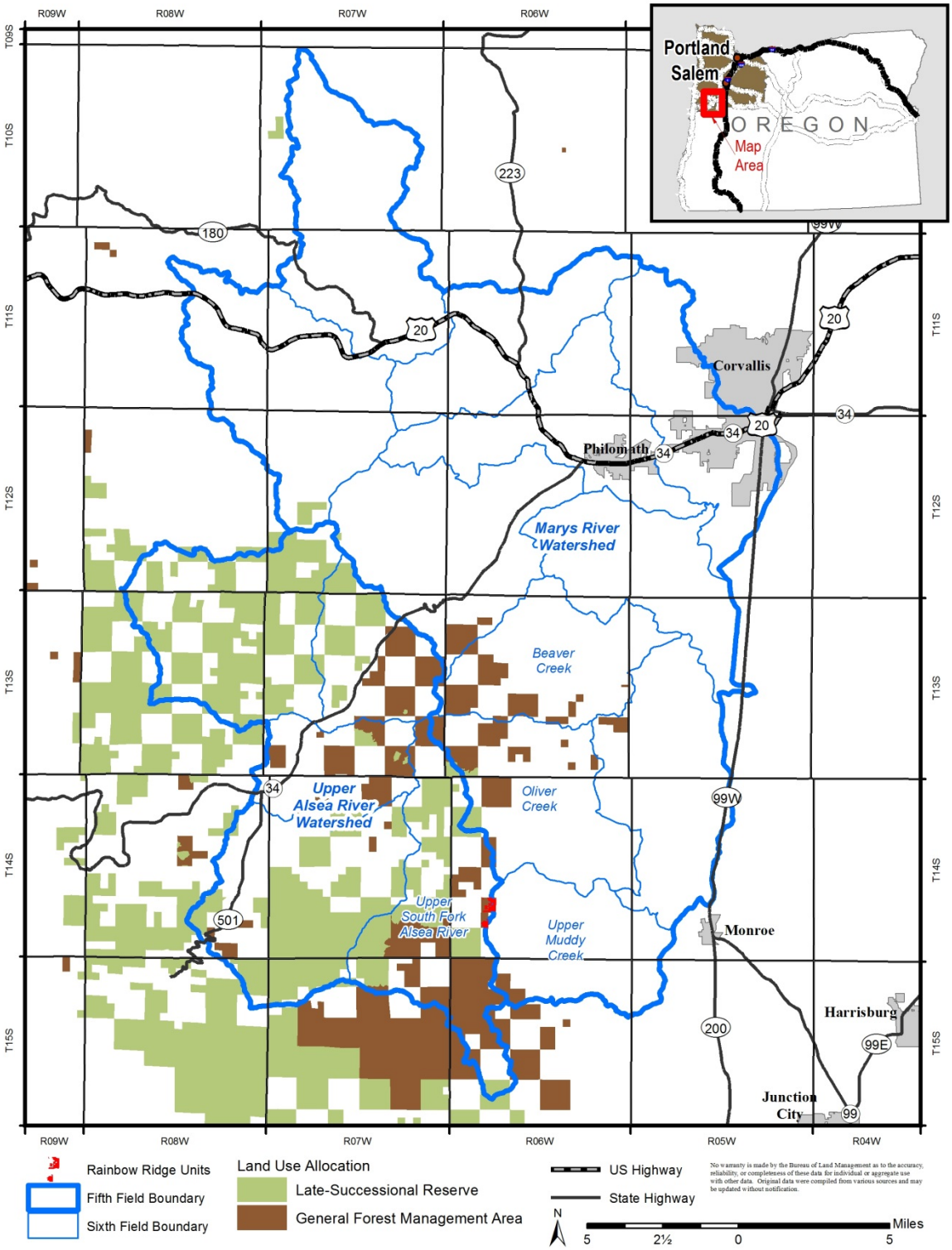
Weed – A plant considered undesirable and that interferes with management objectives for a given area at a given point in time.

