# Big-Vincent Environmental Assessment

**DOI-BLM-OR-C030-2011-0003-EA**

**Coos Bay District**
**Bureau of Land Management**
**1300 Airport Lane**
**North Bend, Oregon 97459**

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# Chapter 1 – Purpose and Need for Action

## Need for the Project

Within the Big-Vincent analysis area there is a need for maintained and improved forest health and a sustainable supply of forest products.

The BLM conducted field reviews, stand exams and data analysis, and concluded that within the Big-Vincent analysis area (**Appendix D**) there are areas of reduced forest health due to the dense overstocking of timber, as well as areas where conifer failed to reestablish after past logging and fire events. Portions of the project area did not receive early pre-commercial silvicultural treatments to ensure survivability of conifer seedlings. As a result, encroaching red alder and salmonberry have suppressed conifers in some areas.

Forest research indicates that it may take a century for conifer to replace alder in forest stands (Deal 2006, Harrington 2006, MacCracken 2002, Newton *et al.* 1968). Conifer establishment may not occur in a red alder community where salmonberry is present (Carlton 1988, MacCracken 2002, Tappeiner *et al.* 1991) or yield fewer than five suppressed western red cedar or western hemlock seedlings per acre (Carlton 1988, MacCracken 2002). Douglas-fir saplings are less frequent and less vigorous than the suppressed western red cedar and western hemlock in red alder communities (Carlton 1988) because they are less shade-tolerant.

The BLM considers densely-stocked conifer stands a forest health concern as well as an opportunity for sustainable production of forest products. Furthermore, stands that were historically conifer-dominated and have become alder-dominated are considered a forest health concern. Forest management activities would redirect the stands to a late-successional forest condition for wildlife habitat or to a healthy conifer forest for the sustainable and predictable supply of forest products, depending upon their land use allocation, as directed by the Coos Bay District RMP.

## Background

The Final – Coos Bay District Proposed Resource Management Plan (RMP) and Environmental Impact Statement (EIS) (USDI 1994) and its Record of Decision (ROD) responds to multiple needs, primarily healthy habitats supportive of native species associated with late-successional and old-growth forests, and a sustainable and predictable supply of forest products to support local and regional economies ((USDI 1995), p. 1). The RMP addressed these needs through an ecosystem strategy under which the BLM lands "will be managed to maintain healthy, functioning ecosystems from which a sustainable production of resources can be provided" ((USDI 1995), p. 5).

The Coos Bay District BLM manages different geographical areas based on specific land use allocations (LUA) established in the RMP including General Forest Management Areas, or GFMA (Matrix and Connectivity/Diversity), Late-Successional Reserves (LSR), and Riparian Reserves (RR). The section below titled 'Purpose (Objectives) of the Project' provides in-depth objectives for each of these land use allocations.

## Brief Summary of the Proposed Action

The Coos Bay District BLM proposes density management, commercial thinning, and hardwood conversion on Matrix, Late-Successional Reserve, and Riparian Reserve land use allocations within the Upper Smith River, Lower Smith River, and Umpqua River-Sawyers Rapids 5$^{th}$ field watersheds starting in 2016. Road-related activities in support of the proposed silvicultural treatments include new construction, renovation, improvement, maintenance, and decommissioning. Chapter 2 provides a detailed explanation of the proposed action and no action alternative.

## Purpose (Objectives) of the Project

Reasonable actions/alternatives within the Big-Vincent project area must meet the objectives provided in the Coos Bay District ROD/RMP (1995). The ROD/RMP and applicable statutes specify the following objectives in managing the lands within the project area:

### Matrix – General Forest Management Area and Connectivity/Diversity Blocks

Provide a sustainable supply of timber and other forest commodities to provide jobs and contribute to community stability (RMP, p. 22) by:

- Conducting timber harvest and other silvicultural activities in that portion of the Matrix with suitable forest lands (p. 22); and
- Providing timber sale volume towards the Coos Bay District Allowable Sale Quantity (ASQ) as required by the Oregon and California Act (O&C Act) of August 28, 1937. The BLM has a statutory obligation under the O&C Act to manage suitable commercial forest lands revested by the federal government from the Oregon and California Railroad grant (O&C lands) for permanent forest production in accordance with the sustained yield principle.

Manage developing stands on available lands to promote tree survival and growth and to achieve a balance between wood volume production, quality of wood, and timber value at harvest (p. 52) by:

- Planning harvest of marketable hardwood stands in the same manner as conifer stands, unless the land is otherwise constrained from timber management (p. 53); and
- Planning to reestablish a conifer stand on a site where hardwood stands have become established following previous harvest of conifers (p. 53).

### Late-Successional Reserves/Density Management Thinning

Manage Late-Successional Reserves (LSR) to protect and enhance conditions of late-successional and old-growth forest ecosystems that serve as habitat for late-successional and old-growth forest-related species including northern spotted owl and marbled murrelet (p. 18) by:

- Conducting thinning operations in forest stands up to 80 years of age. This will be accomplished by pre-commercial and/or commercial thinning of stands regardless of origin (e.g., planted after logging or naturally regenerated after fire or blowdown) (p. 19); and
- Planning and implementing silvicultural treatments inside Late-Successional Reserves to be beneficial to the creation of late-successional habitat (p. 19).

The purposes of density management may include one or more of the following: to accelerate growth of trees which would later provide large-diameter snags and down logs; to promote development of understory vegetation and multiple canopy layers; to produce larger, more valuable logs, to harvest mortality of small trees as the stand develops; to maintain good crown ratios and stable, windfirm trees; and to manage species composition (p. E-5).

### Riparian Reserves

Manage riparian resources to meet the Aquatic Conservation Strategy (ACS) objectives designed to maintain and restore the ecological health of aquatic ecosystems on public lands (p. 6) and provide for special status, supplemental EIS (SEIS) special attention, and other terrestrial species (p. 12) by:

- Applying silvicultural practices for Riparian Reserves to control stocking, re-establish and manage stands and acquire desired vegetation characteristics (p. 13).

The objectives of density management in the Riparian Reserves include promoting the development of large conifers, recruiting large woody debris, improving species composition and stand density, and promoting forest health (p. E-8).

### Wildlife Habitat

Enhance and maintain biological diversity and ecosystem health to contribute to healthy wildlife populations (p. 27) by:

- Designing projects to improve conditions for wildlife if they provide late-successional habitat benefits or if their effect on late-successional associated species is negligible (p. 27).

### Location

The Big-Vincent project area is approximately 25 miles northeast of Reedsport, Oregon. **Table 1-1** specifies the geographic locations of the proposed harvest activities.

**Table 1-1.** Locations of proposed harvest activity areas described in the Big-Vincent project (Willamette Meridian).

| Township | Range | Sections |
|---|---|---|
| 21 S. | 7 W. | 7 and 18 |
| 21 S. | 8 W. | 1, 7, 9, 10, 11, 12, 13, 15, 16, 17, 19, 21, 29 |
| 21 S. | 9 W. | 1, 2, 3, 11, 12, 13, 14, 21, 23, 27, 29, 32 |

Since portions of the Big-Vincent project are located in LSR 265 and 266, the project would incorporate recommendations from the *South Coast – Northern Klamath Late-Successional Reserve Assessment* (LSRA; (USDA and USDI 1998)).

### Decision Factors

In choosing an alternative that best meets the purpose and need, the Field Manager will consider the extent each alternative would:

1. Reduce competition-based mortality and increase tree vigor and growth specific to the Matrix, Late-Successional Reserves, and Riparian Reserves.
2. Provide for future sustained harvests by converting non-productive hardwood stands to conifer within the Matrix.
3. Provide for future late-successional habitat by converting non-productive hardwood stands to conifer within the Late-Successional Reserves and Riparian Reserves.
4. Improve Late-Successional Reserves and Riparian Reserves stand structures by thinning trees in overstocked stands to enhance the growth and vigor of the residual trees while retaining structural and habitat components, such as large trees, snags, and coarse wood.
5. Provide for the recovery of threatened and endangered species.
6. Provide timber resources for sale and revenue from the sale of those resources to the government.
7. Provide cost effective management that would enable implementation of these management objectives while providing collateral economic benefits to society.
8. Comply with applicable laws and Bureau (BLM) policies including, but not limited to: the Clean Water Act, the Endangered Species Act, the O&C Act, the Magnuson-Stevens Fisheries Conservation and Management Act, and the Special Status Species program.

# Conformance with Existing Land Use Plans

This project was initiated under and is tiered to the *Coos Bay District Proposed Resource Management Plan/Final Environmental Impact Statement* (USDI 1994) and it's *Record of Decision* (ROD/RMP (USDI 1995)), as supplemented and amended. The Coos Bay District ROD/RMP is supported by and consistent with the *Final Supplemental Environmental Impact (FSEIS) on Management of Habitat for Late Successional and Old Growth Forest Related Species Within the Range of the Northern Spotted Owl* (Northwest Forest Plan [NFP]) (USDA and USDI 1994) and it's *Record of Decision* (USDA and USDI 1994). The objectives of this environmental assessment incorporate the recommendations listed in the Smith River Watershed Analysis (USDA and USDI 1997), Oxbow Watershed Analysis (Second iteration) (USDI 2002), and Middle Umpqua River Watershed Analysis (Second iteration) (USDI 2004).

## Survey & Manage Compliance and Exemptions

### Thinnings

The Big-Vincent project is consistent with court orders relating to the Survey & Manage mitigation measure of the Northwest Forest Plan, as incorporated into the Coos Bay District Resource Management Plan (USDI 1995).

In 2006, the District Court for the Western District of Washington (Judge Pechman) invalidated the agencies' 2004 RODs eliminating Survey & Manage due to National Environmental Policy Act (NEPA) violations. Following the District Court's 2006 ruling, parties to the litigation entered into a stipulation exempting certain categories of activities from the Survey & Manage standard (hereinafter, "Pechman exemptions").

Judge Pechman's Order from October 11, 2006 directs:

> "Defendants shall not authorize, allow, or permit to continue any logging or other ground-disturbing activities on projects to which the 2004 ROD applies unless such activities are in compliance with the 2001 ROD (as the 2001 ROD was amended or modified as of March 21, 2004), except that this order will not apply to:
>
> A. Thinning projects in stands younger than 80 years old;
> B. Replacing culverts on roads that are in use and part of the road system, and removing culverts if the road is temporary or to be decommissioned;
> C. Riparian stream improvement projects where the riparian work is riparian planting, obtaining material for placing in-stream, and road or trail decommissioning; and where the stream improvement work is the placement of large wood, channel and floodplain reconstruction, or removal of channel diversions; and
> D. The portions of projects involving hazardous fuel treatments where prescribed fire is applied. Any portion of a hazardous fuel treatment project involving commercial logging will remain subject to the survey and management requirements, except for thinning of stands younger than 80 years old under subparagraph **A.** of this paragraph.

The proposed Big-Vincent thinning activities meet Exemption 'A.', above, because it consists of thinning only in stands less than 80 years old (**Appendix D**).

### Hardwood Conversions

The 157 acres of hardwood conversion proposed in the Big-Vincent project do not meet the Pechman Exemptions within the 2011 Settlement Agreement; therefore, surveys are required. The BLM based the species survey list on the use of the 2011 Settlement Agreement because on February 18, 2014, the District Court vacated the 2007 RODs. The District Court and all parties agreed that projects begun in reliance on the Settlement Agreement should not be halted. The District Court order allowed for the Forest Service and the BLM to continue developing and implementing projects that met the 2011 Settlement Agreement exemptions or species list, as long as certain criteria were met. These criteria include:

A. Projects in which any Survey & Manage pre-disturbance survey has been initiated (defined as at least one occurrence of actual, in-the-field surveying undertaken according to applicable protocol) in reliance upon the Settlement Agreement on or before April 25, 2013.

B. Projects, at any stage of the project planning, in which any known site (as defined by the 2001 Record of Decision) has been identified and has had known site-management recommendations for the particular species applied to the project in reliance upon the Settlement Agreement on or before April 25, 2013; and

C. Projects, at any stage of project planning, that the agencies designed to be consistent with one or more of the new exemptions contained in the Settlement Agreement on or before April 25, 2013.

The hardwood conversion component of the Big-Vincent project is consistent with Criteria 'A' above because the BLM began botanical surveys in the proposed Big-Vincent hardwood conversion units in September 2011 (e.g., EA Unit 5-C). The BLM conducted surveys in all hardwood conversion units under the 2011 Settlement Agreement, and used the 2011 Settlement Agreement List of Survey & Manage Species.

## Documents Incorporated by Reference

The Interdisciplinary Team (IDT) used the following documents, hereby incorporated by reference, to assist in the analysis of the Big Vincent project:

- *Middle Smith River Watershed Analysis*, October 1995 (USDI 1995)
- *Smith River Watershed Analysis*, July, 1997 (USDA and USDI 1997)
- *Oxbow Watershed Analysis* (Second iteration), May, 2002 (USDI 2002)
- *Middle Umpqua River Watershed Analysis Version 2.1*, September 30, 2004 (USDI 2004)
- *South Coast – Northern Klamath Late-Successional Reserve Assessment* (USDA and USDI 1998)
- *Revised Recovery Plan for the Northern Spotted Owl* (USDI 2011)
- *Western Oregon Districts Transportation Management Plan* (USDI 2010 *Update*)
- *Revised Policy for the Management of Marbled Murrelet Nesting Structure within Younger Stands*, July 2012 (USDI 2012)
- Referenced staff reports contained in the analysis file
- Referenced BLM memoranda

## Endangered Species Act (ESA)

On February 10, 2015, the BLM requested a Letter of Concurrence from the U.S. Fish and Wildlife Service (USFWS) as provided in Section 7 of the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1536 (a)(2) and (a)(4) as amended). The Letter of Concurrence, received March 12, 2015, agreed with the BLM's analysis, in which implementation of the proposed actions would not jeopardize the continued existence of the spotted owl or the marbled murrelet, and would not adversely modify designated critical habitat for the spotted owl or marbled murrelet. On April 30, 2015, the BLM sent an amended Big-Vincent Biological Assessment to the USFWS, which included an evaluation of the effects of the proposed action on a newly detected northern spotted owl site. The USFWS concluded on May 12, 2015 that "[B]ecause the District plans to apply all of the original conservation measures and project design criteria to this newly detected spotted owl site, the Service concurs with the District's conclusion that the Big Vincent proposed action may affect, but is not likely to adversely affect spotted owls associated with this new spotted owl site." The Letter of Concurrence (as amended) covers all commercial and non-commercial treatments, associated roadwork, and sample tree falling.

The BLM will not initiate consultation with the National Marine Fisheries Service (NMFS) as the Big-Vincent project has been determined to have "*no effect*" to threatened Oregon Coast Coho Salmon (Fisheries no effect staff report). Additionally, project activities would not adversely affect Essential Fish Habitat under the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1855 (b)).

### Public Involvement (Scoping)

The primary purpose of scoping is to identify agency and public concerns relating to a proposed project and define the environmental issues the IDT will examine in detail in the environmental assessment. The BLM sent scoping notices to adjacent landowners, agencies that have requested these documents, and other interested parties on the Coos Bay District NEPA mailing list. The Big-Vincent scoping period was open from March 18, 2011 to April 16, 2011. The BLM received 3 letters providing scoping comments. The IDT considered substantive comments in development of the project design, particularly towards new road construction and decommissioning, thinning prescription design, and large wood recruitment.

### Field Manager Decisions

The Field Manager of the Umpqua Field Office, Coos Bay District BLM, must decide whether to conduct commercial thinning, density management thinning, and hardwood conversion activities within the Big-Vincent project area. A description of the project is located in Chapter 2.

The Field Manager must also determine if implementation of the selected alternative would or would not constitute a major federal action significantly affecting the quality of the human environment. If the Field Manager decides it would not significantly affect the quality of the human environment, then the Field Manager can prepare and sign a Finding of No Significant Impact (FONSI).

If the Field Manager determines that the selected alternative would significantly alter the quality of the human environment, then the Field Manager will drop the project, modify the project, or have an Environmental Impact Statement (EIS) and a Record of Decision (ROD) prepared and signed before proceeding.

### Project Development

The original proposal contained approximately 7,000 acres for treatment. This final proposed action contains approximately 6,431 acres of treatments. Through the project development process, the IDT added and dropped areas, for a net reduction of approximately 569 acres. The reasons for dropping areas included, but were not limited to, poor soils and rock outcroppings, poor stocking or inappropriate stand characteristics for thinning, lack of access and amount of road building required, density of remnant trees, and location of potential marbled murrelet habitat trees and northern spotted owl nest patches.

## Issues Considered but Eliminated From Detailed Analysis

### Hardwood Conversion

One of the public scoping comments requested the EA include a separate alternative that does not include hardwood conversions in LSRs and Riparian Reserves. The Big-Vincent project proposes hardwood conversion on 21 acres of Matrix (GFMA), 55 acres of Late-Successional Reserves (LSR), and 81 acres of Riparian Reserves (RR) (**Table 2-1**). The proposed action provides approximations of total acreages for hardwood conversion for the overall project area; however, individual sales may lump or exclude hardwood conversion units depending upon sale layout. In actuality, the analysis of not conducting hardwood conversion is included in the no action alternative effects analysis.

A scoping comment stated, “We have seen the BLM determine a riparian alder stand to be a former conifer stand when no conifer stumps were present.” The comment continued, “It is inappropriate for the BLM to try and convert these stands into conifer, especially without abundant proof it had historically always been conifer dominated.”

The IDT carefully looked at the current landscape conditions, historic reference conditions, areas with previous conifer stumps, and wildlife habitat recovery needs. Hardwood conversion areas proposed in the Big-Vincent project were previously conifer-dominated. The IDT used the following filter to guide hardwood conversion prescription development:

> Where environmental conditions including Topographic Position Index (Weiss 2000), plant association, or geomorphic characteristics suggest a high constancy and cover of red alder is appropriate, red alder would generally be left as a patch type or would be lightly thinned. Historic conditions and the absence or presence of conifer stumps also informs this filter.

A scoping comment expressed concern regarding alders “cut down within a tree-height of the stream” and continued by stating alders “must be cut into the stream, not removed and sold.” The BLM would require alders cut within a no-treatment zone for a cable-yarding corridor be felled toward or parallel to the stream channel and retained on site. The BLM would require no-treatment zones in the proposed hardwood conversion units be a minimum of 35 feet on intermittent streams and a minimum of 60 feet on perennial streams. No-treatment zones would adequately shade streams, prevent sediment delivery to streams, and ensure a continued supply of organic litter and large woody debris to streams.

One of the scoping comments stated, “Not every alder cut needs to be sold to fulfill the so-called restoration component of this prescription.” The RMP management direction includes the following: “Riparian Reserve acres are not included in calculations of the allowable sale quantity” ((USDI 1995), p. 13), but the sale of alder contributes to the “need for a sustainable supply of timber and other forest products that will help maintain the stability of local and regional economies” ((USDI 1995), p. 1). Additionally, the RMP designated a portion of these lands as Matrix for the primary purpose of timber production, so the BLM’s lack of management to convert these stands for sustainable timber production would violate the management direction of the RMP. In the Late-Successional Reserves (LSR), the RMP’s management direction is to “implement silvicultural treatments inside LSRs to be beneficial to the creation of late-successional habitat” ((USDI 1995), p. 19), and that this “will be accomplished by precommercial and/or commercial thinning of stands regardless of origin” ((USDI 1995), p. 19).

The IDT also considered the objectives of restoring late-successional habitats in the project area and used additional filters such as field reconnaissance and review of historic aerial photos and stand data to determine historic forest types in determining the locations appropriate for hardwood conversions. Therefore, the final acres proposed for hardwood conversion meet the purpose and need and LSRA objectives and would eventually provide habitat for the northern spotted owl.

A scoping comment requested the EA analyze the benefits of alder and the loss of the nitrogen-fixing benefits of alder. The BLM manages forest health for habitats supportive of native species associated with late-successional and old-growth forests, and a sustainable and predictable supply of forest products to support local and regional economies (RMP/ROD, p. 1). Soils supportive of late-successional and old-growth conifer forests and timber production are present throughout the majority (89 percent) of the BLM lands in the analysis area, including in areas of proposed hardwood conversions where red alder has dominated since the unsuccessful reestablishment of conifers in those areas following historic fires. Red alder, as nitrogen fixers, contribute nitrogen to the upper soil layers, but the continued presence of nitrogen-fixing red alder is not a requirement for the successful reestablishment of conifers for late-successional habitat.

## Road Construction

A public scoping comment stated the proposed road construction was "too much." While there is no context given to define this opinion, this EA contains a lengthy analysis concerning the effects of road construction associated with the Big-Vincent project. The proposed road construction is within the range of effects analyzed within the FEIS for the Coos Bay District RMP.

The IDT assessed each new road for implementing the purpose and need of this project. The IDT also used the updated Western Oregon Districts' Transportation Management Plan (TMP) (USDI 2010 *Update*) to manage the transportation system in a manner consistent with the RMP and other current regulations.

Roads represent a project cost that reduces timber sale value and receipts to the BLM and O&C county governments. Consequently, it is not in the BLM's interest to construct any more roads than necessary for stand management. Compared to traditional regeneration harvests, thinning harvests inherently require more roads to facilitate placement of yarding equipment within a timber sale boundary. The need for more roads is also the result of minimizing yarding corridors over stream channels within Riparian Reserves.

One public comment requested an analysis showing the harvest acreage accessed for each road segment. The IDT inherently considers this information in the project development and analysis. The BLM has proposed only those roads needed to implement the project. Providing a list of each road and "acres accessed" would only show a numerical relationship between two items. There would be no environmental or economic threshold associated with this type of information; therefore, it is unnecessary for making resource management decisions. Other factors the IDT considers for each road segment include market volume removed from the stand, future access needs for reforestation and maintenance of the stand, and the capital investment in the construction of the road. These are just some of the factors that the BLM uses in planning, designing and proposing new road construction and are not inherent in showing an "acres accessed" representation. As stated above, this EA contains environmental effects analysis of new road construction included in the proposed action.

## Thinning in Riparian Reserves

In BARK v. U.S. Bureau of Land Management, 643 F.Supp.2d 1214 (D. Or. 2009), Bark argued that the BLM was prohibited from thinning in Riparian Reserves "unless needed" to meet Aquatic Conservation Strategy (ACS) objectives. The Court rejected Bark's reading of the RMP as requiring the BLM show thinning was "needed" as a condition precedent to Riparian Reserves treatments, and accepted BLM's interpretation of its RMP as authorizing timber harvest in Riparian Reserve areas to apply silvicultural practices to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics. The BLM does not interpret this provision as requiring a showing that treatment is absolutely "needed" to achieve ACS objectives when compared to taking no action. The BLM has consistently interpreted this provision of the RMP since its adoption and has implemented numerous similar treatments on approximately 13,000 out of 121,000 acres of Riparian Reserve stands across the Coos Bay District between 2002 and 2015.

# Chapter 2 – Alternatives

This chapter is a description of each alternative and summarizes the environmental consequences of the alternatives

This EA contains the analysis of a no action alternative and proposed action alternative. For an IDT to consider an action alternative, that alternative must meet the purpose and need while not violating any minimum environmental standards. An action alternative must be consistent with the RMP and satisfy the purpose and need of implementing the RMP.

For proposed Big-Vincent harvest unit locations, refer to **Appendix I**. Appendix D in the 1995 RMP describes the best management and conservation practices for harvest related activities, while Appendix E in the RMP describes the silvicultural objectives of commercial thinning, density management thinning, and removal of less desirable commercial species for Matrix lands. Research by Tappeiner *et al*. (1997), Poage and Tappeiner (2002), and others (Muir *et al*. 2002) also guide density management treatments. The IDT identified hardwood conversion areas in applicable watershed analyses (e.g., Smith River Watershed Analysis, Oxbow Watershed Analysis, and Middle Umpqua River Watershed Analysis). Hardwoods became dominant in these areas because conifers did not successfully regenerate after salvage logging operations following the Vincent/Weatherly Creek Fire (1951) and Oxbow Fire (1966). Conifers did not successfully regenerate in these areas for a number of reasons, including the rapid colonization of these disturbed areas by rapidly growing hardwoods, and the unsuccessful air and ground seeding operations following the fires.

The IDT based all quantifications (e.g., acreages, mileages) on estimates obtained from geographical information systems (GIS). Harvest volumes for the commercial thinning and density management treatments are estimates derived from stand exam information, LiDAR[1] imagery, and model projections. In implementing these plans in the field, final numbers and harvest volumes could vary slightly. Each Decision Document would disclose the final acreages and mileages.

## No Action Alternative

The no action alternative provides a baseline for the comparison of the action alternative. This alternative describes the existing condition and the continuing trends. Selection of the no action alternative would not constitute a decision to reallocate these lands to non-commodity uses. Selection of the no action alternative also would not preclude future harvesting in this area, at which time the BLM would prepare another EA. This alternative would not meet the purpose and need.

The project area would not receive the treatments described in this document in the near future. Ongoing activities would continue to occur. These include silvicultural activities in young stands, compliance with Oregon fire control regulations, construction of roads across BLM land under existing right-of-way agreements, routine road maintenance, control of noxious weeds and other projects covered by earlier decision records.

## Proposed Action Alternative

The proposed action is to implement silvicultural treatments on approximately 6,341 acres of mid-seral stands. This action includes commercial and density management thinning of conifer stands and hardwood conversion in Matrix, Late-Successional Reserve, and Riparian Reserve land use allocations.

[1] Light Detection and Ranging (LiDAR) is an optical remote sensing technique using laser pulses from a plane to calculate the position of an object (e.g., the ground, the top of a tree) by measuring the time delay between transmission of the pulse and detection of the reflected signal (**Figure 3-5**).

Treatments would occur through commercial timber sales and non-commercial treatments from 2016 to 2021. The BLM would derive harvest volumes for thinning treatments from cruising methods that would employ sample tree falling techniques.

**Table 2-1** contains a brief summary of harvest activities based on land use allocation and treatment prescription. **Table 2-2** contains a summary of yarding activities. **Table 2-3** contains a summary of haul road related activities. **Table 2-4** contains a summary of road construction, renovations, improvements, and decommissioning.

**Table 2-1.** Timber harvest acreage summary based on land use allocation and treatment type.

| Category | Land Use Allocation | | Treatment Type | Acres | Total Acres |
|---|---|---|---|---|---|
| Timber Harvest | Matrix | General Forest Management Area | Commercial Thinning | 1,824 | **1,845** |
| | | | Hardwood Conversion | 21 | |
| | | Connectivity | Commercial Thinning | 55 | **55** |
| | Riparian Reserve | | Density Management Thinning | 3,518 | **3,598** |
| | | | Hardwood Conversion | 81 | |
| | Late Successional Reserve | | Density Management Thinning | 788 | **843** |
| | | | Hardwood Conversion | 55 | |
| | | | | **Grand Total Acres** | **6,341** |

**Table 2-2.** Timber yarding summary based on land use allocation and yarding system.

| Category | Land Use Allocation | | Acres | | | Total Acres |
|---|---|---|---|---|---|---|
| | | | **Cable Yarding** | **Ground-based** | **Helicopter** | |
| Timber Yarding | Matrix | General Forest Management Area | 1,231 | 179 | 435 | **1,845** |
| | | Connectivity | 55 | - | - | **55** |
| | Riparian Reserve | | 2,678 | 107 | 813 | **3,598** |
| | Late Successional Reserve | | 657 | 111 | 75 | **843** |
| | | **Total Acres** | 4,621 | **397** | 1,323 | **6,341** |

**Table 2-3.** Timber haul summary.

| Timber Haul Season/Road Type | Mileage |
|---|---|
| Dry Season/Natural Roads | 14.5 |
| Dry Season/Gravel Roads | 5.6 |
| All Season/Gravel Roads | 77.8 |
| All Season/Paved Roads | 67.2 |

**Table 2-4.** Road-related actions proposed in the Big-Vincent analysis area.

| Activity | Mileage |
|---|---|
| Construction Total | **18.2** |
| Construction in the Riparian Reserve | 5.0 |
| Improvement | 5.5 |
| Renovation | 76.1 |
| Decommissioning in the Riparian Reserve | 6.2 |
| Decommissioning Total | 22.6 |
| Full Decommissioning | 1.7 |
| Decommissioning (Net)* | **6.1** |
| Decommissioning Key Watershed (Net)† | **0.23** |

* Decommissioning (Net) only includes open existing roads (i.e., renovated and improved roads), and does not include new construction that would be decommissioned.

† Key Watershed (Net) includes fully decommissioned existing roads in the Key Watershed, and does not include new construction that would be fully decommissioned. This is a net loss of roads in the Key Watershed.

**Table 2-5** lists the proposed harvest acreages by harvest prescription and land use allocation. Final acreages may change as the BLM finalizes projects on the ground; the variability of these estimates is included in the effects analysis in this environmental assessment. The IDT has not developed specific timber sales, but has described harvest areas in logical groupings.

**Table 2-5.** Harvest unit acreages based on prescription and land use allocation.

| EA Unit No. | Commercial Thinning | | Density Management Thinning | | Hardwood Conversion | | | Total Harvest (Acres) |
|---|---|---|---|---|---|---|---|---|
| | GFMA† (Acres) | C/D* (Acres) | LSR♦ (Acres) | RR⅄ (Acres) | GFMA† (Acres) | LSR♦ (Acres) | RR⅄ (Acres) | |
| 1 | | | 87 | 191 | | 31 | 34 | 343 |
| 2 | | | 41 | 41 | | | | 81 |
| 3 | 113 | | | 339 | 8 | | 10 | 470 |
| 4 | | | 52 | 88 | | | | 141 |
| 5 | | | 57 | 86 | | 19 | 26 | 188 |
| 6 | | | 150 | 289 | | 5 | 2 | 445 |
| 7 | 63 | | | 10 | | | | 73 |
| 8 | 24 | | 13 | 50 | 13 | | 9 | 109 |
| 9 | 347 | | | 260 | | | | 607 |
| 10 | 313 | | | 318 | | | | 632 |
| 11 | 302 | | | 288 | | | | 590 |
| 12 | 217 | | | 322 | | | | 539 |
| 13 | | 55 | | 15 | | | | 70 |
| 14 | 12 | | | 50 | | | | 62 |
| 15 | 204 | | | 219 | | | | 424 |
| 16 | 230 | | 18 | 355 | | | | 603 |
| 17 | | | 133 | 197 | | | | 330 |
| 18 | | | 56 | 97 | | | | 152 |
| 19 | | | 11 | 28 | | | | 39 |
| 20 | | | 11 | 22 | | | | 33 |
| 21 | | | 13 | 48 | | | | 61 |
| 22 | | | 17 | 20 | | | | 37 |
| 23 | | | 16 | 44 | | | | 60 |
| 24 | | | 16 | 17 | | | | 32 |
| 25 | | | 4 | 7 | | | | 11 |
| 26 | | | 6 | 10 | | | | 16 |
| 27 | | | 23 | 26 | | | | 48 |
| 28 | | | 11 | 18 | | | | 29 |
| 29 | | | 6 | 9 | | | | 15 |
| 30 | | | 37 | 51 | | | | 88 |
| 31 | | | 12 | 3 | | | | 15 |
| **Totals** | **1,825** | **55** | **790** | **3,518** | 21 | 55 | 81 | **6,341** |
| **Grand Total** | **1,880** | | **4,308** | | **157** | | | **6,341** |

† General Forest Management Area, * Connectivity/Diversity, ♦ Late-Successional Reserves, ⅄ Riparian Reserves

Road-related activities include new construction, renovation, improvement, maintenance, and decommissioning (**Table 2-4**). Estimated mileages may change as the BLM finalizes projects on the ground; the variability of estimates is included in the effects analysis in this environmental assessment. Construction of additional short spur roads may be necessary to facilitate harvest operations. These spur roads would generally be ridge top locations and of similar standards to those being analyzed.

All proposed units would be harvested using either a skyline cable, ground-based, or helicopter system, or a combination of systems (**Table 2-6**). Tree cutting would occur with handheld chainsaws or mechanical harvesters (PDF #1). One-end log suspension (PDF #2) would be required with full suspension (PDF #4) over stream channels during inhaul for the skyline cable system. Specific yarding project design features (PDFs) are located on EA pp. 30-31.

**Table 2-6.** Log yarding system acreages proposed for the Big-Vincent harvest units. Acreages are approximations and may change as the BLM finalizes projects on the ground.

| EA Unit No. | Cable Yarding | | Ground-based (Acres) | Helicopter (Acres) | Totals (Acres) |
|---|---|---|---|---|---|
| | Downhill (Acres) | Uphill (Acres) | | | |
| 1 | | 266 | 31 | 45 | 343 |
| 2 | 8 | 63 | 10 | | 81 |
| 3 | 7 | 362 | 63 | 37 | 470 |
| 4 | | 95 | 45 | | 141 |
| 5 | | 184 | 4 | | 188 |
| 6 | | 445 | | | 445 |
| 7 | | 1 | 72 | | 73 |
| 8 | | 78 | | 30 | 109 |
| 9 | | 511 | 82 | 14 | 607 |
| 10 | | 403 | | 229 | 632 |
| 11 | | 431 | 10 | 149 | 590 |
| 12 | | | | 539 | 539 |
| 13 | | 70 | | | 70 |
| 14 | | | | 62 | 62 |
| 15 | | 394 | | 29 | 424 |
| 16 | | 482 | 24 | 98 | 603 |
| 17 | | 317 | 13 | | 330 |
| 18 | | 77 | | 75 | 152 |
| 19 | | 39 | | | 39 |
| 20 | | 33 | | | 33 |
| 21 | | 61 | | | 61 |
| 22 | | 37 | | | 37 |
| 23 | | 44 | | 16 | 60 |
| 24 | | 32 | | | 32 |
| 25 | 11 | | | | 11 |
| 26 | | 16 | | | 16 |
| 27 | | 48 | | | 48 |
| 28 | | 29 | | | 29 |
| 29 | | 16 | | | 15 |
| 30 | | 45 | 43 | | 88 |
| 31 | | 16 | | | 15 |
| **Totals** | **26** | **4,595** | **397** | **1,323** | **6,341** |

## Silvicultural Treatments

There are three basic treatments within the proposed action: commercial thinning, density management thinning, and hardwood conversion. Thinning treatments would occur in stands that are predominantly conifer with some scattered hardwoods. Commercial thinning is the terminology for treatments that aim to maintain and improve conifer growth rates, capture anticipated mortality of smaller trees and accelerate development of trees that can later provide large-diameter valuable logs. Commercial thinning treatments occur on Matrix lands and contribute to the Allowable Sale Quantity (ASQ). Density management thinning occurs within Late-Successional Reserves and Riparian Reserves. The objectives of density management thinning treatments are to develop stand structure and components associated with late-successional conditions, as well as structurally-complex conifer-dominated, species-diverse forests.

Density management thinning treatments do not contribute to the ASQ. Hardwood conversion would restore sites that unsuccessfully regenerated conifer and convert the existing hardwood stand to a conifer-dominated stand. Treatments would remove alder from areas where it was historically infrequent in conjunction with commercial and density management thinning treatments. This would provide canopy gaps and increase horizontal variability in tree densities. By removing or reducing hardwoods and reestablishing conifers where historically and ecologically appropriate, the hardwood conversion treatments accomplish the goals of the Matrix, Late-Successional Reserve and Riparian Reserve land use allocations.

### Big Vincent Prescriptions

Relative density (RD) "expresses the actual density of trees in a stand relative to the theoretical maximum density (RD100) possible for trees that size" (Hayes *et al.* 1997). RD is a measure used to estimate when a stand reaches a density where diameter growth begins to decline and suppression mortality increases. RD increases for a given stem diameter if the number of trees per acre decrease. Generally, a RD of 22 to 25 is an open growing stand. At a RD of 50 or greater, stand growth slows. All of the stands in the Big-Vincent project area are near or above RD 50 (**Appendix D**).

Big-Vincent project thinning prescriptions, based on Hayes *et al*. (1997), consider a final RD of 35 or greater a 'light thinning' and a final RD of 25 or less a 'heavy thinning'. The BLM inferred anything between RD 25 and RD 35 to be a 'moderate thinning'. The BLM projected post-treatment stand data statistics and prescriptions using the Forest Vegetation Simulator (FVS) growth model (**Appendix D**).

#### ***Commercial Thinning Prescription***

In order to accomplish the objectives of commercial thinning as described above, the BLM has developed the following prescriptions:

1. Thin stands from below to a prescribed basal area (BA) of leave trees that coincides with a relative density of approximately 30-35. Prescribed conifer BA would range from 120 to 170 $ft^2$/acre.
2. Maintain species diversity by retaining minor species to the same size-class distribution as currently occurring in the stand. Retained minor species would count towards the target BA and include western red cedar, pacific yew, grand fir, golden chinquapin, Oregon myrtle and big leaf maple ≥ 24 inches DBH.
3. Heavily thin portions of the stand that have small patches of alder to ≤ 50 trees per acre (TPA).

#### ***Density Management Thinning Prescription***

In order to accomplish the objectives of density management thinning as described above, the BLM has developed the following prescriptions:

1. Thin stands from below to a prescribed BA of leave trees that coincide with a RD of approximately 25-35. Prescribed conifer BA would range from 110 to 170 $ft^2$/acre.
2. Create stands with "significant within-stand variation in tree density", where at least 10 percent of the stand would remain as unthinned areas ("skips"[2]) or would be dropped from the unit to retain suppression processes. Gaps would be limited to < 0.25 acre.
3. Maintain species diversity by retaining minor species to the same size class distribution and frequency as currently occurring in the stand, except for gaps. Minor species would count towards the target basal area. Portions of the stand that have small clumps (< 2 acres) of alder would be heavily thinned to ≤ 50 trees per acre.

[2] Skips are areas that will not receive treatment within the unit.

#### ***Hardwood Conversion Prescription***
In order to accomplish the objectives of hardwood conversion as described above, the BLM developed the following prescriptions:

1. Remove all red alder from the red alder-dominated portions of the stand, and retain any scattered, individual, healthy, and releasable conifers.
2. Thin conifer-dominated portions of the stand from below to a prescribed basal area ranging from 120 to 170 $ft^2$/acre. RD would be below self-thinning levels (RD 55) and variable within units ranging between RD 14 for hardwood patches and RD 35 in dense conifer stands.
3. Plant a mix of conifers species with an emphasis on shade-tolerant species where post-harvest site conditions limit available sunlight for growth and development of shade-intolerant species.
4. Retain all minor conifer species and they would count towards the target basal area. Minor conifer species for this action area are western redcedar, Pacific yew, and grand fir. Douglas-fir would be given preference over western hemlock.
5. Maintain hardwood diversity by retaining Oregon myrtle, golden chinquapin, and big leaf maple to the same size-class distribution as currently occurring in the stand.
6. Retain all big leaf maple ≥ 24 inches DBH.

#### ***Riparian Reserves Prescription***
Treatments in the Riparian Reserves are designed to control stocking, reestablish and manage stands, and acquire desired vegetative characteristics needed to attain Aquatic Conservation Strategy Objectives (RMP, p. 13). The site-specific objectives of these treatments are to promote development of large conifers, improve future recruitment of large woody debris, improve diversity of species composition, improve an understory shrub layer, improve structural diversity, and improve stand density. Reduced and more variable stand densities can be defined as an improvement in that they facilitate meeting Riparian Reserve and Aquatic Conservation Strategy (ACS) objectives as stated in the purpose and need.

The silvicultural prescription for the Riparian Reserves is density management thinning or hardwood conversion as detailed above. Project design features specific to the Riparian Reserve further describe proposed treatment action and can be found on EA p. 28.

### Sample Tree Falling
The BLM would conduct sample tree falling in preparation of timber sale contracts to improve the accuracy of the final cruise volume. Sample tree selection would come from trees marked for removal. **Appendix A** contains more information about sample tree falling. Project design features for sample tree falling are located on EA p. 29. Sampled trees would count toward downed wood creation if a timber sale does not occur.

### Snags and Coarse Woody Debris
The BLM would, across all treatments, reserve snags from cutting, to the greatest extent possible (PDF #19). The BLM would fell snags if safety and operational feasibility were in conflict, but all downed snags would remain on site as coarse woody debris (CWD). The BLM would consider logging damage to intermediate support trees, tail hold trees, guyline trees and rub trees a source for created structural legacies such as snags and CWD. The BLM would reserve from harvest and count wind throw, snow breakage, broken tops, and slash pile scorch towards snag and CWD recruitment.

### Road Management
Road management for the project consists of developing and maintaining a transportation system that serves the project needs in an environmentally sound manner as directed by the Coos Bay RMP/ROD (USDI 1995) and the Western Oregon Districts Transportation Management Plan (TMP) (USDI 2010 *Update*). This would involve construction of new roads, renovation, and improvement of existing roads,

maintenance of roads necessary to facilitate harvest operations, and decommissioning of roads following the completion of the project.

Construction of new roads and use of existing roads in this project have been designed to allow yarding and hauling operations to occur at the most appropriate times of the year taking into consideration adjacent wildlife habitat, existing road conditions, unit size, unit volume, and logging cost. For year-round operations to occur, roads must have a rocked or paved surface adequate to withstand winter operations. Refer to **Table 2-3** for a summary of haul activity. Refer to **Table 2-4** for a summary of the proposed road miles for new construction, renovation, improvement, and decommissioning.

### New Road Construction

New road construction would consist of approximately 18.2 miles of natural, rocked, or paved surface roads on or near ridge top locations. The best management practices (BMPs) listed in the project design features would guide the type of road construction and road locations. The BLM is proposing 72 percent (or approximately 13.2 miles) of new roads outside of the Riparian Reserves and approximately 5 miles of new road construction within the Riparian Reserves (**Table 2-7**). The longest road proposed is approximately 1.27 miles (Road 10-2 NC); however, the average new road or spur is approximately 0.15 mile (792 feet) long. There are no new intermittent or perennial stream crossings proposed. One proposed segment of new construction (i.e., 21-9-32.4) would remain open at project completion as a bypass option for the Wells Creek Road slide, and is addressed by the current Programmatic Biological Opinion from USFWS (USDI 2014).

**Table 2-7.** New road construction estimates by EA unit.

| EA Unit No. | New Construction Spur No. | Total Miles | Miles in Riparian Reserve | Surface Type | Haul Season | Closure Type |
|---|---|---|---|---|---|---|
| 1 | 1-1 NC | 0.20 | - | Natural | Summer | Full Decommission |
| | 1-2 NC | 0.11 | - | Natural | Summer | Full Decommission |
| | 1-3 NC | 0.08 | - | Natural | Summer | Full Decommission |
| | 1-4 NC | 0.06 | - | Natural | Summer | Full Decommission |
| | 1-5 NC | 0.18 | 0.02 | Natural | Summer | Decommission |
| | 1-6 NC | 0.01 | 0.00 | Natural | Summer | Decommission |
| | 1-7 NC | 0.11 | 0.10 | Natural | Summer | Decommission |
| | **Total** | **0.76** | **0.12** | | | |
| 2 | 2-1 NC | 0.09 | 0.01 | Gravel | All | Decommission |
| | 2-1.1 NC | 0.02 | - | Gravel | All | Decommission |
| | 2-2NC | 0.01 | 0.01 | Gravel | All | Decommission |
| | **Total** | **0.12** | **0.01** | | | |
| 3 | 3-1 NC | 0.08 | 0.08 | Natural | Summer | Decommission |
| | 3-2 NC | 0.13 | - | Gravel | All | Decommission |
| | 3-3 NC | 0.01 | - | Gravel | All | Decommission |
| | 3-4 NC | 0.02 | 0.02 | Gravel | All | Decommission |
| | 3-5 NC | 0.03 | - | Gravel | All | Decommission |
| | 3-6 NC | 0.19 | 0.00 | Natural | Summer | Decommission |
| | 3-7 NC | 0.02 | 0.02 | Gravel | All | Decommission |
| | 3-8 NC | 0.02 | 0.01 | Gravel | All | Decommission |
| | 3-9 NC | 0.04 | 0.02 | Gravel | All | Decommission |
| | 3-10 NC | 0.03 | 0.01 | Gravel | All | Decommission |
| | 3-11 NC | 0.07 | 0.04 | Gravel | All | Decommission |
| | 3-12 NC | 0.57 | 0.32 | Natural | Summer | Decommission |
| | 3-12.1 NC | 0.03 | 0.03 | Natural | Summer | Decommission |
| | 3-12.2 NC | 0.05 | 0.02 | Natural | Summer | Decommission |
| | 3-13 NC | 0.09 | 0.01 | Gravel | All | Decommission |
| | 3-14NC | 0.68 | 0.34 | Gravel | All | Decommission |
| | 3-14.1NC | 0.02 | 0.01 | Gravel | All | Decommission |
| | 21-9-32.4 | 0.42 | - | Paved | All | Open |
| | **Total** | **2.50** | **0.93** | | | |
| 4 | 4-1 NC | 0.13 | 0.07 | Gravel | All | Decommission |

| EA Unit No. | New Construction Spur No. | Total Miles | Miles in Riparian Reserve | Surface Type | Haul Season | Closure Type |
|---|---|---|---|---|---|---|
| | 4-2 NC | 0.18 | - | Gravel | All | Decommission |
| | 4-3 NC | 0.18 | 0.05 | Natural | Summer | Decommission |
| | **Total** | **0.49** | **0.12** | | | |
| 5 | 5-1 NC | 0.20 | 0.05 | Gravel | All | Decommission |
| | 5-2 NC | 0.07 | 0.01 | Gravel | All | Decommission |
| | 5-3 NC | 0.03 | 0.03 | Natural | Summer | Full Decommission |
| | 5-4 NC | 0.07 | - | Gravel | All | Decommission |
| | 5-5 NC | 0.24 | 0.16 | Gravel | All | Decommission |
| | 5-6 NC | 0.11 | 0.03 | Natural | Summer | Decommission |
| | 5-6.1 NC | 0.03 | - | Natural | Summer | Decommission |
| | 5-7 NC | 0.04 | - | Natural | Summer | Decommission |
| | **Total** | **0.79** | **0.29** | | | |
| 6 | 6-1 NC | 0.73 | 0.48 | Natural | Summer | Decommission |
| | 6-1.1 NC | 0.02 | 0.02 | Natural | Summer | Decommission |
| | 6-1.2 NC | 0.07 | 0.04 | Natural | Summer | Decommission |
| | 6-2 NC | 0.06 | 0.06 | Natural | Summer | Decommission |
| | 6-3 NC | 0.16 | 0.15 | Gravel | All | Decommission |
| | 6-4 NC | 0.18 | 0.01 | Gravel | All | Decommission |
| | 6-5 NC | 0.03 | - | Natural | Summer | Full Decommission |
| | 6-6 NC | 0.04 | - | Natural | Summer | Decommission |
| | **Total** | **1.29** | **0.76** | | | |
| 7 | 7-1 NC | 0.18 | - | Natural | Summer | Decommission |
| | **Total** | **0.18** | **-** | | | |
| 8 | 8-1 NC | 0.38 | 0.13 | Gravel | All | Decommission |
| | 8-1.1 NC | 0.01 | - | Gravel | All | Decommission |
| | 8-1.2 NC | 0.01 | 0.01 | Gravel | All | Decommission |
| | 8-2 NC | 0.22 | - | Gravel | All | Decommission |
| | **Total** | **0.63** | **0.15** | | | |
| 9 | 9-1 NC | 0.02 | - | Gravel | All | Decommission |
| | 9-2 NC | 0.09 | - | Natural | Summer | Full Decommission |
| | 9-3 NC | 0.02 | - | Gravel | All | Decommission |
| | 9-4 NC | 0.08 | - | Gravel | All | Decommission |
| | 9-4.1 NC | 0.12 | - | Natural | Summer | Full Decommission |
| | 9-5 NC | 0.07 | 0.04 | Gravel | All | Decommission |
| | 9-5.1 NC | 0.02 | 0.02 | Gravel | All | Decommission |
| | 9-6 NC | 0.02 | 0.02 | Gravel | All | Decommission |
| | 9-6.1 NC | 0.07 | 0.29 | Natural | Summer | Full Decommission |
| | 9-7 NC | 0.10 | - | Natural | Summer | Decommission |
| | 9-8 NC | 0.02 | - | Gravel | Summer | Decommission |
| | 9-9 NC | 0.05 | - | Natural | Summer | Decommission |
| | 9-10 NC | 0.04 | 0.02 | Natural | Summer | Decommission |
| | 9-11 NC | 0.10 | 0.03 | Gravel | All | Decommission |
| | **Total** | **0.82** | **0.41** | | | |
| 10 | 10-1 NC | 0.35 | 0.02 | Gravel | All | Decommission |
| | 10-1.1 NC | 0.46 | 0.05 | Natural | Summer | Decommission |
| | 10-2 NC | 1.27 | 0.24 | Gravel | All | Decommission |
| | 10-2.1 NC | 0.10 | 0.05 | Natural | Summer | Full Decommission |
| | 10-2.2 NC | 0.01 | - | Gravel | All | Decommission |
| | 10-2.3 NC | 0.04 | - | Gravel | All | Decommission |
| | 10-2.4 NC | 0.08 | - | Natural | Summer | Decommission |
| | 10-2.5 NC | 0.14 | - | Natural | Summer | Decommission |
| | **Total** | **2.45** | **0.35** | | | |
| 11 | 11-1 NC | 0.40 | - | Gravel | All | Decommission |
| | 11-1.1 NC | 0.02 | - | Gravel | All | Decommission |
| | 11-2 NC | 0.10 | - | Natural | Summer | Decommission |
| | 11-2.1 NC | 0.03 | - | Natural | Summer | Decommission |
| | 11-3 NC | 0.05 | - | Natural | Summer | Decommission |
| | 11-4 NC | 0.17 | - | Natural | Summer | Full Decommission |
| | **Total** | **0.76** | **-** | | | |
| 12 | 12-1 NC | 0.40 | 0.10 | Gravel | All | Decommission |

| EA Unit No. | New Construction Spur No. | Total Miles | Miles in Riparian Reserve | Surface Type | Haul Season | Closure Type |
|---|---|---|---|---|---|---|
| | 12-2 NC | 0.87 | 0.04 | Natural | Summer | Decommission |
| | 12-3 NC | 0.16 | 0.17 | Natural | Summer | Decommission |
| | 12-4 NC | 0.21 | 0.09 | Natural | Summer | Decommission |
| | **Total** | **1.65** | **0.40** | | | |
| **15** | 15-1 NC | 1.11 | 0.17 | Natural | Summer | Decommission |
| | 15-1.1 NC | 0.28 | 0.04 | Natural | Summer | Decommission |
| | 15-1.2 NC | 0.01 | - | Natural | Summer | Decommission |
| | 15-1.3 NC | 0.07 | - | Natural | Summer | Decommission |
| | 15-1.4 NC | 0.17 | - | Natural | Summer | Decommission |
| | 151.5 NC | 0.10 | - | Natural | Summer | Decommission |
| | 15-2 NC | 0.05 | - | Natural | Summer | Decommission |
| | 15-3 NC | 0.04 | 0.03 | Natural | Summer | Decommission |
| | 15-4 NC | 0.41 | 0.06 | Natural | Summer | Decommission |
| | 15-4.1 NC | 0.07 | - | Natural | Summer | Decommission |
| | **Total** | **2.31** | **0.29** | | | |
| **16** | 16-1 NC | 0.40 | 0.07 | Gravel | All | Decommission |
| | 16-2 NC | 0.23 | 0.10 | Gravel | All | Decommission |
| | 16-3 NC | 0.35 | 0.20 | Natural | Summer | Decommission |
| | 16-3.1 NC | 0.02 | 0.01 | Natural | Summer | Decommission |
| | 16-3.2 NC | 0.10 | 0.07 | Natural | Summer | Decommission |
| | 16-3.3 NC | 0.02 | - | Natural | Summer | Decommission |
| | 16-4 NC | 0.09 | - | Natural | Summer | Decommission |
| | 16-5 NC | 0.05 | 0.04 | Natural | Summer | Decommission |
| | **Total** | **1.25** | **0.48** | | | |
| **17** | 17-1 NC | 0.79 | 0.15 | Natural | Summer | Decommission |
| | 17-1.1 NC | 0.15 | - | Natural | Summer | Decommission |
| | 17-2 NC | 0.05 | 0.03 | Gravel | All | Decommission |
| | 17-3 NC | 0.08 | 0.01 | Gravel | All | Decommission |
| | 17-4 NC | 0.05 | - | Gravel | All | Decommission |
| | 17-5 NC | 0.10 | - | Natural | Summer | Full Decommission |
| | 17-6 NC | 0.04 | 0.04 | Gravel | All | Decommission |
| | 17-7 NC | 0.37 | 0.11 | Gravel | All | Decommission |
| | 17-7.1 NC | 0.05 | 0.01 | Gravel | All | Decommission |
| | 17-7.2 NC | 0.01 | - | Gravel | All | Decommission |
| | **Total** | **1.69** | **0.35** | | | |
| **22** | 22-1 NC | 0.02 | - | Natural | Summer | Full Decommission |
| | **Total** | **0.02** | **-** | | | |
| **24** | 24-1 NC | 0.03 | - | Natural | Summer | Full Decommission |
| | **Total** | **0.03** | **-** | | | |
| **26** | 26-1 NC | 0.06 | 0.03 | Natural | Summer | Full Decommission |
| | **Total** | **0.06** | **0.03** | | | |
| **27** | 27-1 NC | 0.08 | 0.02 | Natural | Summer | Full Decommission |
| | 27-2 NC | 0.06 | - | Natural | Summer | Full Decommission |
| | **Total** | **0.14** | **0.02** | | | |
| **29** | 29-1 NC | 0.04 | - | Natural | Summer | Full Decommission |
| | **Total** | **0.04** | **-** | | | |
| **30** | 30-1 NC | 0.19 | 0.31 | Gravel | All | Decommission |
| | **Total** | **0.19** | **0.31** | | | |
| | **Grand Total** | **18.17** | **5.00** | | | |

Incorporation and implementation of best management practices (BMPs) would occur for new road and landing construction to eliminate or minimize erosion and sediment transport into the channel network ((USDI 1995), p. D3-D4). These may include, but are not limited to, construction during the dry season (PDF #73), avoiding wetlands (PDF #7) and fragile or unstable areas (PDF #76), minimizing excavation and height of cuts (PDF #76), end-haul of waste material where appropriate (PDF #80), and provision for adequate road drainage (PDFs #78 and 79). New roads would also be single lanes with turnouts (PDFs #74 and 81). As development of each individual sale progresses and becomes more refined, some short unidentified spur roads or landings may be required that would better facilitate harvest operations. Implementation of unidentified new construction would use best management practices (BMPs).

