UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
EUGENE DISTRICT OFFICE

ENVIRONMENTAL ASSESSMENT NO. OR090-07-02

Upper Siuslaw Landscape Plan

July 8, 2009

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INTRODUCTION

SUMMARY

This Environmental Assessment (EA) analyzes alternatives for timber harvest and other management activities within the Upper Siuslaw Planning Area of the Siuslaw Resource Area (see Map 1). The planning area is within portions of the Siuslaw River Watershed, and is comprised of approximately 32,800 acres of Bureau of Land Management (BLM) managed land.

The terms "western portion" and "eastern portion" are used throughout this document to distinguish between the geographic divisions of the planning area.

Approximately 21,200 acres, in the western portion of the planning area, are within Late-Successional Reserve (LSR) 267 and Riparian Reserve Land Use Allocations (LUA). Approximately 11,600 acres are in the Matrix (General Forest Management Allocation and Connectivity) and Riparian Reserve LUAs, the majority of which lies in the eastern portion of the planning area.

An Environmental Impact Statement for the Upper Siuslaw Late-Successional Reserve Restoration Plan (LSR EIS, April 2004) analyzed approximately 24,400 acres of LSR 267, between the western and eastern portions of the planning area. The EIS considered actions only within the LSR LUA; this EA includes those scattered Matrix LUA lands that lie within the EIS geographical boundary.

Actions analyzed in this EA include density management and commercial thinning, botanical restoration treatments, culvert replacements/removals, and road construction, renovation, improvement, and decommissioning.

PURPOSE AND NEED

The purpose of the action is to:

- Conduct commercial thinning and other treatments on overstocked stands in the Matrix LUA to provide timber and to improve forest health and habitat functionality.
- Implement silvicultural treatments, including density management thinning, in the Late-Successional Reserve LUA to accelerate the development of late-successional forest structural characteristics.
- Improve riparian reserve function in the Riparian Reserve LUA to contribute to the attainment of Aquatic Conservation Strategy (ACS) objectives.
- Implement treatments in designated Botanical Reserve Areas to improve growing conditions for wayside aster (*Eucephalus vialis*).

The need is established in the Eugene District Record of Decision and Resource Management Plan (RMP) (June 1995).

Specifically, the RMP directs that Matrix lands be managed to provide a sustainable supply of timber, to provide connectivity, habitat, and ecological function, and to maintain structural components.

In the Late-Successional Reserve LUA, the need is established in the RMP to maintain, protect and enhance conditions of late-successional and old growth forest ecosystems. The need for the

action is also established in the *Late-Successional Reserve Assessment, Oregon Coast Province Southern Portion – RO 267, RO 268* (USDA and USDI LSR Assessment, 1997).

Within the Riparian Reserve LUA, the RMP directs that actions be undertaken to attain Aquatic Conservation Strategy objectives to restore and maintain the ecological health of watershed and aquatic ecosystems. The *Siuslaw Watershed Analysis* (USDI BLM, 1996) supports the need for the action in Riparian Reserves.

The need to manage Botanical Reserve Areas is established in the RMP to maintain, protect, and enhance special status plant populations and habitat. The need is substantiated in the Siuslaw Watershed Analysis (p. D-5), which recommends that habitat enhancement measures be implemented "to improve or maintain viable populations of *Aster vialis*" (syn. *Eucephalus vialis*).

CONFORMANCE WITH LAND USE PLANS

All alternatives are in conformance with the *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl* (Northwest Forest Plan {NSO-ROD}) (USDA Forest Service and USDI Bureau of Land Management, April 1994), and the *Eugene District Resource Management Plan* (RMP)(1995) and all plan amendments in effect on the day of completion of this EA, including the *2007 Record of Decision To Remove the Survey and Manage Mitigation Measure Standards and Guidelines from Bureau of Land Management Resource Management Plans within the Range of the Northern Spotted Owl*. Additional information is available in the Upper Siuslaw Landscape Plan Project analysis file. This file and the above referenced documents are available for review at the Eugene District Office.