Windthrow – Trees uprooted or blown over by natural events.

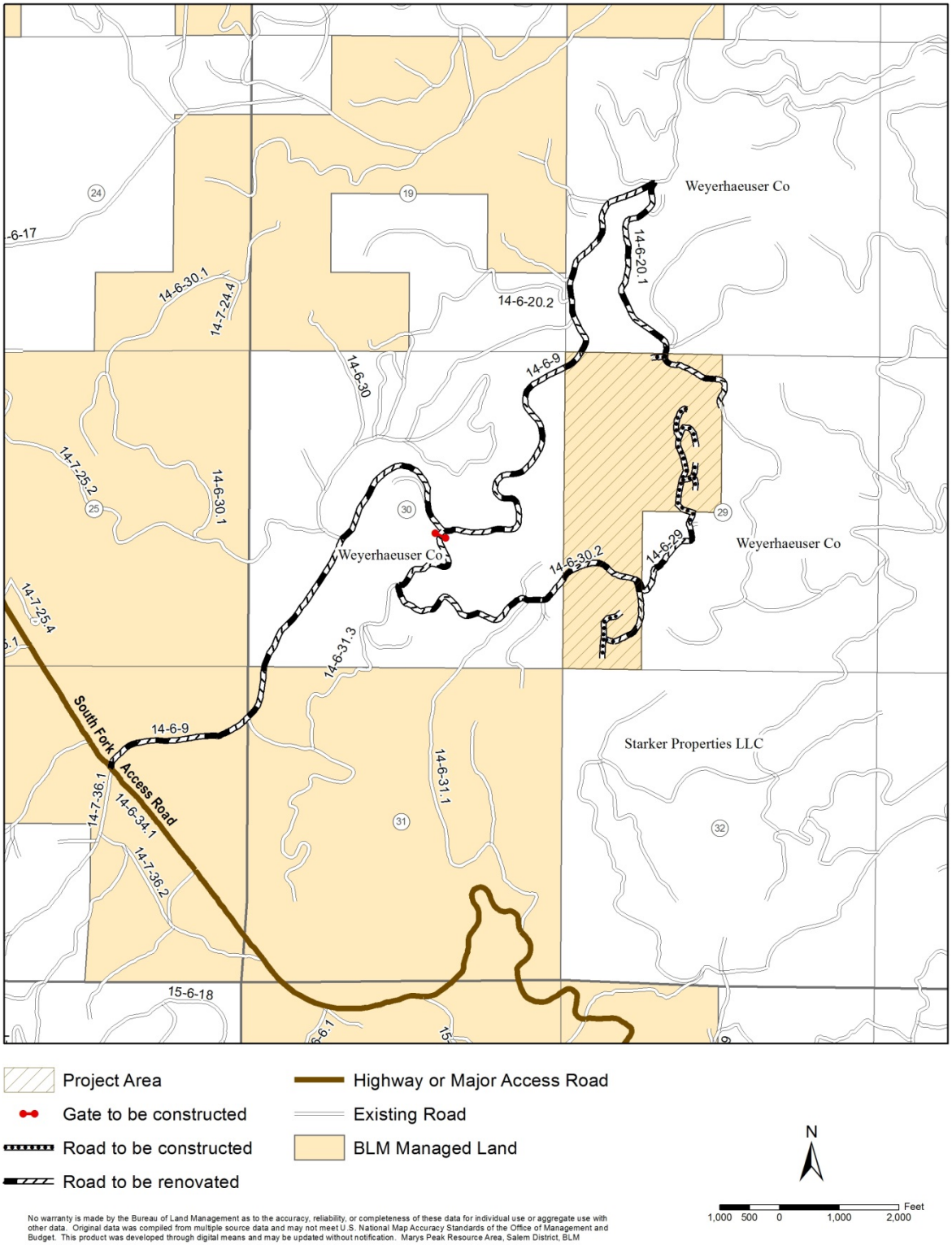
Wolf tree – A live conifer tree which likely developed in an open stand, usually in full sunlight and larger in diameter and older than the stand average. These trees often have multiple tops or upper stems and larger diameter branches often extending downward to over three-quarters the height of the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