Landing construction would mainly consist of creating wide spots to facilitate safe yarding and loading of logs. Cable and cut-to-length system ground-based landings are typically about 0.25-acre in size including the existing roadbed, and helicopter landings are typically about 0.50-acre in size.

### Road Renovation

Road renovation involves bringing an existing road back up to the original design standard. For a natural surfaced road, work includes clearing brush, cleaning or replacing ditch relief/stream crossing culverts, restoring proper road surface drainage, grading or other maintenance. For a gravel road, it also may include adding rock so the road is adequate for winter operations.

### Road Improvement

Road improvement for this project consists of increasing the existing road standard to a higher design standard by surfacing existing dirt roads. Rock-surfaced roads would allow cable harvesting and hauling during the winter season and allow work outside of murrelet and owl seasonally restricted periods.

The following table (**Table 2-8**) displays each road, EA or existing road number, roadwork type, closure type, haul season and length.

**Table 2-8.** Road renovation (Reno), improvement (Imp), and closure type by unit.

| EA Unit No. | EA Road Spur No. | Road Name or Number | Miles | Road Work | Current Surface | Proposed Surface | Haul Season | Closure Type |
|---|---|---|---|---|---|---|---|---|
| 1 | 1-1 Imp | | 0.21 | Imp | Natural | Gravel | All | Decommission |
| | 1-1 Reno | | 0.41 | Reno | Natural | Natural | Summer | Decommission |
| | 1-2 Reno | | 0.21 | Reno | Gravel | Gravel | All | Open |
| | | 21-9-29 | 0.57 | Reno | Gravel | Gravel | All | Open |
| | | 21-8-30 | 0.29 | Reno | Gravel | Gravel | All | Open |
| 2 | 2-1 Imp | | 0.11 | Imp | Natural | Gravel | All | Decommission |
| | | 21-9-29 | 1.46 | Reno | Gravel | Gravel | All | Open |
| 3 | 3-1 Imp | 21-9-28 | 0.61 | Imp | Natural | Gravel | Summer | Decommission |
| | 3-2 Imp | 21-9-28 | 0.72 | Imp | Natural | Gravel | All | Decommission |
| | 3-1 Reno | | 0.11 | Reno | Gravel | Gravel | All | Temp |
| | 3-2 Reno | | 1.26 | Reno | Gravel | Gravel | All | Temp |
| | | 21-9-24.2 | 2.28 | Reno | Gravel | Gravel | All | Temp |
| | | Fall Creek Rd | 2.12 | Reno | Gravel | Gravel | Summer | Temp |
| | | 21-9-26.1 | 0.32 | Reno | Gravel | Gravel | All | Open |
| | | 21-9-27.1 | 0.32 | Reno | Natural | Natural | Summer | Decommission |
| | | 21-9-28.2 | 0.47 | Reno | Gravel | Gravel | All | Open |
| | | 21-9-32.01 | 0.08 | Imp | Natural | Paved | All | Open |
| 4 | | 21-9-11 | 0.59 | Reno | Gravel | Gravel | All | Open |
| | | 21-9-11.1 | 0.14 | Reno | Gravel | Gravel | All | Open |
| | | 21-9-3 | 0.70 | Reno | Gravel | Gravel | All | Open |
| 5 | 5-1 Imp | | 0.07 | Imp | Natural | Gravel | All | Decommission |
| | 5-2 Imp | | 0.49 | Imp | Natural | Gravel | All | Open |
| | 5-1 Reno | | 0.20 | Reno | Natural | Natural | Summer | Decommission |
| | | 21-9-13.15 | 0.14 | Reno | Gravel | Gravel | All | Open |
| | | 21-9-14 | 0.34 | Reno | Gravel | Gravel | All | Open |
| | | 21-9-3 | 1.16 | Reno | Gravel | Gravel | All | Open |
| 6 | 6-1 Reno | | 0.15 | Reno | Natural | Natural | Summer | Decommission |
| | 6-2 Reno | | 0.12 | Reno | Gravel | Gravel | All | Open |
| | | 21-9-22 | 0.62 | Reno | Gravel | Gravel | All | Open |
| | | 21-9-22 | 0.24 | Reno | Natural | Natural | Summer | Decommission |

| EA Unit No. | EA Road Spur No. | Road Name or Number | Miles | Road Work | Current Surface | Proposed Surface | Haul Season | Closure Type |
|---|---|---|---|---|---|---|---|---|
| | | 21-9-23 | 0.26 | Reno | Gravel | Gravel | All | Open |
| | | 21-9-23.1 | 0.31 | Reno | Gravel | Gravel | All | Open |
| | | 21-9-24.2 | 0.57 | Reno | Gravel | Gravel | All | Temp |
| | | 21-9-24.3 | 0.55 | Reno | Gravel | Gravel | All | Open |
| | | 21-9-24.3 | 0.52 | Reno | Natural | Natural | Summer | Decommission |
| | | 21-9-3 | 0.72 | Reno | Gravel | Gravel | All | Open |
| 7 | 7-1 Reno | | 0.14 | Reno | Natural | Natural | Summer | Decommission |
| | | 21-9-12.5 | 0.29 | Reno | Gravel | Gravel | All | Open |
| | | 21-9-24 | 1.16 | Reno | Gravel | Gravel | All | Open |
| 8 | | 21-9-12 | 1.25 | Imp | Natural | Gravel | All | Open |
| | | 21-9-13.9 | 0.20 | Imp | Natural | Gravel | All | Open |
| | | 21-9-13.11 | 0.83 | Imp | Natural | Gravel | All | Open |
| | | 21-9-24 | 0.64 | Reno | Gravel | Gravel | All | Open |
| 9 | 9-1 Imp | | 0.11 | Imp | Natural | Gravel | All | Decommission |
| | 9 Reno | | 0.22 | Reno | Natural | Natural | Summer | Decommission |
| | 9-1 Reno | | 0.47 | Reno | Natural | Natural | Summer | Decommission |
| | 9-2 Reno | | 0.09 | Reno | Natural | Natural | Summer | Decommission |
| | 9-3 Reno | | 0.17 | Reno | Natural | Natural | Summer | Decommission |
| | 9-4 Reno | | 0.04 | Reno | Natural | Natural | Summer | Decommission |
| | | 21-9-13.6 | 0.25 | Reno | Gravel | Gravel | All | Open |
| | | 21-9-13 | 0.19 | Reno | Gravel | Gravel | All | Decommission |
| | | 21-9-13 | 0.61 | Reno | Gravel | Gravel | All | Open |
| | | 21-9-13.3 | 0.29 | Reno | Natural | Natural | Summer | Decommission |
| | | 21-9-13.12 | 0.41 | Reno | Gravel | Gravel | All | Open |
| | | 21-9-13.13 | 0.66 | Reno | Gravel | Gravel | All | Open |
| | | 21-9-13.15 | 0.06 | Reno | Gravel | Gravel | All | Open |
| | | 21-9-24 | 1.37 | Reno | Gravel | Gravel | All | Open |
| | | 21-9-3 | 1.23 | Reno | Gravel | Gravel | All | Open |
| 10 | | 21-8-8.1 | 1.03 | Reno | Gravel | Gravel | All | Open |
| | | 21-9-13.6 | 0.24 | Reno | Gravel | Gravel | All | Open |
| 11 | | 21-8-19 | 0.50 | Imp | Natural | Gravel | All | Open |
| | | 21-8-19.3 | 0.08 | Imp | Natural | Gravel | All | Open |
| | 11 Reno | | 0.08 | Reno | Natural | Natural | Summer | Decommission |
| | 11-1 Reno | | 0.15 | Reno | Natural | Natural | Summer | Decommission |
| | 11-2 Reno | | 0.12 | Reno | Natural | Natural | Summer | Decommission |
| | | 21-8-19.1 | 0.44 | Reno | Gravel | Gravel | All | Open |
| | | 21-8-19.2 | 0.04 | Reno | Gravel | Gravel | All | Open |
| | | 21-9-24.10 | 1.47 | Reno | Gravel | Gravel | All | Open |
| | | 21-9-13.12 | 0.04 | Reno | Gravel | Gravel | All | Open |
| | | 21-9-13.14 | 0.22 | Reno | Gravel | Gravel | All | Open |
| | | 21-9-24.1 | 1.56 | Reno | Gravel | Gravel | All | Open |
| | | 21-9-24.6 | 0.43 | Reno | Gravel | Gravel | All | Open |
| 12 | 12 Reno | | 0.11 | Reno | Gravel | Gravel | All | Temp |
| | 12-1 Reno | | 1.66 | Reno | Gravel | Gravel | All | Temp |
| | 12-4 Reno | | 0.86 | Reno | Gravel | Gravel | All | Temp |
| | 12-5 Reno | | 0.22 | Reno | Gravel | Gravel | All | Temp |
| | 12-6 Reno | | 0.06 | Reno | Gravel | Gravel | All | Open |
| | 12-7 Reno | | 1.14 | Reno | Gravel | Gravel | All | Open |
| | 12-8 Reno | | 0.39 | Reno | Gravel | Gravel | All | Temp |
| | 12-9 Reno | | 0.12 | Reno | Gravel | Gravel | All | Temp |
| | | 21-8-16 | 0.18 | Reno | Gravel | Gravel | All | Open |
| | | 21-9-24.1 | 0.77 | Reno | Gravel | Gravel | All | Temp |
| 13 | 13 Reno | | 0.11 | Reno | Gravel | Gravel | All | Temp |
| | | 21-8-29 | 0.19 | Reno | Gravel | Gravel | All | Open |
| | | 21-8-29.1 | 0.06 | Reno | Gravel | Gravel | All | Temp |
| | | 21-8-30 | 0.95 | Reno | Gravel | Gravel | All | Temp |

| EA Unit No. | EA Road Spur No. | Road Name or Number | Miles | Road Work | Current Surface | Proposed Surface | Haul Season | Closure Type |
|---|---|---|---|---|---|---|---|---|
| | | 21-9-24.1 | 0.19 | Reno | Gravel | Gravel | All | Open |
| 15 | 15 Reno | | 0.15 | Reno | Gravel | Gravel | All | Open |
| | | 21-8-14.1 | 1.05 | Reno | Gravel | Gravel | All | Open |
| | | 22-8-2.4 | 0.85 | Reno | Gravel | Gravel | All | Open |
| | | 21-9-24.1 | 1.76 | Reno | Gravel | Gravel | All | Gated |
| | | 21-9-24.1 | 1.11 | Reno | Gravel | Gravel | All | Open |
| 16 | 16-2 Imp | | 0.20 | Imp | Natural | Gravel | All | Open |
| | 16 Reno | | 0.25 | Reno | Gravel | Gravel | Summer | Open |
| | 16-1 Reno | | 0.07 | Reno | Gravel | Gravel | Summer | Open |
| | 16-2 Reno | | 0.19 | Reno | Natural | Natural | Summer | Decommission |
| | 16-3 Reno | | 0.03 | Reno | Natural | Natural | Summer | Decommission |
| | 16-4 Reno | | 0.08 | Reno | Natural | Natural | Summer | Decommission |
| | 16-5 Swing | | 0.24 | Reno | Natural | Natural | Summer | Decommission |
| | | 21-8-14.4 | 0.52 | Reno | Natural | Natural | Summer | Decommission |
| | | 21-8-14.4 | 0.35 | Reno | Gravel | Gravel | All | Open |
| | | 21-8-15.1 | 0.60 | Reno | Gravel | Gravel | Summer | Open |
| | | 21-8-15.3 | 0.03 | Reno | Gravel | Gravel | All | Open |
| | | 21-8-15.4 | 0.08 | Reno | Gravel | Gravel | All | Open |
| | | 21-8-15.5 | 1.03 | Reno | Gravel | Gravel | Summer | Open |
| | | 22-8-9 | 7.54 | Reno | Gravel | Gravel | All | Open |
| 17 | 17-1 Reno | | 0.06 | Reno | Gravel | Gravel | All | Temp |
| | 17-2 Reno | | 0.28 | Reno | Gravel | Gravel | All | Decommission |
| | | 21-8-11 | 0.03 | Reno | Gravel | Gravel | All | Open |
| | | 21-8-11.1 | 0.39 | Reno | Natural | Natural | Summer | Decommission |
| | | 21-8-11.2 | 0.14 | Reno | Gravel | Gravel | All | Temp |
| | | 21-8-14 | 1.57 | Reno | Gravel | Gravel | All | Open |
| 18 | | 21-8-14 | 0.11 | Reno | Gravel | Gravel | All | Temp |
| 19 | | 21-8-12.2 | 0.36 | Reno | Gravel | Gravel | All | Open |
| | | 21-8-12.1 | 0.33 | Reno | Gravel | Gravel | All | Open |
| | | 21-7-7.2 | 0.54 | Reno | Gravel | Gravel | All | Open |
| | | 21-8-1 | 2.07 | Reno | Gravel | Gravel | All | Open |
| | | 21-7-15.1 | 3.65 | Reno | Gravel | Gravel | All | Open |
| | | 21-7-7.1 | 1.29 | Reno | Gravel | Gravel | All | Open |
| 21 | | 21-8-13.1 | 0.43 | Reno | Gravel | Gravel | All | Open |
| 22 | 22 Reno | | 0.18 | Reno | Natural | Natural | Summer | Full Decommission |
| 23 | | 21-7-19 | 0.58 | Reno | Gravel | Gravel | All | Open |
| | | 21-7-19.1 | 0.21 | Reno | Gravel | Gravel | All | Open |
| | | 21-7-19.2 | 0.77 | Reno | Gravel | Gravel | All | Open |
| | | 21-8-25 | 0.16 | Reno | Gravel | Gravel | All | Open |
| 24 | | 21-8-24.1 | 0.51 | Reno | Gravel | Gravel | All | Open |
| 25 | | 21-8-13.1 | 0.42 | Reno | Gravel | Gravel | All | Open |
| 26 | | 21-8-13.2 | 0.17 | Reno | Gravel | Gravel | All | Open |
| | | 21-8-13.3 | 0.22 | Reno | Gravel | Gravel | All | Open |
| | | 21-8-14.2 | 0.42 | Reno | Gravel | Gravel | All | Open |
| 27 | 27 Reno | | 0.05 | Reno | Natural | Natural | Summer | Full Decommission |
| | | 21-8-24.1 | 1.06 | Reno | Gravel | Gravel | All | Open |
| | | 21-8-14.2 | 0.54 | Reno | Gravel | Gravel | All | Open |
| | | 21-8-25 | 1.77 | Reno | Gravel | Gravel | All | Open |
| 28 | | 21-8-13 | 0.70 | Reno | Gravel | Gravel | All | Open |
| 29 | 29-1 Imp | | 0.03 | Imp | Natural | Gravel | All | Decommission |
| 30 | | 21-9-2.1 | 0.20 | Reno | Gravel | Gravel | All | Open |
| | | 21-9-3 | 1.37 | Reno | Gravel | Gravel | All | Open |
| | | 21-9-3.2 | 0.14 | Reno | Gravel | Gravel | All | Open |
| 31 | | 21-9-32.3 | 0.57 | Reno | Gravel | Gravel | All | Open |
| | | **Total** | **80.96** | | | | | |

### Road Decommissioning

The project would construct approximately 18.2 miles of road and decommission or fully decommission approximately 24.3 miles of roads (**Table 2-4**). The project would result in a net decrease of approximately 6.1 miles of open roads within the project area. The BLM would fully decommission 1.7 miles of roads. Across the BLM-administered lands within the analysis area (approximately 64,000 acres or 100 sq. miles), this would equate to a reduction in the open road density of 0.06 miles/sq. mile (6.1 miles ÷ 100 sq. miles).

Decommissioning would mean closing the roads to vehicles on a long-term basis (> 5 years). However, for future administrative use, the BLM may open and maintain these roads. Road decommissioning strategies would include the installation of barriers (PDF #90) to prevent vehicular traffic (including OHVs), erosion-resistant water bars, eliminating diversion potential at stream channels, stabilizing or removing fills on unstable areas, and treating exposed soils. If slash were available, it may be scattered over the road surface (PDF #91). Culvert removal would occur at some stream crossings. The IDT has determined that there are future administrative uses for these roads.

The BLM would close and fully decommission roads determined to have no future need. The 2010 Transportation Management Plan specifies that fully decommissioned roads "may be subsoiled (or tilled), seeded, mulched, and planted to reestablish vegetation. Cross-drains, fills in stream channels, and unstable areas will be removed, if necessary, to restore natural hydrologic flow. The road will be closed with an earthen barrier or its equivalent" ((USDI 2010 *Update*), p. 34).

There are approximately 28.4 miles of road (new construction, renovation, improvement, and haul) located behind privately-controlled gates due to the checkerboard ownership in the project area. These gates would remain after the BLM concludes project activities and the Transportation Management Plan classifies this as 'temporary closure' (USDI 2010 *Update*).

### Tier 1 Key Watershed and Road Construction/Decommissioning

The Big-Vincent IDT followed RMP Management Direction to "reduce existing road mileage within Key Watersheds. If funding is insufficient to implement reductions, do not construct a net increase in road mileage in Key Watersheds" ((USDI 1995), pp. 7-8). The IDT also incorporated additional guidance from within the Western Oregon Transportation Management Plan, "only the full decommission and obliteration categories are appropriate to meet the Management Direction of a reduction or no net increase in the amount of roads within Key Watersheds" (USDI 2010 *Update*).

The BLM proposes 11 new construction (NC) spurs and 2 road renovation (RENO) spurs within 2 of the 3 applicable Tier 1 Key Watersheds in the Big-Vincent project area (**Table 2-9**). The BLM is not proposing new road construction in the Paradise Creek Key Watershed. The BLM would fully decommission all new and renovated road spurs in Key Watersheds; therefore, there would be a net road reduction of approximately 0.23 miles in the Upper Smith River Key Watershed, and no increase in the Wassen Creek Key Watershed.

**Table 2-9.** New construction (NC) and renovation (RENO) of road spurs in Tier 1 Key Watersheds.

| Tier 1 Key Watershed | Location (TRS) | EA Unit No. | Road Spur No. | Surface Type | Haul Season | Decommission Type | Miles |
|---|---|---|---|---|---|---|---|
| **Wassen Creek** | T21S, R9W, Sec 29 | 1 | 1-1 NC | Dirt | Summer | Full Decommission | 0.20 |
| | | | 1-2 NC | Dirt | Summer | Full Decommission | 0.11 |
| | | | 1-3 NC | Dirt | Summer | Full Decommission | 0.08 |
| | | | 1-4 NC | Dirt | Summer | Full Decommission | 0.06 |
| | **Total New Road Construction Miles** | | | | | | **0.45** |
| | **Total Full Decommissioned Road Miles** | | | | | | **0.45** |
| | **Net Increase in Road Miles** | | | | | | **0** |
| **Upper Smith River** | T21S, R8W, Sec 11 | 17 | 17-5 NC | Dirt | Summer | Full Decommission | 0.10 |
| | T21S, R8W, Sec 12 | 22 | 22-1 NC | Dirt | Summer | Full Decommission | 0.02 |
| | | | 22 **RENO*** | Dirt | Summer | Full Decommission | **0.18** |
| | T21S, R8W, Sec 13 | 24 | 24-1 NC | Dirt | Summer | Full Decommission | 0.03 |
| | | 26 | 26-1 NC | Dirt | Summer | Full Decommission | 0.06 |
| | | 27 | 27-1 NC | Dirt | Summer | Full Decommission | 0.08 |
| | | | 27-2 NC | Dirt | Summer | Full Decommission | 0.06 |
| | | | 27 **RENO*** | Dirt | Summer | Full Decommission | **0.05** |
| | | 29 | 29-1 NC | Dirt | Summer | Full Decommission | 0.04 |
| | **Total New Road Construction Miles** | | | | | | **0.38** |
| | **Total Full Decommissioned Road Miles** | | | | | | **0.61** |
| | **Net Decrease in Road Miles** | | | | | | **0.23** |

* Existing road.

### Haul Route Maintenance

Maintenance of haul roads would occur under the proposed project and consists of, but is not limited to, brushing to control vegetation, cleaning of drainage ditches, maintaining road surface (such as grading), and removal of road debris creating safety hazards (e.g., slough material, fallen trees).

## Project Design Features for the Proposed Action

This section describes measures designed to avoid, minimize or rectify effects on resources and are included as part of the proposed action. Project design features are site-specific measures, restrictions, requirements, or mitigations included in the design of a project in order to reduce adverse environmental consequences.

### General Harvest Operations

1. Mechanical harvesters or chainsaws would be used for tree felling.
2. One-end log suspension would be required in ground-based and cable yarding areas.
3. Within safety standards and to the extent possible, trees would be felled away from all unit boundaries, reserves, property lines, roads, orange-painted reserve trees, no-treatment zones, existing snags, and known managed sites for Survey & Manage species.
4. Full log suspension or seasonal yarding restrictions (dry season only) would be required as operationally feasible on fragile soil areas designated as FGR2 and FGNW in the Timber Production Capability Classification system.
5. Yarding corridor placement would avoid identified snags and wildlife trees, if operationally feasible.
6. Ground-based equipment would not enter the no-treatment zones.
7. Wetlands would be avoided.

### Riparian Reserves

8. The density management thinning and hardwood conversion prescriptions would retain minor conifer and hardwood species. Big leaf maple trees >24 inches DBH would be retained.
9. Leave tree clumping would occur adjacent to the no-treatment zones or scattered throughout the Riparian Reserve, depending on site conditions and tree locations.
10. No-treatment zones for intermittent stream would be at least 35 feet slope distance.
11. No-treatment zones for perennial and fish-bearing streams would vary between 60 and 100 feet horizontal distance depending on the results of LiDAR (**Figure 3-5**) shade analysis.
12. Harvest unit boundaries would be at least 100 feet slope distance from occupied Coho habitat (Coho) and Coho critical habitat (CCH).
13. Within safety standards, all harvest trees would be directionally felled away from stream no-treatment zones; however, trees that must be felled within a no-treatment zone to provide cable yarding corridors would be felled toward or parallel to the stream channel and retained on site. No tree felling would occur in Coho or CCH stream no-treatment zones.
14. Full log suspension would be required across all perennial stream channels and all wetlands.

### Trees Excluded From Harvest

15. In the designing of roads, landings, and yarding corridors, large remnant trees would be avoided to the extent physically and economically feasible.
16. Individual large-diameter conifers with marbled murrelet nesting structure or potential structure, along with any adjacent trees with branches that interlock with branches of any tree with potential structure, would be reserved from harvest.
17. Six or more large-diameter conifers meeting the potential structure criteria for marbled murrelet habitat in a 5-acre moving circle would receive a ½-site potential tree height no-treatment zone.

### Legacy Structures

18. The BLM would reserve from cutting/removal existing down logs in decay classes 3, 4, and 5 and down logs in decay classes 1 and 2 greater than 20 inches in diameter on the large end. Contractors would protect these down logs from damage during logging operations to the extent possible.
19. Snags would be avoided and reserved from cutting. Snags felled to meet safety standards would stay on site. In units deficient in large snags, approximately 1.5 snags per acre (>20” DBH and >16’ tall)

would be created. Where average stand diameter is < 20 inches, created snags would come from the next largest size class available and exclude reserved wildlife trees. Trees damaged during logging operations would count toward snag creation targets.

### Sample Tree Falling (Harvested Volume)

20. Timber cruising would employ methods that would include the felling of sample trees to formulate local volume tables. Felled sample trees would be a subset of those already designated for removal.
21. Selected sample trees would be limited to no more than one tree per 2.5 acres.
22. In Riparian Reserves, sample tree selection would not include those larger than 24 inches DBH.
23. Sample tree felling would not occur within 110 feet[3] of stream channels.
24. Sample tree felling would avoid existing snags.
25. All seasonal and daily timing restrictions for threatened and endangered species would apply to sample tree falling, where necessary.
26. Sampled trees would remain on site to provide coarse woody debris if no timber sale occurs.
27. The BLM would provide contract administration throughout the sample tree falling process.

### Cultural Resources

28. If found, the BLM would suspend all project implementation activities near any objects or sites of possible cultural value such as historical or prehistoric ruins, fossils or artifacts.

### Special Status Species – Including T&E[4] and S&M[5] Species

29. Tail hold or guy line anchors would be avoided within northern spotted owl nest patches.
30. Guyline and tail hold tree selection would follow BLM/USFWS guidance in suitable marbled murrelet and northern spotted owl habitat.
31. Equipment operations would be subject to seasonal and daily timing restrictions to minimize disruption to occupied or suitable murrelet habitat or known spotted owl sites. In some cases, only portions of units would be restricted due to topographic breaks or other landscape features. **Appendix B** provides a unit-by-unit summary of seasonal restrictions to avoid disturbance to northern spotted owl and marbled murrelet. Restrictions only apply within the disruption zone within the units. Protocol surveys are ongoing in all suitable habitats within 1.5 miles of all harvest units. If surveys reveal northern spotted owls did not use any of the adjacent stands, restrictions would not apply in those project areas (USDI 2012 *revision*).
32. If a species of concern is found after the contract has been awarded, the contractor would be required to follow management guidelines to protect the species. These species include threatened and endangered species, occupied marbled murrelet sites, active raptor nests, federally proposed and candidate species, and Bureau Sensitive or state-listed species protected under BLM Manual 6840.
33. All botany Special Status Species found during pre-disturbance surveys in thinning and hardwood conversion units would be buffered using no-treatment zones to protect the microsites so the species persist at the site. All botany Survey & Manage species found during pre-disturbance surveys in hardwood conversion areas would be similarly buffered.

Because a portion of the Big-Vincent action area is designated as Critical Habitat for the northern spotted owl and the area contains known nest sites, the following additional filters heavily influenced the specific unit prescriptions:

34. The BLM would not conduct treatments in NSO nest patches.
35. Harvested units would maintain > 50 percent canopy closure in NSO core areas.

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[3] 110 feet is the ½ site potential tree height in the Lower Smith River 5th field watershed.
[4] T&E – Federal Threatened and Endangered
[5] S&M – Survey & Manage

36. In NSO core areas, the BLM would thin red alder areas to ≤ 50 trees per acre or in gaps < 0.25 acre in size.
37. Harvest units within NSO Critical Habitat would maintain canopy closure > 40 percent in NSO home ranges.
38. For conifer-dominated patches within harvest units, gap creation sizes would be < 0.25acre within NSO home ranges.
39. For alder-dominated patches within harvest units, gap creation sizes would be ≤ 15 acres within NSO home ranges. Thinned or untreated areas between gaps would be ≥ 200 feet. Created gaps > 2 acres would be planted and maintain an overall 60 percent canopy closure within the harvested stand.

## Yarding Areas

### Ground-Based Yarding Areas

40. Ground-based equipment would be restricted to areas with slopes less than 35 percent (RMP, p. D-5 #8b).
41. Ground-based harvest equipment would be restricted to the dry season when soil moistures are below the 25 percent plastic limit thresholds measured 6 inches below the soil surface (i.e., the organic duff is removed). This is typically May through October. Soil moisture contents above the indicated plastic limit may require the discontinuation or limitation of ground-based operations in order to prevent excessive compaction.
42. Existing compacted skid trails would be used to the extent practical (RMP p. D-5 #8a). Slash mat layers (if available) would be used on skid trails created by the harvesting process, to minimize bare soil exposure and compaction. Lateral skid trail use would be limited or minimized. Harvest units exceeding 12 percent soil compaction would require de-compaction of the main skid trails to a depth of 12 inches to stay below the compaction limit threshold.
43. A skyline cable system may operate during the wet season in ground-based areas; however, road surface condition may restrict other ground-based equipment and timber haul.
44. Drainage and erosion control measures would be applied to bare soil areas following use and prior to winter rains (RMP, p. D-5 #8f).
45. Skid trail access points would be blocked to prevent vehicle access after harvest and logging operations are completed.
46. Small areas within the proposed skyline and helicopter yarding units that meet the slope and soil requirements may be harvested with ground-based equipment so long as all resource protection measures, timing restrictions, and project design features are met.

### Cable Yarding Areas

47. Skyline corridors would be no wider than 12 feet.
48. Where feasible, 150 feet between skyline corridors at the far unit edge opposite from the landing would be required.
49. Specifications for the location, number, and width of cable yarding corridors would occur prior to yarding, with natural openings used as much as possible (RMP, p. D-5 #2).
50. Where feasible, skyline corridors would be spaced parallel to each other to avoid multiple corridors extending out radially from landings.
51. Skyline corridors would be perpendicular to streams as much as possible to minimize the total length of openings. Corridors would not cross fish-bearing streams.
52. Falling operations would direct trees towards the lead of cable yarding corridors, to the extent possible, and within safety standards.
53. Cable yarding would be allowed in areas specified for helicopter yarding so long as all resource protection measures, timing restrictions, and project design features are met.

### Helicopter-Yarding Areas

54. Helicopter yarding would be allowed in areas specified as cable or ground-based yarding.

## Fuel Treatments

### Landing Pullback

55. Slash would be pulled back from all landings prior to removal of equipment from the site. Material would be re-piled and placed on top of the existing landing.

### Landing, Roadside and Property Line Hazard Reduction

56. Hazard reduction measures would be taken in hardwood conversion units, on all landing sites, and along all primary and secondary roads[6] within the project area that are not identified for closure or decommissioning after harvest operations.
57. Hand or machine-piled slash would be located within 20 feet of those roads within harvest areas not identified for closure or decommissioning after harvest.
58. Slash piles would be covered with 4 mil black polyethylene plastic sheeting.
59. Hardwood conversion hazard reduction treatments would include slash, lop and scatter, hand or machine pile, cover and burn, or swamper burning.
60. Piles would be located a minimum of 15 feet from leave trees, snags, or suitable coarse woody debris.
61. In roadside locations where opportunities to pile slash are limited, slash would be scattered beyond 20 feet of the road edges avoiding large, continuous concentrations of slash.
62. Hazard reduction measures along non-industrial private property lines or adjacent to sites with high value improvements that would be at risk from wildfire would be taken. Treatments could include hand- or machine-piling of slash, followed by burning.
63. Hand and machine piles would be burned during the late fall or winter.
64. All prescribed burning of piled fuels would comply with the Oregon Smoke Management Rules (2008 OAR 629-048).

## Noxious Weeds

65. Vehicles, machinery, and equipment would be washed prior to entering the project area during the contract period to prevent the introduction and spread of noxious weeds.
66. Vehicles and equipment would be required to stay on road and landing surfaces, except equipment specifically designated to operate off roads and landings (e.g., mechanical harvesters).
67. To the extent practical, equipment would avoid or minimize travel through weed-infested areas.

## Reforestation (Hardwood Conversion Areas)

68. The BLM would conduct post-harvest surveys to identify under-stocked areas and determine seedling needs.
69. A suitable mix of conifer species (e.g., Douglas-fir, grand fir, western redcedar, western hemlock) would be planted and receive mesh tubing, if needed, for animal protection.

## Roads

### General Road Activities

70. Soil-stabilization techniques such as seeding using native seed or a BLM-approved seed mix, mulching with weed-free straw, and fertilizing would be used on exposed soils. Other activities may include installation of water bars/dips to route surface runoff to vegetated areas depending on site-specific conditions. Water bar spacing would follow the guidelines in **Table 2-10**.

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[6] Primary roads are arterial haul routes. Secondary roads are typically spur roads that feed into primary roads.

**Table 2-10.** Water bar drainage spacing guidance based on road grade and surface type. Drainage features may include ditch relief culverts, water bars, ditch-outs or water dips.

| Road Gradient (%) | Maximum Drainage Spacing (Feet) | |
|---|---|---|
| | Road Surface Type | |
| | Natural | Gravel or Paved |
| 3-5 | 200 | 400 |
| 6-10 | 150 | 300 |
| 11-15 | 100 | 200 |
| 16-20 | 75 | 150 |
| 21-35 | 50 | 100 |
| 36+ | 50 | 50 |

71. Stream culvert replacement along existing roads would occur during the Oregon Department of Fish and Wildlife in-water work period, July 1-September 15, and the work area would be isolated from the channel during construction.
72. Dirt roads and landings would receive seasonal preventative maintenance prior to the onset of winter rains. Seasonal preventative maintenance may include, but is not limited to, installing water bars, sediment control mats or devices, removing ruts, mulching and barricades.

### New Construction

New construction would use the applicable "Conservation Practices for Road and Landing Construction" Best Management Practices found in the RMP (pp. D3-D4). These include:

73. Road and landing construction activities would be limited to the dry season, generally from May through October.
74. Roads and landings would be designed and constructed to BLM standards, but be the narrowest and smallest sizes that would meet safety standards, objectives of anticipated uses, and resource protection. For this project, rocked and natural surface roads would typically have a running surface of 14-16 feet.
75. Operators would have the option of rocking roads currently proposed as natural surface at their own expense providing it does not conflict with other objectives and design features.
76. New road construction would occur on stable locations, such as ridge tops, stable benches or flats, and gentle-to-moderate side-slopes as much as possible.
77. Stable end-haul (waste) sites would be located prior to end hauling. Sites would be properly shaped, drained and vegetated.
78. Soil erosion from road drainage would be minimized. Energy dissipators, culvert down pipes, or drainage dips would be used where water discharges onto loose material and erodible or steep slopes.
79. Road surface shape (e.g., crowning, insloping and outsloping) would be determined by planned use and resource protection needs.
80. Roads and landings located on side slopes ≥ 60 percent grade would require ≥ 90 percent of side castings be end-hauled to waste sites.
81. Right-of-way clearing limits (including the roadbed) would be approximately 35 feet in width.
82. Temporary spur roads may be authorized within the project area. All resource protection measures, Best Management Practices, project design features, and timing restrictions would apply to temporary spur roads.

### Road Maintenance, Renovation, and Improvement

83. Drainage and erosion control practices would be applied to renovated or reconstructed roads in the same manner as newly constructed roads (RMP, p. D-4 #17).

84. Road maintenance/renovation activities would be planned to minimize soil erosion (RMP, p. D-4 #18). Renovation and improvement activities would not disturb existing drainage ditches with functional protective layers of non-woody vegetation.
85. Excess or excavated overburden from road activities or culvert replacements would be moved to a stockpiling area away from riparian areas and floodplains. Installing suitable erosion control measures (e.g., tarps, silt fences, or weed-free hay bales) would ensure the stockpiled material would not erode into streams or wetlands in the event of precipitation.

### Haul

86. Hauling on dirt-surfaced roads would generally be prohibited November through April, depending on conditions.
87. Road conditions would be monitored on rock-surfaced roads during winter use to prevent rutting of the rock surface and delivery of fine sediment to stream networks.

Sediment filters and additional ditch relief culverts (

88. **Table 2-11**) would be installed at locations identified by BLM staff to prevent sediment from entering stream channels via road ditches. Sediment filters would allow free passage of water without detention or plugging. Filters would receive frequent maintenance and be removed at the completion of haul. Sediment retained by filters would be removed and disposed of in areas where it would not be delivered to stream channels.

**Table 2-11.** Sediment filters and ditch relief culvert installation recommendations for all-season haul gravel roads by project unit and road number.

| EA Unit No. | Road | Drainage Feature |
|---|---|---|
| 12 | 12 RENO | Sediment filters |
| | 21-8-16 | |
| 16 | 22-8-9 | Sediment filters |
| | | Ditch relief culverts |
| 27 | 21-8-25 | Sediment filters |
| | | Ditch relief culverts |

### Decommissioning

89. Final decommissioning of all natural surface roads and landings would occur prior to winter rains.
90. Closure of decommissioned roads would include installation of barriers to prevent vehicular traffic. Barriers could include, but are not limited to, tank traps, boulders, or earthen berms.
91. Slash material, if available, may be scattered over the decommissioned road surface to (1) protect against erosion, (2) reintroduce organic material to the soil, and (3) prevent vehicle access. If slash were not available, soil stabilization techniques would be used and vehicular access would be blocked.

### Full Decommissioning (in addition to the above decommissioning features)

92. Where necessary to restore hydrologic function, subsoiling/tilling road surfaces would occur to a depth between 8 and 16 inches.
93. Ditch relief culverts and unstable areas would be removed, if necessary, to restore natural hydrologic flow.
94. Surface material (i.e., gravel) would be removed, if applicable.

# Chapter 3 – Affected Environment and Environmental Consequences

## Analysis Background

This chapter combines the affected environment (typically Chapter 3) and effects analysis discussion (typically Chapter 4). Chapter 3 includes those resources that may be affected from implementation of each alternative. It identifies the direct, indirect, and cumulative environmental effects that may result from implementation of either of the two alternatives described in Chapter 2. It also addresses the interaction between the effects of the proposed thinning/hardwood conversion with the current environmental baseline, describing the effects that might be expected, how they would occur and the incremental effect that could result. The description of the current conditions inherently includes and represents the cumulative effects of past and current land management activities undertaken by the BLM, other federal agencies and tribal and private entities.

## Reasonably Foreseeable Actions

Annual recurring activities are likely to occur within the project area. These include, but are not limited to, fire suppression activities, routine road maintenance, treatment of noxious weeds, and silvicultural activities in young stands.

In addition to the aforementioned annual recurring activities, other activities in the analysis area over the next 3 years would include Federal commercial thinning, density management thinning, and variable density thinning timber sales from past planning decisions (**Table 3-1**).

**Table 3-1.** Proposed or active federal timber sale activity within the Big-Vincent analysis area. CT is commercial thinning, DMT is density management thinning, and VDT is variable density thinning.

| EA Number | Timber Sale Name | Contract No. | Treatment Type | Analysis Area (Acres) | New Road Construction (Miles) |
|---|---|---|---|---|---|
| EA OR125-05-01 | Burchard Creek | OR120-TS12-07 | CT | 335 | 1.28 |
| EA OR125-05-01 | Golden Burchard | Currently Planned | DMT | 480 | 0.64 |
| OR-R040-2011-0011-EA | Johnson Cleghorn | ORR04-TS-2013.0004 | VDT | 243 | 0.22 |
| OR-R040-2012-0011-EA | Halfway There | Currently Planned | DMT, CT | 430 | 1.51 |
| OR-R040-2012-0011-EA | Halfway Decent | Currently Planned | DMT, CT | 557 | 2.05 |
| OR-E050-2009-0005-EA | Bear Stew Stewardship | OR090-TS09-0564 | DMT | 9 | - |

In March 2015, the Coos Bay District Spring Planning Update included a 4,000-acre timber management project called the Loon Lake EA in a 5$^{th}$ field watershed adjacent to the Big-Vincent project. The BLM cancelled the Loon Lake EA project in June 2015, and posted this change in the Summer 2015 Planning Update.

The BLM introduced the West Fork EA project in the Summer 2015 Planning Update. Preliminary planning for the West Fork EA project proposes approximately 2,500 acres of density management thinning. The Upper Smith River and Lower Smith River 5$^{th}$ field watersheds are common to both the Big-Vincent and West Fork projects; however, proposed harvest areas do not overlap as they are in different 6$^{th}$ field watersheds.

The Coos Bay District is in the early stages of proposing a helipond maintenance EA. Helipond maintenance activities typically include the removal of small patches of young trees and brush near established water impoundments for the safe entry and egress of helicopters during firefighting operations. The helipond maintenance EA would include approximately 5 heliponds within the Big-Vincent analysis area, and affect approximately 5 acres of timber. The BLM does not anticipate the need for road construction for the helipond maintenance project, as all heliponds are located near existing roads.

The BLM assumes intensive management of private forests on a 40-year harvest rotation under the guidelines of the State of Oregon Forest Practices Act (ORS 2013).

## Cumulative Effects Considerations

The Council on Environmental Quality (CEQ) provided guidance on June 24, 2005, as to the extent to which agencies of the Federal Government are required to analyze the environmental effects of past actions when describing the cumulative environmental effect of a proposed action in accordance with Section 102 of the National Environmental Policy Act (NEPA). CEQ noted the "[e]nvironmental analysis required under NEPA is forward-looking," and "[r]eview of past actions is only required to the extent that this review informs agency decision making regarding the proposed action." This is because a description of the current state of the environment inherently includes effects of past actions. Guidance further states that "[g]enerally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historic details of individual past actions."

The information on individual past actions is merely subjective, and would not be an acceptable scientific method to illuminate or predict the direct or indirect effects of the action alternative. The basis for predicting the direct and indirect effects of the action alternative should be based on generally accepted scientific methods such as empirical research. The cumulative effects of this project upon the environment did not identify any need to exhaustively list individual past actions or analyze, compare, describe the environmental effects of individual past actions in order to complete an analysis which would be useful for illuminating or predicting the effects of the proposed action.

# Resources

## Forest Structure

### Analysis Area

The BLM manages 63,963 acres of the 123,800 acres in the analysis area (**Table 3-2**). There are approximately 36,806 acres (58 percent) that are 31-80 years old (**Figure 3-1**), of which 34,200 acres are dominated by Douglas-fir. Over 78 percent (4,935 acres) of the proposed acres meet this classification (i.e., Douglas-fir-dominated, 31-80 years old). The remaining 1,946 proposed acres are a collection of mixed conifers, mixed conifer/hardwoods and mixed hardwoods.

**Table 3-2.** Total land ownership acreages within the Big-Vincent analysis area.

| 5th Field Watersheds | 6th Field Watersheds | Acres | | | | |
|---|---|---|---|---|---|---|
| | | **BLM** | **USFS** | **State** | **Private/ Other** | **5th Field Watershed Totals** |
| Upper Smith River | Big Creek-Smith River | 18,019 | - | - | 12,124 | 57,466 |
| | Halfway Creek-Smith River | 17,813 | - | 36 | 9,474 | |
| Lower Smith River | Vincent Creek | 5,718 | - | - | 4,089 | 27,572 |
| | Wassen Creek | 6,561 | 7,715 | - | 3,488 | |
| Umpqua River-Sawyers Rapids | Little Mill Creek-Umpqua River | 8,832 | 81 | 262 | 16,961 | 38,762 |
| | Paradise Creek | 7,020 | - | - | 5,616 | |
| | **Totals** | **63,963** | **7,796** | **298** | **51,742** | **123,800** |

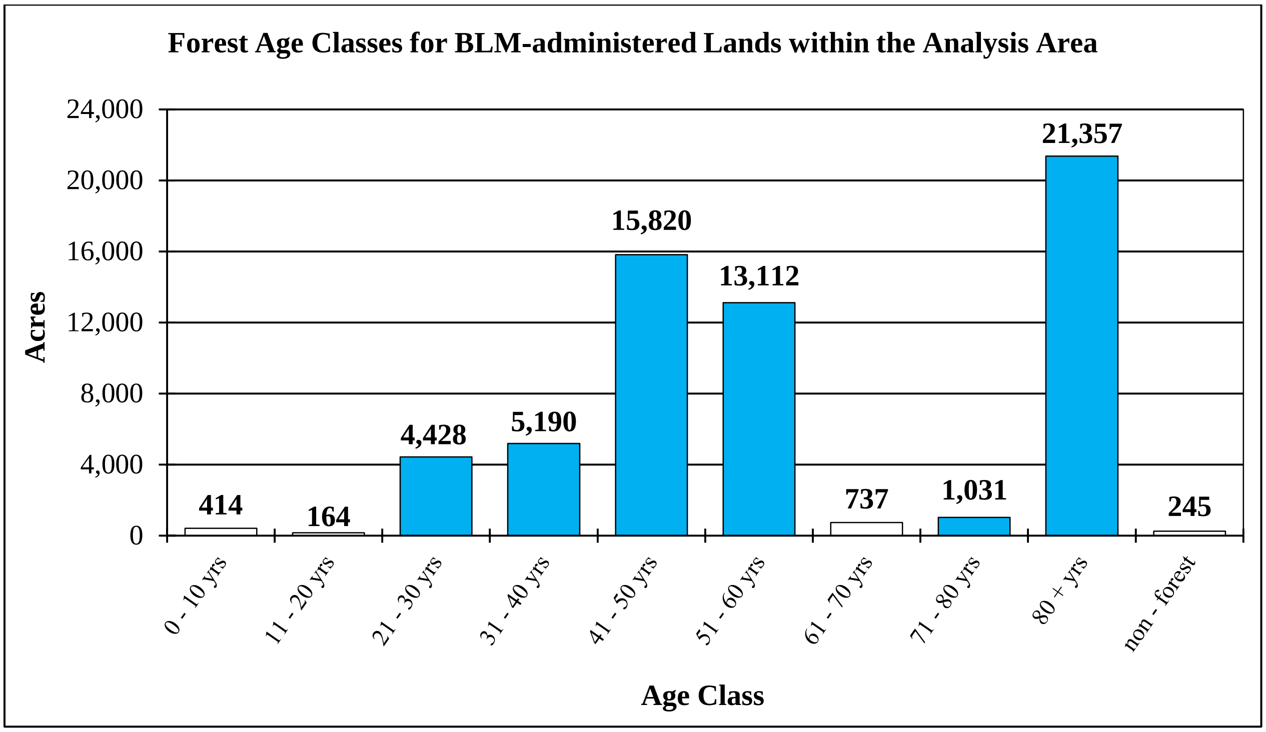


**Figure 3-1.** Forest age classes for BLM-administered lands within the analysis area.

The Big-Vincent analysis area is part of the Oregon Coast Range Province as defined in the South Coast – Northern Klamath Late Successional Reserve Assessment (LSRA) (USDA and USDI 1998) and is located approximately 25 miles northeast of Reedsport, Oregon. Before the advent of logging, fire was the principle disturbance process affecting landscape patterns in the analysis area. Recent high-severity stand replacement fires, namely the Oxbow Fire (1966) and the Vincent/Weatherly Creek Fire (1951), were the principle disturbances, creating very little structurally-developed forest in the center of the analysis area. The eastern and western thirds of the analysis area (LSR 265 and 266) hold almost all of the structurally-developed stands. Estimates of historic (Pre-European) late-successional forest cover in the Oregon Coast Range as a whole are between 52 and 85 percent; by 1936, late-successional forest covered 42 percent of the Coast Range, and by 1996 covered 18 percent (Wimberly 2002). For the analysis area, timber type maps from the 1930s (Harrington 2003) depict approximately 79 percent of the analysis area as covered by large second growth or old-growth.

The Big-Vincent analysis area contains portions of the Upper Smith River, Lower Smith River, and Umpqua River-Sawyers Rapids 5th Field watersheds. The Upper Smith River watershed has 29 percent late-successional and old-growth (LSOG[7]) forest; the Lower Smith River watershed has 44 percent LSOG; and the Umpqua River-Sawyers Rapids watershed has 38 percent LSOG. The effects of fire and forest harvest have resulted in the analysis area (including all ownerships) currently supporting roughly 20 percent LSOG forest. All 5th field watersheds in the analysis area currently possess more than the 15 percent LSOG forest required by the RMP (USDI 1995).