ISSUES

AQUATIC CONSERVATION STRATEGY

ISSUE 1: <u>What are the effects of timber harvest and associated activities on the attainment of Aquatic Conservation Strategy (ACS) objectives?</u>

Actions proposed within the Riparian Reserves and adjacent uplands may affect attainment of ACS objectives. Initial evaluation of this issue determined that ACS objectives 1, 4, 6, 7 and 9 would be maintained under all action alternatives, whereas effects on ACS objectives 2, 3, 5, and 8 could differ by alternative. Analysis of this issue will compare how each alternative contributes toward attainment of ACS objectives 2, 3, 5, and 8. The Siuslaw Watershed is designated critical habitat for Oregon Coast coho salmon, and actions are proposed that may affect critical habitat. Analysis of this issue will compare how each alternative may affect coho salmon critical habitat.

Measures:

<u>ACS No. 2</u>: *connectivity within watershed maintained, restored, or degraded by measuring:*

- Number of barrier culverts removed and/or replaced with non-barrier culverts.
- Miles of aquatic habitat made available.
- Miles of coho salmon critical habitat made available.

<u>ACS No. 3</u>: *physical integrity of the aquatic system maintained, restored, or retarded by measuring:*

- Number of stream crossings removed or added.
- Number of culverts upgraded.
- Number of stream reaches with large woody debris added.

<u>ACS No. 5</u>: *Sediment regime maintained, restored, or retarded by considering:*

- Miles of existing road with sediment delivery potential decommissioned.
- Number of high risk culverts removed or replaced.
- Percent increase in short term sediment delivery due to increased timber haul.
- Percent decrease in long term sediment delivery due to the addition of cross drain culverts.
- Miles of road construction and improvement with sediment delivery potential.

<u>ACS No. 8</u>: *structural diversity maintained, enhanced or restored by considering:*

- Number of acres of Riparian Reserves treated to accelerate late-successional characteristics.

WILDLIFE

ISSUE 2: <u>What are the effects of management activities on the functionality of the South Willamette-North Umpqua Area of Concern (AOC), located in the eastern portion of the planning area?</u>

All lands within the eastern portion of the planning area fall within the South Willamette-North Umpqua AOC. The Interagency Scientific Committee (pre-Northern Spotted Owl, Record of Decision {pre-NSO-ROD}) determined that the AOC constituted a "habitat bridge" on federal land that they considered to be essential for owl movement and genetic interchange between the Oregon Coast and Cascade ranges. Actions are proposed that could affect the functionality of the AOC. Analysis of this issue will compare how proposed timber harvest and other activities under each action alternative may affect the AOC's ability to function as a dispersal corridor for owls.

Measure:

- Acres of northern spotted owl dispersal habitat thinned within the AOC.

ISSUE 3: <u>What are the effects of management activities on spotted owl habitat within Critical Habitat Units and the western portion of the planning area?</u>

A portion of lands within the western portion of the planning area fall within Critical Habitat Units (CHUs) for the northern spotted owl. The management objectives for CHUs are to provide suitable habitat in adequate quantities and proper spatial arrangement across the landscape as well as owl movement (dispersal) that is essential for the conservation of the northern spotted owl. Each of the alternatives treat dispersal habitat in northern spotted owl CHUs. Analysis of this issue allows for comparison of these treatments.

The majority of lands within the western portion of the planning area do not fall within Critical Habitat Units (CHUs) for the northern spotted owl. Each of the alternatives may affect owl movement (dispersal) through the LSR and Matrix LUA. Analysis of this issue allows for comparison of these effects throughout the western portion not including CHUs.

Measure:

- Acres of northern spotted owl dispersal habitat thinned within the CHUs and the western portion of the planning area.

ISSUE 4: <u>What are the effects of management activities on the conservation of the marbled murrelet?</u>

The planning area is within the nesting range of the marbled murrelet. Habitat types (suitable and potential nesting structure within younger stands) are defined by interagency policies. Management actions could affect murrelet habitat. Analysis would focus on the development of local murrelet habitats over time.

Measure:

- Change in acres of marbled murrelet suitable habitat over time.