APPENDIX C – Road Work for the Rainbow Ridge Timber Sale



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 Map Accuracy Standards of the Office of Management and Budget. This product was developed through digital means and may be updated without notification. Marys Peak Resource Area, Salem District, BLM

APPENDIX D – Marking Guide for Rainbow Ridge Timber Sale

T. 14 S., R. 6 W., Section 29

July 24, 2014

Unit/Stand Exam No.	Total Acres (est.) [1]	Treatment Prescription (post-treatment values)			
		Aggregate Leave Areas	Conifer Leave Tree BA (Ft^2)	Min. and Max. BA per Plot[3]	Comments
29A M1219 29B M1220 29C M1221 29D M1221A 29G M02	**107**	**6 areas, 19 ac. total**	**2**	N/A	Outside aggregate leave tree areas, leave approx. 1 tree per acre as described below.
29F M1223 (Ground-Based Upland)	**14**	**N/A**	**150**	140–160	Constant BA mark. Leave all WH and WRC. Leave DF to 150 ft^2 total.
29F M1223 (Skyline and Riparian Reserve)	**19**	**N/A**	**110**	80–140	Variable BA mark. Leave all WH and WRC. Leave DF to 110 ft^2 BA average total, vary from 80 ft^2 -140 ft^2 BA total.

[1] includes road acres. Acres of actual treatment type shown, do not match Riparian reserve density management acres (9 ac) and upland commercial thinning (24) as shown in EA.
[2] Leave Tree BA: remaining basal area of overstory trees (>7 inches DBH) of all conifer species after thinning.
[3] Basal Area Range: Minimum and maximum total basal area per sampling plot. Maximum basal area may be exceeded for snag protection described below.

Boundaries

Unit boundaries and aggregate leave area boundaries are marked by orange paint and Boundary Timber Reserve posters. Boundary between riparian and upland, and skyline and ground-based harvest system, that defines Rx difference in 29F will be flagged in orange prior to marking.

Variable Retention Harvest, Units 29A, 29B, 29C, 29D, and 29G

Outside of aggregate retention areas, select leave trees at a rate of **1 per acre**, distributed on a ten-acre basis (scattered individual trees and clumps of up to 10 trees, resulting in 10 trees per 10 acres overall).

Select leave trees using the following guides:

- Not located immediately adjacent to roads, landing locations and areas vulnerable to prescribed burning (upper steep slopes, head of draws).
- Located near downed log concentrations or large snags (leaving surrounding closest adjacent trees to the snag).
- Select trees of largest diameter that have wide crowns and large branches.
- Select up to 50% minor conifer species. Select a few (2-8) of the largest bigleaf maple. Do not select alder or other hardwood.
- Mark leave trees with butt marks and “W” at breast height, using orange paint.
- A CVS plot is found in Unit 29D, just north of Aggregate #6, just west of proposed road construction. Mark to leave reference tree to aid relocation of plot.

Commercial Thinning and Density Management, Unit 29F

Thin from below leaving healthy dominant and co-dominant trees with the largest crowns.

- Conifer leave trees will be marked using orange paint. Only Douglas-fir will be thinned. All grand fir, western hemlock and western red cedar will be marked to leave and count toward BA targets. Hardwood trees of all species are reserved and do not count toward BA target.
- Leave all snags. In addition, protect snags that are ≥15" DBH and ≥30' height by leaving surrounding closest adjacent trees.
- Leave trees less than seven (7) inches DBH (do not mark). Where significant stocking of under-story conifers occurs, retain overstory BA at lower end of prescribed range.