The Big-Vincent analysis area includes parts of LSR 265 and LSR 266, designated as Late-Successional Reserves, and described in the Late-Successional Reserve Assessment (LSRA (USDA and USDI 1998), pp. 62-63). Late-Successional Reserves 265 and 266 include approximately 72 percent and 41 percent mature and late-successional habitat, respectively. The cover in LSR 266 is less than the estimated mean 42 percent historic old-growth cover (Ripple *et al.* 2000, Wimberly 2002). Cover by young (< 80 years old) forest types in LSR 266 is more than twice as high as in historic landscapes (Ripple *et al.* 2000). At a larger scale, western Oregon (including all ownerships) supports approximately 35 percent cover by LSOG forest (USDI 2008).

Densely stocked young stands dominate private ownerships in the analysis area. Cover by young densely-stocked stands is far higher than conditions depicted in 1930s historic cover type maps for the analysis area (Harrington 2003) or for the historic coast range as a whole (Tappeiner 2002).

Approximately 3-8 percent of the analysis area supports hardwood-dominated patches, estimated using 2006 satellite imagery (gradient nearest neighbor (GNN), http://lemma.forestry.oregonstate.edu/). Changes in disturbance regime in the Oregon Coast Range immediately following the arrival of Europeans have at least doubled cover by hardwoods over recent historic conditions; pollen records suggest that the amount of red alder in the Pacific Northwest is higher now than at any time in the past few centuries (Harrington 2006).

#### ***Connectivity/Diversity Land Use Allocation***
There are eight non-contiguous Connectivity/Diversity (C/D) areas within the analysis area. The RMP direction for C/D blocks is to "maintain 25 to 30 percent of each block in late-successional forest at any point in time" (RMP, p. 22). Currently, only 2 of the C/D acres within the analysis area meet the minimum threshold. Thinning is proposed within a portion of 1 C/D area at T. 21 S., R. 8 W., Section 29 (i.e., EA Unit 13, 70 acres); however, the average tree age within the proposed harvest unit is 52 years and therefore currently does not contribute to the late-successional percentage (3 percent) in that location.

### Harvest Units
The project action area includes both conifer- and hardwood-dominated cover types.

Conifer-dominated harvest units (6,184 acres) include stands primarily regenerated or planted following the Vincent/Weatherly Creek and Oxbow Fires. The BLM commercially thinned approximately 753 acres of the project area between 1996 and 2000.

The BLM has identified and proposed approximately 157 acres of hardwood-dominated harvest units within the Big-Vincent project. Conifers failed to regenerate in these hardwood-dominated stands following these wildfires.

[7] The 1994 RMP FEIS (USDI 1994) defined LSOG and estimated the sum of mature and structurally-complex forest classes.

Harvest units for the Big-Vincent project were all classified as being in the Biomass Accumulation/ Competitive Exclusion (BACE) structural stage following Franklin *et al*.(2002) and using field-collected observations and data on stand characteristics (age, tree heights, tree diameters, others). **Table 3-3** characterizes BACE structural stages in relation to stand age. The BACE-stage treatment units are generally < 50 years old (Hayes *et al.* 2005). Big-Vincent harvest units have few sound (decay class <3) large snags or downed wood and have low variance in diameter, height, or tree species because of intensive management following stand replacement fires. Management action following stand replacement include regeneration harvest, salvage harvest, planting, and/or aerial seeding, and pre-commercial thinning.

**Table 3-3.** Comparison of stand stages by stand age as referenced by Oliver (1981), Franklin et al (2002) and the 1995 RMP. Reprinted from USDI (2008).

| Typical stand age[b] (years) | Oliver (1981) stand development stages | Franklin et al. (2002) structural stage | 1994 RMP/EIS Seral stage | Structural stages (This RMP/EIS) |
|---|---|---|---|---|
| 0 | Disturbance and legacy creation | | | |
| 20 | Stand Initiation | Cohort establishment | Early seral | Stand Establishment |
| 30 | Stem Exclusion | Canopy Closure | Mid seral | Young |
| 50 | | Biomass accumulation/ competitive exclusion | Late seral | |
| 80 | Understory Reinitiation | Maturation | | Mature |
| 150 | Old Growth | Vertical diversification | Mature seral | Structurally Complex |
| 300 | | Horizontal diversification | Old-growth | |
| 800-1200 | | Pioneer cohort loss | | |

[a]A more extensive comparison of classification schemes can be found in Franklin et al. 2002.
[b]Stand ages are provided as references. However, stands can achieve structural classes at different stand ages, depending on disturbance and site conditions.

The Forest Vegetation Simulator (FVS), a growth modeling software ((USDA 2014) – http://www.fs.fed.us/fmsc/fvs/), classified the majority[8] of the harvest units as stem exclusion stage based on the same field-collected observations data set (**Figure 3-2**). This is comparable to the stem exclusion stage of structural development following Oliver and Larson (1996).

[8] FVS did classify small portions (< 20 acres) of EA Unit 5 as Understory Reinitiation.

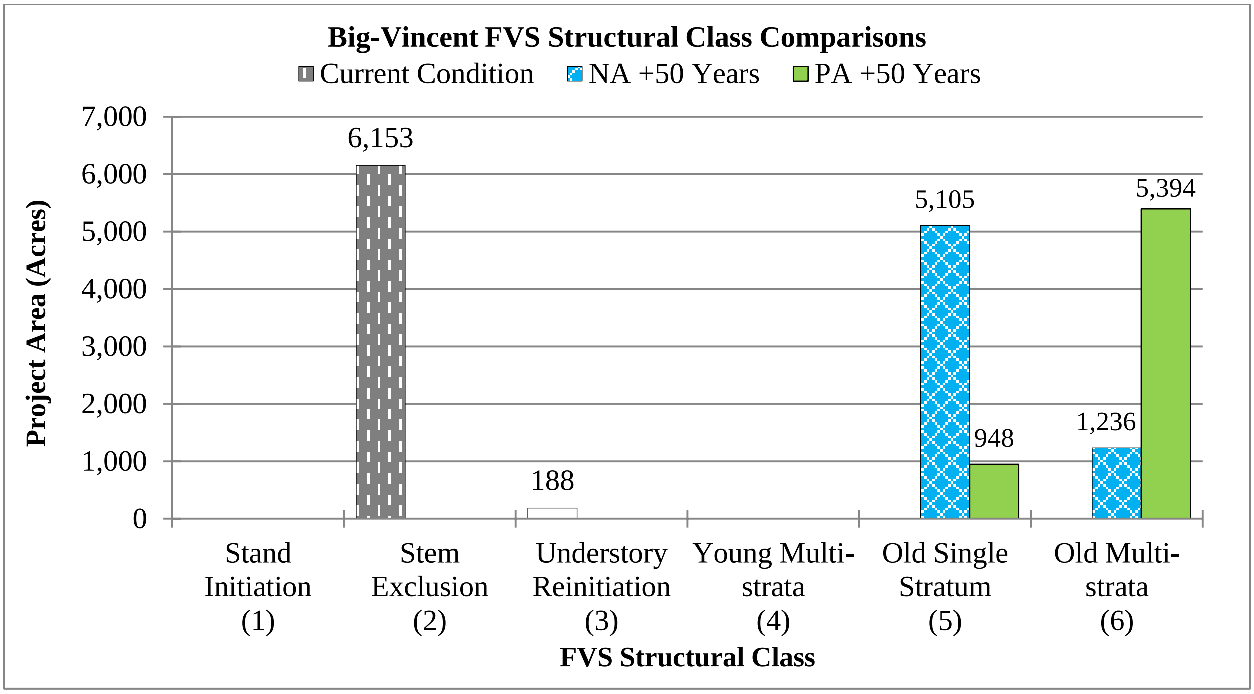


**Figure 3-2.** The current Forest Vegetation Simulator structural class condition of Big-Vincent proposed harvest units and structural class projections under the no action (NA) and proposed action (PA) alternatives. With the NA alternative, in the proposed treatment areas, mature and structurally-complex (FVS Structural Class 6) forest cover would increase from 0 acres to approximately 1,236 acres in 50 years. Conversely, the PA would increase the acres of FVS Structural Class 6 to approximately 5,394 acres in 50 years.

Age-based definitions of the 1995 RMP and field data would not classify any of the action area units as "late-successional" forest. Harvest units in the action area would also not meet definitions of "old-growth" forest (FEMAT 1993, Spies and Franklin 1991, USDA 1993).

On stands originating before 1970, it is difficult to tell using archived aerial photos if stands reestablished through planting, seeding, or natural regeneration following fire or harvest. What is evident in almost every case is the lack of decay class 1 and 2 snags and downed logs. Regardless of stand origin, the BLM subjected the action area to varying degrees of continued management including inter-planting of understocked areas, pre-commercial thinning, and fertilization. The effect of manipulating the original stand through timber harvest excludes them from categorization as natural stands, as demonstrated by the absence of decay classes 1 and 2 snags (**Appendix G**) and downed wood (**Appendix H**), and the presence of large remnant overstory trees.

The majority of the action area contains coniferous forest structure in the absence of repeated disturbance. Evidence includes historic references, remnants of the previous stand, and plant association. Historic aerial photos and the presence of residual conifer stumps in many units suggest that conifers dominated treatment units prior to disturbance (fire/harvest), with red alder restricted to fluvial-disturbed areas. Alder is an early-seral tree species associated with disturbed, moist conditions (Harrington 2006). Past management influences including roads, waste sites, skid trails, scarified soils, and lack of post-planting maintenance have increased red alder densities in the analysis area. Field observations and surveys have identified small isolated patches and scattered remnant trees in treatment units.

A variety of plant associations occur within the action area. Plant associations in the western hemlock series of northwestern Oregon (McCain and Diaz 2002) primarily describe forested upland stands in the action area; riparian associations account for very little treatment unit area and are not representative of associations described by McCain (2004). The major tree species in the western hemlock series are Douglas-fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*), and western redcedar (*Thuja plicata*). The most abundant understory species are sword fern, salmonberry, salal, and vine maple.

Douglas-fir (*Pseudotsuga menziesii*) is the primary overstory tree and the most common species in the proposed treatment areas. Over 80 percent of the areas proposed for thinning are densely stocked plantations of 34-62 year old trees with Douglas-fir comprising upwards of 80 percent of the species composition. Western redcedar (*Thuja plicata*), western hemlock (*Tsuga heterophylla*) and grand fir (*Abies grandis*) are components in the overstory in some areas. Scattered remnant legacy trees, 80 years and older (mostly Douglas-fir and western redcedar) can also be found. Overall, these stands are characterized by uniform conifer trees averaging 200 trees per acre, with average stand diameters of 15 inches, and average relative densities of 65 (**Appendix D**).

#### ***Hardwoods***

Estimates of cover by hardwood-dominated patches in the analysis area vary by estimation method[9]. According to 2006 satellite imagery (GNN, http://lemma.forestry.oregonstate.edu/), approximately 2-2.5 percent (112-160 acres) of the project area is hardwood-dominated stands. Interpretation of aerial photos suggests that approximately 5 percent (260 acres) of the action area has hardwood-dominated areas. The areas proposed for hardwood conversion have scattered patches of conifers growing within them, and were previously conifer-dominated. The BLM bases this conclusion on timber surveys, historical accounts of the area documented within various watershed analyses, and the presence of residual stumps.

#### ***Legacy Structures***

Most snags and down trees in the treatment area are products of suppression-related mortality in the smaller trees in the stands. Large snags and downed wood in the units are exclusively legacy structures from previous stands, evidenced by advanced decomposition, or blow down from adjacent older stands. Random events, such as wind storms, and biotic disturbance, such as root rot, are ongoing fine-scale processes that create small gaps, and recruit low numbers of larger snags and down wood across the project area. Conifers in the proposed project area are young enough to exhibit rapid lateral branch elongation in response to the added growing space provided by a gap-creating event. Consequently, canopy gaps created by the death of one or a few trees will disappear within a few years following gap-creating disturbance for as long as the stands remain in the stem exclusion stage of stand development.

### Forest Structure – No Action

Under the no action alternative, and barring substantial disturbance, stand structure within proposed treatment units would plateau at the old forest, single stratum class requiring a century or more to develop into the old forest, multi-strata (OM) class (**Figure 3-3**).

[9] Differences attributable to different methods (remotely sensed vs. aerial interpretation) include: a) scale differences; b) different thresholds for “hardwood-dominated” and “mixed” categories; and c) differences in the abilities of these two techniques to identify hardwood patch characteristics.

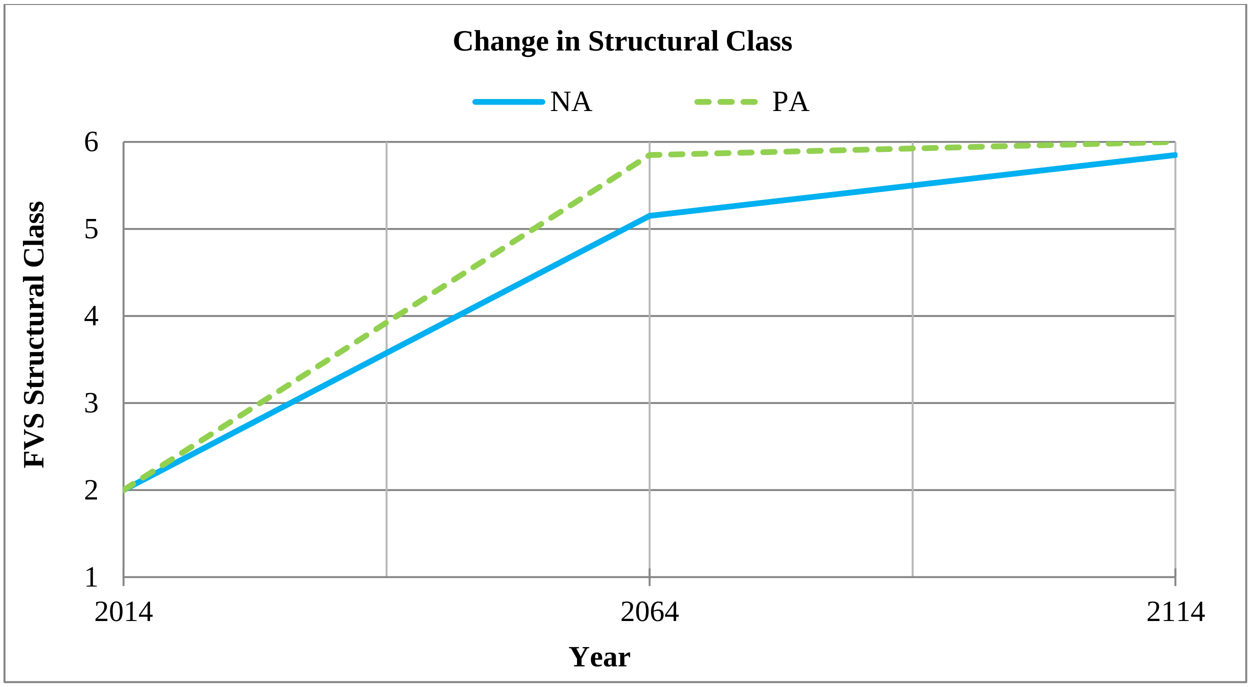

**Figure 3-3.** Change in Forest Vegetation Simulator (FVS) structural class over time for thinning treatments based on the no action (NA) and proposed action (PA) alternatives. Without further treatments or disturbance, the stands do not enter the multi-strata old forest (OM) class until after year 2100. This chart reflects the average of the structural class for all stands. FVS structural class categories are 1 = stand initiation (SI), 2 = stem exclusion (SE), 3 = understory reinitiation (UR), 4 = young forest, multi-strata (YM), 5= old forest, single stratum (OS), 6 = old forest, multi-strata (OM) (Crookston and Stage 1999).

The no action alternative would leave stands on a developmental trajectory that would be different from the pattern followed by the stands that developed into the old-growth forests found in the Coast Range today. Specifically within the harvest units, the no action alternative would entail continued slow growth and suppression mortality in approximately 6,341 acres of Matrix, Late-Successional Reserves, and Riparian Reserves. The amount of light reaching the forest floor in the proposed harvest units is not enough to allow any but the most shade-tolerant plants to persist. The BLM compared current stand conditions with the no action alternative in 50 years for quadratic mean diameter, FVS structural class, and canopy cover in **Appendix D**.

Based solely on age, FEMAT (1993) would define project areas as late seral in roughly 18-46 years. However, late seral stands would require stand-modifying disturbance to facilitate development of multiple tree canopies, tolerant understories, and large overstory dominants associated with old-growth forest (Poage and Tappeiner 2002). Modeling supports this observation, as the project areas would attain the old forest, single stratum (FVS 5) stage in approximately 50 years (**Figure 3-3**). It would take over 100 years to reach the old forest, multi-stratum stage associated with old-growth forests.

Research indicates that stands that develop at very high densities have a limited variation in tree size, which makes them susceptible to diameter growth stagnation and instability (Wilson and Oliver 2000). With finite site resources divided among many trees, individual trees would have slower growth rates, and therefore would be smaller than trees growing in the more open areas of a stand (Oliver and Larson 1996).

Under the no action alternative, stands in the action area would initially experience growth suppression, followed by eventual regeneration harvest on a roughly 100-year rotation for General Forest Management Area (GFMA) Matrix land use areas, and on a 150-year rotation in Connectivity land use areas. Based on that type of harvest cycle, regenerated portions of treatment units would change from stem exclusion (FVS 2) or understory re-initiation (FVS 3) structural stage to stand initiation (FVS 1) stage, supporting 6-8 residual green trees per acre, 1-2 competent snags, and 120 feet of competent downed wood per acre, as directed by the RMP.

The BLM estimated that forest-capable ownerships in western Oregon would retain approximately 48 percent in LSOG (i.e., late-successional/old-growth, mature and structurally-complex) forest cover by 2106 following a similar no action scenario, or 52 percent LSOG cover by 2106 managed under a “no harvest” scenario (USDI 2008).

Under the no action alternative, alder stands without a substantial conifer component would transition into shrub-dominated communities as they reach maturity. These stands would not be fully occupied or contribute to future sustainability objectives for Matrix lands. Stands with only a scattering of surviving conifers or a scattering of long-lived shade-tolerant hardwoods, would transition into a very open stand condition with a heavy shrub layer. As the alder component of the stand breaks up, more light reaches the forest floor allowing the shrub layer to become vigorous (Oliver and Larson 1996). Studies of succession in Coast Range alder stands (Carlton 1988, Henderson 1970) have indicated that shrub dominance (especially by salmonberry) increases with time, and that tree regeneration is generally lacking (Minore and Weatherly 1994). In the absence of a disturbance, the red alder stands with a salmonberry understory would become brush fields when the alder dies (Newton and Cole 1994). According to Worthington *et al*. (1962), “Red alder is a relatively short-lived species, maturing at about 60 to 70 years; maximum age is usually about 100 years.”

Alder stands with a dominant conifer component, or shade-tolerant conifers that successfully emerged through the alder following a canopy-opening disturbance, would have a somewhat different trajectory. After 130 years, these stands would transition into a low-density conifer stand with large individual trees (Newton and Cole 1994, Stubblefield and Oliver 1978).

Under the no action alternative, the BLM would expect dense stands of shade-intolerant Douglas-fir to provide a steady, but limited, supply of moderate-to-large snags, but would not provide the unevenly-distributed high densities of snags and downed wood associated with allogenic[10] disturbance (Franklin *et al.* 2002, Franklin and VanPelt 2004, Garman *et al.* 2003, Rapp 2003). Tree mortality would provide snags and down wood; however, because of their small sizes, they would only last a relatively short time (10-15 years). Individual tree mortality closely links to the relative size of the tree in the stand. Mortality is concentrated on the smaller stems so few of the largest trees in a stand die because of competition (Peet and Christensen 1987).

### Forest Structure – Proposed Action

The proposed action would include commercial thinning in 1,879 acres of GFMA and Connectivity, density management thinning in 4,308 acres of Late-Successional Reserve (LSR) and Riparian Reserve (RR), and hardwood conversion (HWC) in 157 acres of Matrix and LSR to meet objectives for these allocations (**Table 2-1**).

The BLM predicts treatments would promote the development of individual larger green trees faster over time compared with the no action alternative (Davis *et al.* 2007, Garman *et al.* 2003), as well as increasing stand mean diameter. Additional effects on stand structural diversity include:

[10] Originating from outside the stand. Allogenic disturbances include wind, fire, and harvest.

- Decreasing variability in “treatment patch” diameters post-thinning, as thinning-from-below removes dense understory trees, leaving mostly co-dominant and dominant trees. Note that diameter variability in old stands following suppression comes from multiple tree cohorts including tolerant shade trees. The BLM did not model this variability resulting from suppression.

- Increasing variability in tree densities within treatment patches compared to the no action, as well as increased tree density variability within units.

An increase in overstory variability would predict a response in understory and shrub diversity (Harrington *et al.* 2005), development of larger limbs and crowns, epicormic branch response, and randomly distributed suppression mortality. Suppression mortality would still occur within untreated areas within units, including areas adjacent to streams.

Using Forest Vegetation Simulator (FVS) modeling to determine effects, advancement between structural classes in harvest units occurred faster following thinning than in the no action alternative in conifer-dominated stands (**Figure 3-3**). This result is consistent with the concept that treatments would increase diversity, individual residual tree growth, and tree diameters, as well as shorten the time to developing large trees (Garman *et al.* 2003, Harrington *et al.* 2005).

Examination of pre-treatment and post-treatment data from previous thinning projects illustrates the expected amount of within stand density variability. **Table 3-4** is a summary of these data from five stands with a comparison to the proposed action. The plots are stratified into ‘no competition’ (relative density less than 20), ‘low competition’ (relative density from 21 to 34), ‘high competition’ (relative density 35 to 55) and ‘high competition transitioning to imminent mortality” (relative density greater than 55). As indicated by the data, the relative density (RD) of roughly half the plots or patches within a stand corresponds to the average competition category of the stand as a whole. However, many other plots will have relative densities that are higher or lower than the stand average. With the exception of Brummit LSR, Slater Rocks, and Weaver-Sitkum projects, there was no specific goal to achieve variability in these treated areas and a single relative density was the target. The BLM would expect the proposed action to be similar to the results depicted with the exception that removal of hardwoods in the conifer stands would create variable-sized gaps and increase the area with lower stocking.

**Table 3-4.** Comparison of pre- and post-thinning percent of plots (patches) by relative density in typical thinning treatments on the Coos Bay District.

| | Site Name | Location | Stand Exam Date | Total Plots | Average Relative Density (RD) | Percent plots by relative density range<br>Competition Level<br>**None:** RD of < 20 | **Low:** RD of 21-34 | **High:** RD of 35-55 | **High** and transitioning to imminent mortality: RD ≥ 56 |
|---|---|---|---|---|---|---|---|---|---|
| **Big-Vincent EA** | **Pre-treatment Average** (See Appendix D for unit level data) | | 2002-2012 | 874 | 65 | - | - | 30% | 70% |
| **Sale Pre-treatment Data** | Weaver-Sitkum | | | 341 | 65 | - | 3% | 7% | 70% |
| | Scare Ridge | T. 21S., R. 9 W., Sec. 13 | 1991 | 18 | 59 | 5.6% | 16.7% | 22.2% | 55.6% |
| | Mose 15 | T. 21 S., R. 8 W., Sec. 15 | 1994 | 21 | 49 | 4.8% | 23.8% | 38.1% | 33.3% |
| | Soup Creek | T. 23 S., R. 9 W., Secs. 19 and 30 | 1994 | 11 | 57 | - | 18.2% | 18.2% | 63.6% |
| | Slater Rocks | T. 29 S., R. 9 W.; T. 29 S., R. 10 W.; T. 30 S. R. 9 W.; T. 30 S., R. 10 W. | 2007 | 383 | 60 | 7.0% | 1.0% | 33.0% | 59.0% |
| | **Pre-treatment Average** | | | | **58** | **5.8%** | **12.5%** | **23.7%** | **56.3%** |
| **First Exam Post-treatment Data** | Scare Ridge | T21S, R9W, Sec 13 | 1996 | 46 | 32 | 17.4% | 45.7% | 37.0% | - |
| | Dora Ridge | | | 19 | 28 | 21.0% | 47.0% | 32.0% | - |
| | Brummit LSR | T27S, R9W, Sec 19-21, 29-31 | 2009 | 240 | 23 | 49.0% | 37.0% | 12.0% | 2.0% |
| | Mose 15 | T21S, R8W, Sec 15 | 2002 | 27 | 30 | 22.2% | 44.4% | 33.3% | - |
| | Soup Creek | T23S, R9W, Sec 19 and 30 | 1998 | 8 | 39 | 12.5% | 25.0% | 50.0% | 12.5% |
| | **Post-treatment Average** | | | | **31** | **24.4%** | **39.8%** | **32.9%** | **2.9%** |

After treatment, the percentage of plots with relative densities below 20 increased 4 times, going from 6 percent to over 24 percent (**Table 3-4**). Similarly, the percentage of plots with relative densities between 21 and 34 increased more than threefold, going from 12.5 percent to 39.8 percent. Areas at this low stocking level allow enough light into the stand to allow establishment of understory trees, provide for and maintain herb and shrub growth, allow retention of lower live branches, allow some epicormic branching, and maximize individual tree growth.

The percentage of plots with 'high competition' relative densities (RD 35 or higher) in examined post-treatment stands dropped from 80 percent (23.7% + 56.3%) to 36 percent (32.9% + 2.9%) after treatment, or a 55 percent decrease (**Table 3-4**). The amount of light reaching the forest floor in units with high relative densities (≥ 35) is not enough to allow any but the most shade-tolerant plants to persist. While thinning increased the amount of light reaching into the canopy, the remaining 36 percent with ≥ 35 relative densities (i.e., 'high competition') would recapture the growing space, resulting in the resumption of the effects of overcrowding and density dependent mortality.

Under the Big-Vincent proposed action, suppression would continue in the 35-, 60-, and 100-foot no-treatment zones surrounding streams resulting in roughly 1,060 acres remaining in the 'high competition' categories. These overstocked portions of treatment units would provide suppression-induced snags and downed wood at the densities described for the no action alternative.

Thinning the proposed units would reduce stand densities on 5,431 acres of 34-62 year old stands in the project area. Under the proposed action, the BLM expects relative densities in 70 percent of the proposed treatment units which exhibit the highest competition class (i.e., RD ≥ 56 and transitioning to imminent mortality), and the 30 percent of units experiencing ‘high’ competition (RD between 35 and 55) to decrease to low competition levels averaging RD 30 (**Appendix D**).

The effects of the proposed action on stand densities would be insignificant at the landscape scale due to the limited scope of the project area. The effects of the proposed action would be evident only at the local stand scale. This is consistent with the intent of creating stands that have variable densities and stand structure important to wildlife on LSR land allocations, while still maintaining adequate stand-level growth rates for timber production on Matrix lands.

Thinning would accelerate the development of larger trees (Poage and Tappeiner 2002). Tappeiner *et al*. (1997) studied early diameter growth rates for old stands in the Oregon Coast Range and their results suggested “that unless stand densities were reduced (e.g., by thinning), tree growing in the higher-density, young-growth stands would require longer periods to develop the large diameters characteristic of old-growth forests.” Proposed harvest units currently possess trees with a 15-inch average diameter. The BLM reviewed growth predictions by EA unit using FVS. The proposed thinning actions, in 50 years, would produce trees with an average diameter of 23.5 inches (ranging from 14.5-32.1 inches), whereas the no action would produce trees with an average diameter of 20.2 inches (ranging from 14.2-23.7 inches) (**Appendix D**). Although the proposed action would not lead to high suppression-induced snag densities in the harvested areas of the remaining units, the proposed action would facilitate other ecological benefits (described above). No-treatment zones would continue to produce high levels of suppression-induced snag densities similar to the no action. The wildlife analysis includes additional information on snag and down wood creation recommendations for units found deficient in those legacy structures. Total post-thinning tree densities would be high enough to facilitate creation of future large snags and down wood while meeting stand management goals (such as future regeneration harvest in Matrix and developing late-successional structure in the LSR and RR).

Hardwood conversion treatments would reduce the hardwood component on roughly 157 acres, increasing available growing space for conifer trees left on the site and trees planted to fill gaps and open areas (**Table 3-5**). Variable tree density as well as species diversity would occur within individual units by: (1) planting of open areas with approximately 435 seedlings per acre [10’ × 10’ spacing], (2) thinning dense areas of conifers, (3) retaining up to 8 large hardwoods such as big leaf maple and Oregon-myrtle in Riparian Reserves, and (4) retaining minor understory trees such as western redcedar. Additionally, no-treatment zones of at least 35 feet along streams would contribute to species and density diversity in all units. Successfully released conifers would contribute to the structural diversity of the new stand. **Figure 3-4** illustrates a typical hardwood conversion from current conditions (a) to approximately 100 years post-treatment (d).

**Table 3-5.** Stand data for the proposed hardwood conversion areas within Big-Vincent Units 1, 3, 5, 6, and 8.

| EA Unit No. | Stand Data | Hardwood-dominated Area | Conifer-dominated Area | Post-treatment Unit Totals (Hardwood and Conifer Combined) |
|---|---|---|---|---|
| 1 | Acres | 65 | 278 | **343** |
| | TPA | 40 | 208 | **95** |
| | BA | 69 | 268 | **173** |
| | Percentage of Stand | 19% | 81% | **-** |
| | Canopy Closure | 10% | 81% | **47%** |
| 3 | Acres | 18 | 451 | **470** |
| | TPA | 33 | 167 | **85** |
| | BA | 70 | 244 | **139** |
| | Percentage of Stand | 4% | 96% | **-** |
| | Canopy Closure | 10% | 74% | **51%** |
| 5 | Acres | 45 | 143 | **188** |
| | TPA | 30 | 138 | **74** |
| | BA | 62 | 214 | **155** |
| | Percentage of Stand | 24% | 76% | **-** |
| | Canopy Closure | 10% | 55% | **42%** |
| 6 | Acres | 7 | 438 | **445** |
| | TPA | 39 | 155 | **91** |
| | BA | 35 | 195 | **131** |
| | Percentage of Stand | 2% | 98% | **-** |
| | Canopy Closure | 10% | 60% | **58%** |
| 8 | Acres | 23 | 86 | **109** |
| | TPA | 43 | 204 | **91** |
| | BA | 70 | 262 | **139** |
| | Percentage of Stand | 21% | 79% | **-** |
| | Canopy Closure | 10% | 78% | **44%** |

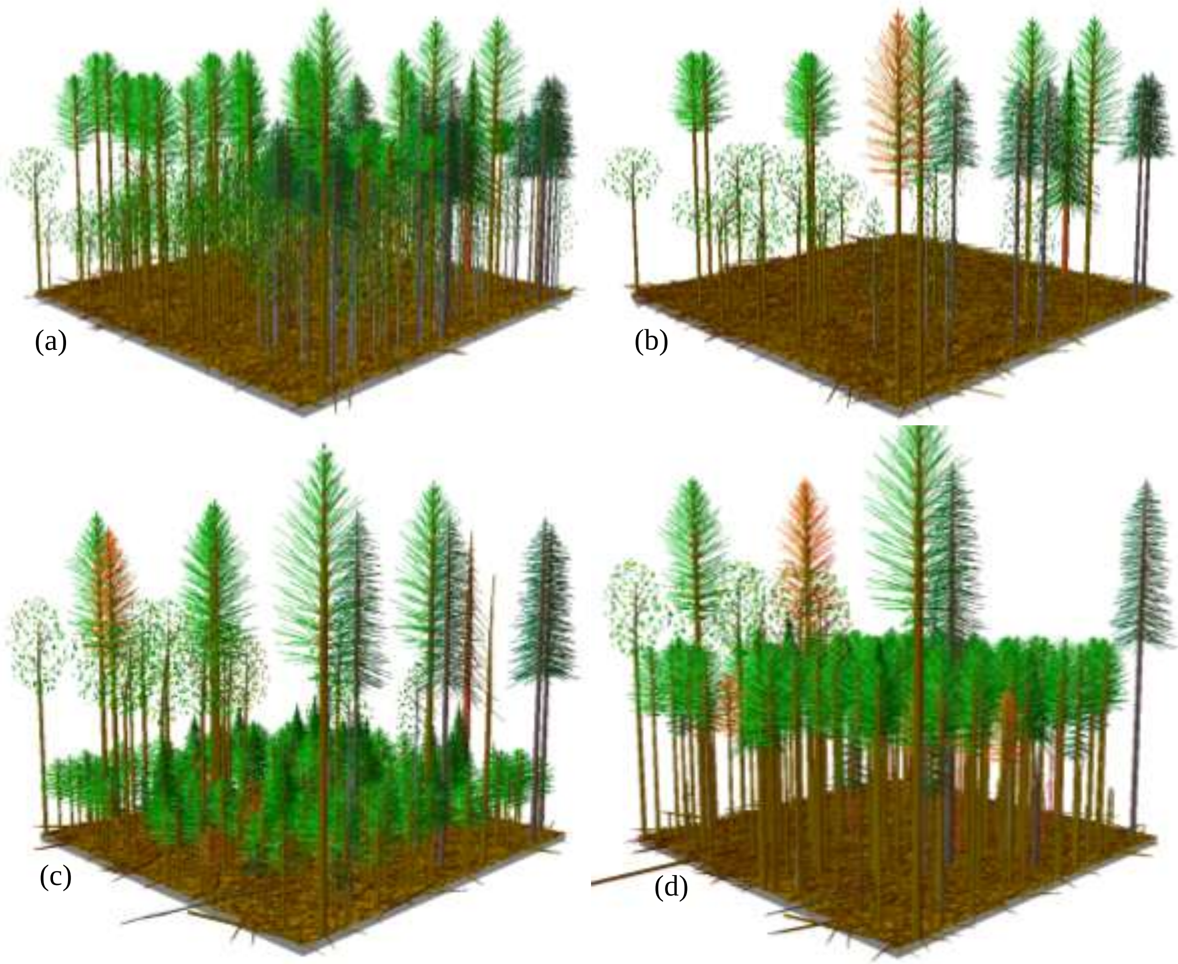


**Figure 3-4.** Typical hardwood-dominated stand conditions before and after hardwood conversion treatment. The modeling represents (a) the current condition, (b) directly post-treatment, (c) approximately 50 years post-treatment, and (d) approximately 100 years post-treatment.

***Forest Structure Conclusion***

Cumulative effects of the Big-Vincent proposed action on forest structure include consideration of the effects of implementation of the 1994 FEIS (USDI 1994) on federally-administered portions of the analysis area and continued harvest on 40-year rotations in privately-administered lands. The difference between the proposed action and the no action in terms of forest structure would be the conversion of hardwood-dominated areas to conifer-dominated multi-storied and multi-aged stands in Matrix, LSR and RR, thinning of RRs (followed by succession), and the thinning of Matrix stands prior to regeneration harvest.

Within the project area, the proposed action would result in conversion of hardwood-dominated areas to conifer-dominated multi-storied stands, and an accelerated increase in old forest, multi-strata (OM) forest structure. This OM forest structure would develop faster than under the no action alternative (**Figure 3-3**). The increase in OM forest structure would affect 6,341 acres (5%) of the 123,800-acre analysis area. In comparison, approximately 51,742 acres (42%) of the analysis area are privately owned (**Table 3-2**). These privately-owned timberlands are typically managed on a 40-year rotation, and do not develop past the early seral stage. The proposed action would accelerate an increase in OM forest structure;

however, the differences in structural class would gradually diminish overtime and would be expected to equalize over 100 years (**Figure 3-3**). Therefore, across the entire analysis area the effects of the proposed action on forest structure would be slight both in scale and in the long term (>100 years).

## Wildlife

The BLM defines the wildlife analysis area as all lands within 1.5 miles of proposed project unit boundaries. The BLM bases this 1.5-mile distance on the Oregon Coast Range province home range size for spotted owls (Courtney *et al.* 2004, Thomas *et al.* 1990). Of the 48,861 acres in the wildlife analysis area, the BLM manages 27,988 acres, or 57 percent. The BLM uses this wildlife analysis area to describe the direct and indirect effects to northern spotted owls (*Strix occidentalis* ssp. *caurina*) and their habitat from implementation of the project activities. The wildlife analysis area also encompasses all surveyed and unsurveyed suitable marbled murrelet (*Brachyramphus marmoratus*) habitat that project activities could affect through disturbance and this area is large enough to quantify and assess effects to other terrestrial/migratory species. The harvest of 6,341 acres (13 percent) within the wildlife analysis area constitutes 10 percent of the BLM-administered lands within the Big-Vincent analysis area and 5 percent of the total Big-Vincent analysis area.

### Threatened and Endangered (T&E) Species

#### Northern Spotted Owl (NSO)

There are 8 known NSO ‘best’ sites within the home range radius of 1.5 miles of the proposed harvest units. Based on previous NSO survey information, the BLM assumed sites tagged in the GIS database as the “best site” to be the primary site for owl reproduction. Sometimes the database indicated an alternative site or activity center that an owl pair would use less frequently.

Within the wildlife analysis area (48,861 acres[11]), approximately 23.6 percent (6,464 acres) of the habitat-capable areas on BLM-administered lands are suitable habitat (nesting, roosting and foraging), and 58.3 percent (15,985 acres) are dispersal habitat. A GIS analysis of land use allocations within the wildlife analysis area shows that 76 percent of the BLM’s suitable NSO habitat and 42 percent of the dispersal habitat is in a protected status (i.e., LSR, Riparian Reserve, administrative withdrawal).

Barred owls (*Strix varia*) are native to eastern North America; however, they have moved west into NSO habitat. The barred owl’s range now completely overlaps that of the NSO (Gutierrez *et al.* 2004). Considered generalists, barred owls make use of a variety of vegetation and forage species (Weins *et al.* 2014). Existing evidence suggests barred owls compete with NSOs for habitat and prey with near total niche overlap, and that interference competition (Dugger *et al.* 2011, Van Lanen *et al.* 2011, Weins *et al.* 2014) is resulting in increased NSO site abandonment, reduced colonization rates, and likely reduction in reproduction (Dugger *et al.* 2011, Forsman *et al.* 2011, Olson *et al.* 2005, Weins *et al.* 2014), thus resulting in probable range-wide population reductions (Forsman *et al.* 2011). Barred owl effects on northern spotted owl survival and colonization appear to be substantial and additive to effects of reduction and fragmentation of habitat in spotted owl home range areas. The magnitude of the barred owl effect may increase somewhat as habitat quantity decreases and fragmentation increases (Dugger *et al.* 2011).

It has been established that activities that reduce the quantity of older forests adjacent to NSO activity centers reduce the probability of continued occupancy, survival, and reproduction (Dugger *et al.* 2011, Dugger *et al.* 2005, Franklin *et al.* 2000, Olson *et al.* 2004, Schilling *et al.* 2013). The presence of barred owls in NSO core use areas may exacerbate by 2-3 times the effect of such activities on NSO pair

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[11] Acres and habitat class parameters derived from BLM/Bureau of Indian Affairs GIS data and NWFP 15-year Monitoring Report (Davis *et al*. 2011). Note: Acres and percentages may not be as consistent as expected due to rounding and variances between GIS data sets.

survival (estimated as probability of extinction of a single territory, and termed "extinction probability") (Dugger *et al.* 2011). The relative effect of barred owls on extinction probability increases as proportion of older forest habitat at the core area scale decreases (Dugger *et al.* 2011). Based on the modeling done by Dugger *et al*. (2011) when there is 95 percent habitat within the core circle, the extinction probability for spotted owl sites is 0.11; with barred owl presence it increases to 0.33. At 50 percent habitat, the extinction probability is ~0.17, increasing to ~0.42 with barred owl, and at 20 percent it is 0.21 without barred owls, increasing to 0.5 with barred owls. This is likely because any reduction of real habitat increases the effect of the effective habitat loss (real habitat reduction plus the effect of exclusion from habitat due to barred owl competition) disproportionally. However, some spotted owls appear to be able to successfully defend territories and reproduce when barred owls are present (Dugger *et al.* 2011, Weins *et al.* 2014), but the mechanism that allows them to persist is currently unknown.

Although barred owls and spotted owls use the same forest types and both appear to prefer older forests (i.e., > 100 years old (Dugger *et al.* 2011) or > 120 years old (Weins *et al.* 2014)), barred owls appear to use forest stand types in proportion to their availability, while spotted owls are reliant on older forest (Dugger *et al.* 2011, Weins *et al.* 2014). Manipulation of older forest stand structure through silvicultural or other means would alter habitat conditions for both barred owl and spotted owl. The relative effect on barred owls may be lesser because they do not appear as dependent on older forests as spotted owls, but there is no evidence that modification would facilitate barred owl invasion into areas as they do not appear to select disproportionately for young or low density stands (Weins *et al.* 2014). The successful establishment of a new territory is unlikely for spotted owls displaced by timber management activities in areas where barred owls are present (Dugger *et al.* 2011, Yackulic *et al.* 2013). Displaced spotted owls may survive for some period, but if they are not able to establish a new territory their contribution to the population is minimal at best.

### ***Northern Spotted Owl Surveys***

The BLM conducted 210 NSO surveys at 44 stations during the 2014 breeding season to determine occupancy of known nest sites as well as 5,738 acres of suitable habitat adjacent to proposed harvest units. Surveys followed the revised 2012 protocol (USDI 2012 *revision*). Surveyors detected no northern spotted owls. Surveyors detected barred owls 17 times; however, detections may have been the same barred owl (or owls), multiple times during separate survey outings. Surveys will continue in 2015 as per the protocol.

Northern spotted owl surveys in March 2015 discovered a new pair within the Big-Vincent wildlife analysis area, within T. 21 S., R. 08 W., Section 29. At this time, nesting has not been confirmed. The discovery led the BLM to submit an amended Biological Assessment to USFWS in April 2015, to which the USFWS responded with an amended Letter of Concurrence, stating "…the Service concurs with the District's conclusion that the Big Vincent proposed action may affect, but is not likely to adversely affect spotted owls associated with this new spotted owl site."

Demography studies to monitor NSO recovery or decline are also ongoing. The Coast Range Demography Study (Forsman *et al.* 2011), adjacent to the west end of the project area, has shown a precipitous decline in NSO detections, from a high of 88 percent in 1991 to 41 percent in 2010. Conversely, the Coast Range study has shown an increase in barred owl detections from 1991 (3 percent) to 2010 (65 percent). The Tyee Demography Study (Forsman *et al.* 2011, Weins *et al.* 2014), which encompasses a portion of the east end of the project area, notes that barred owl detections were low in the early 1990s and have risen to about 72 percent in the study area in 2009. Both demography studies point to high colonization rates by barred owls as a possible factor in the low detection rates for spotted owls. Demography study surveyors documented at least 126 observations of barred owls in the NSO home ranges of the Big-Vincent wildlife analysis area in the last ten years (**Table 3-6**).

**Table 3-6.** Northern spotted owl occurrences and fledglings in the Big-Vincent wildlife analysis area in the last 10 years, based on demography studies.

| NSO Home Range Name ('Best') | Owl Site Number | Sites Within NSO Home Range | Last Verified Occurrence of NSO Nesting (Year) | In the last 10 years | |
|---|---|---|---|---|---|
| | | | | NSO Fledglings | Barred Owl Observations |
| Big Bend† | 3952 | 3 | 2007 | 3 | 27 |
| Halfway Creek* | 0264 | 1 | 2008 | 1 | 7 |
| Halfway Ridge† | 0533 | 3 | 2004 | 1 | 29 |
| Paradise Creek† | 0534 | 3 | 1992 | - | 16 |
| Steampot Ridge | 2343 | 1 | 1991 | - | 10 |
| Upper Johnson Creek* | 2041 | 1 | - | - | 7 |
| Vincent Creek | 2178 | 1 | 1994 | - | 19 |
| Wells Creek | 2177 | 1 | 1990 | - | 11 |
| **Totals** | | **14** | **-** | **5** | **126** |

† Includes primary and alternate NSO sites.
* Includes activity center.

## ***Northern Spotted Owl Habitat***

### *Suitable Habitat*

Suitable northern spotted owl habitat consists of stands used by owls for nesting, roosting, or foraging (NRF) activities (**Table 3-7**). The U.S. Fish and Wildlife Service (USFWS) classifies northern spotted owl NRF habitat as forest stands containing important stand elements such as high canopy closure, a multi-layered, multi-species canopy with larger overstory trees, and a presence of broken-topped trees or other nesting platforms (USDI 2012 *revision*). Forty percent of the home range and 50 percent of the core in suitable habitat are the USFWS suggested minimum thresholds for preventing impairment of spotted owl life history functions (USDA and USDI 2008). The densely-stocked proposed harvest units in the Big-Vincent project currently exhibit high canopy closure; however, stands are not multi-layered NRF habitat. The BLM excluded suitable habitat from harvest units.

**Table 3-7.** Northern spotted owl activity center ownership, federal suitable habitat and dispersal habitat, and federal percentages by owl habitat classification.

| Owl Site Number | Owl Activity Center Classification (Total Acres) | Federal Land (Acres and %) | Non-Federal Land (Acres and %) | Federal Suitable Habitat (Acres and % of Total) | Federal Dispersal Habitat (Acres and % of Total) | Does Suitable Habitat Meet USFWS Mimima˄? |
|---|---|---|---|---|---|---|
| 0264D Halfway Creek | Nest Patch (70) | 62.1 (88.9%) | 7.7 (11.0%) | 57.0 (81.5%) | 61.8 (88.4%) | - |
| | Core (503) | 413.9 (82.3%) | 88.8 (17.7%) | 259.0 (**51.5%**) | 361.8 (72.0%) | **YES** |
| | Home Range (4,524) | **3,715.7** (82.1%)* | 808.1 (17.9%) | 1,860.9 (**41.1%**) | 3,066.9 (67.8%) | **YES** |
| 0533B Halfway Ridge | Nest Patch | 69.9 (100%) | - | 29.9 (42.8%) | 47.6 (68.1%) | - |
| | Core | 431.2 (85.8%) | 71.4 (14.2%) | 160.8 (**32.0%**) | 317.8 (63.2%) | NO† |
| | Home Range | **3,610.9** (79.8%)* | 913.0 (20.2%) | 1,098.9 (**24.3%**) | 2,651.4 (58.6%) | NO† |
| 0534O Paradise Creek | Nest Patch | 69.9 (100%) | - | 66.1 (94.6%) | 69.9 (100%) | - |
| | Core | 502.7 (100%) | - | 265.9 (**52.9%**) | 449.3 (89.4%) | **YES** |
| | Home Range | **3,368.3** (74.5%)* | 1,155.6 (25.5%) | 1,492.6 (**32.9%**) | 2,943.5 (65.1%) | NO† |
| 2041A Upper Johnson Creek | Nest Patch | 51.1 (73.1%) | 18.8 (26.8%) | 31.1 (44.5%) | 45.4 (65.0%) | - |
| | Core | 282.9 (56.3%) | 219.8 (43.7%) | 102.6 (**20.4%**) | 203.2 (40.4%) | NO† |
| | Home Range | **3,054.4** (67.5%)* | 1,469.4 (32.5%) | 730.7 (**16.2%**) | 2213.8 (48.9%) | NO† |
| 2177O Wells Creek | Nest Patch | 69.9 (100%) | - | 55.2 (79.0%) | 61.3 (87.7%) | - |
| | Core | 502.7 (100%) | - | 213.0 (**42.4%**) | 343.9 (68.4%) | NO† |
| | Home Range | **3,099.3** (68.5%)* | 1,424.5 (31.5%) | 1,029.0 (**22.7%**) | 2,338.6 (51.7%) | NO† |
| 2178O Vincent Creek | Nest Patch | 69.9 (100%) | - | 48.1 (68.8%) | 63.7 (91.1%) | - |
| | Core | 482.7 (96.0%) | 20.0 (4.0%) | 195.1 (**38.8%**) | 422.1 (84.0%) | NO† |
| | Home Range | **2,764.4** (61.1%)* | 1,759.4 (38.9%) | 618.8 (**13.7%**) | 2,344.4 (51.8%) | NO† |
| 2343O Steampot Ridge | Nest Patch | 69.9 (100%) | - | 54.9 (78.5%) | 63.1 (90.3%) | - |
| | Core | 390.6 (77.7%) | 112.1 (22.3%) | 231.4 (**46.0%**) | 342.5 (68.1%) | NO† |
| | Home Range | **3,347.4** (74.0%)* | 1,176.4 (26.0%) | 1,947.1 (**43.0%**) | 2,814.0 (62.0%) | **YES** |
| 3952A Big Bend | Nest Patch | 69.9 (100%) | - | 38.7 (55.4%) | 57.4 (82.1%) | - |
| | Core | 477.0 (94.9%) | 25.7 (5.1%) | 168.6 (**33.5%**) | 411.2 (81.8%) | NO† |
| | Home Range | **2,974.4** (65.7%)* | 1,549.4 (34.2%) | 548.4 (**12.1%**) | 2,333.5 (51.6%) | NO† |

***** These are the total acres administered by the BLM in these activity centers.
† Using only federal acreages in optimum conditions, this site cannot meet the USFWS suggested minima to support spotted owl life history function.
˄ The minimum suitable habitat suggested by the USFWS for preventing spotted owl life history function impairment are 40 percent for the home range and 50 percent for the core (USDA and USDI 2008). There are no suggested suitable habitat minima for nest patches.

The Halfway Creek (0264D) NSO *core* and *home range* areas meet USFWS minima (described above) for suitable habitat capable of supporting life history functions. The last verified occurrence of NSO nesting at the Halfway Creek site was in 2008 when surveyors observed one fledgling. Surveys in 2014 did not observe any NSO at the Halfway Creek site. The 70-acre core area of the Paradise Creek (0534O) site meets the USFWS habitat requirements but the home range does not, and the last verified occurrence of NSO nesting was in 1992. The *home range* of Steampot Ridge (2343O) also meet the USFWS minima required for suitable habitat, but the core does not, and the last verified occurrence of NSO nesting was in 1991. Demography surveyors observed barred owls in all known NSO sites in the wildlife analysis area over the past ten years.