BOTANY/INVASIVE SPECIES

ISSUE 5: <u>What are the effects of management activities on the spread of invasive species?</u>

Ground disturbance and a decrease in canopy closure generally lead to an increase in invasive non-native and noxious weeds, as evidenced in literature review and observations on the Eugene District. Analysis of this issue will determine the increase of non-native and noxious weed cover resulting from ground disturbing activities and decreases in canopy closure proposed in the action alternatives.

Measure:

- Acres with probable cover of noxious weeds caused by thinning, road work and landings.

ISSUE 6: <u>What are the effects of management activities within botany reserves on *Eucephalus vialis*?</u>

Eucephalus vialis (wayside aster) is a Bureau-Sensitive species that grows more vigorously in relatively open sites. Approximately 67 acres of RMP-designated botanical reserves with Eucephalus vialis are proposed for treatment in the planning area. Actions are proposed in these reserves to reduce vegetative competition and to maintain an open canopy. Analysis of this issue will help determine the effects and risks of these treatments to aster populations.

Measure:

- Effectiveness of treatment methods used to improve growing conditions for *Eucephalus vialis*.

LOGGING

ISSUE 7: <u>What are the effects of logging systems on the cost of yarding, road construction and road renovation?</u>

Each of the action alternatives employs a different combination of logging systems due to design constraints, environmental concerns, and the extent of area treated. Costs of yarding, road construction, and road renovation/improvement would vary by alternative. Analysis of these costs will provide a means to compare cost-effectiveness among alternatives.

Measure:

- Cost per acre and cost per thousand board feet (MBF).

HAZARDOUS FUELS

ISSUE 8: <u>How will management activities affect the amount of hazardous fuels in the Wildland-Urban Interface (WUI)?</u>

Approximately 16,600 acres of the planning area are identified as WUI, where wild fire is of particular concern. Proposed management activities in the action alternatives could alter the amount of hazardous fuels within the WUI, thereby affecting the risk of catastrophic loss of property and resources should a fire occur. Analysis of this issue allows for comparison of the fire risk among alternatives.

Measure:

- Acres of hazardous Fuel Models (FMs) 12, 11 and 10 in WUI over time.

ISSUES CONSIDERED BUT NOT FULLY ANALYZED

<u>What effect will management actions have on the Siuslaw potential Wild and Scenic River (W&SR) "outstandingly remarkable values" (ORVs)?</u>

This issue was considered because the river segments' outstandingly remarkable values include fisheries, wildlife, and recreation values. The RMP directs that "…no actions would be authorized that would adversely effect [sic] the identified Outstandingly Remarkable Values…" Specific protective measures listed in the RMP include (1) excluding timber harvest from Riparian Reserves within the W&SR corridor, and (2) protecting the segments' identified ORVs. None of the alternatives propose timber harvest in the Siuslaw River's Riparian Reserves, nor would they affect the identified ORVs. Therefore, the issue was not fully analyzed.

<u>What effect would management actions have on the recreation sites and visual resources within the Siuslaw River corridor?</u>

This issue was considered but not fully analyzed because none of the alternatives propose timber harvest within or adjacent to developed recreation sites within the Siuslaw River corridor. Visual resources would be unaffected by all alternatives because of the protections afforded to the river corridor through implementation of the W&SR interim management as described in the RMP.

<u>What are the effects of management actions on stream temperature?</u>

This issue was considered but not fully analyzed because all of the alternatives would implement the "sufficiency analysis" which provides protection to stream primary and secondary shade zones. As a result, none of the alternatives would be expected to affect stream temperature. Research has indicated that shade-producing vegetation is an effective method in reducing solar radiation to streams (Brazier and Brown 1972, Betschta et al. 1987). Shade produced by riparian canopies has a lesser cooling influence on stream temperature in large wide streams and rivers than in small narrow streams (Lewis et al. 2000). The Siuslaw River is more susceptible to solar radiation and increased temperatures due to its width and low gradient. Most of the tributary streams flowing into the Siuslaw River have summer stream temperatures several degrees cooler than the mainstem and meet state temperature standards. The Oregon Department of Environmental Quality (ODEQ) identified the following

segments of the Siuslaw River as Water Quality Limited for temperature in its 2004/2006 303(d) integrated report.