In ground-based area outside of riparian reserve (commercial thinning), mark to leave constant 150 square feet basal area of conifer.

In skyline harvest area and riparian reserves (density management),

- Meet target average basal area of 110 square feet, but VARY it between 80-140 ft^2.
- ***Retain fewer trees*** where the trees are more widely spaced, and ***retain more trees*** where the trees are more closely spaced maintain existing variability.
- Retain "unique" trees –leave trees >18" DBH that are full-crowned, large-limbed, "wolf" trees, broken-top, forked, deep crowns, evidence of wildlife use, and contain cavities or visible nests.

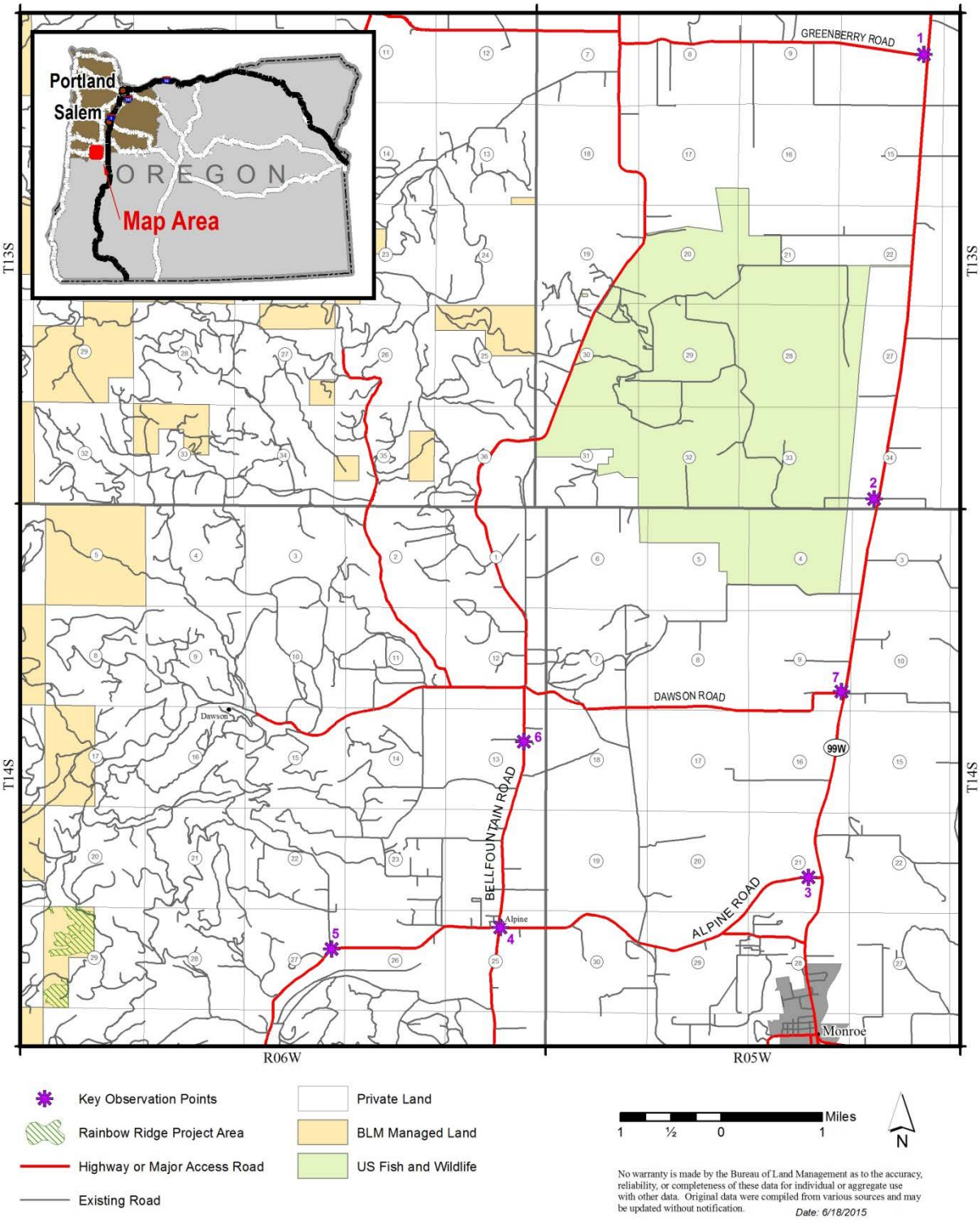
APPENDIX E – Water Quality Management Plan