### *Dispersal Habitat*

Dispersal habitat is analyzed at the 5$^{th}$ field watershed level. There are 105,947 acres of NSO dispersal habitat in the Big-Vincent analysis area, with 2,332 acres of dispersal habitat in the proposed harvest units. There are approximately 529 acres of pre-dispersal habitat within proposed harvest unit boundaries. Dispersal habitat consists of forest stands that juvenile northern spotted owls disperse through while trying to locate NRF habitat on which to establish a territory. Dispersal habitat in the Oregon Coast Range physiographic province is defined by the Interagency Scientific Committee as "forest stands with an average tree diameter ≥ 11 inches and conifer overstory trees with closed canopies (> 40 percent canopy closure in moist forests and > 30 percent in dry forests), and with open space beneath the canopy to allow spotted owls to fly" ((USDI 2011), p. G-1). The proposed harvest units are marginal NSO dispersal habitat because they contain small diameter (<19 inches DBH) trees, impede owl mobility as a result of high tree density, have nearly complete canopy closure, and contain little structural diversity.

Thomas *et al*. (1990) suggested at least 50 percent of an area (i.e., a quarter township) should support dispersal habitat in order for owls be able to adequately move between large habitat reserves. Over 63 percent of the Big-Vincent analysis area contains dispersal habitat.

*Critical Habitat*

The USFWS designated portions of the analysis area as spotted owl critical habitat (77 FR 71875).

Twenty-three of the 31 proposed harvest units are wholly or partially within the Oregon Coast Ranges (OCR) CHU-2, subunits OCR-3 or OCR-5. OCR-3 and OCR-5 consist of approximately 204,037 acres and 176,905 acres (77 FR 71875), respectively (**Table 3-8**). The Coos Bay District BLM manages 26,476 acres (13 percent) of Subunit OCR-3, and 52,750 acres (30 percent) of Subunit OCR-5. All of the proposed harvest units in NSO Critical Habitat are dispersal or pre-dispersal areas.

**Table 3-8.** Review of NSO Critical Habitat Unit (CHU-2) areas in the analysis area, including BLM-administered lands, BLM-administered dispersal habitat within the Oregon Coast Ranges Subunits 3 and 5 (OCR-3, OCR-5), and proposed harvest acres within each subunit.

| NSO CHU-2 | Acres | | | |
|---|---|---|---|---|
| | Critical Habitat (All Ownerships) | Total BLM-administered Critical Habitat | BLM-administered Dispersal Critical Habitat | Proposed Harvest in Critical Habitat |
| Subunit OCR-3 | 204,037 | 26,476 | 20,338 | 2,548 |
| Subunit OCR-5 | 176,277 | 52,750 | 43,609 | 802 |
| **Totals** | **380,314** | **79,226** | **63,947** | **3,350**† |

† Includes dispersal-only and pre-dispersal areas.

*Recovery Action 10 and Recovery Action 32*

As the Big-Vincent harvest units are not structurally-complex and do not contain multi-layered canopies, they do not meet the criteria for RA 32 retention. Big-Vincent stands are 34-62 years old and have been subject to intensive management. Stand exam data, aerial photograph interpretation, use of MaxEnt (http://www.cs.princeton.edu/~schapire/maxent/), and field review corroborates this conclusion (**Appendix D**). The BLM would protect all RA 32 habitats within the Big-Vincent wildlife analysis area. Recovery Action 10 from the Revised Recovery Plan (USDI 2011) involves the conservation of NSO sites and high value NSO habitat to provide additional demographic support to the population. The proposed action would not remove any high value NSO habitat, or even marginal suitable habitat. The proposed action also would not affect any known NSO sites through disturbance, as biologists found no NSO during 2014 surveys. Furthermore, the BLM would retain > 50 percent of known core and home range areas in unthinned dispersal habitat.

### ***Northern Spotted Owl – No Action***

No action would continue the current developmental trajectory for stands within the Late-Successional Reserves and Riparian Reserves. Untreated stands would not develop additional suitable habitat for spotted owls within the 50-year analysis period. While there would be some ingrowth and suppression in the overstocked stands, the needed structural characteristics or multi-layered canopies required for suitable owl nesting, roosting, and foraging habitat would take approximately 100 years to develop, as shown in the Forest Structure analysis (**Figure 3-3**). The relatively small supply of small-diameter snags and down wood would continue to be marginal within the 50-year analysis period, and not the randomly distributed high densities of larger-diameter snags and down wood that are associated with suitable habitat.

Small snag size would continue to provide limited prey habitat under the no action alternative because small snags would not favor northern flying squirrels (Carey *et al.* 1997). Northern flying squirrels (*Glaucomys sabrinus*) are a major spotted owl prey species and need larger cavities than are readily available in the majority of the proposed harvest units. The proposed harvest units are currently marginal dispersal habitat capable of supporting the transience phase of dispersal, in that they have very high canopy closure to provide protection from predators, and some prey availability.

The alder-dominated areas would take a century to become conifer-dominated (Deal 2006, Newton *et al.* 1968). Where salmonberry is present, (i.e., in the 5 proposed hardwood conversion stands), conifer re-establishment may not occur (Carlton 1988, MacCracken 2002, Tappeiner *et al.* 1991). Without treatment, these alder-dominated stands would continue to degrade over the next 20 to 40 years as the alder die out and the sites convert to salmonberry brush fields, neither of which is capable of supporting northern spotted owl life history functions.

Alder deterioration would affect 3 NSO home ranges within 50 years – degrading currently low-functioning dispersal acres to non-habitat incapable of supporting spotted owls or their associated prey base. **Table 3-9** shows home ranges of 3 owl sites that include proposed hardwood conversion units with the resulting effect to habitat acres forecast under the no action alternative in approximately 50 years. This time span is the same used in the Forest Structure effects analysis and would represent the time for which the alder stands would fully decay (Worthington *et al.* 1962) and become incapable of supporting spotted owls.

**Table 3-9.** Projected change in NSO home range dispersal habitat within hardwood conversion units after 50 years under the no action alternative.

| Owl Site Number | Owl Activity Center Classification (Total Acres) | Hardwood Conversion (Acres) | Current Dispersal Habitat (%) | No Action + 50 Years | |
|---|---|---|---|---|---|
| | | | | Final Dispersal Habitat (%) | Change (%) |
| 2177O Wells Creek | Home Range (4,524) | 56† | 51.7% | 50.5% | -1.2% |
| 2178O Vincent Creek | Home Range | 45 | 51.8% | 50.8% | -1.0% |
| 2343O Steampot Ridge | Home Range | 60† | 62.0% | 60.9% | -1.1% |

† NSO home ranges 2177 and 2343 overlap. The BLM analyzed the effect of red alder decay in these home range areas separately.

The degradation of approximately 0.3 percent (15 acres) of home range dispersal habitat in CHU-2 subunit OCR-5 (EA Unit 5) would occur at 1 NSO site (2178O), if red alder were to remain the dominant tree species with succession by salmonberry.

Under the no action alternative, conifer stands in Critical Habitat subunits (OCR-3 and OCR-5) would continue to provide NSO dispersal habitat; however, the quality of the dispersal habitat would remain limited due to suppression of tree size, high tree density, nearly complete canopy closure, and low structural diversity (i.e., single-stratum).

This alternative would not meet any of the recovery actions included in the *Revised Recovery Plan for the Northern Spotted Owl* (USDI 2011). In particular, it would not meet the following in Critical Habitat:

- *Recovery Action 6: In moist forests managed for spotted owl habitat, land managers should implement silvicultural techniques in plantations, overstocked stands and modified younger stands to accelerate the development of structural complexity and biological diversity that will benefit spotted owl recovery* ((USDI 2011), p. III-19).

While the recovery plan does suggest that managers should "restore lost species and structural diversity (including hardwoods) within the historical range of variability" ((USDI 2011), p. III-14), the BLM has demonstrated that the hardwood stands proposed for harvest are outside the historical range within the action area.

***Northern Spotted Owl – Proposed Action***

There is no suitable NSO habitat in the Big-Vincent harvest units. Surveys in 2014 indicated that NSOs were not currently using the suitable habitat stands near the proposed Big-Vincent harvest areas, and thus disruption to any specific owl (**Table 3-6**) would not occur. Surveys are continuing in 2015 per the current survey protocol. If surveys discover the presence of NSO near proposed harvest units, it would trigger the application of seasonal restrictions (PDF #31 and **Appendix B**) so that there would be no effect to the behavior of northern spotted owls within 65 yards of harvest activities.

In the long-term, both in the Riparian Reserves and Late-Successional Reserves, the thinned stands would reach a more advanced structural stage sooner and facilitate faster achievement of structurally-complex forest conditions and connectivity between older forest types. For the purpose of this analysis, and in past consultation with the USFWS, the BLM used average tree age (≥ 80 years) and mean conifer diameter (≥ 16.5 DBH) to measure effects and be a baseline for the definition of suitable habitat (USDI 2014). In 50 years, all of the proposed Big-Vincent stands would exceed 80 years old, and the released Late-Successional Reserves and Riparian Reserves stands would grow to diameters greater than 16.5 inches. As such, the BLM would expect these stands to begin functioning as suitable habitat for foraging activities. The LSR and RR stands would increase in suitable habitat in the relevant owl sites by approximately 1.5-19.7 percent (**Table 3-10**). Furthermore, the BLM would expect thinned stands in the LSR and RR to develop into roosting and foraging (possibly nesting) habitat approximately 50 years faster than the no action, according to the stand trajectory forecast for development of old, multi-strata structure (i.e., FVS class 6) (**Figure 3-3**).

**Table 3-10.** Change in NSO suitable and dispersal habitat on BLM-administered lands in 50 years resulting from the proposed thinning and hardwood conversions. Note: this table does not include ingrowth of younger stands or other disturbance events – it is a representation of the acreages included in the Big-Vincent proposal.

| Owl Site Number | Owl Activity Center Classification (Total Acres) | Current Suitable (%) | Current Dispersal (%) | CT Acres | DMT Acres | HWC Acres | Proposed Action + 50 Years | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Suitable Habitat | | Dispersal Habitat | |
| | | | | | | | Final % | Change | Final % | Change |
| 0264D Halfway Creek | Core (503) | 51.5% | 72.0% | - | - | - | 51.5% | - | 72.0% | - |
| | Home Range (4,524) | 41.1% | 67.8% | - | 66 | - | 42.6% | **+1.5%** | 67.8% | - |
| 0533B Halfway Ridge | Core | 32.0% | 63.2% | - | 99 | - | 51.7% | **+19.7%** | 63.2% | - |
| | Home Range | 24.3% | 58.6% | - | 622 | - | 38.0% | **+13.7%** | 58.6% | - |
| 0534O Paradise Creek | Core | 52.9% | 89.4% | - | - | - | 52.9% | - | 89.4% | - |
| | Home Range | 32.9% | 65.1% | - | 94 | - | 35.1% | **+2.2%** | 65.1% | - |
| 2041A Upper Johnson Creek | Core | 20.4% | 40.4% | - | - | - | 20.4% | - | 40.4% | - |
| | Home Range | 16.2% | 48.9% | - | 374 | - | 24.4% | **+8.2%** | 48.9% | - |
| 2177O Wells Creek | Core | 42.4% | 68.4% | - | - | - | 42.4% | - | 68.4% | - |
| | Home Range | 22.7% | 51.7% | - | 204 | 56 | 27.3% | **+4.6%** | 52.9% | **+1.2%** |
| 2178O Vincent Creek | Core | 38.8% | 84.0% | - | - | - | 38.8% | - | 84.0% | - |
| | Home Range | 13.7% | 51.8% | 12 | 586 | 45 | 26.6% | **+12.9%** | 52.8% | **+1.0%** |
| 2343O Steampot Ridge | Core | 46.0% | 68.1% | - | - | - | 46.0% | - | 68.1% | - |
| | Home Range | 43.0% | 62.0% | - | 285 | 60 | 49.3% | **+6.3%** | 63.5% | **+1.5%** |
| 3952A Big Bend | Core | 33.5% | 81.8% | 41 | 91 | - | 51.6% | **+18.1%** | 81.8% | - |
| | Home Range | 12.1% | 51.6% | 242 | 785 | - | 29.5% | **+17.4%** | 51.6% | - |

According to Thomas *et al.* (1990), p. 164, "Structural components that distinguish superior spotted owl habitat from less suitable habitat in Washington, Oregon, and northwestern California include: a multilayered, multispecies canopy dominated by large (> 30 inches in d.b.h.) conifer overstory trees, and an understory of shade-tolerant conifers or hardwoods; a moderate to high (60 to 80%) canopy closure; substantial decadence in the form of large, live coniferous trees with deformities- such as cavities, broken tops, and dwarf mistletoe infections; numerous large snags; ground-cover characterized by large accumulations of logs and other woody debris; and a canopy that is open enough to allow owls to fly within and beneath it."

Within the conifer harvest units, which average 15 inch DBH trees, implementation of the proposed action would modify, but still maintain the functionality of dispersal habitat. This form of modification refers to activities that alter forest stand characteristics but maintain the components of NSO habitat within the stand such that the functionality of the stand for NSOs remains post-harvest.

The USFWS considers the hardwood conversion (21.6 acres) treatments removal of dispersal habitat in Critical Habitat. There are approximately 15 acres of proposed hardwood conversion spread across 2 patches of EA Unit 5, and 6.6 acres in EA Unit 6 within Critical Habitat; however, the BLM has surveyed these areas and found no NSO using the habitat. Furthermore, the 6.6 acres of hardwood conversion proposed in EA Unit 6 is not within a known NSO home range. In the short-term, the BLM would maintain canopy closure at ≥ 40 percent (USDI 2011), p. G-1) within units containing hardwood conversion; therefore, the BLM would not remove or downgrade any NSO dispersal habitat through hardwood conversion. In 50 years, replanted stands of conifer in the hardwood conversion areas (including in Critical Habitat) would function as higher quality dispersal habitat than the current condition because mid-seral conifer would populate the areas with interspersed late-seral conifer (**Table 3-10**; **Figure 3-4**). Furthermore, the conversion of this small amount of acreage (157 acres) scattered across the wildlife analysis area would not preclude owl movement throughout the area and would have no discernable effect on owl dispersal because the BLM would maintain the existing 105,947 acres of dispersal habitat in the analysis area, including those areas within the Late-Successional Reserves and Riparian Reserves.

Snag and down wood creation in deficient units (PDF #19, **Table 3-12**) would provide habitat for northern spotted owl prey species such as flying squirrels. Flying squirrels use cavities for roosting and raising young. In the Coast Range, these cavities occur mostly in large-diameter live conifer trees or snags with deformities like multiple branching broken tops. Flying squirrels rarely use deciduous trees such as alder or maple for cavities (Carey *et al*. 1997). The relatively small diameter and lack of deformities in most deciduous trees in the harvest units precludes cavity development. A project design feature (PDF #19) would ensure retention of snags for potential cavity-dependent prey species, such as flying squirrels. Thinning would also grow large trees more quickly for future large snag creation and recruitment.

*Northern Spotted Owl – Conclusion*
Over time, the proposed harvest in NSO Critical Habitat, Riparian Reserves, and Late-Successional Reserves would provide a benefit to spotted owls by accelerating the development of late-successional characteristics such as large diameter trees, multiple canopy layers, and foraging perches. Creating snags and down wood, where needed (PDF #19), would provide a short-term supply of these features relied upon by owl prey species, such as the northern flying squirrel.

The Big-Vincent project would not remove suitable NSO habitat. The project would not disturb or disrupt the life history functions of NSO because the application of seasonal restrictions (PDF #31 and **Appendix B**) would prohibit any disturbing/disrupting activities near NSO habitat during the key part of the nesting season. If additional surveys find NSO, the implementation of seasonal restrictions would prevent disturbance to nesting activities.

### Marbled Murrelet (MaMu)

***Marbled Murrelet Surveys***
Between 1992 and 2014, the Coos Bay and Roseburg BLM wildlife biologists conducted 222 marbled murrelet surveys at 78 survey points in the wildlife analysis area. There were 31 murrelet detections. All of the surveys were along the north, east, and west edges of the action area. There were no detections within 0.5 mile (i.e., 880 yards) of any proposed harvest unit. The BLM assessed remnant patches for MaMu potential structure; however, individual remnant structures were not surveyed.

***Marbled Murrelet Habitat***
Portions or all of proposed harvest units 1, 2, 4-6, 8, and 16-31 are located within marbled murrelet Critical Habitat Unit (CHU) sub-units OR-04-d and OR-04-g (76 FR 61599, (USDI 2011)). There are 4 delineated MaMu occupied sites with an associated 1,105 acres of occupied habitat out of 13,518 acres of unsurveyed suitable habitat in the wildlife analysis area. There are 436 acres of unsurveyed suitable MaMu habitat and 3 acres of occupied habitat within 110 yards of proposed harvest units (**Table 3-11**). The USFWS has indicated that loud activities within 110 yards are enough to disrupt bird behavior to a degree that creates the likelihood of injury. These include noises associated with harvest activities (e.g., chainsaw use, helicopters).

**Table 3-11.** Marbled murrelet (MaMu) delineated occupied sites and occupied habitat within the wildlife analysis area.

| Area of Analysis | Acres | No. of Delineated Occupied MaMu Sites | MaMu Occupied Habitat (Acres) |
|---|---|---|---|
| Potential disruption area within 110 yards of harvest units | 383 | - | 3 |
| Proposed harvest units | 6,341 | - | - |

***Marbled Murrelet – No Action***
Within the Riparian Reserves and Late-Successional Reserves, while there would be some ingrowth and suppression in the overstocked stands, they would not have enough structural characteristics or multi-layered canopies needed for marbled murrelet suitable habitat over time. As shown in the Forest Structure analysis, under the no action alternative stands would plateau at the old forest, single stratum class within 50 years, and take nearly a century to reach the old forest, multi-strata stage (**Figure 3-3**).

***Marbled Murrelet – Proposed Action***
In the short-term, the proposed action would not affect marbled murrelet habitat for two reasons. First, harvest activities would not remove marbled murrelet habitat. Identified potential nesting structure remnant trees would receive 110-foot no-treatment zone buffers (approximately 69 acres). The BLM would protect and buffer remnant habitat (individual trees and tree patches) with nesting structure (PDFs #16-17). Second, harvest activities would not disturb marbled murrelet due to the seasonal restrictions and daily timing restrictions. The proposed action would restrict disturbing activities on approximately 383 acres (i.e., within 110 yards of harvest units) during the critical breeding period (April 1-August 5), and daily timing restrictions would restrict disturbing activities from August 6 through September 15.

In the long-term, the proposed action would benefit marbled murrelet by improving habitat, similar to the beneficial habitat improvements for northern spotted owl. The thinned stands would reach a more advanced structural stage sooner and facilitate faster achievement of larger trees and larger limbs in the Late-Successional Reserves and Riparian Reserves.

Within Late Successional Reserves and Riparian Reserves stands, late-successional conditions would develop on a faster trajectory than continuing the current trajectory. The faster late-successional development trajectory of the proposed action would create potential nesting structure for marbled murrelet sooner, as thinning would stimulate complex structure development, including larger limbs and nesting platforms, and create it more quickly than the no action alternative. The proposed action would address the recovery action which says, "Use silvicultural techniques to increase speed or development of new habitat" (USDI 1997).

## Other Special Status Species
Implementation of either alternative would have no measurable affect to several species that could occur within the wildlife analysis area. These include the foothill yellow-legged frog (*Rana boylii*), bald eagle (*Haliaeetus leucocephalus*), American peregrine falcon (*Falco peregrinus*), fringed myotis bat (*Myotis thysanodes*), or Townsend's big-eared bat (*Corynorhinus townsendii*). There is no habitat within the harvest units for these species. There are no suitable large snags for bats, no nesting habitats for peregrine falcons and bald eagles, and no $\geq 4^{th}$ order streams for frogs. Appendix 1 in the wildlife report (incorporated by reference) contains a list of all the Special Status Species that are rare or the BLM has not documented within the analysis area.

### Pacific Fisher
The U.S. Fish and Wildlife Service issued a proposal to list the West Coast distinct population segment (DPS) of the fisher (*Pekania pennanti*) as a threatened species under the Endangered Species Act on October 7, 2014. The Big-Vincent project contains no likely habitat (i.e., habitat is low quality based on the overall number of snags, down wood, and fragmented late-successional habitat), and the fisher is not known to occupy the area. At this time, the U.S. Fish and Wildlife Service has found the designation of critical habitat as "not determinable" for the West coast DPS of the fisher.

There are two known small, disjoint populations in Oregon; an indigenous population in the Siskiyou Mountains, and a reintroduced population in the southern Cascades (Aubry and Lewis 2003). In 1991, two BLM staff reported incidental sightings near Middle Creek and Daniel's Creek (east of North Bend, OR). Biologists with the BLM conducted surveys for marten and fisher in the Coquille, Umpqua, and N. Fork Chetco River drainages from 1994 to 1997. The BLM did not detect any marten or fisher; however, the BLM cannot make definitive conclusions based on a few data points. The BLM conducted protocol surveys in 2005-2006 in LSR 261 (T. 26 S., R. 10 W. and T. 27 S., R. 10 W.), and no fishers or martens were detected. Recent fisher surveys conducted on Coos Bay District BLM lands in 2012-2013 near the California border detected fishers at five remote camera stations. To date, camera surveys have not documented any fisher north of the Rogue River. It is possible that fishers are elsewhere on district; however, there is no documentation of fisher presence in the Big-Vincent analysis area.

The BLM would not expect the proposed action to have an effect on fisher because of the low likelihood of their presence within the wildlife analysis area. Development of enhanced stand structures and creation of down wood in the riparian areas would increase the quality of habitats utilized by fishers over the long term.

## Survey & Manage Species

### Red Tree Vole (RTV)

The only Survey & Manage wildlife species present in the analysis area is red tree vole (*Arborimus longicaudus*) (**Appendix C**). The BLM has 6 RTV nest locations documented in the analysis area; however, only 2 sites are active or presumed active, and none are within proposed harvest units. Furthermore, harvest units are not RTV habitat. RTV prefer mature (80-130 year old) and older mixed-age conifer forests, whereas the Big-Vincent harvest units are 34-62 year old stands of uniform age. Therefore, based on the age of the stands and the absence of habitat in those stands, the proposed action would not affect RTV.

## Migratory Birds

In the Memorandum of Understanding (MOU) to Promote the Conservation of Migratory Birds between the BLM and the U.S. Fish and Wildlife Service, the BLM would evaluate the effects of planned actions on migratory bird populations. The 2008 Birds of Conservation Concern for the Northern Pacific Forest (USFWS 2008) includes the following species that the project could affect: Northern goshawk (*Accipiter gentilis*), olive-sided flycatcher (*Contopus cooperi*), and rufous hummingbird (*Selasphorus rufus*).

Northern goshawks are associated with late-seral stands. Thinning is likely to benefit northern goshawks over the long-term because the BLM expects thinned stands in the analysis area to achieve late-seral structure sooner than overstocked stands (Bailey *et al.* 1998, Bailey and Tappeiner 1998).

Olive-sided flycatchers are associated with conifer forest, especially where burns have left scattered large snags and live trees. It is unclear why this species is declining in an era of increasingly fragmented forests when it prefers edge habitat, but some types of harvested forests could be acting as “sinks” where nesting success is poor. However, in one study, this species responded positively to thinning, possibly because thinning creates the uneven canopy needed for foraging (Hagar and Howlin 2001).

Reasons for population declines in the rufous hummingbird are unclear. This species was one of a group of neotropical birds that did not respond to thinning as a whole (Hagar and Howlin 2001). Because rufous hummingbirds seem to prefer a high canopy and well-developed understory for breeding (Patterson 2003, 2006) they would likely benefit from thinning over the long-term. Thinning would increase light to the understory, promoting shrub growth and increasing nectar availability from flowering plants.

### White-footed Vole

There are no documented observations of white-footed vole on district. The BLM has not listed the white-footed voles as either a S&M species or a BLM Special Status Species so pre-clearance surveys are not required. While there are limited studies on the species, white-footed voles have been associated with the presence of red alder. Manning *et al*. (2003) concluded, "Capture of white-footed voles in the southern Oregon Cascades supports a stronger association of this species with alder trees and hazel shrubs." Therefore, removal of 157 acres of red alders could directly affect individuals of this species population within the project area, if they are present. However, the stands with dominant hardwood patches were previously disturbed and previously supported conifer. As these stands were historically conifer-dominated, they would not have provided habitat for the white-footed vole. Untreated red alder stands would ensure population persistence where they occur within the project area.

### Snags and Down Wood

Snags and down wood provide habitat for cavity-nesting species such the northern flying squirrel and pileated woodpecker. The BLM analyzed snag data (**Appendix G**) from stand exams and found approximately 4 snags/acre for snags 12-15 inches DBH, 0.3 snags/acre for snags 20-23 inches DBH, and 0.2 snags/acre for snags ≥ 24 inches DBH. The majority of snags in the Big-Vincent proposed harvest units are less than 7 inches DBH due to suppression mortality. Small snags yield small diameter down wood (and small cavities), which decay more quickly than large snags and large down wood.

The BLM compared snag densities in all proposed units to the recommended snag density in the Middle Umpqua River Watershed Analysis ((USDI 2004) ACS section, p. 22; Wildlife Appendix 3, p. 2). Approximately half of the proposed harvest units are currently providing for < 40 percent of cavity nesting bird potential population levels because they are lacking 1.5 snags per acre (> 11 inches DBH) due to past harvest and suppression mortality (**Appendix G**) ((USDI 2004) Wildlife Appendix 3, p. 1).

The BLM analyzed down wood data from field surveys collected between 2002 and 2012 and found greater density and volume of decay classes 3, 4, and 5 down wood in proposed units than decay classes 1 and 2 (**Appendix H**).

The watershed analysis suggests at least 255 cubic feet of down wood in decay classes 1 or 2 (p. 23) in density management treatment areas by age 80. However, this recommendation is qualified with the statement that "meeting these levels of down wood may be unobtainable or in some cases undesirable in younger stands." Proposed Big-Vincent units are mid- to late-seral stands and range in age from 34-62 years, and as such, exhibit lower densities of decay class 1 or 2 down wood than older (80+) stands. Only 2 proposed LSR units (#8 and #16), which are both approximately 51 years of age, exhibit down wood levels exceeding the watershed analysis down wood recommendations for 80 year-old stands.

For Matrix areas, the RMP management direction is for 120 linear feet/acre (i.e., 148 cubic feet/acre)[12] for decay class 1 or 2 down wood (RMP p. 22). Four of eleven Matrix (GFMA and C/D) units contain > 120 linear feet of down wood per acre (decay classes 1 or 2, >16" diameter at the large end, and at least 16' long).

### Snags and Down Wood – No Action

Under the no action alternative, densely-stocked stands and suppression mortality processes would continue to recruit small and medium-sized snags and down wood. Tree diameter would increase approximately 35 percent in 50 years, as 15 inch DBH trees would grow to approximately 20.2 inches (**Appendix D**). Gap-creating disturbances (wind, fire, insects, disease, etc.) would provide additional tree

[12] A 16' long log, 16" large end, contains 19.7 cubic feet. 120 linear feet of logs/acre (16' x 16") is equivalent to approximately 148 cubic feet/acre (Aquatic Conservation Strategy section of USDI 2004, p. 23).

growth opportunities. Recruitment of snags from larger trees that develop within natural gaps could occur in the future through additional disturbance events. Small tree and snag sizes would limit the number of snag deformities or multiple broken tops beneficial to prey species such as northern flying squirrels, which rest and nest in cavities of large-diameter snags.

### Snags and Down Wood – Proposed Action

Proposed thinning would speed up development of larger conifer trees (Poage and Tappeiner 2002, Tappeiner *et al.* 1997), from which cohort larger snag recruitment could occur following future disturbance events. Average tree diameter would increase approximately 57 percent in 50 years, as 15 inch DBH trees would grow to 23.5 inches DBH (**Appendix D**). The no-treatment zones, where suppression mortality would continue, would provide for the continued production of small to medium-sized snags and down wood.

The proposed action would reserve existing snags from cutting, except those felled to meet safety standards (PDF #19), and reserve down wood in decay classes 3, 4, and 5, and protect them from damage to the extent possible (PDF #18). Snags felled or accidentally knocked over would remain on site (PDF #19) and would provide down wood habitat for cavity-nesting and other species. Additional snags would be created from green trees in units found to be deficient post-harvest (PDF #19) to reach a post-harvest snag density of approximately 1.5 snags per acre.

NSO prey species populations, particularly cavity nesters such as the northern flying squirrel, would benefit from the development and recruitment of larger snags and down wood for resting and nesting activities. Furthermore, Late-Successional Reserves and Riparian Reserves would benefit due to the increase in habitat for NSO prey species.

Harvest units would include snag creation, as needed, based on current conditions (shown in **Appendix G)**, The BLM would meet minimum snag levels "with per acre requirements met on average areas no larger than 40 acres" (RMP p. 22). The BLM used snag current condition data to approximate levels of snag creation in **Table 3-12** per the LSRA and watershed analysis recommendations and RMP management direction.

Harvest units would include down wood creation, as needed, based on any deficiencies in decay class 1 and 2 down wood levels (**Appendix H**). At the completion of this project, the project area would have approximately 2,100 snags and 4,400 pieces of down wood. **Table 3-12** shows the structural legacy recommendations for proposed harvest units. The BLM estimated values based on current condition data; however, conditions at time of harvest would modify these recommendations, if necessary.

**Table 3-12.** Snag and down wood recommendations to meet RMP management direction, LSRA guidance, and watershed analyses recommendations.

| EA Unit No. | Land Use Allocation | Snag creation recommended? | Down Wood recommended? |
|---|---|---|---|
| 1 | LSR | Yes | Yes |
| 2 | LSR | Yes | Yes |
| 3 | GFMA | - | - |
| 4 | LSR | - | Yes |
| 5 | LSR | - | Yes |
| 6 | LSR | - | Yes |
| 7 | GFMA | Yes | - |
| 8 | GFMA/LSR | - | - |
| 9 | GFMA | - | - |
| 10 | GFMA | - | Yes |

| EA Unit No. | Land Use Allocation | Snag creation recommended? | Down Wood recommended? |
|---|---|---|---|
| 11 | GFMA | - | Yes |
| 12 | GFMA | - | Yes |
| 13 | C/D | - | Yes |
| 14 | GFMA | Yes | Yes |
| 15 | GFMA | Yes | Yes |
| 16 | GFMA/LSR | - | - |
| 17 | LSR | - | Yes |
| 18 | LSR | Yes | - |
| 19 | LSR | - | Yes |
| 20 | LSR | Yes | Yes |
| 21 | LSR | - | Yes |
| 22 | LSR | Yes | Yes |
| 23 | LSR | Yes | Yes |
| 24 | LSR | Yes | Yes |
| 25 | LSR | Yes | Yes |
| 26 | LSR | Yes | Yes |
| 27 | LSR | - | Yes |
| 28 | LSR | - | Yes |
| 29 | LSR | - | Yes |
| 30 | LSR | Yes | Yes |
| 31 | LSR | Yes | - |

### Wildlife Conclusion

The implementation of the proposed actions will not change the likelihood of and need for listing any special status species under the ESA as identified in Manual 6840 and BLM OR/WA 6840 policy.

Overall, the proposed action would have beneficial or neutral effects for wildlife species occurring and having habitat in the project area. The proposed action would not remove suitable spotted owl habitat or marbled murrelet nesting structure. The proposed action would maintain and improve the current spotted owl dispersal habitat. The proposed action would accelerate development of late-successional stand characteristics in Late-Successional Reserves and Riparian Reserves, including more complex forest structure and larger trees with larger crowns, which would benefit both the spotted owl and the marbled murrelet. The resultant stands would vary in density and distribution of overstory and understory vegetation, characteristics beneficial to spotted owl and marbled murrelet. The growth of leave trees at the lower densities would decrease the time needed for the creation of large diameter trees, snags, and woody material, which would also benefit marbled murrelet and northern spotted owl (and their prey base). The proposed project would also maintain or improve snags and down wood levels, including bringing areas deficient in these structures up to the levels recommended in the RMP.

## Water Resources

The water resources analysis area consists of the 6 subwatersheds containing the proposed harvest units (**Table 3-13**). In portions of this EA section, the BLM uses the subwatershed scale to better detect potential effects of the project near the site of the proposed action. The rationale is that adverse effects to water resources are easier to detect in smaller drainages and as one nears the treatment site (Bosch and Hewlett 1982). **Table 3-14** shows the location and scale of the project by subwatershed.

**Table 3-13.** Location of proposed Big-Vincent EA units by $5^{th}$ and $6^{th}$ field watersheds.

| Watershed ($5^{th}$ field) | Sub-watershed ($6^{th}$ field) | EA Unit No. |
|---|---|---|
| Upper Smith River | Big-Creek-Smith River | 4, 5, 7, 8, 9, 10, 11, 12, 14, 15, 16, 17, 19 |
| | Halfway Creek-Smith River | 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29 |
| Lower Smith River | Vincent Creek | 1, 2, 3, 4, 5, 6, 9, 30, 31 |
| | Wassen Creek | 1 |
| Umpqua River-Sawyers Rapids | Little Mill Creek-Umpqua River | 6, 11, 13, 15, 31 |
| | Paradise Creek | 27, 29 |

**Table 3-14.** Proposed harvest acres by subwatershed (approximate values based on GIS data). CT is commercial thinning, DMT is density management thinning, and HWC is hardwood conversion.

| Subwatershed ($6^{th}$ field) | Subwatershed (Acres) | | | Area ($mi^2$) | Proposed Harvest (Acres) | | | | Percentage of Subwatershed | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | BLM | Other Ownership | Total | | CT | DMT | HWC | Total | Thinning | HWC | Total Proposed Harvest |
| Big Creek-Smith River | 18,019 | 12,124 | 30,143 | 47.1 | 1,564 | 2,190 | 26 | 3,780 | 12.5% | 0.1% | 12.5% |
| Halfway Creek-Smith River | 17,813 | 9,510 | 27,323 | 42.7 | - | 615 | - | 615 | 2.3% | - | 2.3% |
| Vincent Creek | 5,718 | 4,089 | 9,807 | 15.3 | 162 | 1,242 | 106 | 1,510 | 14.3% | 1.1% | 15.4% |
| Wassen Creek | 6,561 | 11,203 | 17,764 | 27.8 | - | 212 | 26 | 238 | 1.2% | 0.1% | 1.3% |
| Little Mill Creek-Umpqua River | 8,832 | 17,304 | 26,136 | 40.8 | 155 | 43 | - | 198 | 0.8% | - | 0.8% |
| Paradise Creek | 7,020 | 5,606 | 12,626 | 19.7 | - | 1 | - | 1 | < 0.01% | - | < 0.01% |
| **Totals** | **63,963** | **59,836** | **123,799** | **193.4** | **1,880** | **4,304** | **158** | **6,342** | **5.0%** | **0.1%** | **5.1%** |

## Stream Flow

Almost all precipitation in the proposed harvest units occurs as rainfall from October to May and is due to frontal storms originating over the Pacific Ocean. Mean annual precipitation from 1971 to 2000 was 89 inches near the westernmost proposed harvest unit, and 56 inches near the easternmost proposed harvest unit. Annual stream flow closely correlates with annual precipitation. Fall rains recharge soil moisture depleted by summertime evapotranspiration[13] and stream flow. In winter, the rapid conversion of rainfall to runoff occurs because soils remain wet between frequent storms and evapotranspiration diminishes. During the spring, runoff decreases due to less rainfall, increasing transpiration by plants, and increasing canopy interception and evaporation of precipitation. Both rainfall and discharge drop to seasonally low levels in the summer.

Field surveys, existing stream maps, and/or use of Light Detection and Ranging (LiDAR) contour elevations and other LiDAR-derived data (**Figure 3-5**) were used to establish the upstream end or inception point of each stream originating in or flowing through or adjacent to the proposed harvest units. LiDAR data, acquired between July 2008 and April 2009 is available for 85 percent or 4,626 acres of the proposed harvest units. The BLM ordered and labeled streams with flow and fish presence using information from field surveys and existing maps (**Table 3-15**).

[13] Hydrologists define evapotranspiration as the water lost to the atmosphere from the ground surface, evaporation from the surface of vegetation, and the transpiration of groundwater by plants.

**Table 3-15.** Channel characteristics within the proposed harvest units and within one site potential tree height of the proposed harvest units (approximate mileage based on GIS data).

| **Stream Type** | **Stream Order**[14] | **Channel Length (Miles)** |
|---|---|---|
| Intermittent (seasonal flow), no fish present | 1 | 34.2 |
| | 2 | 10.1 |
| | 3 | 1.0 |
| | **Totals** | **45.3** |
| Perennial (year round flow), no fish present | 1 | 3.7 |
| | 2 | 8.0 |
| | 3 | 6.5 |
| | 4 | 0.6 |
| | **Totals** | **18.8** |
| Perennial, fish present | 3 | 1.6 |
| | 4 | 5.5 |
| | 5 | 4.3 |
| | 7 | 0.3 |
| | **Totals** | **11.7** |

Because rain is infrequent in the summer, many tributaries within the proposed harvest units exhibit extremely low base flows (gallons per minute), discontinuous pools, or they are dry. Intermittent channels with seasonal flow, a definable channel, and evidence of annual scour and deposition account for approximately 60 percent of the entire channel network within or adjacent to the proposed harvest units, and first- and second-order headwater streams at the upper limit of the drainage network account for approximately 74 percent of the entire channel network. Approximately 85 percent of the streams are non-fish-bearing.

## Peak Flows and Harvest

The publication *Effects of Forest Practices on Peak Flows and Consequent Channel Response: A State of Science Report for Western Oregon and Washington* by Grant *et al*. (2008) provides a framework for discussing the likelihood of the proposed action increasing peak flow, the instantaneous maximum discharge generated by an individual storm or snowmelt event. Grant *et al*. (2008) and others, where noted, make the following relevant points:

1. Changes in site-level conditions resulting from forest harvest generally predict increased peak flows. Removal of trees decreases evapotranspiration rates and reduces canopy interception of rainfall leading to increased soil moisture in harvested areas. These effects scale more or less linearly with the amount of vegetation removed (Harr 1976, Rothacher 1973).
2. In much of the western Cascades and elsewhere in western Oregon and northern California, the largest post-harvest water yield increases have occurred during the fall months when maximum differences in soil water content exist between cut and uncut areas. In the fall, a smaller proportion of rain is required for soil moisture recharge in cut areas, so a larger proportion can go to stream flow (Harr 1976). The first fall rains and the resulting peak flows, which can be orders of magnitude smaller than winter peak flows and the annual peak flow, are usually geomorphically inconsequential in the Pacific Northwest (Ziemer 1998). Inconsequential flows are generally too small to change the present morphology or form of the channel. By winter, when soil moisture levels are similar in cut and uncut areas, relative increases in peak flows from harvest units are considerably less than those produced by storm events.

[14] 1st-order headwater streams have no tributaries. Two 1st order channels form a 2nd-order stream. Two 2nd-order streams form a 3rd-order stream. Joining 2 streams with different orders retains the higher order. The main stem always has the highest order (Strahler 1957).

3. The intensity of harvest or arrangement of cut and leave areas in a unit may influence peak flow changes ((Grant *et al.* 2008), Figure 3). An area that is 50 percent clearcut and 50 percent uncut has a high likelihood of increasing peak flows; whereas, thinning over the same area has a low likelihood of increasing peak flows. Patch cuts with patches greater than approximately 24 acres and patch cuts with patches less than 24 acres are intermediate in likelihood of peak flow increase between clearcuts and thinning.
4. The transient snow zone (TSZ) is an elevational band bounded by the rain-dominated hydrologic zone at lower elevations and the snow-dominated hydrologic zone at higher elevations. Rain-on-snow events in the TSZ occur during cloudy periods when warm winds and rain rapidly melt shallow snowpacks. Rain, combined with rapid snowmelt, can result in higher than normal stream flow potentially causing bed and bank erosion.
5. At least 29 percent (and possibly up to 45 percent of a watershed) in the rain-dominated zone needs to be harvested to produce a detectable peak flow increase ((Grant *et al.* 2008) Figure 9). Grant and coauthors (2008) recommend using an equivalent clearcut area (ECA) approach to analyze larger basins (approximately 4-193 sq. mi.) with respect to prior forest cutting and recovery history. Proposed treatments can then be added to the existing ECA to determine the effective percentage harvested, and this value can be compared to the detection thresholds mentioned previously.
6. The magnitude of any peak flow increase resulting from forest management diminishes with increasing watershed area for several reasons, including the temporal and spatial variability of rainfall and the variable timing of peak flows from individual small watersheds. The ability of individual small watersheds to affect downstream discharge decreases as small streams form increasingly larger drainage networks (Garbrecht 1991). In addition, flood peaks are diminished because of channel resistance, floodplain storage, and transmission losses. Peak flow increases measured as a percentage change cannot combine to yield a higher percentage increase in peak flows in a larger basin (Grant *et al.* 2008).
7. Road density, road connectivity to streams, and drainage efficiency, the routing and timing of water delivery to a channel and through a stream network (Tague and Grant 2004), have more of an effect on peak flow increase than the amount of harvest and buffer width ((Grant *et al.* 2008) Figure 12).

### Peak Flows and Harvest – No Action

Harvest of private forestlands would continue, with about a 40-year rotation. While new harvests occur, older harvest areas would recover hydrologically in 20-30 years and lose as much water to the air as the original forest. Because evapotranspiration and interception decreases generally scale linearly with the amount of vegetation removed, fall peak flow increases are far more likely following harvest on private land compared to harvest on federal land. Clearcuts on private lands follow the Oregon Forest Practices Act (i.e., smaller buffers, few leave trees) and create a greater soil water difference between cut and uncut areas. A larger proportion of rainfall goes to stream flow in these areas and this may cause detrimental channel changes depending on slope, bank stability, substrate size, in-stream wood loading, etc. Reasonably foreseeable Federal thinning has a negligible effect on peak flows, and the supporting EAs do not identify harvest-related detrimental effects to channels or mention detectable changes to peak flows at the subwatershed scale.

### Peak Flows and Harvest – Proposed Action

Thinning with interspersed alder conversion has a low likelihood of increasing peak flows. Removal of trees would decrease evapotranspiration and interception of rainfall, but the amount and configuration of the remaining vegetation would reduce the difference between soil water in treated and untreated areas. Reiter and Beschta (1995) state, “where individual trees or small groups of trees are harvested, the remaining trees will generally utilize any increased soil moisture that becomes available following harvest. Because of such ‘edge effects’, partial cuts, light shelterwoods, and thinnings are expected to have little effect, if any, on annual water yields." Similarly, in a summary of water yield response to forest cutting outside the snow zone, Satterlund and Adams (1992)(p. 253) found that "lesser or nonsignificant responses occur… where partial cutting systems remove only a small portion of the cover at any one time." Differences in soil water content between the proposed cut areas and the uncut areas would be relatively small and would mute any fall peak flow increases.

All proposed harvest units are below 2,000 feet, the approximate lower limit of the transient snow zone on District ((USDI 2008) Vol I Chapter 3 – 332); therefore, post-harvest peak flow augmentation from rain-on-snow events is unlikely. Although rain-on-snow can occur in the Coast Range, it is more common in the lower and middle elevations of the western Cascades of Washington and Oregon (Harr and Coffin 1992). Rain is the predominant mechanism of peak flow generation in Oregon's Coastal region (Greenberg and Welch 1998, Reiter and Beschta 1995).

Peak flow increase would not be detectable at the subwatershed scale according to equivalent clearcut area (ECA) analysis conducted using 2012 data. The BLM hydrologist compared acreage values for non-forest areas (roads and pastures) and non-hydrologically recovered areas (i.e., stands with less than 30 percent canopy cover, stands less than 20 feet tall) to hydrologically recovered acres for the 6 subwatersheds in the analysis area. Five of the subwatersheds have ECA values below 11 percent so they are well below the detection threshold referenced above (Grant *et al.* 2008). The Little Mill Creek-Umpqua River subwatershed has an ECA value of 21 percent. The Little Mill Creek-Umpqua River value is higher, but still below the 29 percent detection threshold. The proposed thinning units with 60-133 trees per acre post-harvest and the adjacent, relatively small alder conversion units (range 2.7-35.6 acres, average 16 acres), all with buffers and leave trees, would not move any subwatershed over a harvest threshold that could lead to detectable peak flow increases.

### Peak Flows and Roads

Roads have the potential to increase peak flows (Beschta 1978, Wemple *et al.* 1996). Roads affect peak flows by intercepting subsurface flow and converting it to surface flow, effectively increasing the density and runoff efficiency of streams in a watershed. Mid-slope roads can intercept surface and subsurface water and divert it into the road drainage system. Roads constructed near ridges pose less of a risk because they intercept shorter flow paths (Croke and Hairsine 2006, Royer 2006).

The Oregon Watershed Assessment Manual developed for the Oregon Watershed Enhancement Board (OWEB) provides a coarse level screen for the potential risk for road-related peak flow enhancement (WPN 1999). If the percent of forested area in roads is less than 4 percent than the potential risk is low. Four to 8 percent is moderate, and greater than 8 percent is high. With the exception of the Vincent Creek subwatershed at 4.6 percent, the other 5 subwatersheds in the analysis area are all below 4 percent. Wassen Creek is the lowest at 1.3 percent.

#### Peak Flows and Roads – No Action

Under the no action alternative, the reasonably foreseeable federal projects overlapping the analysis area include approximately 5.7 miles of road construction (**Table 3-1**). The BLM would not anticipate road-related peak flow increases detrimental to stream channels according to analysis in the EAs that cover the reasonably foreseeable federal actions. These proposed projects include design features similar to those in this EA that would reduce road connection with the stream network. Other road construction would occur in the analysis area to access private forestlands. It is unknown whether there would be enough private road construction to exceed the OWEB threshold described above to cause effects to flow regimes. However, new road design and construction practices required by the Oregon Department of Forestry (ORS 2013) have greatly improved since the construction of legacy roads in the 1960s and 1970s. Connection of any new private roads to streams would be less likely, and therefore less likely to increase peaks flows.

### Peak Flows and Roads – Proposed Action

The construction of new roads would have no discernable effect on peak flows because of their location on stable ridges or benches away from streams. New roads would be preferentially crowned or outsloped to drain to the forest floor and disperse, not concentrate runoff. Outsloping eliminates the need for ditches and ditch relief culverts, and reintroduces intercepted cutslope water back into slow subsurface pathways at the downslope edge of the road. In areas where shaping the road alone is not feasible, the installation of ditch relief culverts would drain runoff to undisturbed forest floor areas in no-treatment zones or upslope positions. Gully formation and surface water delivery between ditch relief culvert outlets and streams would not occur. The maximum spacing that the BLM allows between ditch relief culverts is 200 feet on natural surfaced roads and 400 feet on rock roads (**Table 2-10**).

Older, minimally maintained roads are a greater risk to aquatic resources than the proposed new roads built to current standards. The proposed renovation, improvement and decommissioning would allow the BLM to provide a long-term (many years) benefit to flow routing in the affected areas. Higher priority treatment sites include midslope road segments with high cutslopes and ditch lines that discharge directly to streams. The BLM has identified 6 locations for ditch relief culvert installation prior to haul (**Table 2-11**), and the addition of more pipes is possible.

The percentage of forested area in roads would essentially remain the same for 3 of the subwatersheds in the analysis area (i.e., Wassen Creek, Paradise Creek, and Little Mill Creek-Umpqua River) and slightly decrease for the other 3 subwatersheds (i.e., Big Creek-Smith River, Halfway Creek-Smith River, and Vincent Creek) following new road construction and decommissioning proposed in this EA. The proposed action would add 18.2 miles of road, decommission 24.3 miles, and fully decommission 1.7 miles, for a net decrease of 0.23 miles of road in Tier 1 Key Watersheds (**Table 2-4**). The Vincent Creek subwatershed would still be at the low end of OWEB's moderate risk category at 4.4 percent forested areas in roads; therefore, the BLM expects no discernable increase in peak flows.

## Water Quality

The Oregon Department of Environmental Quality (ODEQ) develops water quality standards that protect beneficial uses of rivers, streams, lakes, and estuaries. Section 303(d) of the Federal Clean Water Act requires the State of Oregon to develop a list of water bodies that do not meet water quality standards (ODEQ 2010).

### Stream Temperature

EA Unit 16 is the only proposed unit adjacent to a listed water body. EA Unit 16 parallels the Smith River for approximately 1,300 feet. The Smith River exceeds the 64.4 °F temperature standard[15] designated to protect salmon and trout rearing and migration and is therefore on the 303(d) list. The majority of energy for summertime stream heating comes from solar radiation (Boyd and Sturdevant 1997), and wider water bodies like the Smith River are susceptible to heating because they are not fully shaded even in areas with undisturbed or mature riparian vegetation.

In the analysis area, summer stream temperatures in perennial channels that originate in or flow almost entirely through BLM-administered land are below the 64.4 °F Oregon temperature standard designated to protect salmon and trout rearing and migration. The BLM monitored summer water temperature at the downstream edge of proposed Big-Vincent Units 3, 6, 10, 11 and 16 in 2012, 2013, and 2014. Seven-day average maximum temperatures ranged from 58.7-61.4 °F, with an average of 59.7 °F.

[15] The value given for the temperature standard, 64.4 °F, is the 7-day average maximum temperature. The 7-day average maximum is the average of the daily maximum stream temperatures for the seven warmest consecutive days during the summer.

### Stream Temperature – No Action

Other planned Federal timber sales in the analysis area (**Table 3-1**) incorporate no-treatment zones to protect shade along perennial stream reaches and maintain stream temperatures within the range of natural variability. Prior analyses determined that proposed management activities would not produce a measureable increase in stream temperature.

Water temperature increases are possible on streams draining private forests in the analysis area because the Oregon Forest Practices Act allows removal of shade-providing vegetation. Therefore, removal of some shade-providing trees could occur along streams where harvest occurs on private lands in the analysis area.

### Stream Temperature – Proposed Action

Based on the analysis below, the BLM would not expect an increase in stream temperature from the proposed harvest.

***Stream Temperature: No Treatment Zones***

There would be no measurable increase in stream temperature from density management thinning and hardwood conversion in the Riparian Reserves. The proposed harvest unit boundaries are at least 100 feet from Coho and Coho Critical Habitat (CCH) streams (PDF #12). On other perennial and fish-bearing stream reaches, no-treatment zones derived from LiDAR shade analysis (**Figure 3-5**) would extend upslope 60 or more feet and they would protect the primary shade zone and portions of the secondary shade zone (PDF #11).