Temperature Water Quality Limited Streams in the Planning Area

Waterbody	River Mile	Parameter	Season	List date
Siuslaw River	0 to 106	Temperature	Year around (non-spawning)	2004
South Fork Siuslaw River	0 to 7.3	Temperature	Year around (non-spawning)	2004

ODEQ has initiated evaluation of Total Maximum Daily Loads (TMDLs) for the Mid Coast Basin Siuslaw Subbasin. Initial scoping and data collection are ongoing. Upon completion, BLM will prepare a Water Quality Restoration Plan (WQRP), which will address water quality parameters listed in the TMDLs.

What are the effects of management actions on dissolved oxygen in streams?

This issue was considered but not fully analyzed because the types of streams in the planning area in which restoration activities under the action alternatives would occur typically exhibit low Biochemical Oxygen Demand (BOD), cool water temperatures, rapid re-aeration rates, and are close to saturation of dissolved oxygen (DO). A few studies have shown low DO levels in low gradient streams associated with heavy inputs of fine, fresh organic material in very slow moving water where oxygen re-aeration is poor. The number of trees proposed to be felled into streams and the small amount of organic fines entering streams under any of the action alternatives would be very unlikely to result in low DO levels in streams.

Although low DO levels have not been confirmed within the planning area, based on data collected at River Mile 20 (about 25 river miles below the planning area), the Oregon Department of Environmental Quality (ODEQ) identified the following segments of the Siuslaw River as Water Quality Limited for DO in its 2004/2006 303(d) integrated report.

Dissolved Oxygen Water Quality Limited Streams in the Planning Area

Waterbody	River Mile	Parameter	Season	List date
Siuslaw River	5.7 to 105.9	Dissolved Oxygen	June 1- September 14	2002
Siuslaw River	5.7 to 105.9	Dissolved Oxygen	September 15 to May 31	2002

ODEQ has initiated evaluation of TMDLs for the Mid Coast Basins Siuslaw Subbasin. Initial scoping and data collection are ongoing. Upon completion, BLM will prepare a Water Quality Restoration Plan (WQRP), which will address water quality parameters listed in the TMDLs.

What are the effects of management actions on peak flows in streams?

This issue was considered but not fully analyzed because all alternatives would maintain flow regime. Thinning would occur in stands located at low elevations with very little land (estimated at less than 0.1 percent) in the zone in which rain-on-snow events are more likely (USDI BLM 1996). Effects from thinning on flows are likely to be minimal because large portions of the canopy would be retained under all alternatives. All alternatives are expected to have a slightly beneficial impact on peak flows by reducing the number of road miles connected to stream channels via decommissioning or adding cross drains to existing roads. The application of BMPs in road, harvest, and yarding design would substantially mitigate the amount of compaction from any the action alternatives.

What are the effects of management actions on Special Status Species Plants?

This issue was considered but not fully analyzed because under all action alternatives, site specific botanical surveys would be conducted during the design phase of individual projects prior to implementation. If any Special Status plants are found, they would be managed in accordance with land use objectives and Special Status Species management policies at the time of implementation.

What are the effects of road construction, ground-based harvest, and fuels treatments on soil productivity?

This issue was considered but not fully analyzed because road construction, ground-based harvest, and fuels treatments proposed under the action alternatives would follow Best Management Practices (refer to RMP p.158, 166) to minimize loss of soil productivity. In the

long term, site productivity would return to current levels on decommissioned natural-surfaced roads.

<u>What are the effects of ground-based harvest and fuels treatments on soil compaction?</u>

This issue was considered but not fully analyzed because all ground-based harvest and site preparation (fuels treatment) activities proposed under the action alternatives would be designed using Best Management Practices to have insignificant growth-loss effect from compaction. Decompacting skid trails and areas compacted during fuels treatments would ameliorate compaction to 2 percent or less; which is considered to impair less than 1 percent growth loss (RMP p. 166)

ALTERNATIVES

Four action alternatives are analyzed that consider management activities on 11,600 acres within the Matrix (General Forest Management Allocation and Connectivity) and adjacent Riparian Reserve LUAs, as well as 21,200 acres within the Late-Successional Reserve and adjacent Riparian Reserve LUAs. These alternatives were designed using Critical Habitat designations current at the time of project development. A No Action alternative has also been analyzed. Table 1 compares design features of all alternatives.