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 dissipaters 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 per 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 F – Key Observation Points



DRAFT FINDING OF NO SIGNIFICANT IMPACT

Introduction

The Bureau of Land Management (BLM) has revised the Rainbow Ridge Timber Sale Environmental Assessment (DOI-BLM-OR-S050-2013-0002-EA). This revision (Revised EA) provides an expanded discussion on the effects to visual resources. No other substantive changes were made to the proposed action or the analysis from the original EA. The original EA was published in November 2014 for a 30-day public comment period. The Revised EA is attached to and incorporated by reference in this draft Finding of No Significant Impact (FONSI). The analysis in the EA is site-specific and supplements analyses found in the *Salem District Proposed Resource Management Plan/Final Environmental Impact Statement,* September 1994 (RMP/FEIS).

This project is located on BLM-managed lands in Township 14 South, Range 6, Section 29, Willamette Meridian in Benton County, Oregon. The EA included two action alternatives: variable retention harvest (Alternative 2, the proposed action) and regeneration harvest with dispersed retention (Alternative 3). The proposed action is to conduct regeneration harvest on approximately 81 acres of stands that are less than 70 years old in the Matrix (General Forest Management Area) and conduct commercial thinning and density management on approximately 30 acres of stands that are 42 years old in the Matrix (24 acres) and Riparian Reserves (6 acres)[1].

The Revised EA and FONSI will be available for public review from July 8, 2015, to July 22, 2015. The notice for public comment will be published in a legal notice in the *Gazette-Times* newspaper on July 8, 2015. Written comments should be addressed to Tessa Teems, Field Manager, or Stefanie Larew, Project Lead, Marys Peak Resource Area, 1717 Fabry Road SE, Salem, Oregon, 97306. Comments may also be e-mailed to blm_or_sa_mail@blm.gov or faxed to (503) 375-5622.

Finding of No Significant Impact

Based upon review of the Rainbow Ridge Timber Sale EA, the DNA, and other 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 area. No site-specific environmental effects meet the definition of significance in context or intensity as defined in 40 CFR 1508.27. Therefore, supplemental or additional information to the analysis done in the RMP/FEIS through a new environmental impact statement is not needed. This finding is based on the following information:

Context:

Potential effects resulting from implementation of the proposed action have been analyzed within the context of the Upper Alsea River and Marys River fifth field watersheds, the Upper South

[1] Acres in this document are based on final GPS acres determined after the original EA was published. These acres will be reflected in the final decision document.

Fork Alsea and Upper Muddy Creek sixth field watersheds, and the project area boundaries. The proposed action would occur on approximately 135 acres of Matrix and Riparian Reserve land use allocations (EA pp. 13, 16), encompassing less than 0.03 percent of BLM-managed lands within the Marys River and Upper Alsea River 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 activities are air quality, fire risk, and fuels management, carbon sequestration (storage) and climate change, fisheries and aquatic habitat, recreation, rural interface, and visual resources, soils, vegetation - invasive, non-native plant species, water, and wildlife. The effects of the proposed actions are unlikely to have significant impacts on these resources for the following reasons:

   ***Project Design Features** (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/FEIS. The BLM has found the implementation of project design features to be effective in reducing the likelihood of negative impacts. 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).