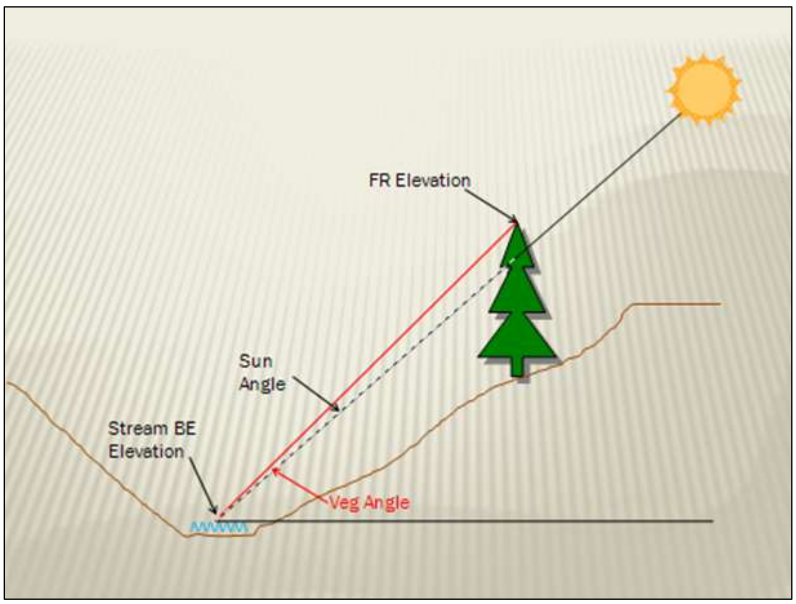


**Figure 3-5.** Light Detection and Ranging (LiDAR) compares the first return (FR) elevation of vegetation with the sun angle to determine if the vegetation is tall enough to intercept sunlight at a particular date and time. LiDAR can accurately delineate the vegetation tall enough to provide primary shade from 10 a.m. to 2 p.m., the period of greatest solar loading, and secondary shade during the morning and afternoon hours when the sun is lower in the sky and less intense. BE stands for ‘bare earth’.

Perennial and fish-bearing no-treatment zones derived from LiDAR shade analysis for this EA are conservative relative to the amount of riparian vegetation necessary to maintain existing stream temperature. The no-treatment zones contain redundant shade. That is, where vegetation close to the stream has a high angular canopy density or canopy closure as projected in a straight line from the stream surface to the sun, upslope vegetation within the no-treatment zone is providing relatively little to no additional shade at the stream surface. In addition, topography, stream-adjacent shrubs, and wood suspended over the channels provide shade. The perennial streams in the proposed units are generally narrow (i.e., less than 6 feet wetted width during the summer), hillslope and terrace-constrained (i.e., downcut with high banks), relatively brushy, and contain wood in and over the channels.

Results from the largest, most recent, and most site-specific study with similar treatments to those in the proposed project demonstrate that the no-treatment zones would be effective at preventing stream temperature increases. Groom and coauthors (2011) found no change in maximum temperatures for state forest streams that had a 25-foot no-cut buffer and a limited entry zone out to 170 feet with retention of at least 50 trees per acre. The buffer in the Groom *et al*. (2011) study is much narrower and far less protective of shade than the buffers in this EA; therefore, the BLM would not expect harvest-related stream temperature increases. Thinned stands would also have at least 60 trees per acre upslope of the no-treatment zones.

Monitoring of post-harvest no-treatment zones in units to the south of the proposed Big-Vincent units indicates that operational no-treatment zones can quite often be wider than specified in an EA, a further protection to existing stream shade and water temperature. The BLM analyzed thinning sale no-treatment zones in the Little Mill Creek-Umpqua River and Paradise Creek subwatersheds under the 2008 Umpqua River-Sawyers Rapids (URSR) EA. This EA specified 50- to 60-foot slope distance no-treatment zones on perennial streams. On-the-ground measurements and aerial photo analysis of 8 recently harvested URSR units indicate that operational no-treatment zones are wider than the no-treatment zones specified in the EA. URSR EA Units 1B, 31, 43, 46, 47, 56, 90, and 91 have average no-treatment zone widths of between 71 feet and > 100 feet slope distance, respectively. No-treatment zones increase for several reasons: 1) presence of unstable ground, 2) presence of pronounced topographic breaks farther upslope, 3) absence of merchantable trees, and 4) constraints to cable yarding. It is reasonable to expect that the BLM would delineate wider operational no-treatment zones in the Big-Vincent analysis area for some if not all of the same reasons, which adds to the conclusion that there would be no effect to stream temperatures from this project.

### ***Stream Temperature: Sample Tree Falling***

Sample tree falling in the Riparian Reserves would have no effect on stream temperature in the proposed harvest units. Sample trees are a subset of those trees marked for removal and would be well outside of the primary shade zone. Sample tree felling would not have a discernable effect on secondary shade either. The stand density within the commercial thinning units averages approximately 200 trees per acre. The felling of one tree per 2.5 acres (PDF #21), or 1 tree out of 500, would have a negligible effect on canopy closure within the secondary shade zone.

### ***Stream Temperature: Yarding Corridors***

Cable yarding corridors would not measurably increase stream temperatures. First, proposed corridors would be narrower than the maximum corridor width specified in the Coos Bay District Resource Management Plan ((USDI 1995), p. D-5) (approximately 12 feet wide versus 50 feet). Second, the spacing between corridors would be greater than the minimum corridor spacing of 50 feet listed in the Resource Management Plan. Third, there would be far less than 250 feet of corridors within any 1,000 feet of stream. Furthermore, approximately 75 percent of projected yarding corridors would cross narrow, relatively brushy, intermittent streams that have discontinuous flow or no flow during the time of the year when water temperature is a concern. Yarding corridors crossing intermittent streams would be dispersed over 22 different harvest units and the corridors would overlap approximately 1.7 percent of the 45.3 miles of intermittent streams within or adjacent to the proposed harvest units. Similarly, yarding corridors crossing perennial streams would be dispersed over 10 proposed harvest units and those corridors would overlap approximately 0.8 percent of the 30.5 perennial stream miles. The research that has been done on gap dynamics in riparian buffer strips indicates that gaps created from snapped stems, or weakened and uprooted trees has minimal effects on summer and winter water temperatures (Everest and Reeves 2007). All of these factors support the conclusion there would be no effect to stream temperature from yarding corridors.

### Sediment

Sediment input to stream channels is a result of both natural and management-related processes. Primary sediment sources include episodic landslides and debris flows usually associated with intense winter storms (Townsend *et al.* 1977), hill slope erosion, stream bank erosion, and roads. Forest management related increases in sedimentation are most often the result of poorly designed and poorly maintained forest roads. These roads can be a major contributor of fine sediment to streams (Reid and Dunne 1984).

There are no streams in the analysis area listed by the Oregon Department of Environmental Quality as impaired by excess fine sediment.

#### Sediment – No Action

Other planned Federal timber sales in the analysis area (**Table 3-1**) include road design features similar to those in this EA, and the design features prevent or minimize sediment delivery from roads to streams.

Natural sedimentation levels within the analysis area would remain constant over the long-term, but may vary considerably from year to year. Management-related sediment sources, primarily from roads, might decrease in the future. Even while some new roads are constructed, engineers have greatly improved road design and construction practices since construction of legacy roads in the 1960s and 1970s. As compared to these legacy roads, new road construction practices require greater protection of water quality. At the same time, improvement or decommissioning of older legacy roads is possible.

The no action alternative would not renovate or decommission roads identified in the analysis area as potentially adding sediment to streams. Some roads proposed for renovation or decommissioning would continue to deliver fine sediment to stream channels. Future road decommissioning and closures within the affected area would depend on the availability of funding from other sources.

#### Sediment – Proposed Action

Big-Vincent project design features would prevent or minimize sediment delivery to all streams within and adjacent to the proposed harvest units.

***<u>Sediment: Road Construction</u>***

New road construction, use, and decommissioning would not result in sediment delivery to surface water. The proposed new road segments would be located on or near ridges and on stable benches away from streams (PDF #76). The construction of approximately 5 miles of new roads would occur within the Riparian Reserves (**Table 2-7**); however, the BLM road layout crews would likely reduce Riparian Reserve road distances to avoid steepened areas near stream inception points and other fragile or potentially unstable areas. New roads would not cross any stream so there would be no direct route for sediment delivery to channels.

Sediment transport from ditch relief culvert outlets to streams along new roads is not expected. Brake *et al*. (1997) observed mean and maximum sediment travel distances of approximately 31 feet and 132 feet below ditch relief culverts on new roads in the Oregon Coast Range. The best prediction of sediment travel distance was with an equation containing the contributing length of road between culverts and forest floor slope below the culvert. All new roads would be greater than the mean sediment travel distance reported in Brake *et al*. (1997), and for those segments within 132 feet, there are mitigating factors that make delivery of sediment unlikely. New road surfaces would be preferentially crowned or outsloped to drain to the forest floor and disperse, not concentrate, runoff (PDF #79). The BLM would minimize ditches and ditch relief culverts, which are sometimes not necessary in ridge and bench locations typical of the new road locations. Brake *et al*. (1997) recorded a mean sediment plume length of less than 15 feet with culvert spacing between 328 feet and 492 feet. The maximum distance that the BLM allows between ditch relief culverts is 200 feet on natural surfaced roads and 400 feet on rock or paved roads (**Table 2-10**), and any installed ditch relief culverts on new roads would be several times farther from streams than Brake's mean sediment plume length.

Landing construction and use would not result in sediment delivery to streams. Approximately 24 percent of proposed landings would be within the Riparian Reserves. The majority of landings within Riparian Reserves (i.e., approximately 22 percent) would occur at least 100 feet from streams. The remaining 2 percent of landings (i.e., those closest to streams) would occur at locations with a vegetated buffer at least 35 feet wide. These distances are effective for preventing sediment delivery and providing stream bank stability.

### ***Sediment: Road Renovation and Improvement***

Renovation and improvement of approximately 81.6 miles (**Table 2-4**) of the haul route would minimize sediment delivery to streams during and after project operations. Older, minimally maintained roads can pose a greater risk to aquatic resources than new roads built to current standards. The proposed renovations and improvements of these existing roads, to the standards required for new construction (USDI 1995), would provide long-term (many years) benefit to flow routing and water quality in the affected areas.

Road renovation and improvement activities would generate very little (several cubic yards) sediment delivery to streams. Approximately 79 percent of the improvement and 73 percent of the renovation miles are outside of the Riparian Reserves and therefore disconnected from stream channels. Ground-disturbing activities would only occur during the dry season (PDF #41), and bare soil areas would be seeded and mulched before the onset of winter rains (PDF #72) to prevent erosion and sediment delivery. The BLM would not grade vegetated ditch lines without blockages (PDF #84); therefore, sediment would remain bound by the herbaceous roots. Ditch relief culvert installation or replacement would not occur near stream channels. Stream crossing culvert replacement and spot rocking of existing stream crossings may cause short-term (minutes to hours) turbidity increases above background levels at the site scale (tens of feet), especially during the first winter post-construction. Fine sediment from spot rock would flush during rainstorms and streams could adjust to a different bottom profile following culvert installation. Turbidity would decrease downstream as mobilized sediment deposits behind channel obstructions. Culvert replacement would happen when stream channels are dry or contain little flow, July 1 through September 15 (PDF #73), and if necessary, stream diversion around the work area to control turbidity would occur. The BLM has not identified specific spot rocking and stream crossing replacement locations, but this work would be limited in scope (e.g., < 10 sites associated with any individual timber sale).

### ***Sediment: Decommissioning/Full Decommissioning***

The act of decommissioning and fully decommissioning roads means blocking access, leaving disturbed areas in an erosion-resistant condition, reducing sediment delivery to streams, and restoring natural hydrologic flow. Actions to accomplish these tasks would occur during the summer when surface flow is all but absent and sediment delivery potential is at a seasonal low. Culvert removal may cause short-term (minutes to hours) turbidity increases above background levels at the site scale (tens of feet) especially during the first winter post-excavation. Stream channels would adjust to a different bottom profile during the first rains of the wet season, but complete removal of the crossing fill would leave little sediment to mobilize. Turbidity would decrease downstream as mobilized sediment deposition would occur behind wood and rock in the channels.

### ***Sediment: Haul Activities and Road Maintenance***

Timber haul has the potential to generate several cubic yards of sediment delivery to streams. This volume is negligible compared to natural erosion processes (e.g., landslides, debris flows, suspension of stream substrate, stream bank cutting) occurring during winter rains that generate thousands to tens of thousands of cubic yards of delivery.

In addition to the project design features listed in Chapter 2, the following circumstances prevent or limit the movement of haul-generated sediment to streams:

1. The BLM would offer multiple timber sales over several years; therefore, haul activities would be spread out over space and time. The tentative schedule is to offer sales from 2016 to 2021, and purchasers would have 3 years to complete harvest activities. There are approximately 77.8 miles of all season gravel roads (**Table 2-3**) in the analysis area, but active haul would be limited to a portion of these road miles in any one year making implementation and enforcement of the project design features easier.
2. Roads proposed for renovation and improvement cross 89 intermittent streams and 18 perennial streams. Field reconnaissance indicates that most of these roads have stable roadbeds, vegetated ditches, and adequate spacing between ditch relief culverts.

The BLM used information in Brake *et al*. (1997) as a screen to identify road segments for possible sediment abatement. Brake and others (1997) observed mean and maximum sediment travel distances of approximately 17 feet and 77 feet below ditch relief culverts on existing roads in the Oregon Coast Range. District personnel reviewed all renovation and improvement roads within the analysis area for proximity to streams within this maximum sediment travel distance, and identified 11 sites (

3. **Table 2-11**) along 4 roads for installation of sediment filters (**Figure 3-6**) and additional ditch relief culverts to prevent or minimize sediment delivery to surface water (PDF #88).

**Figure 3-6.** The installation of Terra-Tubes on BLM Road 30-10-5 minimized sediment movement above a stream crossing. The BLM proposes the use of similar filter traps for the Big-Vincent project, if necessary, to prevent haul-related sediment movement.

4. During the summer, road surfaces and ditches are generally dry so sediment transport does not occur.
5. The BLM has identified approximately 16 intermittent crossings, 5 perennial stream crossings, and 20 miles of natural surface and gravel roads for summer-only haul, again eliminating sediment delivery to stream systems.

6. All season haul would occur on paved roads. The durable surface of paved roads all but eliminates sediment delivery to the ditch.
7. At least 13.7 miles of renovation roads are behind gates (including Fall Creek). Outside of sporadic timber haul, these roads would receive little traffic; surface wear and sediment displacement are much greater on non-paved roads with higher traffic (Reid and Dunne 1984). Five renovation road segments totaling 2.1 miles are gated on one end and restricted to summer-only haul.
8. The BLM would monitor water draining from ditches (PDF #87), if it occurs, and additional sediment filters would be required (PDF #88), or haul would be suspended if the turbidity of the receiving streams noticeably increases.

Road maintenance would prevent far more sediment delivery than it would generate (several cubic yards). A limited amount of fines would flush into streams from spot gravel applied to stream crossings prior to winter haul, or in response to degraded road conditions during haul. Adding additional sediment filters to a flowing ditch during the winter would require a small amount of ground disturbance (several square feet) with hand tools, and this could cause short term (minutes to hours) turbidity increases above background levels in the ditch and possibly the receiving stream. Preventative maintenance on roads being closed just for the winter would happen during the dry season, when no surface flow means no sediment delivery.

***Sediment: Harvest in Riparian Reserves***

Sediment delivery to streams from upslope harvest activities would not occur because no-treatment zones would make effective filter strips. Most undisturbed forest soils in the Pacific Northwest have very high infiltration capacities (i.e., rainfall can infiltrate soils at the rate of several inches per hour without overland flow), and the soils are not effective at overland sediment transport by rain splash or sheet erosion (Dietrich *et al.* 1982, Harr 1976, Johnson and Beschta 1981). Furthermore, no-treatment zones are 1-3 times the width of the buffers that Rashin and others (2006) found effective at preventing sediment delivery. In a 2-year study of surface erosion and sediment routing following clearcut logging in western Washington, the authors found stream buffers were most effective at preventing sediment delivery when timber falling and yarding activities were kept at least 33 feet from streams and outside of steep inner gorge areas. The proposed treatments exclude streamside slumps and inner gorge areas from harvest.

No-treatment zone buffers would adequately protect bank stability because the contribution of root strength to maintaining stream bank integrity only declines at distances greater than one-half a crown diameter ((Burroughs and Thomas 1977, Wu 1986), both cited in FEMAT (1993), p. V-26), and the no-treatment zones proposed are several crown diameters wide.

***Sediment: Yarding Corridors***

The preparation and use of cable yarding corridors would cause negligible stream bank erosion and sediment delivery to streams. Disturbance would be of limited scope (several feet along discrete stream segments) and short duration (minutes to hours). The BLM would require streamside trees felled for corridors over, in, or parallel to the stream channels be retained on-site to provide large woody debris and protect channels from skidded logs (PDF #13). The requirement for full-log suspension along yarding corridors over perennial streams (PDF #14) would prevent sediment delivery to streams; furthermore, due to steep terrain full-log suspension would typically occur over intermittent streams.

## Fisheries

The fisheries analysis area includes the Lower Smith River, Upper Smith River, and Umpqua River-Sawyers Rapids 5th field watersheds and the Big-Creek Smith River, Halfway Creek-Smith River, Little Mill Creek-Umpqua River, Paradise Creek, Vincent Creek, and Wassen Creek 6th field sub-watersheds (**Table 3-13**). A watershed-based approach determined the analysis area based on the location of the proposed units and road activities. Although the Paradise Creek 6th field sub-watershed is included in the analysis area, the only proposed activities are renovation of approximately 7.1 miles of gravel roads and 0.28 miles of paved roads, improvement of 0.04 miles of gravel roads and all season haul on 7.1 miles of gravel roads and 6.6 miles of paved roads. Timber harvest activities would not occur in the Paradise Creek sub-watershed.

### Endangered Species Act

The analysis area is located within the federally listed threatened Oregon Coast Coho (*Oncorhynchus kisutch*) evolutionary significant unit (ESU). The National Marine Fisheries Service (NMFS) published the listing determination and Coho critical habitat (CCH) designation for Oregon Coast Coho February 11, 2008 (73 FR 7816).

Pacific lamprey (*Entosphenus tridentatus*) is on the United States Fish and Wildlife Service's species of concern list. The Oregon Coast steelhead (*Oncorhynchus mykiss*) is on NMFS's species of concern list. Species of concern status does not carry any procedural or substantive protections under the ESA (USDC 2008).

### Magnuson-Stevens Act

The Magnuson-Stevens Fishery Conservation and Management Act designated streams as Essential Fish Habitat (EFH) for a variety of species. The species with designated EFH found within the analysis area include Coho and Chinook Salmon. The Magnuson-Stevens Act defines EFH as "…those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (67 FR 2343).

There are approximately 10.0 miles of Coho occupied/CCH/Essential Fish Habitat (EFH) within or directly adjacent to 17 proposed harvest units and the distance to Coho occupied/CCH/EFH from harvest units ranges from 0 to 6.6 miles (**Table 3-16**).

**Table 3-16.** Coho Salmon/CCH/EFH stream distances to proposed harvest units.

| EA Unit No. | Miles | | Nearest Coho/CCH/EFH Stream |
|---|---|---|---|
| | Distance of Coho/CCH/EFH From Unit | Coho/CCH/EFH in Unit | |
| 1 | 6.6 | 0 | Wassen Creek |
| 2 | 0.5 | 0 | Vincent Creek Tributary |
| 3 | 0 | 1.3 | Vincent Creek |
| 3 | 0 | 0.8 | Vincent Creek Tributary |
| 4 | 0 | 0 | Scare Creek – adjacent |
| 5 | 0.3 | 0 | Vincent Creek Tributary |
| 6 | 0 | 0.8 | Vincent Creek Tributary |
| 7 | 0.4 | 0 | Big Creek Tributary |
| 8 | 0.02 (82 feet) | 0 | Scare Creek |
| 9 | 0.3 | 0 | Big Creek Tributary |
| 10 | 0 | 1.4 | Big Creek Tributary |

| EA Unit No. | Miles | | Nearest Coho/CCH/EFH Stream |
|---|---|---|---|
| | Distance of Coho/CCH/EFH From Unit | Coho/CCH/EFH in Unit | |
| 11 | 0 | 1.3 | Big Creek |
| 12 | 0 | 0.5 | Big Creek |
| 13 | 0.7 | 0 | Weatherly Creek |
| 14 | 0 | 0.2 | Blind Creek |
| 15 | 0 | 0.4 | East Fork Mosetown Creek |
| 16 | 0 | 0.2 | East Fork Mosetown Creek |
| 16 | 0 | 0.9 | East Fork Mosetown Creek Tributary |
| 17 | 0 | 0.2 | West Fork Halfway Creek |
| 18 | 0 | 0.6 | West Fork Halfway Creek |
| 19 | 0 | 0.1 | Halfway Creek |
| 20 | 0 | 0.1 | Halfway Creek |
| 21 | 0 | 0.6 | Halfway Creek |
| 22 | 0.01 (64 feet) | 0 | Halfway Creek Tributary |
| 23 | 0 | 0.6 | Halfway Creek |
| 24 | 0.3 | 0 | West Fork Halfway Creek |
| 25 | 0.3 | 0 | Halfway Creek Tributary |
| 26 | 0.5 | 0 | West Fork Halfway Creek |
| 27 | 0.6 | 0 | West Fork Halfway Creek |
| 28 | 0.2 | 0 | Halfway Creek Tributary |
| 29 | 0.3 | 0 | Halfway Creek Tributary |
| 30 | 0.2 | 0 | Vincent Creek |
| 31 | 1.1 | 0 | Vincent Creek |

### Special Status Species

Aquatic sensitive species on the Special Status Species (SSS) list found in the analysis area include Oregon Coast Coho (federally threatened) and Oregon Coast steelhead (Bureau Sensitive). The proposed action has the potential to affect Oregon Coast steelhead and their habitat in the same streams as Coho Salmon. Chum Salmon (*Oncorhynchus keta*) are listed on the BLM SSS list and distribution in the analysis area is not known; however, a safe assumption would be that some streams used by Coho could also be used by Chum.

### Fish Habitat

The term 'fish habitat' as used below includes Coho Critical Habitat, habitat for fish on the BLM Special Status Species list, and Essential Fish Habitat.

Human activities have influenced fish habitat within the analysis area. Many stream channels in the lower valleys are down-cut and not connected with a floodplain. Road development near streams has caused channelization and reduced stream meander. Past harvest practices near streams have caused a loss of in-stream large wood and a diminished recruitment of future large wood. Large wood serves an important role in creating and maintaining stable and functional stream channels, reducing stream energy, retaining stream substrate materials, maintaining lower width/depth ratios, and allowing floodplain development (Hicks *et al.* 1991). For a detailed description of fish habitat in the analysis area refer to the Middle Smith River Watershed Analysis (USDI 1995) Chapter 3, pp. 27-45; Chapter 4, pp. 3-5, Smith River Watershed Analysis ((USDA and USDI 1997) pp. 30-31, 52-60, 72, 83-88, Appendices C and D), Oxbow Watershed Analysis (USDI 2002) pp. 3-4, 34-47, 59, 64-66, and Middle Umpqua River

Watershed Analysis (USDI 2004) Chapter 3, pp. 19-22; Chapter 4, pp. 1-19; Chapter 6, pp. 1-5; Chapter 7, pp. 1-14; Chapter 8, pp. 1-13.

The analysis area exhibits fish habitat qualities common to many watersheds affected by roads, harvest activities, and fire.

Streams in the Smith River Watershed are predominantly comprised of gravels and cobbles with small amounts of fine sediments, sands, and silts in moderately confined and unconfined depositional reaches. In the reference condition, many channels already contained high levels of persistent large wood where fire-introduced wood accumulated. The interaction of large wood with streams is essential for creating juvenile and adult fish habitat. At the time of the publication of the watershed analysis, riparian areas were early-seral dominated by smaller diameter trees. The riparian vegetation of the watershed had shifted to a more deciduous-dominated area, from either areas dominated by conifers or areas that had recruitment of individual conifer trees in deciduous stands. Watershed analysis team members recommended hardwood conversion and thinning in order to grow large conifers for future recruitment of large wood to enhance aquatic species habitat ((USDA and USDI 1997), pp. 30, 52, 54, 58, 59, 83-88).

Tributaries with valley bottom roads and young Riparian Reserve streambeds in the Oxbow Watershed are predominantly bedrock with high levels of siltation and sand. Undisturbed smaller tributaries have better gravel retention and higher quality riffle habitat for spawning compared to higher order streams.

The Oregon Department of Fish and Wildlife (ODFW) used habitat benchmarks, including one measure of stream reach quality (i.e., large woody debris) to rate most stream reaches in the Oxbow as 'fair' overall. Streams in the Oxbow Watershed lack large wood input (and the functions associated with it) where old-growth stands or residual logging slash do not remain. A lack of large wood throughout the system is a result of salvage after the Oxbow Burn and the philosophy of 'stream cleaning' throughout the 1970s and 1980s. The watershed analysis team noted how red alder provided most of the shade within 100 feet of stream channels; however, hardwoods decay quicker than conifer and as such are less desirable than conifer as in-stream large wood sources. Recommendations made by the Oxbow watershed analysis team included thinning and species conversion to accelerate large wood recruitment ((USDI 2002), pp. 44-45, 65).

Many streams in the Middle Umpqua River watershed have a legacy of riparian and in-stream habitat degradation due to historical logging practices, road construction, agriculture, and other land management activities. Many fish-bearing streams in the watershed have been channelized, simplified, and widened. Deep pools and adequate gravels needed for rearing and spawning have diminished dramatically from historical conditions. Stream cleaning in conjunction with timber harvests, removal of wood perceived to be barriers to fish passage, and fires have contributed to lack of in-stream wood. The Middle Umpqua River watershed analysis team members also recommended hardwood conversion and density management thinning to improve fish habitat ((USDI 2004) Chapter 3, p. 20, Chapter 6, pp. 2-4, Chapter 8, pp. 6-10).

The Coos Bay District BLM, Smith River Watershed Council, Partnership for the Umpqua Rivers, Roseburg Resources Company, and Oregon Department of Fish and Wildlife have improved fish habitat and increased the amount of in-stream wood through log and boulder placement on private and BLM-administered lands in the analysis area (**Table 3-17**).

**Table 3-17.** Cooperative in-stream restoration projects conducted within the Big-Vincent analysis area.

| Stream Name | Log (only) Structures Created | Logs Placed | Log/Boulder Structures Created | Boulders Placed | Steam Miles Treated | Timeframe |
|---|---|---|---|---|---|---|
| Big Creek | 127 | 350 | - | 830 | 6.0 | 2002-2004 |
| East Fork Mosetown Creek | 20 | 30 | - | - | 0.4 | 2003 |
| Halfway Creek | 49 | 175 | - | 60 | 2.3 | 2002, 2005 |
| Scare Creek | 27 | 416 | 38 | 1,090 | 3.0 | 2014 |
| Vincent Creek | 78 | 1,014 | 51 | 1,810 | 8.0 | 2012-2014 |
| Weatherly Creek | 46 | 174 | 8 | 1,561 | 3.0 | 2002, 2012 |
| **Totals** | **347** | **2,159** | **97** | **4,521** | **22.7** | **-** |

Streams that received treatment include Vincent Creek, Scare Creek, Big Creek, Weatherly Creek, East Fork Mosetown Creek, and Halfway Creek. Logs and boulders placed in-stream improve fish habitat; however, the riparian areas are lacking long-term large wood recruitment sources. Boyer *et al*. (2003) suggest wood placement can expedite improvement of degraded streams, however, these approaches are likely to prove even more effective when designed to complement long-term riparian forest management objectives that focus on recovery of a sustainable source of large wood for streams. Pollack and Beechie (2014) state, "From a restoration perspective, it may also be desirable to directly introduce wood to streams and riparian areas to ensure that there is adequate deadwood in the short term. Even unthinned riparian forests will provide deadwood to forests and streams at a relatively slow rate, and restoration of riparian and in-stream wood loads to levels that create complex habitat may take decades without active wood placement. Direct placement could also compensate for the loss of in-stream and riparian wood delivery that will occur if riparian stands are actively thinned." Absence of large wood structures in streams can also result in 1) channel morphology simplification, 2) increased bank erosion, 3) decreased nutrient and sediment retention, 4) loss of habitats associated with diversity in cover, and 5) changes in hydrologic patterns (Bilby and Bisson 1998, Gregory and Bisson 1997, Naiman *et al*. 1992).

Water quality parameters such as temperature, dissolved oxygen, and sediment can affect fish survival. Halfway Creek, a tributary to Halfway Creek, and Smith River are the streams within the fisheries analysis area listed on the Oregon Department of Environmental Quality 303(d) list for elevated water temperatures (ODEQ 2010). Conifers and hardwoods such as big leaf maple, myrtle, and alder provide ample shade for other streams within the proposed units. ODEQ has not listed any streams in the analysis area for other water quality parameters such as dissolved oxygen or sedimentation.

Natural surface and rocked roads within the analysis area with surface erosion, inadequate drainage, and stream crossings or unstable cut banks and fill slopes contribute sediment to stream channels and potentially fish habitat where there is a connection between the road and a stream channel. Adjacent streams have been subject to episodic or chronic fine sediment input due to poor road design and lack of maintenance. Properly designed, surfaced, and maintained roads in the analysis area do not contribute sediment to stream channels. Roads with proper drainage features (such as ditch relief culverts) direct sediment-laden water onto forest soils and not directly into streams and fish habitat.

## Fisheries – Riparian Reserve Condition Including Large Wood Recruitment

Riparian Reserve stands within the proposed units range from 34-62 years old. Past management practices and other disturbance events have, in some cases, resulted in stands that are lacking the desirable species components that will lead to the development of late-successional habitat (USDA and USDI 1998). Riparian Reserve stands in proposed units range from conifer-dominated to hardwood-dominated. The conifer-dominated stands within the units have uniform structure, low species diversity, slow growth rates, low stand vigor, small diameter trees, and are in an overstocked condition. The average quadratic mean diameter (QMD) across all stand types ranges from 11-18 inches DBH.

Red alder currently dominate many riparian areas in the region managed under the Northwest Forest Plan (Cunningham 2002). The proposed units dominated by alder had a greater conifer component prior to the Oxbow and Vincent/Weatherly Creek fires and past harvests (USDA and USDI 1998). Poor regeneration of conifer and severe suppression by the hardwood canopy has put these stands on a different trajectory than was present prior to disturbance. Alder-dominated Coast Range riparian areas have limited opportunity for natural regeneration of trees because of high shrub cover, especially salmonberry (Hibbs and Giordano 1996). The probability of recruiting large wood to streams is low in areas dominated by alder (MacCracken 2002). The benefits alder provide to streams in terms of leaf litter, increased abundance of insects, or nitrogen input may be outweighed by decreases in large wood input and wood residence times resulting in overall loss of fish habitat in alder-dominated areas (Johnson and Edwards 2002).

"Decomposition rates of large wood in streams vary widely and depend on tree species, piece size, wood quality and condition, and location within the riparian/aquatic system" (Boyer *et al.* 2003). "…Conifers provide the most desirable structural elements in streams and rivers because they are resistant to movement and decompose slowly" (Boyer *et al.* 2003). Alder can function as in-stream wood but it is short-lived due to its small size and is more susceptible to washing downstream. Keim *et al*. (2000) found tree-length alder with rootwads anchored to the bank was effective in trapping woody debris and forming accumulations; however, its effectiveness was short-lived. By the third year after treatment, the pulled-over alders were losing structural integrity due to advancing decay and breakage. Conifers are longer lasting in streams as compared to hardwoods (Naiman *et al.* 2000). Compared to conifers, red alder is short-lived, does not attain as large a size, cannot withstand hydrological forces at high flows, and decomposes rapidly (MacCracken 2002).

The following analyses will group all harvest prescriptions (thinning and conversion) and refer to them as <u>harvest</u>, unless otherwise stated.

### Fisheries – No Action

Without treatment, the conifer-dominated stands would decline in growth and vigor resulting in stagnant stands more susceptible to wind, fire, insects and disease. Greater mortality rates from suppression mortality in early-seral stands produce only small dead trees and hence smaller pieces of large woody debris. Bragg *et al*. (2000) point out that "Turnover rates for small pieces are likely to be rapid in all but the smallest flows, while larger pieces can persist for extended periods even in large rivers. Therefore, a stream with many small pieces is less structurally productive because of debris instability, while a stream with a few large pieces will have a value proportionate to the abundance of LWD." While smaller wood can be functional in stream channels (i.e., sediment capture, nutrient storage, and macroinvertebrate habitat), it is more susceptible to displacement downstream during high flows and it is less resistant to decay than larger wood (Harmon *et al.* 1986, Spence *et al.* 1996). McHenry *et al*. (1998) found that piece movement increased when large wood is composed of small diameter pieces recruited from young riparian forests. Gravel accumulations behind in-stream wood enhances spawning habitat for anadromous fish; however, the smaller wood recruited to stream channels under the no action alternative would not be as effective as large wood at trapping gravel and small debris, storing sediment and nutrients, or pool formation for fish habitat.

While suppression mortality would eventually release conifers for growth, the recruitment of large diameter logs to stream channels would remain deficient for a longer time if left untreated. Delayed recruitment of large diameter logs in streams would maintain the current trajectory of pool formation. Pools provide rearing habitat for fish and give fish a place to rest during high velocity storm events.

Rosenfeld and Huato (2003) found that wood pieces < 12 inch diameter accounted for only 6 percent of pool formation, while pieces > 24-inch diameter accounted for 43 percent of pool formation within their study area of small coastal streams in British Columbia. However, in-stream wood 5-8 inches in diameter and 5-10 feet long is considered by many stream survey professionals to be 'large wood' (Beechie *et al.* 2000, Foster *et al.* 2001, May and Gresswell 2003, Robison and Beschta 1990).

Field observations in the units found trees that appeared to have died from suppression mortality ranged from approximately 4-6 inches DBH. Wood recruitment to stream channels would remain at its current level until trees in riparian stands grow to larger sizes and eventually fall into stream channels.

Hardwood-dominated stands would continue to exclude most conifer species including Douglas-fir from becoming the dominant species until a single large disturbance or the accumulation of small-scale disturbances create opportunities for conifer establishment. The alder stands with salmonberry understory will become salmonberry brush fields, not conifer stands, when the alders die (Cunningham 2002, Hibbs and Giordano 1996, USDI 2002). Salmonberry brush fields are "climax communities" that are unable to contribute wood to the streams (USDI 2002). Hibbs and Giordano (1996) conclude, "As alder dominated stands senesce, only a significant natural or man-made disturbance will allow reestablishment of a tree overstory." Therefore, the probability of recruiting large wood (5-8 inches diameter and 5-10 feet long) to streams is low in areas dominated by alder (MacCracken 2002). In-stream wood improves fish habitat by providing cover from predators, scouring out pools, providing pool cover, slowing water velocities, retaining spawning gravels, and providing nutrients for macroinvertebrates; however, the continued exclusion of conifer development in alder-dominated areas under the no action alternative (in the absence of other disturbance) would delay the aforementioned beneficial habitat characteristics.

Roads that are currently contributing sediment to streams would continue to do so under the no action alternative. Chronic sediment input to streams reduces spawning production, juvenile rearing survival, and insect production (Everest *et al.* 1987, Hicks *et al.* 1991, Meyer *et al.* 2005, Waters 1995). The stream culverts and ditch relief culverts with chronic sediment inputs would remain at risk for failure.

## Fisheries – Proposed Action

### Fisheries – Large Wood Recruitment in the Riparian Reserves

#### ***Fisheries – Large Wood Recruitment: Harvest***

The proposed harvest in riparian stands would begin to restore historic landscape-level vegetation patterns beneficial to aquatic habitats. Increasing stand and species diversity as well as placing the stands on a trajectory towards developing late-successional characteristics would be attained through the proposed activities. Late-successional characteristics include multi-level canopies, future recruitment of large in-stream wood, and diverse species and structural composition. The proposed harvest would, over time, increase the size of wood falling into streams. Larger conifers that fall into streams are less likely to move downstream and more likely to improve fish habitat by forming pools, providing pool cover, providing cover from predators, slowing water velocities, and retaining spawning gravels.

The no-treatment zones would retain the original number of trees per acre (TPA), maintain stream bank stability, and provide nutrient input to streams for fish and their macroinvertebrates food sources. Trees in the no-treatment zones would remain available for wood recruitment into streams and maintain stream shade and stream temperature. The Oregon temperature standard to protect salmon and trout rearing and migration is 64.4 °F. The no-treatment zones would include 35-foot no harvest buffers on intermittent streams, and 60-100 foot buffers on perennial streams and 100-foot buffers on Coho/CCH streams. The BLM would exclude these areas from harvest based on LiDAR and Timber Production Capability Classification (TPCC). The IDT designed proposed harvest units to exclude areas subject to frequent fluvial disturbances such as floods and landslides. Harvest activities would not increase the likelihood of slides occurring; however, if slides occur, trees occupying the site could be delivered to streams, which would increase habitat complexity for rearing fish, provide predator cover for fish, and slow water velocities during high flow events.

Thinning riparian stands would accelerate growth rates in trees, which would produce larger down logs sooner in the long-term. A study located on the western slope of the central Oregon Cascades consisting of four thinning treatments in second-growth Douglas-fir stands indicated that heavy thinning may accelerate development of large trees (Beggs 2004). Larger trees would be available for large wood recruitment, both in and near streams in a shorter period than would occur without thinning. Converting alder stands to conifers can accelerate the processes that result in large conifers in streams (MacCracken 2002). The increased availability of larger down logs in streams would benefit fish habitat by preventing downstream transport of LWD, storing large volumes of sediment (May and Gresswell 2004) and smaller wood, and creating pools and backwaters, which provide rearing habitat and places for fish to rest during high velocity flow events.

The average post-treatment tree height in riparian stands would range from approximately 101 to 144 feet, and harvest would be no closer to the streams with Coho, CCH, and EFH than 100 feet. Thinning typically removes smaller trees and leaves the taller trees, which would still be available for future large wood recruitment outside of the no-treatment zones. The upper crown of a tree does not normally have wood of sufficient diameter to influence stream hydraulics, stream morphology, or fish habitat (Robison and Beschta 1990). Thus, the 'effective tree height', which is the height to the minimum diameter and length necessary for the wood to qualify as functional in-stream wood (5-8 inches diameter, 5-10 feet long), is the appropriate standard to use for assessing the potential fall area.

Van Sickle and Gregory (1990) modeled a mixed-height hardwood and conifer stand (66-213 feet) in coastal Oregon and found that 90 percent of the wood input was from within 59 feet of the channel. Robison and Beschta (1990) developed a model that predicted that a 75-foot strip adjacent to a stream that flowed through a Douglas-fir stand with an average DBH of 20 inches and an average height of 112 feet would contain all of the trees with stream recruitment potential. Benda and Bigelow (2014) evaluated the recruitment, storage, transport, and the function of wood in 95 kilometers of streams in northern California. They found that in managed stands dominated by Douglas-fir less than 100 years old, 90 percent of the wood recruitment by volume originated from within 100 feet of the channel. The proposed 100-foot no-treatment zone adjacent to Coho/CCH/EFH in the Big-Vincent project area would encompass most of the distances mentioned above; therefore, loss of sources of in-stream wood outside of the no-treatment zones in Coho/CCH/EFH areas would be minimal.

The proposed density management thinning in Riparian Reserves would reduce suppression and competition mortality; therefore, releasing the remaining conifers to increase in size more quickly. Thinning outside of the no-treatment zones has the potential to slow the timing and reduce the amount of near-term wood input, but increase the size of trees that may eventually fall in the channel. Suppression mortality, as well as other agents of mortality, would still occur within the no-treatment areas resulting in dead trees available for in-stream wood recruitment. Trees left in the harvested portions of Riparian Reserves also would remain available for in-stream wood recruitment by the same mortality processes as before harvest, such as wind, fire, insects or disease (Harmon *et al.* 1986).

Hardwood conversion units total less than 3 percent of the harvest proposed within Riparian Reserves, and are not proposed next to fish-bearing streams. Large conifers, an element that hardwood riparian areas lack, are a critical ecosystem component (Apostol and Berg 2006). Riparian habitat surveys indicate that hardwood species, especially alder, provide most of the shade within 100 feet of stream channels in the harvest units. Alder conversion beyond the 35-foot no-treatment zones on intermittent streams would reduce the number of hardwood trees that may provide large wood input to stream channels. Retained conifers and hardwoods in conversion units beyond the no-treatment zones would still be available to provide large wood to streams. Although hardwood leaves provide an immediate source of leaf litter, which provides food sources for the macroinvertebrate food web, conversions would reestablish conifers in slope positions they once occupied and eventually replace contributions of relatively nondurable alder wood with larger and more decay-resistant conifer wood. Active management of alder-dominated riparian forests can successfully accelerate mature conifer riparian forests (Berg 1995). Over time, these large conifers would be available for recruitment into stream channels where they would influence stream channel morphology, creating complex habitats for aquatic species.

Sample tree falling would occur in the proposed units, including in riparian stands (PDF #20). Sample tree falling would not affect current or future large wood recruitment because trees selected would be located outside of the no-treatment zones and would be a subset of those already identified in the prescription for removal.

The proposed action includes constructing yarding corridors across perennial and intermittent streams. Yarding corridors would not cause a reduction in current or future recruitment of wood to fish habitat for the following reasons:

1) Corridors would not be located directly over fish habitat (PDF #51);
2) Trees felled within the RR no-treatment zones for yarding corridors would remain on site (PDF #13);
3) Corridors would only be 12 feet wide and dispersed across six 6$^{th}$ field sub-watersheds located in three 5$^{th}$ field watersheds (PDF #47); and
4) Skyline corridors placed perpendicular to streams (as much as possible) (PDF #51) would also minimize the total length of openings created by yarding across stream channels.

***<u>Fisheries – Large Wood Recruitment: Road/Landing Construction</u>***

The proposed action includes approximately 5 miles (28 percent) of new roads within the Riparian Reserves (**Table 2-7**). This would include approximately 2 miles of gravel spurs and 2.8 miles of natural roads distributed across approximately 66 road segments. Constructing new roads in riparian areas would not reduce current or future wood recruitment to fish habitat because the trees harvested would not have reached fish habitat due to the distance of the new roads to the closest stream. The closest section of new road (6-1 NC) to fish habitat is located on a ridge approximately 800 feet away, and trees at that distance would not reach that habitat. No new roads would cross fish-bearing streams. The new roads would be located on stable non-slide prone slopes that would not deliver wood to fish habitat.

The proposed action includes approximately 27 percent of roadside landings within the Riparian Reserves. Of these, the closest landing would occur approximately 950 feet from fish habitat. Trees felled from the edge of the closest landing would also not reach fish habitat and are outside of the distance for trees to provide shade or in-stream wood; therefore, roadside landings would not reduce current or future wood recruitment to fish habitat. The BLM proposes 1 helicopter landing location at an existing rock pile, 87 feet from fish habitat, with no additional tree removal.

### Fisheries – Sediment

***<u>Fisheries – Sediment: Harvest</u>***

Sediment from the proposed harvests would have a negligible effect on fish habitat. The no-treatment zones would maintain a buffer between harvest activities and stream channels. The no-treatment zones would maintain areas of non-compacted soils and undisturbed vegetation and duff layers to filter fine sediment before it would reach streams. Ground-based equipment would not cross through stream channels and would not operate within no-treatment zones (PDF #6). Ground-based equipment operations would only operate in the dry season (PDF #41); therefore, preventing sediment delivery to streams.

***Fisheries – Sediment: Yarding Corridors***

Sedimentation from the proposed yarding corridors would have a negligible effect on fish habitat because of the distance between fish habitat and the proposed corridors. The average distance between yarding corridors over intermittent streams and fish habitat is 1,500 feet and 1,630 feet, respectively, and the average distance between perennial stream yarding corridors and fish habitat is 1,280 feet. The closest intermittent stream corridor is 180 feet from fish habitat, and the closest perennial stream corridor is 240 feet from fish habitat.

Project design features would require one-end log suspension in ground-based and cable yarding areas (PDF #2), and full-suspension across all perennial stream channels (PDF #14); therefore, yarding activities would not alter aquatic habitats. No yarding corridors would cross fish-bearing streams (PDF #51). Perpendicular corridor placement over non-fish-bearing streams would minimize the total length of openings (PDF #51); therefore, minimizing potential ground disturbance. Yarding corridor segments, which do not have full suspension, would have areas of soil disturbance; however, the segments of soil disturbance would be short and discontinuous and would not result in a measurable amount of sediment delivery to stream channels. The BLM would require trees felled within the no-treatment zones to facilitate yarding be felled toward the channel and remain on site (PDF #13). These trees would armor stream banks and reduce the amount of contact that yarded logs would have with the stream bank and channel. Sediment entering the intermittent streams at the corridor crossings not achieving full suspension would not result in a measurable amount delivered to fish habitat because the distance to fish habitat is approximately 110 feet to 6.6 miles, with an average of 1,630 feet (average does not include EA Unit 1 distances, which are all > 6.5 miles from fish habitat). This distance would allow sediment to filter out and settle before reaching fish habitat. Stream channels in the proposed units have material such as woody debris and rocks sufficient to trap and store sediment.

***Fisheries – Sediment: Road/Landing Construction***

As previously analyzed in the Water Quality section, the proposed road and landing construction would not result in measurable sediment delivery to surface waters, therefore minimizing the effects to fish habitat due to road and landing construction. Sediment input from new road and landing construction would not be measurable in fish-bearing streams because:

- New road design and construction would feature proper drainage so that any sediment-laden surface water would quickly infiltrate forest soils, and
- New construction would implement project design features to reduce or eliminate erosion and sediment input to streams.

Spur road 6-1 NC is the closest proposed new road to fish habitat and is located on a ridge, approximately 0.15 miles (800 feet) from an unnamed tributary to Vincent Creek. The other new road segments in close proximity (defined as 0-132 feet) to streams are approximately 950-5,914 feet from fish habitat, and average 2,900 feet from fish habitat. There are no stream crossings proposed for any new road construction; therefore, there is no mechanism for sediment to travel to nearby streams. The new roads would be primarily located on or near ridge tops and stable benches (PDF #76) and would incorporate design features that include avoiding fragile or unstable areas, minimizing excavation and height of cuts, end haul of waste material where appropriate (PDF #80), seeding and mulching bare soil (PDF #72), and construction during the dry season (PDF #73). Brake *et al.* (1997) observed that the maximum sediment travel distance below cross drains (ditch relief culverts) was 132 feet on new roads, with a mean travel distance of 31 feet. All proposed new roads would occur at distances further away from streams than the maximum sediment travel distance discussed above; therefore, there would be no sediment effect to fish habitat from road and landing construction.

The proposed action includes approximately 27 percent of landings within the Riparian Reserves. However, distances between landings and fish habitat are greater than sediment can normally travel when factoring in the sedimentary buffers created by vegetated no-treatment zones. The closest proposed landing to a stream is located in EA Unit 5 and is approximately 465 feet from an intermittent stream and 3,350 feet from fish habitat in a tributary to Vincent Creek; this landing would not contribute sediment to fish habitat because of the distances involved and the implementation of new construction project design features. The BLM proposes 1 helicopter landing location at an existing rock pile in EA Unit 12 near Big Creek, approximately 87 feet from Coho/CCH/EFH. No other landings would be located within no-treatment zones. The helicopter landing site would not contribute sediment to fish habitat because it would be located on an existing rock pile.

***Fisheries – Sediment: Haul***

As previously analyzed in the Water Quality section, sediment derived from haul would not measurably affect water quality in streams; therefore, sediment from haul would not affect fish habitat. Hauling on natural surface roads would only occur during the dry season (PDF #86). During summer haul, there is little or no flowing water on road surfaces or ditch lines to transport sediment to stream channels. However, sediment generated from summer haul on natural surface roads could move off-site during winter rains. Haul sediment would not reach streams because it would travel to ditches, through ditch relief culverts, and to the vegetated forest floor. Natural surface roads and landings would receive seasonal preventative maintenance (i.e., water bars, sediment control mats or devices, rut removal, mulching or barricades) prior to the onset of winter rains to prevent sediment from reaching stream channels (PDF #72). During the wet season, the BLM would prohibit haul on natural surface roads (PDF #86), therefore restricting movement of sediment to streams due to haul activities. Hauling on paved roads during the wet season would not deliver sediment to streams because paved roads are not likely to produce sediment (Reid and Dunne 1984). All-season haul on rocked roads has the potential to deliver sediment to stream channels; however, ditches and ditch relief culverts would route sediment to the forest floor in the same way as natural surface roads. The BLM contract administrator would monitor road conditions during winter use to prevent rutting, require operators install additional lifts of gravel and sediment filters if necessary, and suspend haul if rain accumulations have the potential to deliver sediment to stream channels (PDF #87). Road maintenance during the life of the project would minimize road drainage problems and reduce the possibility of road failures and sediment delivery to streams.

The BLM hydrologist and fish biologist analyzed the existing road network, and recommended 11 locations where use of additional sediment filters or ditch relief culverts would avoid haul-related sediment from reaching stream channels. Sediment filters would receive frequent inspection and maintenance (PDF #88). Disposal of sediment deposited behind filters would occur in vegetated upslope areas. Sediment filters would be removed when haul is complete. The BLM engineers may identify and include additional sediment abatement measures in the timber sale contract, if needed.

Ditch lines would primarily direct sediment derived from haul to the forest floor via ditch relief culverts before the sediment could reach stream channels. Brake *et al*. (1997) found that on established logging roads within the Oregon Coast Range the maximum observed distance sediment traveled below a ditch relief culvert with vegetation filtering was typically not more than 16.7 feet. Roadwork completed prior to haul and roadwork conducted after haul would further reduce the amount of off-site sediment movement after hauling. Any sediment generated because of the haul would be immeasurable and not outside levels that presently occur during rain events. The amount of sediment reaching fish habitat from haul would be indistinguishable from background levels and would not cause a measurable effect to fish habitat.