ALTERNATIVE A – No Action

Under this alternative, no management actions as proposed in this EA would occur that would provide a sustainable supply of timber, accelerate the development of late-successional characteristics, or improve riparian function. Actions proposed and analyzed under existing NEPA documentation (specifically, the Upper Siuslaw Aquatic Habitat Restoration Plan and Environmental Assessment (HMP) [BLM OR090-EA98-17, 1998]) could occur in the mainstem Siuslaw River and tributaries. Actions specifically required by the RMP or by law or policy would occur, such as wildfire suppression, salvage harvest in response to insects, disease or fire, felling of hazard trees along roads or trails, road maintenance, and road construction by adjacent landowners. See the section below titled "Past, Present and Reasonably Foreseeable Future Actions" for more detail.

Features common to all action alternatives

Proposed actions would occur over a span of ten years. Stand ages are 'frozen' at a base year of 2007. Stands less than 30 years old (2007 base year) would not be treated.

Design features are described in Appendix A. Applicable Best Management Practices (BMPs) described in the RMP would be followed for all proposed activities.

GIS interpretation and specialists' knowledge of the planning area was used to determine possible harvest locations and yarding systems, as well as to estimate miles of road construction and renovation/improvement for each alternative.

Roads:

- Non-inventoried roads: Old, compacted jeep roads, skid trails or logging roads from past activities would be utilized wherever possible, unless their locations would not meet land management standards. Road locations would be determined in conjunction with BMPs for timber yarding.
- Road renovation/improvement: Non-inventoried or existing roads would be renovated or improved to meet design features. Actions could include clearing vegetation, grading, and/or widening road grades to minimum width standards. These roads could include main haul routes such as the Siuslaw Access Road (Road Nos. 18-8-34 and 19-7-25).
- New road construction: Generally, new roads would be located on ridge tops or in areas having gentle to moderate side slopes. New roads would be built to current standards in accordance with BMPs.
- Decommissioning: BLM is party to a number of right-of-way and road use agreements with adjacent landowners within the planning area, thus any road decommissioning would require the consent of affected landowners. BLM has also entered into an agreement to notify the Association of O&C Counties regarding road decommissioning, and would make formal notification to them as required. In addition, roads would be evaluated for future management needs, such as fire and administrative access, when determining suitability for decommissioning.

  Criteria for road decommissioning are listed in each alternative. Design features for decommissioning would be applied as follows:

  - Natural surfaced roads would be decommissioned using measures described in Design Features 19 and 20.
  - Roads that are rocked to facilitate harvest activities would be decommissioned using measures described in Design Feature 21.

Other:

- Log haul during periods of wet weather would occur on roads considered suitable for wet weather haul after site-specific evaluation during project design.
- Stream buffer widths would be determined on a site-specific basis using the criteria described in Appendix A design feature 7, in order to maintain stream bank stability, shading, and stream temperature.
- Stream crossing culverts and cross drain culverts required for timber sale activities would be added or replaced as needed.
- Twenty stream crossing culverts that are barriers to fish passage have been identified for replacement (see Appendix B). Replacement would depend on funding available at the time of implementation; culverts on haul routes may be replaced under timber sale contracts.

ALTERNATIVE B – Maintain northern spotted owl dispersal habitat

This alternative is designed to promote forest health by thinning stands to maintain stand vigor and develop stand stability while maintaining dispersal habitat (canopy closure of 40% or more). Prescribed burning of *Eucephalus vialis* botanical reserves would be designed to reduce the amount of the existing live fuel component (shrubs, forbs and moss).

SILVICULTURAL PRESCRIPTION

Thinning would occur in stands 30 to 79 years old.