   ***Vegetation and Forest Stand Characteristics** (EA section 3.1):* The Rainbow Ridge timber sale is situated on a ridge separating two fifth-field watersheds, the Upper Alsea River and the Marys River watersheds. The project area is approximately 135 acres of the 240 acres the BLM manages in the section. Due to the small size of the overall project area, impacts to natural vegetation within these watersheds from the implementation of this project are localized. Early-seral habitat is lacking on BLM lands in the project area. Regeneration harvest (including recent windthrow) would not significantly change the distribution of age classes in the watersheds, but it would increase the amount of early-seral habitat on BLM lands in these watersheds from approximately 16 percent to 17 percent.

   Noxious Weeds *(EA section 3.1)* – While the number of species known to the project area may increase in number over the short term, any increase is anticipated to be insiginficant because large areas with ground-disturbing activities would be sown with Oregon Certified (blue tagged) red fescue (*Festuca rubra*). Sowing disturbed soil areas allows the fescue grass to become established and dominant in areas that may otherwise be suitable for noxious weeds. This reduces the physical space or the potential habitat for noxious weeds to become established. As native vegetation increases in density and size, due to additional sunlight, it would become established in areas dominated by the red fescue because the red fescue tends to get out competed by the native vegetation (EA p. 44).

   ***ESA listed, Bureau Special Status, and Survey and Manage Botanical and Fungal Species** (EA section 3.1):* There are no known threatened and endangered botanical or fungal species within or adjacent to the project area. Special status fungi known sites are protected by their inclusion within riparian reserves, fungi protection areas, aggregates, or clumps of wildlife trees. Fruiting structure locations (known sites) only indicate presence of the organism; the distribution and size of fungal organisms within the soil is unknown. There are no special

status species known within the commercial thinning or density management treatment areas. Such treatments would allow for an increase in size and density of the tall shrub layer creating future habitat for epiphytic lichen and bryophyte species.

Wildlife *(EA section 3.2):* The project would not contribute to the need to list any BLM special status species. There is no critical habitat in the project area for either the northern spotted owl or the marbled murrelet.

Northern spotted owl: No suitable habitat would be affected; there is no suitable roosting, foraging, or nesting habitat within the project units. Dispersal habitat would be maintained within the thinning units and would be removed within the regeneration harvest units (USFWS letter of concurrence, p. 66). Because of these reason, the Rainbow Ridge timber sale is not likely to adversely affect the species.

Marbled murrelet: The Rainbow Ridge area is considered "non-habitat" for the marbled murrelet and will have no effect on the species (USFWS letter of concurrence, p. 69).

Red tree vole: The project would likely retain the presence of red tree voles within the section and would not contribute to the need to list the species, because most of the proposed treatment units are currently unsuitable habitat that is unlikely to support persistent red tree vole populations, an occupied patch of older forest has been reserved from harvest, and the recent status review for the species (USDI-FWS 2011) concluded that existing regulatory mechanisms on Federal land are adequate to provide for the conservation of the Northern Oregon Coast DPS of the red tree vole (EA p. 60).

Thinning would not significantly change species diversity (a combination of species richness and relative abundance) of the migratory and resident bird community. Regeneration harvest would provide high-quality early-seral habitat for several species that favor early-seral forest conditions. No species would become extirpated in the watershed as a result of the proposed harvest, though some species would be likely to leave or enter thinned stands as a short-term response to reduced canopy closure and tree density (EA pp. 60–62).

Fisheries and Aquatic Habitat, Hydrology, and Soils *(EA sections 3.3, 3.4, and 3.5):* New road construction is unlikely to have significant impacts because of the location, topography, lack of connectivity to streams, and project design features. New roads would be located outside Riparian Reserves, generally be located on ridgetops, and would require no stream crossings. Gentle to moderate slope gradients in project areas provide little opportunity for surface runoff to reach stream channels. The stream protection zones (SPZs) 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. Renovation of existing roads would improve their conditions and reduce the likelihood of road-related sediment delivery.