### ***Fisheries – Sediment: Road Maintenance, Renovation, and Improvement***
As previously analyzed in the Water Quality section, roadwork including maintenance, renovation, and improvement would occur during the dry season when intermittent streams are not flowing, and would minimize sediment delivery to streams and fish habitat before, during, and after harvest activities. This roadwork would divert road drainage away from stream channels and toward the forest floor where it would infiltrate into the soil. Renovation activities may include, but are not limited to, surfacing with rock, stabilizing cutbanks and fill slopes, restoring out slope or crown sections, and providing adequate drainage. Installation of new ditch relief culverts would also route road water onto the forest floor and away from streams. In some areas, the road crown would be graded and shaped to prevent water from flowing down the road to stream crossings. Seeding and mulching of bare soil areas before onset of winter rains, if needed, would prevent sediment delivery to streams. Roadwork activities at the completion of project activities would reduce the potential sediment input to streams in the short- and long-term. Cleaning plugged stream and ditch relief culverts would reduce the risk of culvert and road failure. The road maintenance, renovation, and improvement would provide a slight, long-term (many years) benefit to flow routing and water quality.

The maintenance, renovation, and improvement of roads would result in sediment run-off during the first winter, but the amount of sediment to reach fish habitat would be short-term and indistinguishable from background levels because sediment derived from roadwork would be primarily directed to well-vegetated ditch lines and then out of ditch lines via ditch relief culverts to the forest floor before reaching streams. Where roads connect to streams, sediment could enter stream channels. However, well-vegetated ditch lines found within the majority of the analysis area would capture and store sediment and reduce the amount of sediment reaching stream channels. The project design feature, “Renovation and improvement activities would not disturb existing drainage ditches with functional protective layers of non-woody vegetation” would reduce the total length of ditch line disturbance and reduce sediment input to streams (PDF #84). Vegetation establishment on bare soil areas would occur after soil disturbance and before onset of winter rains (PDFs #44 and 70). Installation of sediment control devices (PDF #88) would trap and store sediment, which would further reduce the amount of sediment delivered to streams.

The road activities would include ditch relief culvert installation (
**Table 2-11**).

The BLM may identify other culverts for replacement while the timber sale contract is prepared. Stream culvert replacements would not occur on streams containing fish habitat. Replacing the culverts would reduce the risk of culvert failure and subsequent sediment input to streams containing fish habitat. The BLM expects sediment input to fish habitat from culvert replacements to be unmeasurable and indistinguishable because:

- Stream culvert replacements would follow ODFW in-stream timing guidelines, which is from July 1-September 15 (PDF #71). During this time there would be very little if any flow in the streams proposed for culvert replacements.
- When replacing stream culverts, the BLM would divert stream flow around the work area, contain sediment using appropriate filters or barriers, and pump turbid water from the excavation site onto a vegetated terrace or hill slope.

### ***Fisheries – Sediment: Decommissioning and Full Decommissioning of Roads***
The BLM proposes fully decommissioning 22 RENO and 27 RENO, and decommissioning all newly constructed roads (with the exception of the Wells Creek slide reroute 21-9-32.4) after harvest activities are complete. There are no stream crossings on 22 RENO or 27 RENO, or on any new construction; therefore, there are no transport mechanisms for sediment to reach fish habitat. Stream crossing culvert removal is proposed on the 21-9-22.0 road (i.e., 1 intermittent channel > 3,500 feet from Coho and CCH), the 21-9-13.3 road (i.e., 1 channel > 8,000 feet from Coho and > 10,000 feet from CHU), and the 21-8-

11.1 road (i.e., 3 intermittent channels and 1 perennial stream > 1,000 feet from Coho and CCH). Brake *et al*. (1997) observed mean and maximum sediment travel distances of approximately 17 feet and 77 feet below ditch relief culverts on existing roads in the Oregon Coast Range. Sediment from the removal of ditch relief culverts during road decommissioning would not affect fish habitat because Coho/CCH is approximately 13 times further away than the maximum sediment travel distance observed by Brake *et al* (1997). The BLM would leave decommissioned and fully decommissioned roads in an erosion-resistant condition (PDF #91), which would reduce the potential for sediment delivery to fish habitat. Decommissioning would include installation of a suitable barrier to block vehicular access (PDF #90). Seeding and mulching of bare soil areas would prevent erosion, and the installation of erosion-resistant water bars (where necessary) would provide road drainage. Roads proposed for full decommissioning would receive similar treatment after closure as decommissioned roads. Fully decommissioned roads may be subsoiled if needed to restore water infiltration and natural hydrologic flow (PDF #92).

### Fisheries – Conclusion

There would be no cumulative effects to Coho, CCH, Special Status Species habitat, or Essential Fish Habitat from harvest or road activities in the project area or at the 5$^{th}$ and 6$^{th}$ field watershed scale. The cumulative effects are within the scope of anticipated effects to aquatic resources, including fisheries, analyzed in the Coos Bay District Proposed Resource Management Plan Environmental Impact Statement ((USDI 1994), pp. 4-60 – 4-61).

A long-term reduction in sediment entering streams would follow road maintenance, renovation, improvement, decommissioning and full decommissioning because these road activities would improve road drainage and therefore reduce surface erosion. Sediment generated from road-related activities would be indistinguishable from background levels, would be dispersed between six 6$^{th}$ field subwatersheds, and would not have a measurable direct or indirect effect to fish habitat. The amount of sediment reaching stream channels would not cause a reduction in macroinvertebrate production, which is a food source for fish. The proposed road-related activities would not change the amount of sediment deposited within pools, or on top of in-stream spawning gravel, or in between the spaces of in-stream spawning gravel.

Harvest would increase long-term large wood recruitment to stream channels, and therefore benefit fish habitat through decay-resistant structure, pool cover, trapped small wood and sediment, spawning gravel accumulation, and nutrient storage. Hardwoods left within the no-treatment zones would provide stream structure and trap small wood and sediment, and provide deciduous leaf litter for macroinvertebrate consumption.

Cumulative effects of past land management practices on private and BLM-administered lands have contributed to the current degraded fish habitat within the analysis area. The BLM expects that, on BLM-administered lands, road and harvest project design features and best management practices would reduce the influence of BLM past practices on aquatic habitats.

Areas of short-term, localized sediment input to streams would occur because of the harvest and road-related activities; however, when added to other Federal and non-federal actions this input would not affect fish habitat at the 6$^{th}$ and 5$^{th}$ field watershed scale.

## Soil Resources

The soils resources analysis area included approximately 60,000 acres, which is large enough to assess all of the soils in the proposed harvest units.

The Natural Resources Conservation Service (NRCS) classifies the soils within the proposed harvest units into approximately 28 different soil types that develop mainly from the sedimentary rocks of the Tyee Formation (NRCS 2014).

Within the proposed harvest units, the NRCS data ranks the lands, on average, as having a high soil productivity level. The NRCS calculated the average yearly forest productivity as 144 cubic feet per acre per year, which is the volume of wood fiber yield produced in a fully stocked, even-aged, unmanaged stand (NRCS 2014). This is 7 times higher than the 20 cubic feet per acre per year minimum required for classification as commercial forestland for the BLM (USDI 1986). The NRCS rates 87 percent of the soils as resilient to management actions. Eighty percent of the soils in proposed harvest units have a high restoration potential, which means they have the inherent ability to recover from degradation. Twenty percent of harvest unit soils have a moderate restoration potential.

In the proposed harvest units, soil depths (as measured to a restrictive layer such as bedrock) range from 0 inches (18% with little or no soil, i.e., rock outcrop or rock bands), to an average of 30-46 inches (47%), to an average of 79 inches (35%). The NRCS rates the ability of these soils to drain in 7 levels ranging from 'excessively drained' to 'very poorly drained'; soils in the project area are 'well drained'. The NRCS also rates soil on saturated hydraulic conductivity, meaning the ability of pores in a saturated soil to transmit water. Ninety-nine percent of soils in the project area infiltrate water 'rapidly' (i.e., 6 to 20 inches per hour), and the final 1 percent infiltrates 'very rapidly', or at more than 20 inches per hour (NRCS 2014). This means that the soils are good conduits to transmit water, even when saturated, which is critical for the large volumes of rain the Oregon Coast Range receives.

### Slope Stability

The BLM geologist used geologic maps, geologic reports, aerial photography from 1960 to present day, LiDAR in GIS, and field visits to evaluate land stability in the proposed action area including new road construction, waste areas, and hardwood conversion areas.

The sedimentary geology is susceptible to all forms of landslides, including creep, slumps, rock fall, deep-seated movement, and debris torrents (Beaulieu and Hughes 1975). Twenty percent of the proposed harvest units have slope gradients from 0-30 percent, 25 percent of the units have slope gradients from 31-60 percent, and 55 percent of the units have slope gradients > 61 percent.

#### Slope Stability – No Action

The natural deposition of heavy rains, snow events, wind storms, earthquakes, and freezing and thawing weather cycles would continue to influence the occurrence of natural landslides, rock falls, and soil creep events. The no action alternative would have no effect on slope stability and there are no other reasonably foreseeable actions that would affect slope stability.

#### Slope Stability – Proposed Action

***Thinning and Hardwood Conversion***

The BLM geologist did not observe or identify any active landslide features or slope stability concerns in the proposed thinning or hardwood conversion units. The risk that the proposed action would promote landslides is low because retained vegetation plays a role in the soil moisture regime and slope reinforcement occurs from live roots (Wu 1984). Thinning would retain live roots across hillslopes, which stabilize slopes and further maintain slope integrity. Retained riparian no-treatment zones, with their network of live roots and vegetation, would minimize effects to soil displacement. Hardwood-dominated areas can be indicative of slope instability due to past ground movement, as species such as red alder are among the first to establish after movement or disturbance. The BLM concluded that the 5 proposed hardwood conversion units are the result of past logging disturbance, and not landslides. The proposed harvest activities within EA Unit 1, which is on top of and along the degraded scarp of an ancient (approximately 300+ years old) deep-seated landslide, would not cause the slide to reactivate, as the location is on top of the head of the feature.

***Road Activities***
The BLM geologist evaluated the proposed road construction, renovation or improvement, haul and decommissioning or full decommissioning locations using aerial imagery, LiDAR, and field visits. The proposed activities would not affect slope stability in these areas for the following reasons. The proposed areas presented no indicators to suggest land movement such as 'pistol-butt' trees, tension cracks, or sag ponds. Roads construction would not occur through the toe (end) of landslides, thereby avoiding the possibility of reactivating old slides through the removal of supportive slope buttressing. Approved waste sites would receive end haul soil materials thereby avoiding sidecast overburden and the steepening of slopes. Road maintenance and renovation would improve drainage and reduce plugged culverts and ditches that block water, saturate soils, and lead to failures.

***Waste Areas***
The BLM geologist visited and evaluated, or reviewed 15 waste area locations using LiDAR and aerial photography. All 15 proposed sites were located on suitable, stable gradients, away from streams and appropriate for waste placement. Seeding bare soil areas prior to rain would further stabilize these sites.

## Soil Erosion

The primary forest management concern for soil resources is to maintain soil productivity for future tree growth. Loss of soil through erosion, landslides, or a change in soil properties from intense burning or soil compaction can cause adverse effects to soils from forest management. The BLM evaluated the erosion hazard ratings for the proposed harvest units using NRCS ratings. There is a slight erosion hazard in one percent of the area; a moderate hazard in 21 percent; a severe hazard in 16 percent; and a very severe hazard in 62 percent of the area (NRCS 2014). Erosion hazard ratings depend on both slope steepness and infiltration rate. Soils are also erodible if exposure to the open sky exceeds 50-75 percent of the land surface. Therefore, the areas of ground disturbance analyzed include proposed yarding corridors, skid trails, and new roads. Erosion hazard ratings are not applicable for road renovations and road improvements as these areas have already experienced soil removal. The remaining lands would retain tree and brush cover to protect them from erosion.

### Soil Erosion – No Action

Under the no action alternative, the BLM expects natural weathering and erosional processes to continue at the current rate. Multiple factors including exposure, elevation, aspect, soil type, and water infiltration rates would determine soil erosion rates. Dense vegetation would slow soil erosion, whereas open sky areas would experience a greater rate of erosion. Gravel or asphalt cover most roads within the project area, and county-owned roads adjacent to streams are asphalt. These types of surfaces have minimal erosion potential, especially in a wooded environment.

### Soil Erosion – Proposed Action

The proposed action would minimize erosion by limiting soil-disturbing activities such as road construction, renovation, and ground-based harvest to the dry season (PDF #41). Seeding and mulching bare soil areas, or covering them with a protective layer of slash before winter rains would further minimize erosion (PDFs #44 and 70). Slash mats (branches and woody materials) over skid trails (PDF #42) would filter out fine sediment before they migrate great distances, thereby slowing, reducing, or eliminating erosion where ground-disturbing activities occur. The proposed action would allow maintenance to existing roads for renovation, or improvement and would upgrade road conditions and their associated drainage features, which would reduce future erosion (PDFs #83-85).

#### ***Skid Trails in Ground-based Yarding Areas***

Skid trails would occur on approximately 20 acres of the 397 acres of ground-based yarding areas (**Table 3-18**). Skid trails allow for the efficient extraction of timber, and as such are areas subject to erosion from ground-based equipment or single-end suspension log movement. The elevation of one end of a log (single-end suspension) by ground-based yarding equipment (PDF #2) when the logs are removed from a unit reduces both compaction and erosion because of the minimization of soil rutting. The use of existing skid trails with slash mats (PDF #42), to the extent practical, would minimize erosion and the downhill movement of soil in harvest areas below 35 percent slope gradient. For ground-based operations, best management practices limit skid trails to less than 12 percent ((USDI 1995), p. D-5) of the harvest area to minimize soil compaction, but the practice also minimizes where erosion occurs. Minimizing the number of skid trails and the use of existing skid trails would limit, to the greatest extent possible, the erosional activities within the harvest units. If needed after harvest, placement of additional tree branches and other woody material or slash over skid trails would prevent further movement of soils, and provide filtering mechanisms to prevent offsite movement of fine sediment. The application of other drainage and erosion control measures would also reduce soil movement on skid trails.

#### ***Yarding Corridors***

There are approximately 4,566 acres proposed for cable yarding. Skyline harvest systems create less soil disturbance and erosion than ground-based equipment. Twelve-foot wide yarding corridors spaced at least 150 feet apart (PDFs #47-48) would reduce soil erosion. Spacing corridors at this interval would minimize the number of corridors and reduce the total area of soil disturbance from cable yarding. Yarding corridors typically have a dense brush layer to protect the soil from erosion. Where logs have more contact with the soil, a thinned, open canopy system would halt erosion within one to a few growing seasons because vegetation would regrow and stabilize those areas. One-end log suspension, required in all proposed harvest areas (PDF #2), would minimize erosion, and full-log suspension or seasonal restrictions on identified fragile gradients (PDF #4) would further reduce erosion potential.

#### ***Road Construction***

The BLM expects soil erosion from road cut banks and surfaces, especially from heavy rains during the first winter following construction activities. Construction of new roads using modern road-building techniques, and locating new roads on stable, ridge tops, or the upper mid-slopes would minimize soil erosion. The proposed action does not include any new roads over stream crossings; therefore, stream crossing erosion based on new road construction would not occur. Road design (including ditch relief culverts and energy dissipators), best management practices (RMP, pp. D-3 and D-4), and project design features for road construction would minimize erosion and manage infiltration and runoff. Seasonal natural surface road maintenance would reduce erosion by the use of strategically placed water bars and the seeding of bare soils (PDFs #70, 72, 83-85).

#### ***Waste Sites***

Waste sites are level erosion-resistant areas where construction waste materials are deposited when side slopes are equal to or greater than 60 percent slope. Suitable waste sites prevent the erosion of soils into streams or floodplains. All 15 sites were located on suitable, stable-gradients away from streams. Vegetative seeding of bare soils at waste sites would occur prior to rains to minimize waste site erosion (PDF #77).

#### ***Decommissioning/Full Decommissioning***

The BLM expects minimal erosion on decommissioned or fully decommissioned road surfaces as the BLM would treat them with erosion control measures to manage infiltration and runoff (PDF #91).

## Soil Compaction

Project areas experienced an average of 2.3 percent soil compaction from previous logging skid trails approximately 34-62 years ago (**Table 3-18**).

**Table 3-18.** Existing skid trail compaction, proposed compaction (estimated), and cumulative skid trail compaction in areas with proposed ground-based operations. Ground-based acreages are approximate and do not include no-treatment zones within unit boundaries.

| EA Unit No. | Ground-Based Acres Per Unit | Soil Compaction | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | **No Action** (Existing Environment) | | | **Proposed Action** | **Totals** (Cumulative Effect) | | |
| | | **Skid Trail* Area ft$^2$** | **Acres** | **% of Unit** | **Estimated New Skid Trails (2.83%) Area ft$^2$** | **Area ft$^2$** | **Acres** | **% of Unit** |
| 1 | 30.8 | 4,368 | 0.1 | **0.3%** | 37,968 | 42,336 | 1.0 | 3.2% |
| 2 | 9.7 | 20,412 | 0.5 | **5.1%** | 11,957 | 32,369 | 0.7 | 7.2% |
| 3 | 62.1 | 73,584 | 1.7 | **2.7%** | 76,553 | 150,137 | 3.4 | 5.5% |
| 4 | 45.5 | 142,140 | 3.3 | **7.2%** | 56,090 | 198,230 | 4.6 | 10.0% |
| 5 | 4.2 | 2,652 | 0.1 | **2.4%** | 5,177 | 7,829 | 0.2 | 4.8% |
| 7 | 71.8 | 18,000 | 0.4 | **0.6%** | 88,511 | 106,511 | 2.4 | 3.3% |
| 9 | 82.8 | 51,648 | 1.2 | **1.4%** | 102,071 | 153,719 | 3.5 | 4.2% |
| 11 | 9.6 | 12,000 | 0.3 | **3.1%** | 11,834 | 23834 | 0.5 | 5.2% |
| 16 | 24.1 | 0 | 0.0 | **0%** | 29,709 | 29,709 | 0.7 | 2.8% |
| 17 | 12.3 | 9,180 | 0.2 | **1.6%** | 15,162 | 24,342 | 0.6 | 4.5% |
| 30 | 42.5 | 58,932 | 1.4 | **3.3%** | 52,391 | 111,323 | 2.6 | 6.0% |
| **Totals** | **396** | 392,916 | **9.2** | **2.3%** | 487,423 | 880,339 | **20.2** | **5.1%** |

* The BLM assumed a12-foot width for new skid trails.

For the ground-based harvest units, the Natural Resources Conservation Service-mapped soil units indicate that 42 percent of the soil units in the project area are rated as 'well suited' to mechanical equipment (i.e., rubber-tired skidders and dozers), with 31 percent 'moderately suited', and 27 percent 'poorly suited' (NRCS 2014). All soil units present in the proposed harvest areas have a low resistance to compaction, which indicates that the soil has one or more features that favor the formation of a compacted layer.

The following project design features would minimize or avoid compaction to soils, including those soils rated as 'poorly suited' for mechanical equipment, or that have a low resistance to compaction:

- (PDF #2) One-end log suspension would be required in ground-based and cable yarding areas;
- (PDF #4) Full log suspension or seasonal logging restrictions (dry season only) would be required as operationally feasible on fragile soil areas designated as FGR2 and FGNW in the Timber Production Capability Classification;
- (PDF #40) Ground-based equipment would be restricted to areas with slopes < 35 percent;
- (PDF #41) Ground-based equipment would be restricted to the dry season when soil moistures are below the 25 percent plastic limit thresholds measured 6 inches below the soil surface;
- (PDF #42) Existing compacted skid trails would be used to the extent practical;
- (PDF #42) Slash mat layers (if available) would be used on skid trails;
- (PDF# 42) Lateral skid trails would be limited or minimized; and,

- (PDF #42) Harvest units exceeding 12 percent soil compaction would require decompaction of the main skid trails to a depth of 12 inches to stay below the compaction limit threshold.

The BLM geologist used GIS, LiDAR and 1960s and 1970s aerial photographs to locate and calculate areas of existing compaction in ground-based units proposed for harvest where mechanical equipment would operate. The BLM geologist scaled aerial photographs into GIS data to measure the existing compacted areas. Field visits to evaluate soil conditions included marking old skid trails, recording their locations with GPS, and testing soils for compaction. **Table 3-18** provides a current soil compaction analysis for each proposed ground-based unit.

The unit with the highest percentage of skid trail compaction was EA Unit 4 at 7.2 percent (**Table 3-18**). Currently, all ground-based units are below the 12 percent compaction objective ((USDI 1995), p. D-5) of the 1995 Resource Management Plan.

The BLM geologist calculated the plastic limits for the 9 soil units in the ground-based harvest areas using Natural Resources Conservation Service data. The soil units include: Orford gravelly silt loam, Preacher loam, Preacher-Bohannon complex, Preacher-Bohannon-Xanadu complex, Xanadu gravelly loam, Damewood-Bohannon-Umpcoos complex, Fernhaven gravelly loam, Fernhaven-Digger complex, and Honeygrove-Peavine complex. The BLM used a weighted average based on soil acres, as one soil unit is comprised of multiple soil types, and there are multiple soil units in each ground-based unit. Plastic limit soil moistures range from 20 to 30 percent. Based on these calculated plastic limits, 248 acres require soil moistures below 20 percent to operate mechanized equipment, 122 acres require soil moistures below 25 percent, and 11 acres require soil moistures below 30 percent. The BLM defines this threshold as the soil moisture content measurement taken 6 inches below the organic layer. Soil moistures tolerating ground-based equipment use without compaction typically occur between May and October.

### Soil Compaction – No Action

Under the no action alternative, soil compaction from previous logging on Federal and private lands in the analysis area would continue to recover through root growth, animal burrowing, and the accumulation and development of a new layer of loose leaves and organic debris.

### Soil Compaction – Proposed Action

The BLM proposes activities that could create approximately 11 acres of additional compaction, based on a basic formula that incorporates average skid trail width (12 feet) and spacing (200 feet), and potential tree height (approximately 100 feet). The calculation projects the average ground-based harvest unit would experience approximately 2.83 percent soil compaction in terms of area from mechanical equipment. However, implementation of appropriate harvest techniques would protect soil productivity. Compacted areas would remain below the compaction threshold recommended in the district ROD/RMP. Project design feature (#42) requires use of existing skid trails to the extent practical. The BLM calculated the total proposed soil compaction by adding the estimated 2.83 percent soil compaction average to each unit, as if each unit were to receive all new skid trails. The resulting data indicates that each unit's total would not exceed the 12 percent maximum soil compaction objective stated in the RMP (p. D-5). Of the 396 acres of ground-based operations, approximately 20 acres (or 5 percent) would sustain various levels of compaction from existing and new skid trails. Current Best Management Practices (RMP, p. D-5) minimize soil compaction in multiple ways. The use of slash mats (made up of tree limbs and branches) on skid trails (PDF #42) would minimize rutting, erosion and compaction. Reuse of existing skid trails would limit compaction to existing areas. The limitation of ground-based harvest activities to the driest part of the year would minimize or eliminate the potential for soil compaction, as soil moisture contents would not be conducive to compaction. Furthermore, skid trails would not occur through wetlands as these areas are no-treatment zones (PDF #7).

After the proposed harvests are completed, the placement of adequate barriers (i.e., water bars or or slash) to block skid trail access points would prevent off-highway vehicle use and any additional erosion and compaction.

## Botany

There are no federally threatened and endangered (T&E) plant species known or suspected to occur in the Big-Vincent analysis area.

The botany analysis area includes all of the 6$^{th}$ field watersheds listed in **Table 3-2**. The BLM used the entire project analysis area to determine the relevant species known or suspected in the project areas. Action areas within the analysis area exhibit various plant associations of coniferous forests with some hardwood woodlands and some small open meadows. The most extensive plant associations are the early- to mid-seral stage western hemlock conifer stands. The vegetation reflects the gradual moisture transition, going west to east, from moist coastal conditions to drier upland conditions. The main geographical features of the watershed are the mountainous ridgelines that support timber stands intermixed with sporadic rock bands and waterfalls. Some of the steep rock bands support special habitats for grass and forb communities.

Project areas are densely stocked 34-62 year old conifer plantations. The 2 major overstory species in the western half of the action area are Western hemlock (*Tsuga heterophylla*) and Douglas-fir (*Pseudotsuga menziesii*). Grand fir (*Abies grandis*), Western hemlock, and Douglas-fir are the major overstory components in the eastern half of the action area. Western cedar (*Thuja plicata*), grand fir, chinquapin (*Chrysolepis chrysophylla*), and madrone (*Arbutus menziesii*) are widely scattered minor overstory components. Higher concentrations of these minor species occur in some areas demonstrating a different plant association within those particular units. Remnant trees (80 years and older), mostly Douglas-fir and grand fir, are found scattered throughout the proposed action area.

An understory of patchy hardwoods include minor amounts of tanoak on the upper slopes and scattered red alder (*Alnus rubra*) and bigleaf maple (*Acer macrophyllum*) in drainage bottoms, wet areas, and along open and roadside areas. Understory shrub and herbaceous plant communities are underdeveloped in many areas due to dense canopies. Rhododendron (*Rhododendron macrophyllum*), evergreen huckleberry (*Vaccinium ovatum*) and Oregon grape (*Berberis nervosa*) typically dominate the drier ridge tops, upper slopes, and south and west aspects. Vine maple (*Acer circinatum*), salal (*Gaultheria shallon*) and red huckleberry (*Vaccinium parviflorum*) typically dominate the moist lower slopes, drainage bottoms, and north and east aspects, which usually contain a low herbaceous cover typified by western swordfern (*Polystichum munitum*) and sorrel (*Oxalis oregana*) in varied but dense quantities in the semi-shaded canopied areas. Other common shrubs and herbs in the project area include oceanspray (*Holodiscus discolor*), creeping blackberry (*Rubus ursinus*), salmonberry (*Rubus spectalibis*), bedstraw (*Gallium aparine*), redwood violet (*Viola sempervirens*) and trillium (*Trillium ovatum*).

Scattered remnant conifer trees and patches of remnants occur within the botany analysis area, and provide habitat for fungi and lichens; however, the BLM has buffered these structures out of harvest units (PDFs #16-17). Researchers have found that older trees are associated with increasing numbers and varieties of fungi species (Molina *et al.* 2001). Where remnant trees occur, lichen populations exist in abundance in both the upper and lower canopies. Older and mature hardwood shrubs (e.g., oceanspray) also host the greatest species richness for macrolichens and bryophytes (Muir *et al.* 2002). Lichens are typically most abundant on the edges of stands, in riparian areas where there is a hardwood component, and where canopy gaps allow sunlight penetrate to the lower canopy and forest floor.

Decaying logs and stumps, creek areas, openings, rocky outcrops, and hardwood trees harbor the majority of the bryophyte diversity. Bryophyte diversity is lowest in dense, young stands with few snags or downed logs or in units where all the snags and large downed wood is fire-charred.

### Botany Survey Methods

The BLM botanist evaluated species-habitat associations using Interagency Special Status/Sensitive Species Program (ISSSSP) Species Fact Sheets and Distribution maps and fungi habitat tables ((USDA 2014) http://www.fs.fed.us/r6/sfpnw/issssp/). The BLM conducted reviews of GIS Geographic Biotic Observations (GeoBOB) and the Oregon Biodiversity Information Center (ORBIC) records, presence of suitable or potential habitat, existing survey records, inventories, spatial data, scientific literature, and used professional judgment to conduct field surveys for Special Status Species according to approved protocols. The BLM botanist used the random intuitive controlled method to survey high-likelihood habitats more intensively than other areas within the project area (USDA and USDI 1997, USDA and USDI 2003). The intuitive controlled approach relies on the knowledge, experience, observation skills, and intuition of the surveyor and may be one of the more reliable methods for locating rare species.

### Botany Special Status Species

For BLM-administered lands, Special Status Species (SSS) policy (http://www.fs.fed.us/r6/sfpnw/issssp/agency-policy/) details the need to conserve Bureau Sensitive species and their habitats to the point where they no longer require special recognition. These species are not threatened or endangered, or proposed for listing under the Endangered Species Act.

To date, the BLM has documented 2 Bureau Sensitive plant species in the proposed harvest units ( **Table 3-19**); however, there are 35 Special Status Species suspected of possibly occurring in the analysis area (**Appendix E**). This determination is based on the proposed project overlapping the known or suspected range of a species as well as the likelihood that potential habitat is present. Aerial photographic interpretation, ground surveys, and review of information on each species' habitat requirements, and proximity of known site locations determine potential habitat. Policy recommends conducting surveys if Bureau Sensitive species are known or suspected to occur in a proposed harvest unit. The 10 Bureau Sensitive fungal species suspected of occurring in the project area are all considered impractical to survey for (Cushman and Huff 2007); therefore, there are 25 Bureau Sensitive species for which surveys are recommended (**Appendix E**). The BLM began surveys 2011, and they are currently ongoing. The BLM would follow SSS policy with respect to buffering any future SSS sites found, such that the species would persist at those sites.

**Table 3-19.** Known botany Special Status Species in the project area compared to the number of known sites on Coos Bay District BLM-administered lands. The BLM queried GeoBOB and ORBIC data in GIS.

| Species | Number of Known Sites – | | Number of Sites in the Big-Vincent Analysis Area | Number of Sites on Coos Bay District BLM |
|---|---|---|---|---|
| | In Thinning Units | In HWC Units | | |
| **FUNGI** | | | | |
| *Phaeocollybia californica* | 1 | - | 4 | 18 |
| **LICHENS** | | | | |
| *Hypotrachyna revoluta* | 2 | - | 2 | 25 |

The BLM does not conduct surveys for Bureau Strategic species. However, the BLM would collect occurrence data, if incidentally encountered during surveys.

### Botany Survey & Manage (S&M) Species

Using Pechman Exemption 'A', there is no requirement to survey in stands under age 80 for proposed thinning units. All proposed Big-Vincent thinning units are younger than 62 years of age, so the exemption applies. However, surveys are required in the hardwood conversion units of the Big-Vincent project, as these units would primarily remove red alder and retain conifers.

The S&M species documented within harvest unit boundaries include the same 2 species described above under Special Status Species; however, the BLM located these 2 species in a thinning portion of EA Unit 1, and not a hardwood conversion area. *Phaeocollybia californica* is S&M Category 'B', and *Hypotrachyna revoluta* is Category 'E'. The BLM also incidentally documented 4 other S&M species, *Chaenotheca chrysocephala* ('B'), *Chaenotheca ferruginea* ('B'), *Cetrelia cetrarioides* ('E'), *Stenocybe clavata* ('E') in the hardwood conversion areas of EA Unit 1 (**Appendix F**).

### Botany – No Action

Under the no action alternative, the known SSS and S&M species sites (totaling approximately < 1 acre) within the project areas would continue to grow and reproduce, especially if undisturbed by wildfire.

In identified habitat hotspots such as open meadows, rocky ridges, and high moisture areas where there is a higher probability for Special Status Species diversity and abundance due to greater light and moisture availability, the habitats would transition over decades to conifer (**Table 3-3**) with shrubs and other understory species remaining in natural gaps. The steepest rocky habitats would limit conifer succession, and likely remain as high incline meadows. Special Status Species shrub, forb, lichen, moss (bryophyte), and fungi populations, if present under the drier conditions of the dense canopies, would remain limited in abundance until natural gaps create hotspot opportunities.

Red alder-dominated areas would remain so until they reach maturity at 60-100 years of age, at which point natural succession would replace the red alder with dense stands of salmonberry (where present) or other brushy non-conifer species. Salmonberry and other brushy non-conifer species are not the preferred hosts for epiphytic SSS/S&M lichens and bryophytes, or for mycorrhizal fungi.

Reasonably foreseeable future BLM actions (**Table 3-1**) in the analysis area, such as recurring road maintenance would occur but would not affect any of the known BLM-administered SSS/S&M sites.

Under the no action alternative, timber harvest would continue on private lands within the analysis area on a 40-year rotation; however, the younger habitat present on private timberlands would not typically support rare or old growth indicator species.

### Botany – Proposed Action

Under the proposed action, a total of 3 SSS sites (for 2 species) and 3 S&M sites (for 3 other species) would receive no-treatment buffers. These buffered sites would total < 1 acre.

#### Fungi – SSS/S&M

To date, only 1 SSS/S&M fungi (i.e., *Phaeocollybia californica*) site is known within harvest unit boundaries. This known site, and any others located in future, would receive a no-treatment buffer to retain the microhabitat, microclimate, canopy cover, and coarse woody debris. No-treatment zones would also prevent soil disturbance and compaction, which reduces or alters the quantity of fungal colonization of Douglas-fir seedlings (Page-Dumroese *et al.* 1998, Wiensczyk *et al.* 2002). In addition to the no-treatment zone around the known SSS fungi site (PDF #33), the Northwest Forest Plan (NWFP) established a system of Late Successional Reserves to minimize the likelihood of and need for listing any of these species under the Endangered Species Act. The current level of protection of Late-Successional

Reserve areas combined with existing management policies will continue to conserve rare and little known late-successional forest associated species. In the NWFP, approximately 81 percent of all federally managed lands are in reserves, and 87 percent of all late-successional forests are in reserves.

As SSS and S&M fungi species are not practical to survey for, the BLM used the *Conservation Assessment for Fungi Included in Forest Service Regions 5 and 6 Sensitive and BLM, California, Oregon and Washington Special Status Species* Program (Cushman and Huff 2007) to assess effects. As outlined by this conservation assessment, thinning these proposed units would not cause actions that intensively or extensively remove or consume the woody substrate, forest floor litter, or shrub hosts with which the individual species are associated nor would thinning cause actions that would remove or destroy a fungal organism.

***<u>Hardwood Conversion</u>***

Hardwoods in the hardwood conversion units do not provide habitat for any Special Status Species fungi. Ongoing surveys have not located any SSS or S&M fungi species in hardwood conversion units. Since all the proposed hardwood conversion units would involve cutting hardwood trees less than 80 years of age, the BLM expects a minimal effect to any S&M fungal species as these species are thought to be associated with late-successional and old-growth forests. The BLM would incorporate no-treatment zones around SSS or S&M species sites located in hardwood conversion units (PDF #33).

### Vascular Plants and Lichens and Bryophytes – SSS/S&M

***<u>Commercial Thinning/Density Management Thinning</u>***

To date, the BLM has documented 1 SSS lichen (i.e., *Hypotrachyna revoluta*) in a thinning harvest unit (**Table 3-19**). The application of no-treatment zones (PDFs #32-33) around known Special Status Species sites in thinning and hardwood conversion units would protect habitat microclimates and minimize any direct treatment effects. Additional sites of SSS/S&M species, if found, would receive similar no-treatment zone buffers; therefore minimizing effects to the species.

Thinning dense conifer stands would open the canopies and allow a shrub understory to develop. The development of a healthy understory of shrub species would benefit SSS and non-SSS lichens (and bryophytes) as older and mature hardwood shrubs, like oceanspray, host the greatest species richness for macrolichens and bryophytes (Muir *et al.* 2002).

***<u>Hardwood Conversion</u>***

There are no vascular SSS plants documented in the proposed hardwood conversion units. There are 4 documented lichen S&M species in hardwood conversion areas. Management of the known habitat for these 4 species, *Chaenotheca chrysocephala*, *Chaenotheca ferruginea*, *Cetrelia cetrarioides*, and *Stenocybe clavata* would occur through the delineation of a no-treatment zone based on the Coos Bay District BLM buffer protocol (Brian *et al.* 2002); therefore, there would be no effect to the habitat of these species.

### Botany Conclusion

The implementation of the proposed action will not change the likelihood of and need for listing any special status species under the ESA as identified in Manual 6840 and BLM OR/WA 6840 policy, because buffering of known sites would protect the integrity of and retain the site populations.

## Climate Change

New information has been produced regarding climate change since publication of the 1994 PRMP FEIS (USDI 1994), to which this EA tiers. Climate researchers state that global temperatures have increased (approximately 1 °C since late 1800s); and that it is also likely temperatures in the Pacific Northwest have increased (CIG 2004, IPCC 2007, Jolly *et al.* 2004) by a similar amount (OCCRI 2010). The IPCC (2007) contends that a human influence on climatic change is likely, through production of greenhouse gases, disturbance, and land cover change. Temperature increases in the west over the next century may range from 2 °C at the low end of the uncertainty range to 6 °C at the upper end of the uncertainty range (IPCC 2007, Miles and Lettenmaier 2007, OCCRI 2010). This increase is well (> 2 standard deviations) outside of historic conditions. For context, the shift from the last ice age to the current climate was approximately 9 °C. There have also been increases in winter precipitation since 1930 over much of the western United States (US), although patterns vary in different regions within the west (Jolly *et al.* 2004, Salathe *et al.* 2009). Precipitation changes in the western US over the next century are complex and more uncertain than temperature changes. Western states precipitation may increase by as much as 6 percent by 2100 (CIG 2009, Hidalgo *et al.* 2009). This increase would be well within 20$^{th}$ century variability in precipitation (< 1 SD from historic mean), and would again be expected to differ widely by region within the western US.

Some researchers in the scientific community predict indirect changes in western US ecosystems attributable to changes in temperature and precipitation cycles. Most modeled changes describe potential broad shifts in vegetation types (Lenihan *et al.* 2006, Millar *et al.* 2006), fire behavior (CIG 2004, Mote *et al.* 2003) or hydrological cycle (Furniss *et al.* 2008, Hidalgo *et al.* 2009). The BLM would consider these shifts speculative at the scale of western Oregon, and obscured by local conditions at the scale of the analysis area.

Uncertainty in future socioeconomic and political responses and uncertainty in how the climate actually works yields uncertainty in climate change (model) predictions (CIG 2004). Uncertainty in global climate model predictions attributable to physical processes increases at smaller spatial scales, due to the importance of regional climatic patterns (such as ENSO[16]) and local topography (such as the Coast Range) (CIG 2009). Predictive models of temperature and precipitation have been downscaled for the Pacific Northwest, but not specifically for the Coast Range Province or for the Big-Vincent analysis area. The application of larger-scale model results to the analysis area directly would be predicted to induce bias, and have low accuracy. Extrapolating such models to predict future vegetation or animal response would increase bias even further, and would probably have limited utility in describing the cumulative effects of the proposed action or in differentiating between alternatives.

Secretarial Order #3226 (2001, amended 2009) directs all departments to "consider and analyze potential climate change impacts when undertaking long-range planning exercises." The 1994 RMP FEIS ((USDI 1994) Appendix V, p. 217) considered climate change effects as part of long-term planning efforts at the plan-scale (western Oregon). Although the 1994 RMP FEIS analysis recognized the possibilities of increased incidence of wildfire, insect outbreaks, shifting range of species (including Douglas-fir), and forest species composition, it found "no scientific consensus about the extent or rate of global warming nor the probable effect on forest ecosystems in western Oregon" ((USDI 1994), p. 217). Although it is not speculative that changes in the affected environment will occur due to climate change, it is not possible to reasonably foresee the specific nature or magnitude of the changes (USDI 2008), p. 488). Consideration of predicted changes in vegetation, fire, hydrological cycles, or other responses due to climate change would be speculative at the plan scale; predictions at the scale of the analysis area would be more uncertain. Therefore, the BLM did not incorporate potential changes attributable to climate change in the analysis area in the Big-Vincent EA.

[16] ENSO is the El Nino southern oscillation.

## Carbon Stores and Carbon Flux

Carbon flux is the rate of exchange of carbon between pools, the net difference between carbon removal and carbon addition to a system. For the atmosphere, this refers to carbon removed by plant growth and other processes balanced by carbon added through respiration, biomass decay, burning, volcanic activity and other volatilization processes. Forest management can be a source of carbon emissions through deforestation and conversion of lands to a non-forest condition, or stored carbon through forest growth or afforestation ((USDI 2008), p. 220).

Analysis of carbon flux quantifies the net effect of the proposed action on greenhouse gas (GHG) levels by comparing changes in carbon storage that would occur under the proposed action to the carbon storage that would occur under the no action alternative, as suggested in IM-2010-012 (USDI 2010). Specifically, this analysis estimates the carbon flux associated with implementation of the proposed action roughly 50 years from the present, incorporating differences in carbon storage in live and dead carbon pools as well as the mid-term flux from wood products produced by the proposed action through this period.

The BLM used the Forest Vegetation Simulator (FVS) (Dixon 2002) to determine the current and projected stand conditions for 50 years from harvest for the proposed action and the no action alternative. The BLM then used the Carbon Calculator for Typical Western Oregon BLM Projects (v. 1.0) (the 'Calculator') to conduct the analysis of carbon flux associated with changes in live and dead pools attributable to the proposed action and no action alternative. FVS considers changes due to succession and forest management in all major live and dead carbon pools within the action area (harvest units). This FVS model does not directly incorporate microclimatic effects, dynamics of herb and shrub understory layers, or stable soil pools. Herb and shrub carbon pools are relatively small when compared to total stores, and are similar between young and mature stands ((USDI 2008) App-29). Soil carbon represents 9-20 percent of total site carbon but is the most stable carbon store and the least likely to be affected by thinning disturbance. For example, 60-year-old forest stands and 450-year-old forest stands have similar soil carbon storage (Harmon *et al.* 1990).

The BLM input site-specific data from stand exams into the FVS Growth and Yield Model and modeled the proposed action and no action alternative prescriptions. The BLM then used the Calculator to determine the amount of carbon that each alternative would release or sequester and the resulting net carbon balance. The BLM considers the modeled output values in this analysis as approximate, with estimated values for carbon stored and carbon released expressed as tonnes (metric tons). Scientific literature most commonly uses tonnes to express carbon storage and release. One tonne of carbon is equivalent to 3.67 tons of carbon dioxide (EPA 2005). The BLM has selected 50 years as the analysis period of carbon storage for this project because it encompasses the duration of the direct and indirect effects on carbon storage. In 50 years, stands in the project area would have nearly returned to current carbon storage levels, and carbon storage would have offset carbon emissions resulting from harvest. The 10-year period for short-term effects would encompass the duration of all of the direct emissions from the proposed action.

### Carbon Stores and Carbon Flux – No Action

Under the no action alternative, the decay of snags, woody debris, and dead vegetation would release carbon to the atmosphere; however, the growth of forest vegetation would also sequester carbon. Under the no action alternative, a portion of the carbon currently stored in live trees would convert over time through ongoing processes of tree mortality. After 50 years of growth, live tree carbon would increase 348,922 tonnes (**Table 3-20**).

**Table 3-20.** Carbon storage and carbon emissions (in metric tonnes) estimated for the proposed action and the no action alternative.

<table>
<tr><th colspan="2" rowspan="2">Source</th><th>No Action</th><th>Proposed Action</th><th rowspan="2">Notes*</th></tr>
<tr><th colspan="2">Metric Tonnes Carbon</th></tr>
<tr><td colspan="2">Live Tree Carbon – Current Condition</td><td>701,279</td><td>701,279</td><td>Pre-treatment Live Tree Carbon</td></tr>
<tr><td rowspan="3">Storage</td><td>Live Tree (net)</td><td>348,922</td><td>291,181</td><td>Includes natural losses due to stand maturation and decay in 50 years</td></tr>
<tr><td>Harvested Wood</td><td>0</td><td>88,989</td><td>Harvested Wood storage 50 years from harvest (sum of products in use, stored in landfill, and emitted for energy). The number shown is the cumulative total for the end of the Analysis Period.</td></tr>
<tr><td>Total Storage, 50-year Analysis Period</td><td>348,922</td><td>380,170</td><td>Sum of Live Tree (net) + Harvested Wood storage</td></tr>
<tr><td rowspan="3">Emissions</td><td>Short-Term (1-10 years)</td><td>-</td><td>34,295</td><td>Sum of harvest operations and fuel treatment Short-Term emissions</td></tr>
<tr><td>Long-Term (11-50 years)</td><td>-</td><td>11,318</td><td>Total Emissions for the 50 year Analysis Period minus the Short-Term emissions</td></tr>
<tr><td>Total Emissions</td><td>-</td><td>45,613</td><td>Sum of Short-Term and Long-Term emissions</td></tr>
<tr><td colspan="2">Net Carbon Storage, 50-year Analysis Period</td><td>348,922</td><td>334,557</td><td>Total Storage minus Total Emissions</td></tr>
<tr><td colspan="2">Total Carbon Flux 50-year Analysis Period</td><td colspan="2">14,435</td><td>The difference between the no action and proposed action is 4%.</td></tr>
</table>

* Modeling used the Carbon Calculator for Typical Western Oregon BLM Projects (v. 1.0) developed by the Salem BLM District, Mary's Peak Resource Area, December 21, 2009.

### Carbon Stores and Carbon Flux – Proposed Action

***Short-Term Effects (0-10 Years After Timber Harvest):***
Treating approximately 6,341 acres (**Table 2-1**) of forest would volatilize some carbon, move carbon from live tree pools to detritus, and store some carbon in forest products. Removing live trees would decrease stored live tree carbon to 291,181 tonnes, and transfer 88,989 tonnes of live tree carbon storage to other pools (**Table 3-20**). The BLM estimates the stands would transfer approximately 60 percent of tree carbon to wood product storage. Life cycle assessment mill survey data shows that approximately 50-70 percent of the aboveground biomass in a sustainably managed forest is currently utilized in product processing mills to make solid wood products along with paper and biofuel co-products (Lippke *et al.* 2011). Harvested wood, harvest operations, and slash treatments would create short-term emissions totaling 34,295 tonnes 0-10 years post-harvest.

***Long-Term Effects (11-50 Years After Timber Harvest):***
The BLM estimates long-term emissions from the proposed action (11-50 years after harvest) at 11,318 tonnes using the Carbon Calculator (**Table 3-20**). In the project area, the proposed action would result in a carbon flux of approximately 14,435 tonnes over the period from thinning through 50 model years post-harvest.

***Carbon Stores and Carbon Flux Conclusion***
At the scale of western Oregon, considering the cumulative effects of both forest succession (a carbon sink) and harvest (a carbon source) under the NWFP in the plan area, carbon stores would be predicted to

increase by 2106, from 427 to 596 million tonnes (USDI 2008). This flux is less than under a no-harvest scenario, but does represent a gain in carbon storage. U.S. annual $CO_2$ emissions are over 6 billion MG (EPA 2010). The flux of carbon associated with the proposed action (over 50 years) would represent 0.00024 percent of this yearly flux. The difference in carbon storage in 50 years between alternatives would be too small to lead to a detectable change in global carbon storage, and existing climate models do not have sufficient precision to reflect the effects on climate from such a small fractional change in global carbon storage (USDI 2008). The federal government has not established thresholds for carbon flux related to individual actions. Predicted uncertainty associated with all estimates of carbon flux in this analysis would be high (approximately 30 percent (USDI 2008)).

It should be emphasized that, as in most non-empirical carbon modeling exercises, estimates of carbon flux are useful mostly for broad generalizations or comparisons, appropriate to convey relative sizes, but not very accurate for specific places and situations (Sharrow 2008). This analysis also does not address substitution (i.e., without change in global demand for wood products, the no action alternative would necessitate harvest in another location) resulting in a comparable (or larger) carbon flux.

This EA is tiered to the 1994 RMP FEIS, which considered carbon flux and climate change at the plan scale. The 1994 RMP FEIS considered carbon flux speculative and did not consider the indirect effects of carbon flux associated with the plan on aspects of the affected environment including wildlife, economies, human health, and other resources ((USDI 1994) Appendix V, p. 217). The 1994 RMP FEIS concluded that with implementation of any of the alternatives at the plan level, "the overall impact on the global atmospheric carbon dioxide balance would be much less than 0.01 percent of the total" ((USDI 1995), p. 4-1). The conclusions of the 1994 FEIS remain valid and applicable to the cumulative effects of the proposed action based on multiple factors. These factors are the small estimated permanent flux of carbon associated with the cumulative effects of the proposed action, the high uncertainty in any such estimate of carbon flux and other sources of greenhouse gases (GHGs), and the response of global climate to these GHGs.

## Recreation

Due to the checkerboard nature of public and private land ownerships, not all proposed harvest areas have legal road access for the public. Dispersed recreation opportunities include (but are not limited to) driving for pleasure, hiking, hunting, camping, bird watching, and vegetative gathering. There would be no change to the amount or quality of dispersed recreation opportunities within the action area. There are no developed recreation sites within the analysis area. BLM expects dispersed camping and hunting to continue at the present rate. The nearest developed recreation site is Vincent Creek Campground, approximately 2.3 miles to the northwest of the project area. Five thousand visitors utilized the Vincent Creek Campground in fiscal year 2012 for day use, restroom use, or camping.

The Big-Vincent project would not affect short-term dispersed recreation opportunities because the 1994 Proposed Resource Management Plan (PRMP) Environmental Impact Statement (EIS) determined that "timber harvest would not adversely affect either dispersed or existing developed recreation site opportunities under any of the alternatives" ((USDI 1994), p. 4-96). In addition, "proposed timber management actions under Alternatives C, D, E, and the PRMP would not adversely impact either dispersed or developed recreation opportunities within the short or long term" ((USDI 1994), p. 4-96). This is because "the planning areas extensive land base is more than adequate to satisfy the demand for dispersed picnicking, nature study, and wildlife viewing in undeveloped settings" ((USDI 1994), p. 4-100). This is applicable to all types of dispersed recreational pursuits within the action area.

## Components of the Aquatic Conservation Strategy (ACS)

There are four components to the Aquatic Conservation Strategy (ACS): Riparian Reserves (RR), key watersheds, watershed analysis and watershed restoration. A "fifth" component is the standards and guidelines for management activities located in the Coos Bay District RMP.

### Riparian Reserves (RR)

The Riparian Reserve widths within the analysis area are 2 site potential tree heights for fish bearing streams and 1 site potential tree height for perennial and intermittent streams. A site potential tree height in the Upper Smith River and Umpqua River-Sawyers Rapids 5$^{th}$ field watersheds is 200 feet, and 220 feet in the Lower Smith River 5$^{th}$ field watershed.

### Key Watersheds

Within the analysis area, a portion of the proposed action is located in the Upper Smith River, Wassen Creek and Paradise Creek Tier 1 Key Watersheds (**Table 2-9**). Tier 1 watersheds contribute directly to conservation of at-risk anadromous salmonids and resident fish species, and they have a high restoration potential as part of a watershed restoration program.

The proposed action does not increase the net road mileage in Key Watersheds.

The Western Oregon Transportation Management Plan includes the following guidance: "Only the full decommission and obliteration categories are appropriate to meet the Management Direction of a reduction or no net increase in the amount of roads within Key Watersheds" (USDI 2010 *Update*).

In the Wassen Creek Tier 1 Key Watershed, all of the new road construction (approximately 0.45 miles) would be fully decommissioned upon project completion; therefore, there would be no net increase in road mileage (**Table 2-9**).