Matrix: 6,400 acres (2,400 acres in Riparian Reserves); and

LSR: 5,700 acres (1,900 acres in Riparian Reserves)

Matrix, LSR and Riparian Reserves would receive the same treatments. Trees identified for harvest would generally be from the smaller diameter classes, varying spacing to reserve the larger, more vigorous trees to a specified basal area. Thinning would be moderate to a Relative Density (RD) in the mid-30's which is expected to result in a residual canopy closure of 45 to 60 percent.

STREAM BUFFERS

Stream buffers would be a minimum of 75 feet on either side of streams.

COARSE WOODY DEBRIS (CWD) AND SNAGS

CWD and snag recruitment would occur through natural processes in Matrix, LSR and Riparian Reserve LUAs.

YARDING

Yarding would consist of approximately 7,800 acres cable, 3,900 acres ground based, and 400 acres aerial (helicopter).

ROADS

Approximately 35 to 40 miles of road construction and approximately 190 miles of road renovation/improvement would occur.

Decommissioning

Matrix and LSR:

- Newly constructed and renovated/improved natural surfaced roads.
- Newly constructed and renovated/improved roads within late-successional stands that have been rocked to facilitate harvest activities.

EUCEPHALUS VIALIS TREATMENTS

Up to 67 acres of RMP-designated *Eucephalus vialis* botanical reserves would be treated by prescribed fire (under-burning). Fire treatment would consist of low intensity under-burning conducted in early summer or late fall.

ALTERNATIVE C – Maintain northern spotted owl dispersal habitat on Matrix and LSR lands; promote development of multi-canopy layers and late-successional characteristics on LSR lands.

This alternative is designed to promote forest health by thinning stands to maintain stand vigor and develop stand stability while maintaining owl dispersal habitat (canopy closure of 40% or more) on most acres. Treatments on LSR lands are also designed to encourage the development of multi-canopy layers and to achieve tree densities typical of local late-successional forests as soon as possible. Heavy thinning on 200 acres would promote the rapid development of late-successional characteristics. Commercial thinning within *Eucephalus vialis* botanical reserves would be designed to improve growing conditions for *Eucephalus vialis*.

Silvicultural Prescription

Thinning would occur on stands 30 to 59 years old.

Matrix: 3,200 acres (1,100 acres in Riparian Reserves)
Trees identified for harvest would generally be from the smaller diameter classes, varying spacing to reserve the larger, more vigorous trees to a specified basal area. Thinning would be moderate to an RD in the mid-30's, which is expected to result in a residual canopy closure of 45 to 60 percent.

LSR moderate thin: 3,300 acres (1,100 acres in Riparian Reserves)
Generally, trees would be retained from all diameter classes in proportion to their abundance. Thinning would be moderate to 60 to 80 trees per acre to maintain a residual canopy closure greater than 40 percent.

LSR heavy thin: 200 acres
Thinning would be to 40 to 60 trees per acre which could result in a residual canopy closure of less than 40 percent. Trees would be retained from selected diameters across the diameter range of the stand to promote spatial variability. Heavy thinning would occur where more than 40 percent of the area in a 1.5 mile radius consists of suitable habitat for the NSO.

Stream Buffers

Stream buffers would be a minimum of 75 feet on either side of streams.

CWD and Snags

Matrix and associated Riparian Reserves: CWD and snag recruitment would occur through natural processes.

LSR and associated Riparian Reserves: Snags and coarse woody debris would be retained during thinning harvest of stands, except for safety or operational reasons. New snags and coarse woody debris would be created when existing levels of snags and coarse woody debris do not meet the levels defined below:

	CWD Retention or Creation			Snag Retention or Creation	
Stand QMD* (pretreatment)	Total	Component Diameters**	Component Lengths	Total	Component Diameters
>14 in	240 ft/ac	>14 in	>20 ft	6 tpa	>14 in dbh
≤14 in	120 ft/ac	>12 in	>20 ft	3 tpa	>12 in dbh

* Quadratic Mean Diameter
** large end

Yarding

All acres would be cable yarded.

Roads

Roads would be constructed or renovated/improved as needed. On LSR lands, newly constructed spurs would generally be less than 200 feet in length. Approximately 10 to 15 miles of road construction and approximately 170 miles of road renovation/improvement would occur.