Air Quality, Fire Risk, and Fuels Management *(EA section 3.6):* Effects to this resource would not be significant because the proposed action would comply with the Clean Air Act

and State of Oregon Air Quality Standards by adhering to Oregon Smoke Management guidelines. The harvest itself would decrease the risk of a canopy fire and the fine fuels generated by harvest would decay in the project areas within three to five years, reducing the risk of a surface fire to near current levels. The potential for a human-caused wildfire would be reduced by treating the fuels most likely to be ignited by human activities. Prescribed burning would lessen the fuel load along private property lines and roads that are open to public access. It would also serve as site preparation for planting.

Recreation, Rural Interface, and Visual Resources *(EA section 3.7):* The proposed project would comply with Visual Resource Management Class IV objectives as defined in the Salem District RMP. Class IV provides for management activities which require major modification of the existing character of the landscape. Regeneration harvest is an example of an allowable management activity in VRM Class IV that may dominate the landscape (EA p. 93).

Within the regeneration harvest areas: Approximately 38 acres (27 acres of treatment and 11 acres of no-cut clumps or aggregates) are viewable from major roads east of the project area. The regeneration portion may remain observable for several years until the seedlings are well established. Effects to visual resources would be insignificant because the project would not change the characteristic of the landscape, where forest management activities are common. Further, the project would not cause any change in the visual resource inventory class rating or any of its components. Project design features (EA section 2.6) that minimize the effect of these activities (RMP p. 37) include leaving no-cut areas (aggregates) and post-harvest planting that would contribute to color and texture by more closely mimicking a natural disturbance.

Within the thinning areas: A forest setting and most of the canopy would remain in the density management and commercial thinning areas, but few trees would remain in the regeneration harvest area. Evidence of the density management and thinning portions of the project would not be observable within five years as understory vegetation reestablishes and grows and the remaining stand continues to mature.

Recreational activities within the project area would be limited during periods of operation and may be displaced to other areas. Following harvest activities, current recreational activities would continue with potential of increased hunting and off-highway vehicle use due to the opening or building of skid roads for harvest activities and creation of early-seral habitat that game animals favor.

Carbon Sequestration (Storage) and Climate Change *(EA section 3.8):* The Rainbow Ridge Timber Sale 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 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 project is designed to meet RMP standards and guidelines, modified by subsequent direction (EA section 1.5); 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.

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 effects on the quality of the human environment are not likely to be highly controversial. CEQ guidelines relating to controversy refer not to the amount of public opposition or support for a project, but a substantial dispute as to the size, nature, or effect of the action. The effects of actions planned under the action alternatives are similar to many other forest management projects implemented within the scope of the 1995 RMP. No unique or appreciable scientific controversy has been identified regarding the effects of the project. There is, therefore, no known scientific controversy over the impacts of the project.

   Effects are expected to be consistent with those of the published literature cited in the EA and are not controversial in a scientific sense. The public has had opportunities to comment on this project the public meeting, through formal scoping, during the formal comment period for the EA, and upon publishing the DNA (February 2015). While comments were received expressing disagreement with the BLM timber management program, none established a scientific dispute of the size, nature, or effects of the action alternatives.

   The BLM is aware that the fundamental nature of science requires disagreement and vigorous debate, and that as a result some disagreement will always be present in any scientific discussion. The topic of ecological forestry (or variable retention harvest) is no exception. The BLM is aware of the articles in peer-reviewed scientific literature, such as DellaSalla et al. (2013), which express some reservations and disagreements with ecological forestry applications. The BLM also notes that much of DellaSalla (2013) relates to the