In the Upper Smith River Tier 1 Key Watershed, all of the new road construction (approximately 0.38 miles) would fully decommission upon project completion, therefore there would be no net increase in road mileage. The full decommissioning of an additional two renovated roads would yield a net decrease in road mileage of approximately 0.23 miles for this watershed.

There would be no new road construction in the Paradise Creek Tier 1 Key Watershed.

### Watershed Analysis

Three watershed analyses cover the project area. They include the Middle Umpqua River Watershed Analysis (USDI 2004), the Oxbow Watershed Analysis (USDI 2002), and the Smith River Watershed Analysis (USDA and USDI 1997). The IDT has incorporated the silvicultural recommendations for the Riparian Reserves into the proposed action.

The Middle Umpqua River Watershed Analysis includes ACS and Density Management chapters that contain analyses of how density management and alder conversion may affect riparian functions. Table DM-1 in the Density Management chapter provides the riparian functions identified by FEMAT. These riparian functions are root strength provided stream bank stability, large wood delivery to streams, large wood delivery to riparian areas, leaf and particulate organic matter input to streams, water quality: temperature as affected by shade, riparian microclimate, water quality: sediment, and wildlife habitat. Table DM-1 also details the affected ACS objectives, and provides results of analysis for how they may be affected by potential no action, alder conversion, and density management prescriptions. The discussion below incorporates information from this watershed analysis.

In summary, the Middle Umpqua River Watershed Analysis recommends conducting active treatments within the Riparian Reserves to achieve ACS objectives. "Density management affords a means to do both active management (speed or assure attainment of late-successional stand attributes and large trees that are suitable for recruitment as large riparian/in-stream structures), and provide passive restoration through maintenance of continuous forest cover (thus assuring the benefits of root strength for streambank and hill slope stability, nutrient cycling, and shade). Density management treatments applied to younger stands are more effective at setting stands on a trajectory to become old-growth, at attaining large stem diameters, for developing wind firmness, and retaining deep crown depths than are late entries" ((USDI 2004) ACS chapter, p. 9). Relying solely on a passive restoration strategy can greatly delay attainment of some Riparian Reserve functions and perpetuate stand conditions associated with densely stocked plantations ((USDI 2004) Recommendations chapter, p. 24).

In addition to density management, the Middle Umpqua River watershed analysis team recommended conversion of alder-dominated sites to restore conifer where disturbed by past management. Alder's value for in-stream structure or terrestrial down wood habitat is short-term. The reasons are that alder is not decay resistant, and alder wood is comparatively weak, allowing it to more readily break under the force of high stream flows compared with Douglas-fir ((Niemiec *et al.* 1995), pp. 95-96). Alder conversion prescriptions, which include streamside buffers on both sides of the channel, would assure leaf litter delivery, stream temperature protection through shading, and water quality protection through sediment delivery prevention. Restoring a conifer component would meet future in-stream wood needs, provide a longer-term snag component, and restore tree species diversity and structural diversity which would benefit ultimate attainment of late-successional habitat.

## Watershed Restoration

Watershed restoration is a comprehensive, long-term program to restore watershed health and aquatic ecosystems, including the habitats supporting fish and other aquatic and riparian-dependent organisms. The Coos Bay RMP states the most important components of watershed restoration are control and prevention of road-related run-off and sediment production, restoring the condition of riparian vegetation, and restoring in-stream habitat complexity. Harvest in Riparian Reserves, road maintenance, renovation, improvement, decommissioning, and full decommissioning would accomplish watershed restoration. Watershed restoration would be accomplished by harvest in Riparian Reserves, road maintenance, renovation, improvement, decommissioning, and full decommissioning.

## Management Actions/Direction

The following is a list of management actions/directions within Riparian Reserves applicable to the proposed action:

### Roads Management

- Completing watershed analysis including appropriate geotechnical analysis prior to construction of new roads or landings in Riparian Reserves.
- Minimizing road and landing locations in Riparian Reserves.
- Preparing road design criteria, elements, and standards that govern construction.
- Preparing operation and maintenance criteria that govern construction.
- Minimizing disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow.
- Restricting sidecasting s necessary to prevent the introduction of sediment to streams.
- Reconstructing roads and associated drainage features that pose a substantial risk.
- Closing and stabilizing roads based on the ongoing and potential effects to the ACS objectives and considering short-term and long-term transportation needs.

### Timber Management

- Applying silvicultural practices for Riparian Reserves to control stocking, re-establish and manage stands, and acquire desired vegetation characteristics needed to attain ACS objectives.

## Existing Watershed Condition

The following acreages are approximate values based on GIS data.

### Upper Smith River 5th Field Watershed

- The BLM manages 56,515 acres out of 95,535 acres or 59 percent of the watershed (**Table 3-14**).
- Approximately 29,520 acres or 52 percent of the BLM-administered land in the watershed is in Riparian Reserves.
- The BLM controls 375 miles or 57 percent of all road miles in the watershed.
- Approximately 99 percent of the BLM forest in the watershed is greater than 21 years old. Stream flow increases following logging generally decrease over time and eventually disappear in about 20-30 years in western Oregon as maturing stands begin losing as much water to the atmosphere as the original forest (Adams and Ringer 1994).
- Small headwater streams that have intermittent or seasonal flow account for 78 percent of the stream miles in the watershed.
- Fish are present in roughly 22 percent of the stream miles in the watershed.

### Lower Smith River 5th Field Watershed

- The BLM manages 37,632 acres out of 140,763 acres or 27 percent of the watershed (**Table 3-14**).
- Approximately 19,443 acres or 52 percent of the BLM-administered land in the watershed is in Riparian Reserves.
- The BLM controls 235 miles or 35 percent of all road miles in the watershed.
- Approximately 97 percent of the BLM forest in the watershed is greater than or equal to 21 years old.
- Small headwater streams that have intermittent flow account for 74 percent of the stream miles in the watershed.
- Fish are present in roughly 16 percent of the stream miles in the watershed.

### Umpqua River-Sawyers Rapids 5th Field Watershed

- The BLM manages 22,950 acres out of 63,516 acres or 36 percent of the watershed (**Table 3-14**).
- Approximately 8,960 acres or 39 percent of the BLM-administered land in the watershed is in Riparian Reserves.
- The BLM controls 155 miles or 32 percent of all road miles in the watershed.
- Approximately 97 percent of the BLM forest in the watershed is greater than or equal to 21 years old.
- Small headwater streams that have intermittent flow account for 77 percent of the stream miles in the watershed.
- Fish are present in roughly 16 percent of the stream miles in the watershed.

See the Water Resources and Fisheries sections for more information about the existing conditions of the affected environment within the analysis area.

## Aquatic Conservation Strategy Objectives

The site scale for this analysis is the stream reaches within or adjacent to a proposed harvest unit or road activity. The watershed scale is the 5th field watershed.

The analysis below will group all harvest prescriptions (thinning and conversion) and refer to them as <u>harvest</u> unless otherwise noted.

### ACS Objective 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.*

#### ***Site Scale: Short- and Long-Term***

Several functions of the Riparian Reserves including stream bank stability, leaf and particulate organic matter input to the stream, shade, erosion control, and microclimate would be maintained at the site scale in the short-term and long-term via the network of no-treatment zones and upslope trees remaining after harvest.

Thinning in Riparian Reserves affords a means to do both active management to speed attainment of late-successional stand attributes and large trees that are suitable for recruitment as large riparian and in-stream structures. It also provides for passive restoration through maintenance of continuous forest cover, thus assuring the benefits of root strength for stream bank and hillslope stability, nutrient cycling, and shade. Moving forests in the Riparian Reserves outside the no-treatment zones into the understory reinitiation stage of stand development sooner would result in greater vegetative species diversity, multi-canopy structure, and larger average tree size.

Implementation of project design features would ensure maintenance of diverse habitat features. The BLM would reserve snags from cutting (PDF #19). Down logs in certain decay classes would remain on site (PDF #18). The BLM would reserve dominant conifers including remnant individual trees and groups of trees (PDFs #16-17). Reserved conifers and larger hardwoods in alder conversion units would provide species, spatial, and structural diversity.

The BLM would maintain the natural distribution of alder within the proposed harvest units even though alder conversion is proposed. Alder stands are naturally renewed and perpetuated on sites subject to disturbance such as slide tracks, channel migration zones, and floodplains and terraces. The proposed action excludes these areas from harvest and removes alder only from previously harvested upslope sites that once supported conifers.

#### ***5th Field Watershed Scale: Short- and Long-Term***

Functional riparian areas in the proposed harvest units are important to aquatic systems and wildlife at the site scale. Benefit to the distribution, diversity and complexity of landscape scale features is limited because the proposed project treats less than 5 percent of the acreage in the watersheds that contain the harvest units.

### ACS Objective 2

*Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.*

#### ***Site Scale: Short- and Long-Term***

The BLM can maintain connectivity between stream reaches and the adjacent uplands, but not the connectivity within and between watersheds. This is because private parcels surround the BLM lands in the analysis area, and the BLM does not manage entire streams from headwater to mouth. Forested BLM lands are typically higher in the watershed where streams are smaller and mostly characterized by intermittent or seasonal flow.

The BLM would maintain connectivity between the streams and adjacent uplands in the proposed harvest units in the short-term and long-term by the implementation of no-treatment zones along all streams (PDFs #10-11), retention of 60-133 trees per acre (TPA) in thinning units, and retention of upslope conifer and hardwood species in conversion units. Riparian-dependent organisms would continue to utilize habitats within the no-treatment zones, and the release of understory shrub and tree species upslope would provide, over time, habitat at several canopy levels.

Approximately 72 percent of the proposed new road miles are outside of the Riparian Reserves, and new roads do not cross any stream; therefore, routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species would remain open.

***5th Field Watershed Scale: Short- and Long-Term***

The BLM manages slightly over half of the watersheds that contain the proposed harvest units. Checkerboard federal parcels preclude the maintenance and restoration of connectivity within and between watersheds. Different management objectives and methods between agencies and private landowners also make it challenging to maintain and restore connectivity.

### ACS Objective 3

*Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.*

***Site Scale: Short-Term***

The BLM would maintain the physical integrity of the aquatic system at the site scale in the short-term. Buffers would prevent sediment delivery and protect bank stability (PDFs #10 and 11). Full log suspension would be required across all perennial stream channels (PDF #14). Furthermore, harvest and yarding operations would typically achieve full suspension over most intermittent streams due to terrain gradients. Harvest-related peak stream flow increases detrimental to bank and bottom configurations would not occur. New road construction would occur away from stream channels (PDF #76).

***Site Scale: Long-Term***

Large wood delivered to channels from the no-treatment zones and from the thinning and conversion areas would provide several restorative benefits to the aquatic system over the long-term. Large wood would facilitate sediment storage in headwater reaches and create low gradient depositional stream reaches with channels that are narrow, deep, and connected to the floodplain in the larger third-, fourth- and fifth-order channels. These areas would increase the availability and quality of spawning and rearing habitat, and decrease susceptibility to stream heating.

***5th Field Watershed Scale: Short- and Long-Term***

The proposed project would not affect the short-term physical integrity of the aquatic system inside or outside of the harvest units. Large wood recruitment over the long-term would benefit few stream reaches in the watersheds that contain the proposed harvest units. There are approximately 76 miles of intermittent and perennial channels within and immediately adjacent to the proposed harvest units versus roughly 3,699 miles of intermittent and perennial channels in the three 5th field watersheds.

### ACS Objective 4

*Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain in the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.*

***Site Scale: Short- and Long-Term***
The proposed action would maintain water quality necessary to support healthy riparian and aquatic ecosystems at the site scale in the short-term and long-term.

The proposed action would not measurably increase water temperatures, lead to more than negligible sediment delivery to streams, or result in the release of hazardous materials.

Thinning would not measurably increase water temperature because no-treatment zones would protect vegetation in the primary shade zone and portions of the secondary shade zone, and canopy closure provided by remaining upslope trees would provide shade during the less critical morning and afternoon hours. Cable yarding corridors would use natural openings as much as possible, and a majority of the corridors would cross intermittent streams that have discontinuous flow, or no flow, during the summer, when water temperature is a concern.

Alder conversion in the Riparian Reserves would not increase water temperatures because no-treatment zones would protect critical shade zones. Residual trees, shrubs, wood in and over the channels, and local topography would provide additional and sometimes redundant layers of shade.

Road renovation, improvement, decommissioning, maintenance, and construction would occur during the dry season (PDF #73). If haul occurs on gravel roads during the wet season, ditch line sediment control devices would capture road-generated sediment that has the potential to degrade aquatic habitats.

Refueling of gas or diesel-powered machinery would not occur in close proximity to stream channels (RMP p. D-3), and contractor requirements for spill prevention and containment and countermeasure plans would minimize the likelihood of contamination reaching a waterway.

***5th Field Watershed Scale: Short- and Long-Term***
Water quality would be maintained at the site scale and therefore at the watershed scale.

### ACS Objective 5

*Maintain and restore the sediment regime under which an aquatic ecosystem evolved. Elements of sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.*

***Site Scale: Short-Term***
Harvest activities would not accelerate mass soil movement or stream erosion at the site scale in the short-term. No-treatment zones (PDFs #10 and 11) would provide bank stability and sediment filtering, and partial cutting would maintain live roots that bind the soil. The roots of different trees in a stand intertwine, unlike the tree crowns, which are spatially distinct. Consequently, thinning does not kill all the roots in the discrete areas of soil below the cut trees ((Stout 1956) cited in (Oliver and Larson 1996)). Eis (1972) found that 45 percent of the selectively cut Douglas-fir in a stand were root grafted and half of the stumps were still alive 22 years after logging. Alder conversion units would contain comparatively fewer trees than thinning units post-harvest; however, these areas would have no-treatment zone buffers next to riparian areas (PDFs #10 and 11), and they would typically contain residual conifers and hardwoods.

New road construction on or near ridges and on stable benches away from streams (PDF #76), would not affect sediment input, storage, and transport in channels.

***Site Scale: Long-Term***
Thinning and alder conversion within Riparian Reserves, outside the no-treatment zones, would increase conifer growth rates in streamside areas that deliver wood to channels via windthrow, landslides, and debris flows. Delivering large, decay resistant wood to project area streams would maintain the local sediment regime over the coming decades and centuries. Small headwater streams can function as one of the dominant storage reservoirs for sediment in mountainous terrain given an adequate supply of in-stream wood (May and Gresswell 2004).

The proposed project would use renovation, improvement, decommissioning, and maintenance to improve road drainage and reduce sediment delivery to stream channels in the long-term. Removal of a limited number of existing culverts (5 intermittent, one perennial) that create a physical barrier to sediment transport would occur, as well as the restoration of natural stream channel dimension, pattern, and profile.

***5th Field Watershed Scale: Short- and Long-Term***
Activities implemented to improve road drainage and reduce sediment delivery at the site scale would provide limited benefit at larger scales. The BLM controls approximately 37 percent of the roads in the watersheds that contain the proposed harvest units; however, road activities would occur on relatively few road miles within these watersheds.

### ACS Objective 6
*Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetlands habitats and to retain patterns of sediment, nutrient, and wood routing (i.e., movement of woody debris through the aquatic system). The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.*

***Site Scale: Short- and Long-Term***
The proposed action would maintain in-stream flows sufficient to create and sustain site scale riparian and aquatic habitats in the short-term and long-term. The BLM would expect a small increase in flow resulting from harvest-related reductions in evapotranspiration and interception (but not measureable at the drainage (stream), subwatershed, and watershed scales), and thus this increase is inconsequential to channel morphology. The BLM would expect the vegetation remaining after harvest would utilize soil moisture that becomes available following harvest.

Construction of new roads would not affect the timing, magnitude, and duration of flows. This is because their preferential location on or near ridges and on stable benches (PDF #76), and their outsloped shape (RMP p. D-4) would have them drain to vegetated areas away from streams. Road renovation, improvement, decommissioning, and maintenance would improve road drainage and reduce the amount of water that roads direct to stream channels.

***5th Field Watershed Scale: Short- and Long-Term***
The proposed action would not create measureable change in the timing, magnitude, and duration of flows at the 5th field scale for at least three reasons. First, harvest would produce a small stream flow response, if any, and the ability of individual small catchments to affect downstream discharge decreases as small streams form increasingly larger drainage networks (Garbrecht 1991). Second, the temporal and spatial variability of precipitation and the variable timing of flows from drainages across the analysis area complicate change detection. Finally, inter-annual flow variability would be greater than the magnitude of any flow increase, and the size of any increase would be less than the 5-10 percent error associated with stream flow measurements (USDI 1992).

### ACS Objective 7

*Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.*

***Site Scale: Short- and Long-Term***

The proposed harvests would maintain the timing, variability, and duration of floodplain inundation at the site scale in the short-term. No-treatment zones (PDFs #10 and 11) and log suspension (PDFs #2, 4 and 14) during yarding eliminate the risk of stream bank soil compaction; therefore, infiltration rates and the capacity of floodplains to store water would remain unchanged.

The proposed harvests would restore the timing, variability, and duration of floodplain inundation at the site scale in the long-term. The proposed action alternative would ensure a long-term supply of large, durable wood to streams. Large wood in higher gradient reaches (4-20 percent) creates steps and flats that store relatively large volumes of sediment and near surface ground water. Over time, large wood would capture enough substrate in some lower gradient reaches to reconnect downcut channels with their floodplains and terraces and reestablish subsurface water storage capacity. Streams that have large amounts of deep gravel and well-connected terraces would typically have cooler water temperatures (IMST 2004). Alluvial gravels in floodplains store cold water from periods of high runoff and release the water gradually as flows recede in the summer ((Coutant 1999) cited in (IMST 2004)).

The proposed action would maintain the timing, variability, and duration of water table elevation in meadows and wetlands at the site scale in the short-term and long-term. There are no known open typical meadows within the proposed harvest units and pocket wetlands (< 1 acre) are scattered. Selective cutting of trees would produce a negligible change in the soil moisture of units containing these small wetlands. The proposed action does not include water diversions or well drilling, activities usually associated with lowering water tables.

***5th Field Watershed Scale: Short- and Long-Term***

The maintenance and restoration of the timing, variability, and duration of floodplain inundation along discrete stream reaches higher in the watershed would have limited benefit at the 5th field scale now or in the future. The BLM manages just over half of the watersheds that contain the proposed harvest units and the units account for less than 5 percent of the total 5th field watershed acreage. Large wood removal, road building, and channel straightening has greatly altered the morphology of the larger streams with larger floodplains located on private lands downstream of federal ownership.

### ACS Objective 8

*Maintain and restore the species composition and structural diversity of plant communities in riparian zones and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.*

***Site Scale: Short- and Long-Term***

The proposed project incorporates no-treatment zones (PDFs #10 and 11) and upslope leave trees to maintain the structural diversity of riparian plant communities and the associated benefits of these communities over the short-term and long-term.

No-treatment zones would protect bank stability, litter inputs and shade, and prevent harvest-related sediment delivery in riparian zones (i.e., "Those terrestrial areas where the vegetation complex and microclimate conditions are products of the combined presence and influence of perennial and/or intermittent water, associated high water tables, and soils that exhibit some wetness characteristics" ((USDI 1995), p. 93).

Studies indicate that the proposed 35-100 feet wide no-treatment zones capture much of the hardwood litter input potential in streamside alder stands generally 72+ feet tall. According to FEMAT ((1993), pp. V-26, V-27), the effectiveness of riparian floodplain forests to deliver leaf and other particulate organic matter declines at distances greater than approximately one-half a tree height away from the channel. In a study of source distances for coarse woody debris entering small streams (first- through third-order) in western Oregon and Washington, McDade and others (1990) found that more than 83 percent of hardwood pieces originated within 33 feet of the stream channel, and all hardwood pieces were delivered from within 82 feet of the channel. In a study of riparian litter inputs to streams in the central Oregon Coast Range, Hart (2006) reports that deciduous sites provided significantly more vertical litter inputs at the stream edge than coniferous sites, and that there was no indication that annual litter inputs were moving more than 16 feet down slope at ground level.

No-treatment zones that contain inner gorge areas, begin at the edge of the stream or floodplain, and extend upslope 35+ feet would provide adequate summer thermal regulation. Anderson *et al*. (2007) studied thinning of 30-70 year old stands in western Oregon and concluded that buffers of widths defined by significant topographic breaks or the transition from riparian to upland vegetation appear sufficient to mitigate the effects of upslope thinning on the microclimate above topographically constrained first- and second-order streams. The authors found that microclimate gradients in headwater riparian zones were strongest within 33 feet of the stream center, "a distinct area of stream influence within broader riparian areas."

Thinning and hardwood conversion in Riparian Reserves outside of the no-treatment zones would reduce competition mortality and decrease the number of smaller snags and down logs in the short-term. In the long-term, thinning and hardwood conversion would accelerate the development of large conifers and the recruitment of understory vegetation. Harvest would protect stand components that currently provide structural diversity such as minor tree species, snags, and down wood.

The proposed yarding corridors and new roads within the Riparian Reserves would not prevent riparian plant communities from benefitting streams. Proposed harvests would disperse relatively-narrow yarding corridors across harvest areas, and approximately 97 percent of new roads are greater than a half-site potential tree height distance from streams.

#### ***5th Field Watershed Scale: Short- and Long-Term***

Riparian Reserves consisting of no-treatment zones and upslope leave trees maintain a contiguous forest in the short-term and long-term. Thinned stands would have a lower number of understory trees and an understory that develops more rapidly than unthinned stands.

In the distant future (tens to hundreds of years), large woody debris delivered to the streams in the proposed units would deposit downstream via high flows and landslides. The water storage and sediment trapping ability of wood jams would benefit water quality and quantity.

### ACS Objective 9

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

#### ***Site Scale: Short- and Long-Term***

No-treatment zones would provide site scale refugia for riparian-dependent plants and animals in riparian zones, and selective cutting upslope in the Riparian Reserves and beyond would restore some habitat characteristics of an older forest sooner.

Chan and authors (2004) state, "Exclusion of timber harvest from Riparian Reserves has been assumed to maintain species diversity, ecosystem integrity and protection of ecosystem functions. The 'hands-off' assumption may have been valid in an ecological context when humans had little impact on disturbance regimes and ecological processes in forests. However, many of the forests designated as Riparian Reserves under the Northwest Forest Plan were previously managed for timber production and are characterized by relatively dense, uniform, 30-70 year old even-aged stands of Douglas-fir and western hemlock. These young stands are typically lacking in structural and biological diversity. Lack of complexity makes these stands poorly suited for supporting many riparian-dependent species, the northern spotted owl, and many other wildlife species (Carey 1995, Lindenmayer and Franklin 2002). A passive management option is to assume that over time young stands within Riparian Reserves would naturally develop desired characteristics and functions while forgoing timber harvest for commodity production. However, these stands typically remain in the stem-exclusion stage (Oliver and Larson 1996), and therefore depauperate of desired structural characteristics, for extended periods of time (potentially exceeding 100 years)."

Thinning would decrease the time that stands are in the stem exclusion stage thus moving the stands more rapidly into the understory reinitiation stage of development. Thinning in stands that have already entered the understory reinitiation stage would promote a more vigorous understory and allow plants with lower shade tolerance to maintain a better presence in the stand. Along with this successional progression is a more rapid attainment of average stand diameters of 20 inches and larger. This corresponds to a shift from secondary habitat to primary habitat conditions for several mammals and attainment of nesting conditions for several birds associated with late-successional forests (sources summarized by (Harris 1984), pp. 59-64 and displayed in Figures 5.11-5.13). Wildlife habitats associated with large diameter trees include eventual large diameter snags and large diameter down wood, prey substrates provided by large surface areas of coarse deep-fissured bark, deep canopies, large limbs and platforms, and cavities and other structures found in damaged or injured large trees (Neitro *et al.* 1985, Weikel and Hayes 1997).

Vegetation in the no-treatment zones and upslope areas within the Riparian Reserves would develop along a different trajectory depending on tree densities, and this would diversify plant and animal habitat. Pollack and Beechie (2014) simulated the growth of planted stands of 30- to 40-year old Douglas-fir in the Oregon Coast Range. They modelled the abundance of large diameter live trees, snags and down wood in unthinned (243 trees per acre (TPA) average), lightly thinned (162 TPA), moderately thinned (101 TPA), and heavily thinned (61 TPA) stands. The authors found that increased thinning levels resulted in (1) more open stands with a low number of very large overstory trees, (2) an understory that develops more rapidly, and (3) reduced large diameter dead wood production. Unthinned stands produce abundant large diameter deadwood but reduce the overstory tree and understory development. Existing near-stream forests in the proposed harvest units have developed under different trajectories and they have tree densities that range from heavily thinned to unthinned as defined above. No-treatment zones would maintain this near-stream habitat diversity. This would provide a diversity of live and dead wood loading to channels and near-stream environments. Forty-five percent or 14 of the proposed 31 harvest units would have post-thin tree densities essentially corresponding to the moderate thinning value in the study (i.e., 91 to 133 TPA proposed versus 101 TPA in the study). Pollack and Beechie (2014) suggest that there is no one ideal management regime, and light or moderate thinning may be an option that provides some increase in diameter growth of live trees while minimizing production losses of large diameter deadwood.

### ***5th Field Watershed Scale: Short- and Long-Term***

Density management thinning in Riparian Reserves with variable width no-treatment zones provides for a diversity of habitat to support well-distributed populations of plants and animals. Proposed harvests, however, would affect a relatively small portion of the Riparian Reserves. Approximately 52 percent of the BLM-administered acres in the watersheds containing the proposed harvest units are in Riparian Reserves, and the proposed project would harvest less than 10 percent of this acreage.

## Resources Not Analyzed in Detail

Due to the lack of concern by scoping respondents, adequacy of best management practices and policy and the limited intensity and scope of effects on the affected resource, the items below are excluded from comparative analysis as directed by CEQ regulations § 1500.0(b), 1500.2(b) and other sections. The BLM hereby incorporates by reference the analysis file pertaining to these conclusions.

### Air Quality

Smoke from prescribed fire burning of landing piles along road systems would contribute minor short-term increases in particulate matter in the air shed near the project area. With the prescribed fire activities in the region being conducted in compliance with the Oregon Smoke Management Plan, (OAR 629-43-043) burning activities are not expected to result in adverse effects over a widespread area. Based on guidance from the Oregon Smoke Management Plan, the BLM would only permit burning of slash when atmospheric conditions would allow for quick dissipation of smoke away from smoke sensitive receptor areas (local communities).

### Annual Yield, Low Flows and Forest Harvest

Reduced interception and reduced evapotranspiration following thinning with interspersed alder conversion and variable width no-treatment zones make site-scale (i.e., the stream reach draining a harvest unit) annual yield increases possible; however, any increases would be relatively small and short-lived, and not detectable at subwatershed and watershed scales. Reiter and Beschta (1995) state, "Where individual trees or small groups of trees are harvested, the remaining trees will generally use any increased soil moisture that becomes available following harvest. Because of such 'edge effects', partial cuts, light shelterwood cuts, and thinnings are expected to have little effect, if any, on annual water yields." Similarly, in a summary of water yield response to forest cutting outside the snow zone, Satterlund and Adams ((1992) pg. 253) found that "lesser or nonsignificant responses occur… where partial cutting systems remove only a small portion of the cover at any one time."

Regional research shows patch-cutting (similar to alder conversion) and harvest of individual trees produce considerably less increase in annual yield compared to clearcutting. Annual yield is defined as the total volume of surface flow computed for a water year (October 1$^{st}$ to September 30$^{th}$) expressed as a uniform depth of water over the contributing watershed. In western Oregon, patch-cutting 25 percent of a 250-acre drainage (H.J. Andrews Experimental Forest, western Oregon Cascades) produced an annual yield increase approximately one-half the size of that produced by clearcutting a 237-acre drainage (Harr 1976). Annual yield was increased 15 inches (from predicted) after 100 percent clearcutting, and increases averaged about 7.1 inches for the first five years following patch-cutting. Patch-cutting 30 percent of 169-acre drainage (Coyote Creek Experimental Watersheds, western Oregon Cascades) produced an annual yield increase approximately one-third the size of that produced by clearcutting 123-acre drainage (Harr *et al.* 1979). Annual yield during the first five years after clearcutting averaged 11.4 inches (from predicted), while annual yield following patch-cutting averaged 3.5 inches. By comparison, harvest of individual trees making up about 50 percent of the total basal area in the 171-acre Coyote Creek watershed produced an average annual yield increase of only 2.4 inches. In the Alsea Watershed Study in coastal Oregon, three patch-cuts, totaling 25 percent of a 750-acre drainage, with 50- to 100-foot buffers, produced an average annual yield increase one-seventh the size (2.8 inches versus 19.3 inches) of that produced by a severely burned, extensively clearcut 175-acre catchment without riparian buffers (Harr 1976).

Increased tree growth by remaining trees (and their uptake of nutrients and water) would limit the short-lived site-scale annual yield changes. Douglas-fir and western hemlock canopies respond quickly to thinning by stopping self-pruning of lower branches, expanding branch length, and growing longer and denser crowns (Chan *et al*. 2004). Chan and others (2004) note that canopy expansion and closure was evident 5 years after thinning in 40-70 year old headwater forests of western Oregon.

Small increases in site-scale low flows following harvest may benefit aquatic species during the summer if stream temperatures decline as water volumes increase. However, harvest-related low flow increases are generally short-lived, between 5-10 years, and the additional quantities of stream flow represent a small component of annual yield (Harr 1976, Reiter and Beschta 1995).

### Cultural Resources

A national programmatic agreement (PA) (USDI-SHPO 2012) signed by the BLM, specifies procedures for conducting field inventories to find cultural resource localities.

A statewide "protocol" agreement (USDI 1998) between the Oregon State Historic Preservation Office (SHPO) and the Oregon BLM implements the national programmatic agreement in the action area. Appendix D (USDI 1998) to the statewide protocol agreement covers field survey requirements for Oregon's Coast Range Mountains, including the action area; the protocol addressed the fact that numerous archaeological field surveys conducted prior to ground-disturbing actions have been ineffective in the Coast Range Mountains. Appendix D removes the requirement for surveys prior to ground-disturbing actions, and replaces it with field surveys in likely areas after completion of ground-disturbing actions (i.e., post-harvest), when soil visibility is at its maximum.

A national programmatic agreement (USDI-SHPO 2012), signed in March 2012, and amended in 2014 (USDI-SHPO 2014), stipulated that the development of new statewide protocols would occur within three years. The requirements and procedures for field survey as specified in Appendix D to the current protocol may change under a new agreement between Oregon SHPO and BLM, so future actions may not have the same cultural resource inventory requirements. As of the EA date of publication, the incorporation of post-harvest archaeological surveys would occur after timber harvests in the action areas.

The BLM conducted a Class I inventory (records check) for cultural resources in the project action area. The inventory evaluation of the proposed action area locations, and the occurrence of the two historic fires, indicate that intact prehistoric deposits are not present in this relatively steep-sided mountainous region between the Umpqua River corridor to the south and the Smith River to the north. Relatively flat ridge top terrain is located in the western portion of the action area, where destruction from the two major fires was less complete than in the steep-sloped central core area. These relatively flat ridges are generally isolated, and do not provide trail connection to the Umpqua or Smith River lowlands. Known prehistoric cultural sites exist on relatively flat ground along the Umpqua and Smith Rivers, but none has been located within, or near the action areas. The affected environment in the Big-Vincent units consists of low-probability landforms (i.e., hill, terrace, or slope) that were previously disturbed by timber harvest and subsequent replanting/seeding operations.

The BLM would suspend all activities near any objects or sites of possible cultural value such as historical or prehistoric ruins, fossils or artifacts, if found, and notify the Authorized Officer of the findings.

### Drinking Water Protection Areas

The water resources analysis area, the 6 subwatersheds that contain the proposed harvest units, does not drain to any Drinking Water Source Areas for Public Water Systems; therefore, the project would have no effect on drinking water.

### Environmental Justice

The BLM does not know of specific cultural activities by minority or low-income populations within the Big-Vincent project area. The BLM also does not know whether specific cultural activities occur in the action areas at proportionately greater rates by minority or low-income populations than the general population. This includes the relative geographic location and cultural, religious, employment, subsistence or recreational activities that may bring them to the action area. Thus, BLM concludes that no disproportionately high or adverse human health or environmental effects would occur to Native Americans and minority or low-income populations from implementing the project.

### Fire Regime Condition Class (FRCC)

A fire regime condition class (FRCC) is a classification of the amount of departure from the natural (historical) regime (Hann and Bunnell 2001, Hardy *et al.* 2001, Schmidt *et al.* 2002). The departure is measured in three classes and are based on low (FRCC 1), moderate (FRCC 2) and high (FRCC 3). Most of the analysis area shows a moderate degree of departure, and is FRCC 2. Mechanical treatments such as logging in conjunction with harvest fuel reduction treatments would assist in maintaining the same FRCC or help shift the analysis area towards a FRCC 1 condition.

### Forest Fuels

Under the proposed action, a short-term increase in surface fuels loadings would occur, escalating the risk of wildfire damage. Although the probability is low, there is a risk that fires could start where logging equipment is involved. However, local fire protection agencies regulate equipment operations, and implement and enforce operating restrictions as fire danger levels rise. In addition, project design features mitigate these potential hazards. Shortly after harvest activities are completed, the fuel continuity would be broken up and fuel loadings reduced with slash piling. This would eliminate heavy concentrations of fuels, but would leave sufficient amounts of woody material to contribute nutrients to the soil. Slash pile burning would occur during the time of the year when soils are saturated and fuel moistures are high and comply with the Oregon Smoke Management Plan.

### Hazardous Materials

Activities resulting from the Proposed Action would be subject to State of Oregon Administrative Rule No. 340-108, *Oil and Hazardous Materials Spills and Releases*. This specifies the reporting requirements, cleanup standards, and liability that attaches to a spill or release or threatened spill or release involving oil or hazardous substances. Normal contract administration would also include site monitoring for solid and hazardous waste. When needed, the BLM would apply the Coos Bay District Hazardous Materials Contingency Plan and Spill Plan for Riparian Operations if a release threatens to reach surface waters or is in excess of reportable quantities.

### Noxious Weeds

The BLM is required to develop a noxious weed assessment when it is determined that an action may introduce or spread noxious weeds, or when known habitat exists (USDI 2007) in the action area. The analysis file contains the completed Big-Vincent weed assessment. Project design features incorporate weed prevention measures identified in the assessment and not already applied on district lands as part of routine activities (USDI 1997) to minimize the introduction and/or spread of weeds into the action area.

### Port-Orford-cedar

The Big-Vincent analysis area is outside of the natural range of Port-Orford-cedar (*Chamaecyparis lawsoniana*). The BLM is not aware of Port-Orford-cedar within the management activity area or the analysis area. The answer to all three questions in the risk key provided in the 2004 Final Supplemental Environmental Impact Statement for Management of Port-Orford-Cedar in Southwest Oregon ((USDA and USDI 2004) pp 2-18) which gives direction for assessing risk and controlling the spread of *Phytophthora lateralis*, was ‘no’. Therefore, no POC management practices are required.

### Water Rights

The proposed project would have no measurable effect on water quality or quantity at points of diversion registered with the Oregon Water Resources Department (OWRD). The ORWD has in-stream water rights to support aquatic life on Vincent, Big, Halfway, and Weatherly Creeks. There is also an irrigation right near the mouth of Paradise Creek, and an irrigation right near the mouth of Wells Creek. The irrigation points of diversion are greater than 2 miles downstream of any proposed harvest unit. The amount and configuration of the proposed harvest would not produce a measurable flow response and project design features would prevent or minimize sediment delivery to stream reaches that are thousands of feet upstream of the registered points of diversion.

### Wildland Urban Interface (WUI)

The National Fire Plan addresses WUI criteria. The BLM would further evaluate harvest areas meeting the WUI criteria to determine the appropriate mitigating measures to protect and provide for public health and safety. Depending on site-specific conditions following harvest, the following project design features may be used adjacent to private land boundaries in WUI areas: pullback and removal of ladder and surface fuels and roadside hazardous fuels reduction.

## Unaffected Resources

None of the following critical elements of the human environment is located in the project area or within a distance affected by implementation of either alternative:

- Areas of Critical Environmental Concern (ACEC)
- Farmlands, Prime or Unique
- Flood Plains (as described in Executive Order 11988)
- Wild and Scenic Rivers

# Chapter 4 – References


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# Chapter 5 – List of Preparers

| | |
|---|---|
| Kyle Johnson | Project Lead/Forester |
| Heather Partipilo | Planning & Environmental Coordinator |
| Dave Shanley-Dillman | Wildlife Biologist |
| Jennifer Sperling | Botanist |
| Jennifer Feola | Fish Biologist |
| John Colby | Hydrologist |
| Greta Krost | Geologist |
| Bill Elam | Fuels/Fire |
| John Guetterman | GIS |
| Jay Flora | GIS |
| Jim Counts | Road Engineer |
| Casara Nichols | Noxious Weeds |
| Meredith Childs | Forester (Silvicultural) |
| Joanne Miller | Realty |

# Chapter 6 – List of Agencies and Persons Contacted

The BLM informed the public of the planned EA through the publication of the Coos Bay District planning update and a scoping notification on the District's web site.

The BLM directly notified the following public agencies and interested parties:

American Forest Resources Council
Association of O&C Counties
Cascadia Wildlands
Coast Range Association
Confederated Tribes of Coos, Lower Umpqua, and Siuslaw
Confederated Tribes of Grand Ronde Indians
Douglas County's Attorney
Douglas County Board of Commissioners
Douglas Timber Operators
Governor's Natural Resources Office
Klamath-Siskiyou Wildlands Center
Lane County Board of Commissioners
NOAA National Marine Fisheries Service
NW Environmental Defense Council
Oregon Department of Environmental Quality
Oregon Department of Fish and Wildlife
Oregon Department of Forestry
Oregon Division of State Lands
Oregon Water Resources Department
Oregon Wild
Private Citizens (numerous)
Rep. Peter Defazio
Roseburg Resources
Smith River Watershed Council
Umpqua Watersheds
U.S. Fish and Wildlife Service
All adjoining landowners within 0.5 miles (1 individual, 1 corporation)
All adjoining water rights permittees within 0.5 miles (1 state agency)

# Appendix A – Sample Tree Falling

## Background

The Code of Federal Regulations requires the BLM to sell timber on a tree cruise basis (43 CFR 5422.1) and to have an accurate appraisal at the time BLM offers the sale (43 CFR 5420.0-6). The BLM would sell the Big-Vincent projects as lump-sum timber sales. In a lump-sum sale, timber cruisers assess the standing timber and give it a specific value. This value becomes the BLM cruise estimate and is the minimum bid for the removal of the timber in the advertised sale. The winning bidder pays the exact amount of the winning bid to the BLM.

Conversely, the Forest Service in Western Oregon normally uses a log-scale sale process. The Forest Service does provide perspective purchasers an appraisal of the timber; however, purchasers make a bid on the average stumpage. Using the average stumpage bid by the purchaser, the Forest Service assesses and determines a final price of the scaled logs after cutting the trees (Howard and DeMars 1985).

The Forest Service does not use sample tree falling, because they do not need as accurate a cruise before the sale offer. However, the Forest Service has used validation falling in the past. The BLM needs a more accurate cruise to prepare the best appraisal for the minimum lump-sum bid price, before the sale advertisement.

It is in the public interest that the BLM maintains accurate and reliable timber cruises. The practice of sample tree falling maintains accurate and reliable timber cruises. Sample tree falling provides statistically reliable data available in no other way. It helps ensure the public receives fair market value for the timber sold as required by Congress through FLPMA.

## Other Cruise Methods

The BLM has frequently used visual timber cruises but this technique does not allow the BLM to check the accuracy of the final cruise. The pure ocular cruising method makes many assumptions about the trees undergoing measurement:

- The cruiser selects the correct form class/bark thickness ratio/volume equation.
- The cruiser accurately measures the tree height and diameter at breast height (DBH).
- The form of the tree and merchantable height fit the measured form class/volume equation.
- Tree defect is apparent by visible indicators.
- The cruiser assumes the correct amount of hidden defect and breakage.

Although cruisers can obtain form class and bark thickness by climbing the tree, the other estimated variables are subject to inherent measurement bias.

## Accuracy of Sample Tree Falling

Conducting sample tree falling removes the measurement bias inherent in making visual estimates. Through checking measurements directly by felling a sample tree, cruisers can make corrections to their estimates. This is because sample tree falling provides the direct measurement of form class, bark thickness, taper, defect, breakage, volume and value without bias. This is a statistically valid sampling methodology (Bell and Dilworth 1997 (Revised), Iles 2003, USDI 1989); cruisers select a portion of the cruise trees to cut, buck (cut-to-length) and scale. By felling a sample tree and substituting the scale of the tree for the cruise in the volume calculations, it eliminates the measurement bias created through ocular estimation. Cruisers can apply the measurements gained by felling, such as form class, bark thickness, and stump to DBH ratio, to the remaining standing trees and incorporate that information into district databases.

The BLM Manual Supplement Handbook 5310-1 states, “In addition to meeting sample error standards, the volume estimates of all 3P and variable plot methods must be checked by felling a portion of sample trees (USDI 1989). The following minimum number of sample trees must be felled, bucked, and scaled to minimize technique error through an on-site check of merchantable tree height, form class/bark thickness, defect deduction, and grade estimation.” Thinning in young stands (such as these) has 85-99 percent log recovery; therefore, cruisers need to fell only 10 percent of sample trees to minimize sampling variability and maintain a low sampling error.

Because of the statistically valid cruise design, cruisers can reliably extrapolate the sample results to the rest of the unit.

## Sample Tree Falling as a Connected Action

The BLM includes sample tree falling in the Big-Vincent EA as a project design feature and thus analysis of the proposed action includes the effects of sample tree felling. There is no CEQ requirement that a federal agency must issue a single decision for actions considered and analyzed in the same EA document. Sample tree felling is a ground-disturbing activity that must occur prior to the offering of a timber sale.

All of the proposed timber sales could proceed without sample tree falling. In addition, sample tree falling does not depend on the larger action (the timber sales) for its justification. Sample tree falling can proceed without taking other actions. The BLM might not choose to offer these sales. However, the volume tables gained from conducting sample tree falling could assist in the calculation of final cruise volumes in sales that occur within the same watershed and have similar stand characteristics.

Other sale preparation activities occur before a timber sale decision. These include tree marking, flagging of sale boundaries, surveying property lines and biological surveys. Unlike sample tree falling, these activities are not ground-disturbing and occur as part of routine timber sale preparation. Nor do these activities justify that a timber sale goes forward. The BLM has conducted many of these activities for a sale and the sale has never gone forward. Therefore, issuing a decision to conduct sample tree falling does not constitute a decision to offer a timber sale.

## Sample Tree Falling in the Late-Successional Reserves

The LSRA recommends the following: “Potential stands for commercial thinning have tree diameter distributions which can support a commercial harvest operation under market conditions. They are generally even-age, single canopy stands” ((USDA and USDI 1998), p. 80). LSR stands proposed for harvest in the Big-Vincent EA meet this definition.

The LSRA also describes density management:

“The purpose of commercial thinning is to maintain or improve growth rates and vigor, manipulate species composition, and spatial arrangement. This is accomplished primarily by reducing stand density. Where necessary, active recruitment of snags/CWD and planting of an understory of appropriate tree species can be done concurrently. This treatment will usually be implemented via an economical commercial harvest operation” ((USDA and USDI 1998), p. 80).

Proposed timber sales that do not occur would not preclude the BLM from cutting trees within the LSR. Other allowable non-commercial activities, such as habitat restoration, would occur: “Coarse wood and snags provide habitats for a large number of biotic species. ...Coarse wood may be obtained through the falling of trees. ...An assessment of current and potential future conditions of coarse wood and snag levels should be completed in order to determine the appropriate amount of management” (LSRA (USDA and USDI 1998), p. 89).

# Appendix B – Wildlife Timing Restrictions

## Northern Spotted Owls

Seasonal restrictions would limit noise-disrupting activities during the critical breeding season (March 1 to June 30). These restrictions apply to protect areas within 65 yards of suitable NSO habitat. However, protocol surveys are ongoing in all suitable habitats within 1.5 miles of all harvest units. If northern spotted owls did not use any of the adjacent stands, then restrictions would not apply in those project areas as per the protocol (USDI 2012 *revision*), provided the spot checks and renewal surveys are conducted as specified by the protocol. Since these overlap with marbled murrelet restrictions, this only extends the harvest season for the additional month of March.

## Marbled Murrelets

Seasonal restrictions would limit noise-disrupting activities during the critical breeding season (April 1 to August 5). These restrictions apply to protect areas within 110 yards of occupied or suitable murrelet habitat. From August 6 to September 15, daily timing restrictions would prohibit activities from occurring earlier than two hours after sunrise or occurring after two hours before sunset.

**Table B-1.** Seasonal restriction summary for proposed harvest units to avoid disturbance to northern spotted owl and marbled murrelet.

| EA Unit No. | Northern Spotted Owl | | Marbled Murrelet | | |
|---|---|---|---|---|---|
| | Unit Acres Within 65 Yards of Suitable Habitat | Seasonal/Timing Restrictions If NSO Present? | Unit Acres Within 110 Yards of: | | Seasonal/Timing Restrictions? |
| | | | Suitable Habitat | Occupied Site | |
| 1 | 9 | Yes | 18 | - | Yes |
| 2 | - | - | - | - | - |
| 3 | 19 | Yes | 35 | - | Yes |
| 4 | 6 | Yes | 10 | - | Yes |
| 5 | 11 | Yes | 21 | - | Yes |
| 6 | 5 | Yes | 10 | - | Yes |
| 7 | - | - | - | - | - |
| 8 | 13 | Yes | 21 | - | Yes |
| 9 | - | - | - | - | - |
| 10 | - | - | 18 | - | Yes |
| 11 | 9 | Yes | 17 | - | Yes |
| 12 | 26 | Yes | 47 | - | Yes |
| 13 | - | - | - | - | - |
| 14 | - | - | - | - | - |
| 15 | 10 | Yes | - | - | - |
| 16 | 3 | Yes | 7 | - | Yes |
| 17 | 23 | Yes | 40 | - | Yes |
| 18 | 12 | Yes | 25 | - | Yes |
| 19 | 14 | Yes | 3 | - | Yes |
| 20 | 4 | Yes | 7 | - | Yes |
| 21 | 8 | Yes | 12 | - | Yes |
| 22 | 14 | Yes | 21 | - | Yes |
| 23 | 4 | Yes | 10 | - | Yes |
| 24 | 11 | Yes | 18 | - | Yes |
| 25 | 10 | Yes | 10 | - | Yes |
| 26 | 4 | Yes | 7 | - | Yes |
| 27 | 15 | Yes | 26 | - | Yes |
| 28 | 14 | Yes | 22 | - | Yes |
| 29 | 7 | Yes | 11 | - | Yes |
| 30 | 4 | Yes | 7 | 2 | Yes |
| 31 | 4 | Yes | 6 | - | Yes |
| **Totals** | * | | * | **2** | |

* Total acres would not reflect an accurate number due to acreage overlap.

# Appendix C – Wildlife Survey & Manage Tracking Form

Coos Bay District BLM – Umpqua Field Office
**Project Name:** Big-Vincent EA
**Prepared by:** David Shanley-Dillman
**Date:** January 7, 2015
**Project Type:** Commercial Thinning, Density Management Thinning, and Hardwood Conversion
**Location:** T. 21 S., R. 7 W., Sec. 7 and 18. T. 21 S., R. 8 W., Sec. 1, 7, 9, 10, 11, 12, 13, 15, 16, 17, 19, 21, and 29. T. 21 S., R. 9 W., Sec. 1, 2, 3, 11, 12, 13, 14, 21, 23, 27, 29, and 32.
**S&M List Date:** 2011 Settlement Agreement

**Table C-1.** The Coos Bay District BLM compiled the wildlife species listed below from the 2011 Settlement Agreement List of Survey & Manage Species and Category Assignment Attachment 2 (USDI 2014). Species range and potential habitat were determined using the Interagency Special Status/Sensitive Species Program (ISSSSP) Species Fact Sheets (http://www.fs.fed.us/r6/sfpnw/issssp/). This includes species with pre-disturbance survey requirements (Category 'A' and 'C' species), whose known or suspected ranges include the Coos Bay District BLM.

| Species | Survey & Manage Category | Survey Triggers | | | Survey Results | | | Site Management |
|---|---|---|---|---|---|---|---|---|
| | | Within Range of Species? | Harvest Units Contain Suitable Habitat? | Habitat Disturbing? | Surveys Required? | Survey Dates | Sites Known or Found in Harvest Units? | |
| **VERTEBRATES** | | | | | | | | |
| *Arborimus longicaudus* (Oregon Red Tree Vole) | **C** | Yes | No | No | No | - | No | No |
| *Strix nebulosa* (Great Gray Owl) | **A** | Yes | No | No | No* | - | - | - |

* Pre-disturbance surveys for great gray owls are not required since there is no suitable nesting habitat within the project area (or within proximity of the project area) per the *Protocol for the Great Gray Owl within the range of the Northwest Forest Plan v3.0*, January 12, 2004 (Quintana-Coyer *et al.* 2004).

**Statement of Compliance:** The Coos Bay District BLM applied the 2011 Settlement Agreement Species List to the Big-Vincent project, completing pre-disturbance surveys, and management of known sites (Table C-1) required by Survey Protocols and Management Recommendations to comply with the *2001 Record of Decision and Standard and Guidelines for Amendments to the Survey & Manage, Protection Buffer, and other Mitigation Measure Standards and Guidelines*.

Pre-disturbance (botany) surveys were initiated in the fall of 2011 in the Big-Vincent project area, which is consistent with the IM OR-2014-037 Criteria 'A' (USDI 2014): Projects in which any Survey & Manage pre-disturbance survey has been initiated (defined as at least one occurrence of actual, in-the-field surveying undertaken according to applicable protocol) in reliance upon the Settlement Agreement on or before April 25, 2013.

_/s/________________________________________
David Shanley-Dillman, Wildlife Biologist
Umpqua Field Office, Coos Bay District BLM

_1/7/2015__________________________
Date

# Appendix D – Stand Exam Information

The BLM conducted stand exams to determine current stand conditions, with the results shown below. Additionally, Forest Vegetation Simulator (FVS) modeling (Dixon 2002) showed projected outcomes for 1-year post-thin, the no action alternative in 50 years (NA+50) and the proposed action in 50 years (PA+50).