Decommissioning

Matrix:

- Newly constructed and renovated/improved natural surfaced roads.
- Newly constructed and renovated/improved roads within late-successional stands that have been rocked to facilitate harvest activities.

LSR:

- All newly constructed and non-inventoried roads used for harvest activities.
- Renovated/improved roads within late-successional stands that have been rocked to facilitate harvest activities.

EUCEPHALUS VIALIS TREATMENTS

Up to 67 acres of RMP-designated *Eucephalus vialis* botanical reserves would be treated by commercial thinning to a residual canopy closure of approximately 50 to 75 percent.

ALTERNATIVE D – Maintain northern spotted owl dispersal habitat on Matrix lands; promote rapid development of Late-Successional characteristics on LSR lands

This alternative is designed to promote forest health on Matrix lands by thinning stands to maintain stand vigor and develop stand stability while maintaining dispersal habitat (canopy closure of 40% or more). Proportional heavy thinning on LSR lands would promote the rapid development of late-successional characteristics. Non-commercial thinning of *Eucephalus vialis* botanical reserves is designed to improve growing conditions while maintaining an intermediate cover to lessen competition from invasive weeds and other species

Silvicultural Prescription

Thinning would occur on stands 30 to 59 years old.

Matrix: 2,800 acres (1,000 acres in Riparian Reserves)
Trees identified for harvest would generally be from the smaller diameter classes, varying spacing to reserve the larger, more vigorous trees to a specified basal area. Thinning would be moderate to an RD in the mid-30's which is expected to result in a residual canopy closure of 45 to 60 percent.

LSR heavy thin: 3,500 acres (1,100 acres in Riparian Reserves)
Trees would be retained from selected diameters across the diameter range of the stand to promote spatial variability. Thinning would be to 40 to 60 trees per acre which may result in a residual canopy closure of less than 40 percent.

1,200 acres would be heavy thinned to 40 to 60 trees per acre, with cut stems left on site to benefit wildlife, in areas that are not accessible due to road construction constraints.

Stream Buffers

Stream buffers would be a minimum of 75 feet on either side of streams.

CWD and Snags

Matrix and associated Riparian Reserves: CWD and snag recruitment would occur through natural processes.

LSR and associated Riparian Reserves: Snags and coarse woody debris would be retained during thinning harvest of stands except for safety or operational reasons. New snags and coarse woody debris would be created when existing levels of snags and coarse wood debris do not meet the levels defined below:

	CWD Retention or Creation			Snag Retention or Creation	
Stand QMD* (pretreatment)	Total	Component Diameters**	Component Lengths	Total	Component Diameters
>14 in	240 ft/ac	>14 in	>20 ft	6 tpa	>14 in dbh
≤14 in	120 ft/ac	>12 in	>20 ft	3 tpa	>12 in dbh

* Quadratic Mean Diameter
** large end

Yarding

All acres would be cable yarded.

Roads

Roads would be constructed or renovated/improved as needed. Within LSR and NSO Critical Habitat Units (CHUs) lands, newly constructed spurs would generally be < 200 feet in length. Approximately 5 to 10 miles of road construction and approximately 170 miles of road renovation/improvement would occur.

Decommissioning

Matrix:

- Newly constructed and renovated/improved natural surfaced roads.
- Newly constructed and renovated/improved roads within late-successional stands that have been rocked to facilitate harvest activities.

LSR:

- All natural surfaced newly constructed and non-inventoried roads used for harvest activities.
- Renovated/improved roads within late-successional stands that have been rocked to facilitate harvest activities.
- Other existing roads that are not needed for future management.

EUCEPHALUS VIALIS TREATMENTS

Up to 67 acres of RMP-designated *Eucephalus vialis* botanical reserves would be treated by non-commercial thinning (generally girdling) to a residual canopy closure of 50-75 percent. Thinning would take place in stages over a period of years in order to reduce fuel loading and lessen weed invasion. If necessary, a minimal amount of hand piling and burning would occur where more than 2 acres of Fuel Model 10 (heavy timber litter) or 12 (moderate slash) are created in any of the five project sites.