ongoing social controversy over management practices and refinement of land management goals and practices. Where the article discusses the size, nature, and effects of ecological forestry, and discusses perceived shortcomings in the framework principles, it also acknowledges the positive aspects of the framework, and notes that the details of its management are "yet to be described" (DellaSalla et al. (2013), pp. 420–421). Unanimity in science is rarely, if ever, present. That some discussion and debate in the peer-reviewed scientific forums continues to occur is a sign, not of controversy as NEPA uses the term, but of a healthy discussion. In the end, however, while the BLM encourages this debate, NEPA and the principles which underlie it do not require unanimity. Articles such as DellaSalla (2013) are limited in direction application, and are more focused on advocacy and social policy. Rather than present scientific debate on the effects of implementing ecological forestry on matrix lands available for regeneration harvest, the articles seek to pass judgment on whether ecological forestry is the appropriate tool to address the current and changing conditions of forests in the Pacific Northwest. These policy positions do not generate and are not evidence of a substantial dispute over the size, nature, and effects of the proposed action, and thus do not give rise to "controversy" under NEPA.

The BLM is, as noted, aware that social controversy is ongoing over the existence and practices of the BLM's timber harvest program across western Oregon. The societal debate, reflected in the comments received by the BLM is precisely the public opposition or support that the CEQ guidelines have identified as not relevant to the term "controversy" as applied to NEPA. The BLM has responded to comments provided during scoping and will respond to comments received during the EA comment period in the Decision Record. Comments have not constituted a true dispute over the size, nature, or effects of the action. Because the comments received from the public do not establish such a dispute, the action is not controversial under NEPA.

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 involve uncertain, unique, or unknown risks, because the BLM has experience implementing similar actions in similar areas without these risks. The BLM has found project design features (EA section 2.6) to be effective in minimizing 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: The project is within the scope of proposed activities documented in the Salem District RMP. Regeneration harvest with a variety of green tree retention methods is authorized in the RMP for the Matrix (General Forest Management Area) land use allocation. The BLM has experience implementing similar actions in similar areas without setting a precedent for future actions or representing a decision about a future 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 in context of past, present, and reasonably foreseeable actions and determined that there is not a potential for significant cumulative effects (EA sections 3.1–3.8, February 2015 DNA) beyond those already analyzed in the FEIS, because of the small size of the project and the project design features to minimize the risk of adverse effects to the human environment. The project would occur on approximately 135 acres of a 240 acre parcel that the BLM manages (only 56 percent of what the BLM manages in the section). The project would increase the amount of early seral habitat on BLM lands in the watersheds by only one percent.

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 proposed project is not expected to adversely affect any of the aforementioned resources. There are no features within the project area that are listed or eligible for listing in the National Register of Historic Places.

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:

   ESA Wildlife – Threatened and Endangered Species *(EA sections 3.2 and 5.1):* Consultation concerning listed wildlife species has been addressed by inclusion of this action 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 2015 and 2016. This 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 U.S. Fish and Wildlife Service (dated 9/23/2014) confirming their concurrence that the activities included within the Rainbow Ridge timber sale are not likely to adversely affect any listed wildlife species or their critical habitat.

   ESA Fish *(EA sections 3.3 and 5.1):* No effects are anticipated to Upper Willamette River Spring Chinook salmon, Upper Willamette River steelhead, Oregon chub, and Oregon Coastal coho salmon in either watershed due to distance to occupied habitat; therefore, no ESA consultation is warranted.

   Protection of Essential Fish Habitat (EFH) as described by the Magnuson/Stevens Fisheries Conservation and Management Act and consultation with NMFS is required for all projects which may adversely affect EFH of Chinook and coho salmon. The treatment area is at least 1.5 miles from nearest habitat utilized by coho salmon in the South Fork Alsea River and 26 miles from nearest habitat utilized by Chinook and coho in the Marys River. Based on the distance of the proposed action from occupied habitat, there would be no effects on EFH. Consultation with NOAA NMFS on EFH is not required for this project.

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: /s/ Stefanie Larew 7/7/2015

Acting for Tessa Teems Date

Marys Peak Field Manager