**Table D-1.** Stand exam information. FVS structural classes are 2 = stem exclusion (SE), 3 = understory reinitiation (UR), 5 = old forest, single stratum (OS), 6 = old forest, multi-strata (OM) (Crookston and Stage 1999).

| EA Unit No. | Age | Basal Area (BA) | | Relative Density (RD) | | Trees Per Acre (TPA) | | Quadratic Mean Diameter (QMD) | | | | FVS Structural Class (Max) | | | Canopy Cover (CC) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Current | Post-thin | Current | Post-thin | Current | Post-thin | Current | Post-thin | NA +50 years | PA +50 years | Current | NA +50 years | PA +50 years | Current | Post-thin | NA +50 years | PA +50 years |
| **1** | 52 | 268 | 173 | 69 | 31 | 208 | 95 | 15.4 | 17.8 | 21.0 | 23.0 | 2=SE | 5=OS | **6=OM** | 81 | 47 | 77 | 65 |
| **2** | 45 | 280 | 139 | 72 | 30 | 215 | 82 | 15.5 | 17.7 | 20.8 | 25.7 | 2=SE | 5=OS | 5=OS | 81 | 50 | 77 | 67 |
| **3** | 53 | 244 | 139 | 59 | 28 | 167 | 85 | 16.8 | 19.8 | 23.4 | 26.5 | 2=SE | 5=OS | **6=OM** | 74 | 51 | 70 | 60 |
| **4** | 58 | 209 | 149 | 51 | 35 | 144 | 82 | 17.1 | 18.3 | 21.6 | 24.3 | 2=SE | 5=OS | **6=OM** | 52 | 52 | 49 | 44 |
| **5** | 56 | 214 | 155 | 52 | 31 | 138 | 74 | 17.2 | 19.6 | 23.2 | 27.0 | 3=UR | 6=OM | 6=OM | 55 | 42 | 53 | 45 |
| **6** | 52 | 195 | 131 | 49 | 29 | 155 | 91 | 15.9 | 18.0 | 21.2 | 23.2 | 2=SE | 6=OM | 6=OM | 60 | 58 | 57 | 48 |
| **7** | 42 | 246 | 139 | 68 | 30 | 273 | 133 | 13.0 | 14.3 | 16.9 | 18.6 | 2=SE | 5=OS | 5=OS | 75 | 47 | 71 | 61 |
| **8** | 51 | 262 | 139 | 66 | 26 | 204 | 91 | 15.6 | 17.2 | 20.4 | 23.9 | 2=SE | 5=OS | **6=OM** | 78 | 44 | 74 | 63 |
| **9** | 49 | 238 | 132 | 59 | 30 | 177 | 72 | 16.1 | 18.8 | 22.1 | 32.0 | 2=SE | 5=OS | **6=OM** | 75 | 51 | 72 | 61 |
| **10** | 49 | 280 | 137 | 68 | 30 | 183 | 63 | 16.9 | 20.1 | 23.7 | 27.6 | 2=SE | 5=OS | 5=OS | 77 | 46 | 73 | 62 |
| **11** | 50 | 247 | 149 | 58 | 30 | 156 | 75 | 18.0 | 20.0 | 23.4 | 31.9 | 2=SE | 5=OS | **6=OM** | 67 | 46 | 64 | 54 |
| **12** | 50 | 237 | 145 | 57 | 30 | 156 | 69 | 17.3 | 20.0 | 23.0 | 32.1 | 2=SE | 5=OS | **6=OM** | 68 | 43 | 64 | 55 |
| **13** | 48 | 214 | 159 | 51 | 30 | 124 | 66 | 17.8 | 21.3 | 25.1 | 27.2 | 2=SE | 5=OS | 5=OS | 65 | 49 | 62 | 52 |
| **14** | 50 | 261 | 143 | 63 | 30 | 167 | 60 | 17.0 | 21.0 | 24.4 | 27.7 | 2=SE | 5=OS | **6=OM** | 75 | 46 | 71 | 61 |
| **15** | 50 | 216 | 142 | 54 | 30 | 155 | 69 | 16.2 | 19.5 | 23.0 | 25.5 | 2=SE | 5=OS | **6=OM** | 71 | 48 | 68 | 58 |
| **16** | 51 | 192 | 137 | 50 | 30 | 194 | 120 | 14.9 | 15.6 | 19.0 | 23.9 | 2=SE | 6=OM | 6=OM | 81 | 54 | 77 | 65 |
| **17** | 44 | 271 | 112 | 73 | 25 | 268 | 112 | 13.6 | 13.7 | 15.9 | 21.9 | 2=SE | 5=OS | **6=OM** | 83 | 48 | 78 | 65 |
| **18** | 44 | 271 | 112 | 73 | 25 | 268 | 112 | 13.6 | 13.7 | 16.1 | 20.6 | 2=SE | 5=OS | **6=OM** | 83 | 48 | 78 | 67 |
| **19** | 46 | 259 | 132 | 66 | 30 | 205 | 81 | 15.2 | 17.3 | 20.5 | 22.0 | 2=SE | 5=OS | **6=OM** | 81 | 51 | 77 | 65 |
| **20** | **34** | 263 | 132 | 79 | 30 | 228 | 113 | 11.0 | 12.0 | 14.2 | 18.1 | 2=SE | 5=OS | **6=OM** | 84 | 54 | 80 | 68 |
| **21** | 46 | 259 | 132 | 66 | 30 | 205 | 81 | 15.2 | 17.3 | 20.5 | 22.0 | 2=SE | 5=OS | **6=OM** | 81 | 51 | 77 | 65 |
| **22** | 36 | 263 | 132 | 79 | 30 | 228 | 113 | 11.0 | 12.0 | 14.2 | 18.1 | 2=SE | 5=OS | **6=OM** | 84 | 54 | 80 | 66 |
| **23** | 46 | 259 | 132 | 66 | 30 | 205 | 81 | 15.2 | 17.3 | 20.5 | 22.0 | 2=SE | 5=OS | **6=OM** | 81 | 51 | 77 | 65 |
| **24** | 44 | 265 | 132 | 70 | 30 | 236 | 102 | 14.4 | 15.7 | 18.5 | 19.0 | 2=SE | 5=OS | 5=OS | 82 | 52 | 78 | 66 |
| **25** | 37 | 263 | 132 | 79 | 30 | 228 | 113 | 11.0 | 12.0 | 14.2 | 14.5 | 2=SE | 5=OS | 5=OS | 84 | 54 | 80 | 68 |
| **26** | **62** | 257 | 124 | 64 | 30 | 185 | 63 | 16.0 | 20.0 | 23.6 | 24.2 | 2=SE | 5=OS | **6=OM** | 78 | 46 | 74 | 63 |
| **27** | 44 | 265 | 132 | 70 | 30 | 236 | 102 | 14.4 | 15.7 | 17.9 | 19.0 | 2=SE | 5=OS | 5=OS | 82 | 52 | 78 | 68 |
| **28** | 43 | 265 | 132 | 70 | 30 | 236 | 102 | 14.4 | 15.7 | 18.1 | 21.7 | 2=SE | 5=OS | **6=OM** | 82 | 52 | 78 | 66 |
| **29** | 44 | 265 | 132 | 70 | 30 | 236 | 102 | 14.4 | 15.7 | 17.3 | 20.7 | 2=SE | 5=OS | **6=OM** | 82 | 52 | 78 | 68 |
| **30** | 46 | 259 | 132 | 66 | 30 | 205 | 81 | 15.2 | 17.3 | 21.0 | 22.9 | 2=SE | 5=OS | **6=OM** | 81 | 51 | 77 | 65 |
| **31** | 46 | 259 | 132 | 66 | 30 | 205 | 81 | 15.2 | 17.3 | 20.5 | 22.0 | 2=SE | 5=OS | **6=OM** | 81 | 51 | 77 | 63 |
| **Average** | **47.4** | **250** | **137** | **65** | **30** | **200** | **89** | **15** | **17.2** | **20.2** | **23.5** | **2-SE** | **5=OS** | **6-OM** | **76** | **50** | **72** | **62** |

* Data was not available. Comparable stand data used.

# Appendix E – Botany Special Status Species

**Table E-1.** The following list of botany Special Status Species have the possibility of occurring within the Big-Vincent analysis area. The BLM reviewed District occurrence potential for each Special Status Species and rated each as low (0 sites), moderate (1-9 sites), or high (10+ sites). For species with known sites nearby the project area, the occurrence likelihood would increase; and for species with sites away from the project areas and primarily coastal zone in nature, the likelihood would decrease.

| Group/Species | Documented (D) or Suspected (S) on Coos Bay District BLM | No. of Sites in Project Area | Likelihood in Project Area | Reason |
|---|---|---|---|---|
| VASCULAR PLANTS | | | | |
| **Ferns** | | | | |
| *Adiantum jordanii* | S | | Low | No sites on district. |
| *Pellaea andromedifolia* | D | - | Low | Preferred habitat is scarce in project areas. |
| *Polystichum californicum* | S | | Low | No sites on district. |
| **Forbs** | | | | |
| *Erigeron cervinus* | S | | Low | No sites on district. |
| *Eucephalus vialis* | S | | Low | No sites on district. |
| *Iliamna latibracteata* | S | | Low | No sites on district. |
| *Romanzoffia thompsonii* | D | - | Low | Preferred habitat is scarce in project areas. |
| *Sidalcea hendersonii* | D | - | Low | Preferred habitat is scarce in project areas. |
| *Sidalcea malviflora* ssp. *patula* | S | | Low | No sites on district. |
| *Trillium kurabayashii* (= *T. angustipetalum*) | S | | Low | No sites on district. |
| **Rushes** | | | | |
| *Scirpus pendulus* | S | | Low | No sites on district. |
| NON VASCULAR PLANTS | | | | |
| **Bryophytes (Hornworts)** | | | | |
| *Phymatoceros phymatoides* | D | - | **Moderate** | **Several known sites in the analysis area, approximately 2 miles SSE of EA Unit 1.** |
| **Bryophytes (Liverworts)** | | | | |
| *Cryptomitrium tenerum* | S | | Low | No sites on district. |
| *Metzgeria violacea* | D | - | Low | Hyper-maritime, ranges up to 14 miles from coastline. |
| *Porella bolanderi* | S | | Low | No sites on district. |
| **Bryophytes (Mosses)** | | | | |
| *Codriophorus depressus* (= *Racomitrium depressum*) | S | | Low | Few legacy trees in area, and most are fire scarred with few lichens or bryophytes present. |
| *Schistostega pennata* | S | | Low | No sites on district. |
| *Tetraphis geniculata* | S | | Low | No sites on district. |
| **Lichens** | | | | |
| *Bryoria subcana* | D | - | **Moderate-High** | Several sites on district; prefers ridgelines. |
| *Calicium adspersum* | S | | Low | Few legacy trees in project area, and most are fire scarred with few lichens or bryophytes present. |
| *Heterodermia leucomela* | D | - | Low | All sites on district exist along the immediate coastline. |
| *Leptogium cyanescens* | S | | Low | No sites on district. |
| *Lobaria linita* | S | | Low | Preferred habitat is scarce in project area. |
| *Niebla cephalota* | D | - | Low | All sites on district exist along the immediate coastline. |
| *Hypotrachyna revoluta* | D | 2 | **High** | **Known sites in the project area.** |
| NON VASCULAR PLANTS (Not Practical) | | | | |
| **Fungi** | | | | |
| *Albatrellus avellaneous* | S | | Low | Known sites near Shore Acres/Cape Arago area. |
| *Arcangeliella camphorata* | D | - | Moderate | Three sites on district. |
| *Boletus pulcherrimus* | S | | Low | No sites on district. |
| *Cortinarius barlowensis* (=*C. azureus*) | S | | Low | No sites on district. |
| *Phaeocollybia californica* | D | 1 | **High** | Nine sites on district. **Known site in the project area.** |
| *Phaeocollybia gregaria* | S | | Low | No sites on district. |
| *Phaeocollybia oregonensis* | D | - | Moderate | Three sites on district. |
| *Ramaria spinulosa* var. *diminutive* | S | | Low | No sites on district. |
| *Rhizopogon exiguous* | S | | Low | No sites on district. |
| *Thaxterogaster pavelekii* | S | | Low | No sites on district. |

# Appendix F – Botany Survey & Manage Tracking Form

Coos Bay District BLM – Umpqua Field Office
**Project Name:** Big-Vincent EA
**Prepared by:** Jennifer Sperling
**Date:** January 7, 2015
**Project Type:** Hardwood Conversion
**Location:** T. 21 S., R. 7 W., Sec. 7 and 18. T. 21 S., R. 8 W., Sec. 1, 7, 9, 10, 11, 12, 13, 15, 16, 17, 19, 21, and 29. T. 21 S., R. 9 W., Sec. 1, 2, 3, 11, 12, 13, 14, 21, 23, 27, 29, and 32.
**S&M List Date:** 2011 Settlement Agreement

**Table F-1.** The Coos Bay District BLM compiled the species listed below from the 2011 Settlement Agreement List of Survey & Manage Species and Category Assignment Attachment 2 (USDI 2014). This includes those vascular and non-vascular species with pre-disturbance survey requirements (Category **A** and **C** species), whose known or suspected ranges include the Coos Bay District BLM according to *Survey Protocols for Survey & Manage Component 2 Bryophytes, Version 2.0* (USDA and USDI 1997), *Survey Protocols for Seven Protection Buffer Fungi, Version 1.3* (USDA and USDI 1999), *Survey Protocols for Component 2 Lichens, Version 2.0* (USDA and USDI 1998), and BLM Conservation Assessments. Species range and potential habitat were determined using the Interagency Special Status/Sensitive Species Program (ISSSSP) Species Fact Sheets (http://www.fs.fed.us/r6/sfpnw/isssssp/). This list includes Category B and E species with known sites located in hardwood conversion units.

| Species | Survey & Manage Category | Survey Triggers | | | Survey Results | | | Site Management |
|---|---|---|---|---|---|---|---|---|
| | | Within Range of Species? | Project Contains Suitable Habitat? | Habitat Disturbing? | Surveys Required? | Survey Dates | Sites Known or Found? | |
| Suspected, Not Found | | | | | | | | |
| **BRYOPHYTES** | | | | | | | | |
| *Schistostega pennata* | **A** | Yes | Yes | Yes | Yes | Ongoing | - | - |
| *Tetraphis geniculata* | **A** | Yes | Yes | Yes | Yes | Ongoing | - | - |
| **LICHENS** | | | | | | | | |
| *Cladonia norvegica* | **C** | Yes | Yes | Yes | Yes | Ongoing | - | - |
| *Hypogymnia duplicata* | **C** | Yes | Yes | Yes | Yes | Ongoing | - | - |
| *Leptogium cyanescens* | **A** | Yes | Yes | Yes | Yes | Ongoing | - | - |
| *Lobaria linita* | **A** | Yes | Yes | Yes | Yes | Ongoing | - | - |
| *Pseudocyphellaria perpetua* | **A** | Yes | Yes | Yes | Yes | Ongoing | - | - |
| *Pseudocyphellaria rainierensis* | **A** | Yes | Yes | Yes | Yes | Ongoing | - | - |
| **FORBS** | | | | | | | | |
| *Eucephalis vialis* | **A** | Yes | Yes | Yes | Yes | Ongoing | - | - |
| Found in Hardwood Conversion Unit | | | | | | | | |
| **LICHENS** | | | | | | | | |
| *Cetrelia cetrarioides* | E | Yes | Yes | Yes | No | 06-2014 | Yes | **Yes** |
| *Chaenotheca chrysocephala* | B | Yes | Yes | Yes | No | 06-2014 | Yes | **Yes** |
| *Chaenotheca ferruginea* | B | Yes | Yes | Yes | No | 06-2014 | Yes | **Yes** |
| *Stenocybe clavata* | E | Yes | Yes | Yes | No | 12-2014 | Yes | **Yes** |

A = Manage all known sites, pre-disturbance surveys practical.
B = Manage all known sites, pre-disturbance surveys not practical and not applicable.
C = Manage high-priority sites, pre-disturbance surveys practical.
D = Manage high-priority sites, pre-disturbance surveys not practical.
E = Manage all known sites, pre-disturbance surveys not applicable.
F = Known site management and pre-disturbance surveys not applicable.

**Statement of Compliance:** The Coos Bay District BLM applied the 2011 Settlement Agreement Species List to the Big-Vincent project, completing pre-disturbance surveys, and management of known sites (**Table F-1**) required by Survey Protocols and Management Recommendations to comply with the *2001 Record of Decision and Standard and Guidelines for Amendments to the Survey & Manage, Protection Buffer, and other Mitigation Measure Standards and Guidelines*.

Pre-disturbance surveys were initiated in the fall of 2011 in the Big-Vincent hardwood conversion units, which is consistent with the IM OR-2014-037 Criteria 'A' (USDI 2014): Projects in which any Survey & Manage pre-disturbance survey has been initiated (defined as at least one occurrence of actual, in-the-field surveying undertaken according to applicable protocol) in reliance upon the Settlement Agreement on or before April 25, 2013.

Project surveys did not discover any sites for Survey & Manage botany species in Categories 'A' or 'C'.

Known sites are present within proposed hardwood conversion units for four species:

Category **B** Lichen (*Chaenotheca chrysocephala*): June 2014 pre-disturbance surveys located one site in EA Unit 1. Management of the species habitat would occur through the delineation of a no-treatment zone based on the Coos Bay District BLM buffer protocol (Brian *et al.* 2002).

Category **B** Lichen (*Chaenotheca ferruginea*): June 2014 pre-disturbance surveys located one site in EA Unit 1. Management of the species habitat would occur through the delineation of a no-treatment zone based on the Coos Bay District BLM buffer protocol (Brian *et al.* 2002).

Category **E** Lichen (*Cetrelia cetrarioides*): June 2014 pre-disturbance surveys located one site in EA Unit 1. Management of the species habitat would occur through the delineation of a no-treatment zone based on the Coos Bay District BLM buffer protocol (Brian *et al.* 2002).

Category **E** Lichen (*Stenocybe clavata*): December 2014 pre-disturbance surveys located one site in EA Unit 1. Management of the species habitat would occur through the delineation of a no-treatment zone based on the Coos Bay District BLM buffer protocol (Brian *et al.* 2002).

| | |
|---|---|
| _/s/___________________________________ | _1/7/2015_________________________ |
| Jennifer Sperling, Botanist | Date |
| Umpqua Field Office, Coos Bay District BLM | |

# Appendix G – Snags Current Condition

**Table G-1.** Snag density current condition for Big-Vincent harvest units.

| EA Unit No. | Land Use Allocation | Snags Per Acre | | | | |
|---|---|---|---|---|---|---|
| | | 12” - 15” DBH | 16” - 19” DBH | 20” - 23” DBH | ≥ 24” DBH | Totals* (All sizes) |
| 1 | LSR | 0.6 | - | 0.6 | - | 1.2 |
| 2 | LSR | - | - | - | - | - |
| 3 | GFMA | 4 | 1.4 | - | 1.9 | 7.3 |
| 4 | LSR | 4.8 | - | - | - | 4.8 |
| 5 | LSR | 4.3 | 1.1 | 1.5 | 0.3 | 7.2 |
| 6 | LSR | 11.2 | - | 1.3 | 0.6 | 13.1 |
| 7 | GFMA | - | - | 1.3 | - | 1.3 |
| 8 | GFMA/LSR | - | 3.8 | - | - | 3.8 |
| 9 | GFMA | 4.3 | 5.7 | - | 0.2 | 10.2 |
| 10 | GFMA | - | 0.5 | - | 1.2 | 1.7 |
| 11 | GFMA | 4.8 | - | - | 1.3 | 6.1 |
| 12 | GFMA | 3.7 | - | - | 0.6 | 4.3 |
| 13 | C/D | - | 3.2 | - | - | 3.2 |
| 14 | GFMA | - | - | - | - | - |
| 15 | GFMA | - | 0.5 | - | 0.7 | 1.2 |
| 16 | GFMA/LSR | 1.6 | 0.4 | 0.8 | 0.7 | 3.5 |
| 17 | LSR | 1.9 | 0.6 | - | - | 2.5 |
| 18 | LSR | - | - | - | - | - |
| 19 | LSR | 2.7 | - | - | - | 2.7 |
| 20 | LSR | - | - | - | - | - |
| 21 | LSR | 2.7 | - | - | - | 2.7 |
| 22 | LSR | - | - | - | - | - |
| 23 | LSR | - | - | - | - | - |
| 24 | LSR | - | - | - | - | - |
| 25 | LSR | - | - | - | - | - |
| 26 | LSR | - | - | - | - | - |
| 27 | LSR | 3.5 | - | 1.3 | - | 4.8 |
| 28 | LSR | 7.1 | - | - | - | 7.1 |
| 29 | LSR | 3.5 | - | 1.3 | - | 4.8 |
| 30 | LSR | - | - | - | - | - |
| 31 | LSR | - | - | - | - | - |
| **Average** | **-** | **4.0** | **0.6** | **0.3** | **0.2** | **3.0** |

Source: Stand exam data.
***** Totals may include slight inconsistencies due to rounding.

# Appendix H – Down Wood Current Condition

**Table H-1.** Down wood current condition summary for Big-Vincent harvest units.

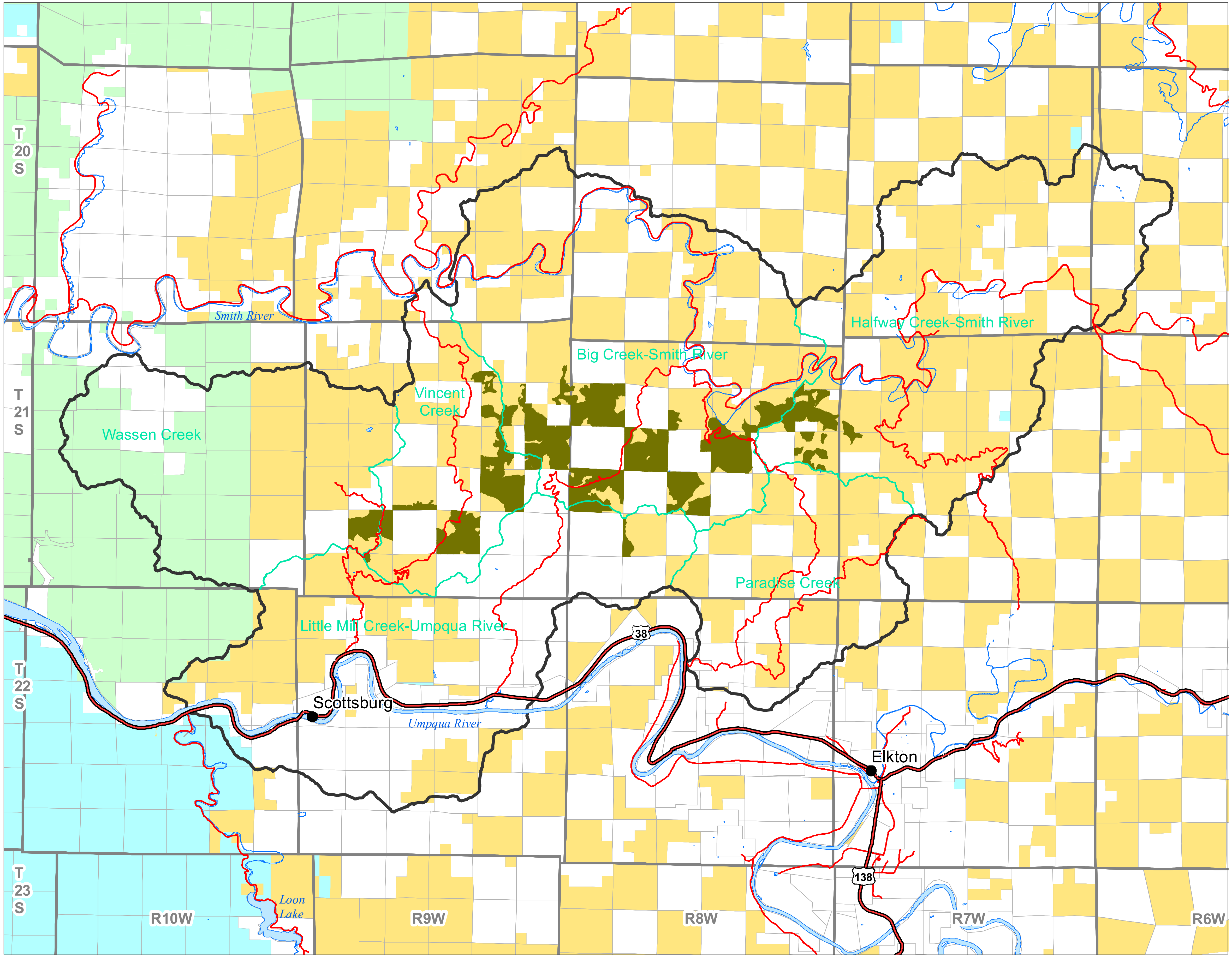
| EA Unit No. | Land Use Allocation | Down wood total length (feet/acre) (Diameter >16" large end) | | | | |
|---|---|---|---|---|---|---|
| | | Decay Class 1 | Decay Class 2 | Decay Class 3 | Decay Class 4 | Decay Class 5 |
| 1 | LSR | 50.7 | 25.3 | 50.7 | 329.5 | 202.8 |
| 2 | LSR | - | - | - | 444.3 | 159.2 |
| 3 | GFMA | - | 136.8 | - | 856.8 | 615.7 |
| 4 | LSR | - | - | 76.0 | 228.0 | 76.0 |
| 5 | LSR | - | - | - | - | - |
| 6 | LSR | - | 48.9 | 76.0 | 999.1 | 586.6 |
| 7 | GFMA | 57.0 | 154.7 | - | 114.0 | 97.7 |
| 8 | GFMA/LSR | 136.8 | 136.8 | 136.8 | - | 136.8 |
| 9 | GFMA | 221.0 | 294.7 | 929.0 | 1,445.2 | 998.1 |
| 10 | GFMA | - | - | - | 537.7 | 48.9 |
| 11 | GFMA | 34.2 | - | 136.8 | 1,607.7 | 313.5 |
| 12 | GFMA | - | - | 45.6 | 605.9 | 2,143.7 |
| 13 | C/D | - | - | - | 76.0 | 266.0 |
| 14 | GFMA | - | - | 342.0 | 342.0 | - |
| 15 | GFMA | - | - | 118.5 | 1,106.5 | 1,004.8 |
| 16 | GFMA/LSR | 194.4 | 124.4 | 414.8 | 1,252.2 | 277.0 |
| 17 | LSR | 52.3 | 52.3 | 97.8 | 153.5 | 238.4 |
| 18 | LSR | - | 171.1 | 97.7 | 195.4 | 97.7 |
| 19 | LSR | 37.2 | - | 82.9 | 848.9 | - |
| 20 | LSR | - | - | - | 228.0 | 228.0 |
| 21 | LSR | 37.2 | - | 82.9 | 848.9 | - |
| 22 | LSR | - | - | - | 293.2 | 239.2 |
| 23 | LSR | - | - | - | 342.1 | 1,368.5 |
| 24 | LSR | - | - | - | 456.1 | 228.0 |
| 25 | LSR | - | - | - | 798.3 | 1,596.6 |
| 26 | LSR | - | - | - | 684.2 | - |
| 27 | LSR | - | 57.0 | - | 114.0 | 171.0 |
| 28 | LSR | - | - | - | 136.8 | 136.8 |
| 29 | LSR | - | 57.0 | - | 114.0 | 171.0 |
| 30 | LSR | - | - | - | 1,163.1 | 855.1 |
| 31 | LSR | - | 171.1 | - | 684.4 | 171.1 |

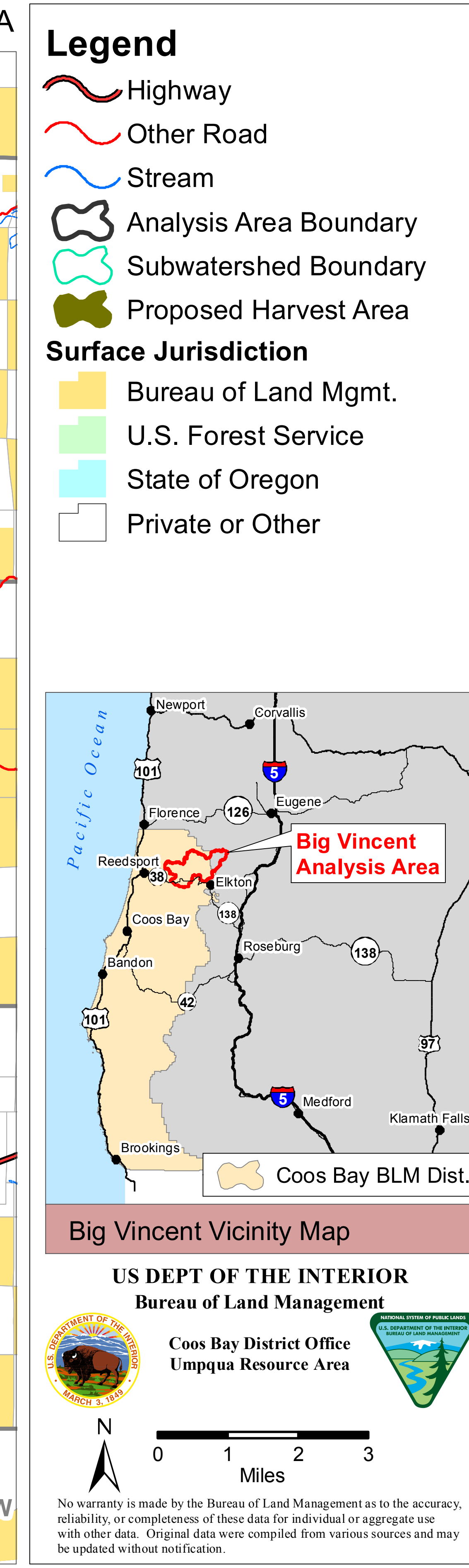
Source: Forest operations inventory (FOI) survey data (2002-2012).

# Appendix I – Maps

**Map 1: Vicinity Map - Big-Vincent Project EA**

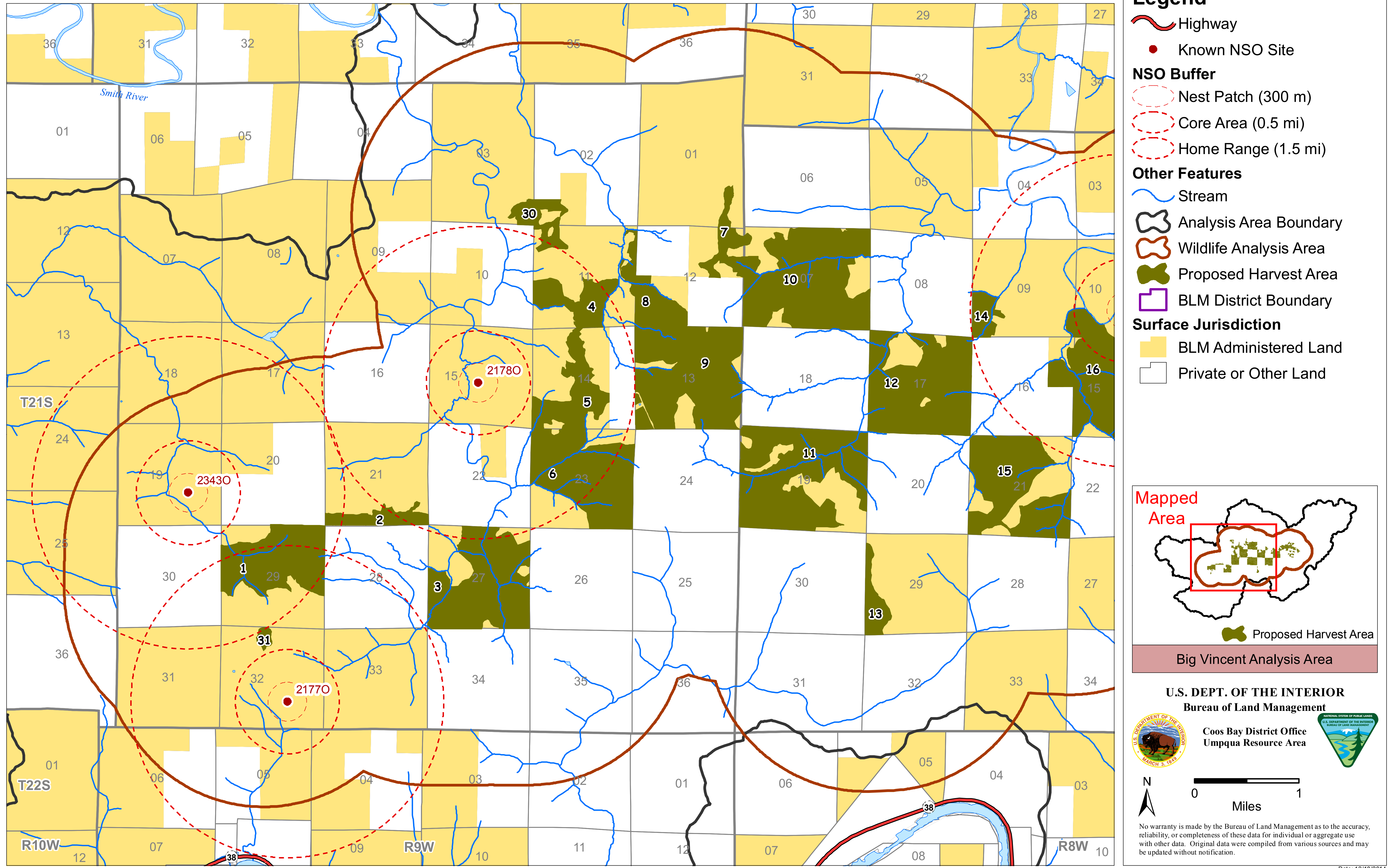
DOI-BLM-OR-CO30-2011-0003-EA



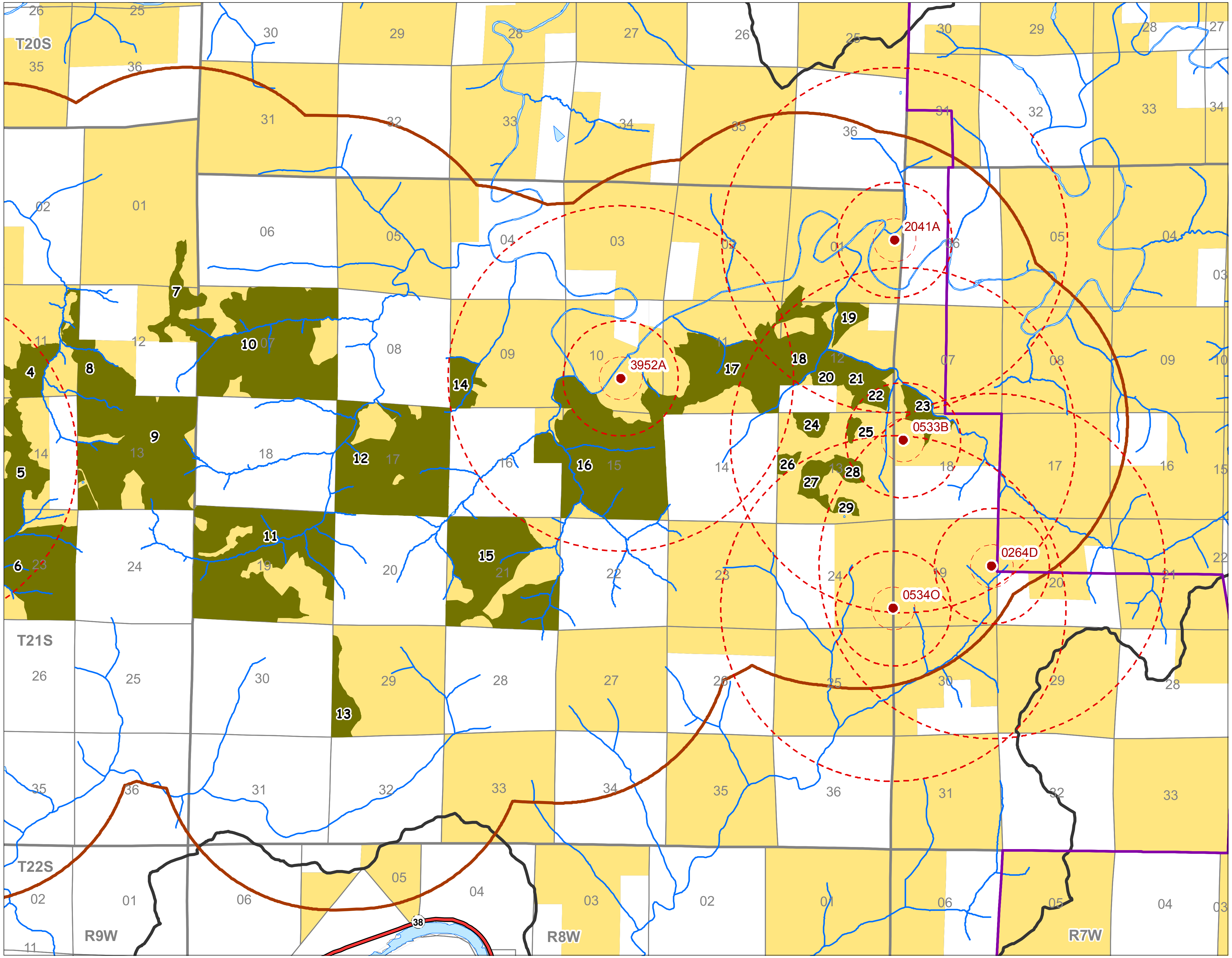
## Map 2a: Big-Vincent Wildlife Analysis Area and NSO Buffers (West)

DOI-BLM-OR-CO30-2011-0003-EA



## Map 2b: Big-Vincent Wildlife Analysis Area and NSO Buffers (East)

DOI-BLM-OR-CO30-2011-0003-EA




## Legend

- Highway
- Known NSO Site

**NSO Buffer**

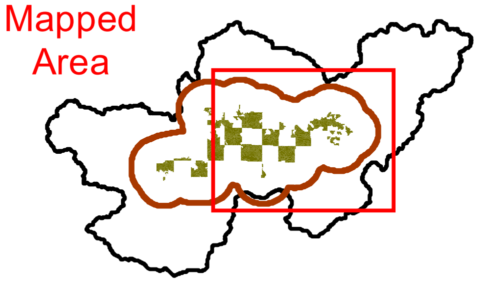
- Nest Patch (300 m)
- Core Area (0.5 mi)
- Home Range (1.5 mi)

**Other Features**

- Stream
- Analysis Area Boundary
- Wildlife Analysis Area
- Proposed Harvest Area
- BLM District Boundary

**Surface Jurisdiction**

- BLM Administered Land
- Private or Other Lands




Big Vincent Analysis Area

U.S. DEPT. OF THE INTERIOR
Bureau of Land Management

Coos Bay District Office
Umpqua Resource Area

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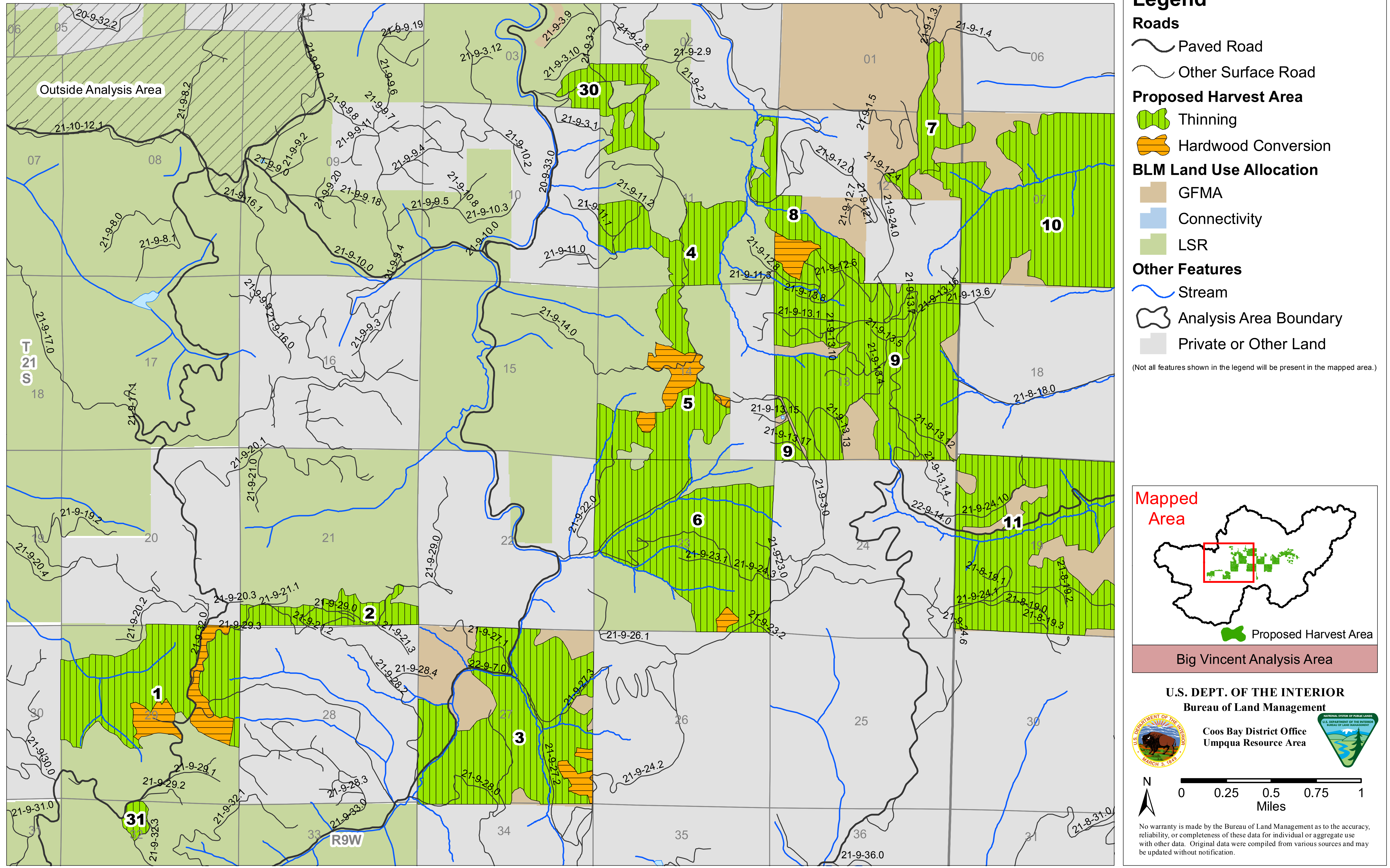
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources and may be updated without notification.

Date: 12/18/2014

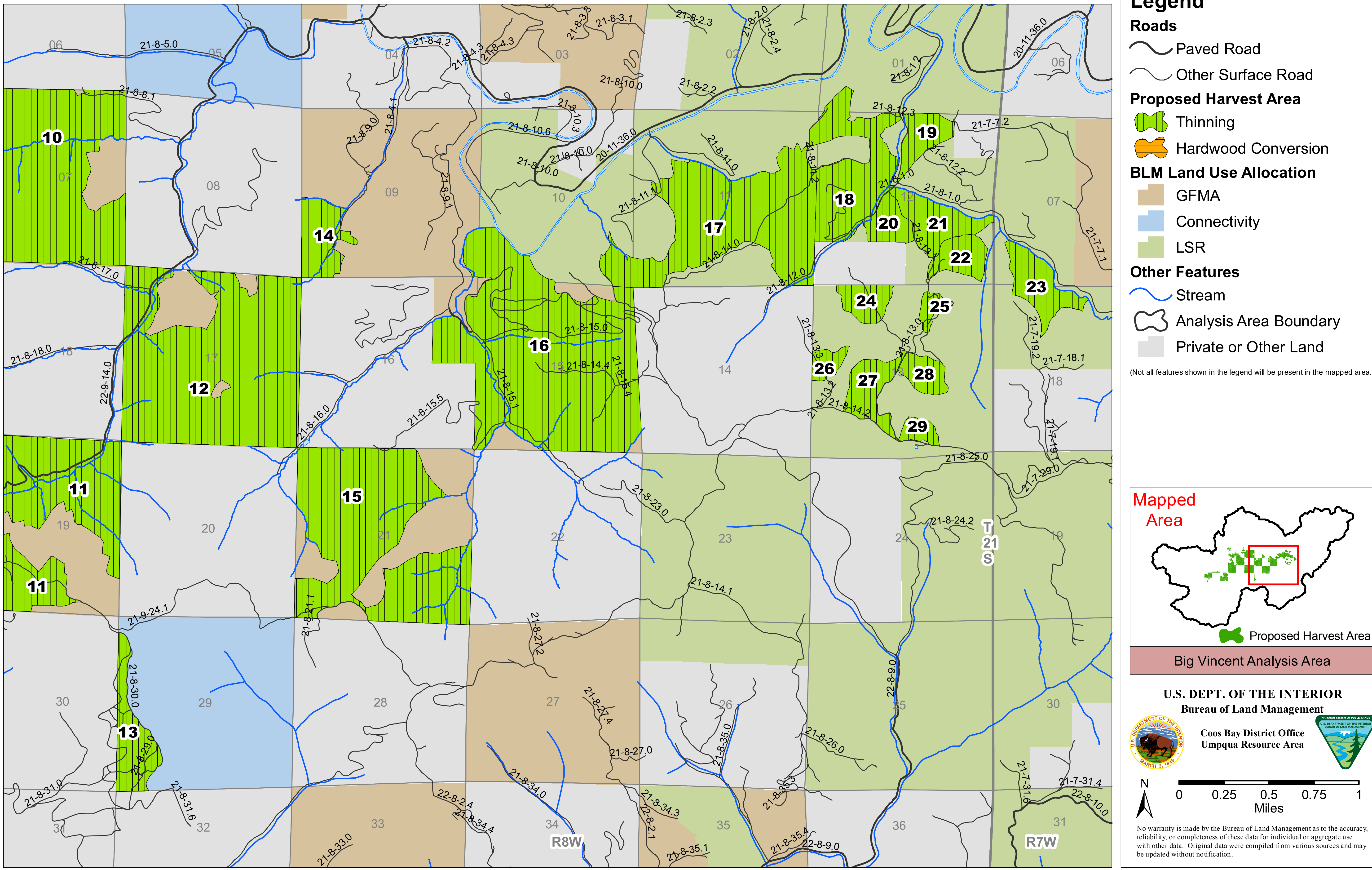
**Map 3a: Big-Vincent Treatment Units (West)**

DOI-BLM-OR-CO30-2011-0003-EA



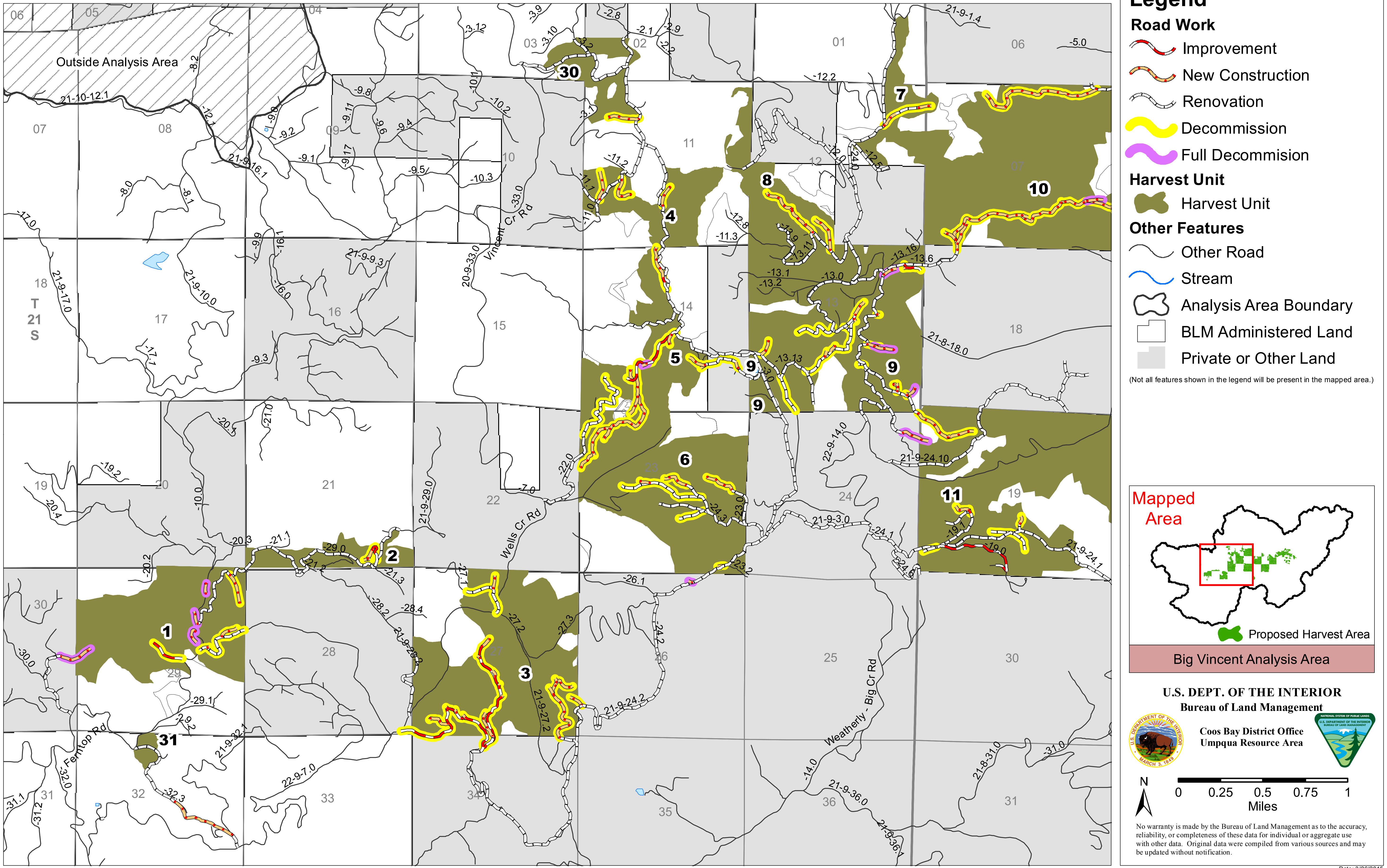
## Map 3b: Big-Vincent Treatment Units (East)

DOI-BLM-OR-CO30-2011-0003-EA



## Map 4a: Big-Vincent Road Work (West)

DOI-BLM-OR-CO30-2011-0003-EA



# Map 4b: Big-Vincent Road Work (East)

DOI-BLM-OR-CO30-2011-0003-EA