ALTERNATIVE E – (Proposed Action) – Maintain northern spotted owl dispersal habitat, limiting harvest within the Area of Concern

This alternative incorporates design features from the other action alternatives and is designed to promote forest health through thinning of stands to maintain stand vigor and develop stand stability while generally maintaining dispersal habitat (canopy closure of 40% or more). Harvest of owl habitat within existing NSO provincial home ranges in the South Willamette-North Umpqua AOC would be limited to ensure dispersal functionality. Heavy thinning 500 acres on LSR lands would promote the rapid development of late-successional characteristics. Prescribed fire and non-commercial thinning treatments in *Eucephalus vialis* botanical reserves are designed to reduce the amount of the existing live fuel component (shrubs, forbs and moss) and improve growing conditions while maintaining an intermediate cover to lessen competition from invasive weeds and other species.

Silvicultural Prescription

Thinning would occur in stands 30 to 79 years old.

Matrix: 3,800 acres (1,300 acres in Riparian Reserves);
Trees identified for harvest would generally be from the smaller diameter classes, varying spacing to reserve the larger, more vigorous trees to a specified basal area. Thinning would be moderate to an RD in the mid-30's which is expected to result in a residual canopy closure of 45 to 60 percent.

LSR moderate thin: 5,100 acres (1,560 acres in Riparian Reserves)
Trees identified for harvest would generally be from the smaller diameter classes, varying spacing to reserve the larger, more vigorous trees to a specified basal area. Thinning would be to an RD in the mid-30's which is expected to result in a residual canopy closure of 45 to 60 percent.

Approximately 400 of these acres that are inaccessible for yarding using conventional methods could be thinned, with cut stems left on site, to meet management objectives.

LSR heavy thin: 325 acres (140 acres in Riparian Reserves)
Trees would be retained from selected diameters across the diameter range of the stand to promote spatial variability. Thinning would be to 40 to 60 trees per acre and could result in a residual canopy closure of less than 40 percent. Heavy thinning would occur where more than 40 percent of the area in a 1.5 mile radius consists of suitable habitat for the NSO.

Stream Buffers

Stream buffers would be a minimum of 75 feet on either side of streams.

CWD and Snags

Matrix and associated Riparian Reserves: CWD and snag recruitment would occur through natural processes.

LSR and associated Riparian Reserves: Snags and coarse woody debris would be retained during thinning harvest of stands except for safety or operational reasons. New snags and coarse woody debris would be created when existing levels of snags and coarse wood debris do not meet the levels defined below:

	CWD Retention or Creation			Snag Retention or Creation	
Stand QMD** (pretreatment)	Total	Component Diameters**	Component Lengths	Total	Component Diameters
>14 in	240 ft/ac	>14 in	>20 ft	6 tpa	>14 in dbh
≤14 in	120 ft/ac	>12 in	>20 ft	3 tpa	>12 in dbh

* Quadratic Mean Diameter
** large end

Yarding

Yarding would consist of approximately 6,700 acres cable, 2,300 acres ground-based and 400 acres helicopter.

ROADS

Roads would be constructed or renovated/improved as needed. Approximately 20 to 30 miles of construction and approximately 170 to 190 miles of renovation/improvement would occur.

Decommissioning

Matrix:

- Newly constructed and renovated/improved natural surface roads.
- Newly constructed and renovated/improved roads within late-successional stands that are natural surface or have been rocked to facilitate harvest activities but are not needed for future management.

LSR:

- All newly constructed and non-inventoried roads used for harvest activities.
- Renovated/improved roads within late-successional stands that are natural surface or have been rocked to facilitate harvest activities.
- Other existing roads that are not needed for future management.

EUCEPHALUS VIALIS TREATMENTS

Up to 67 acres of RMP-designated *Eucephalus vialis* botanical reserves would be treated. A combination of treatments would be used to achieve a target residual canopy closure of 50-75 percent:

- Prescribed fire (under-burning). Fire treatment would consist of low intensity under-burning conducted in early summer or late fall.
- Non-commercial thinning (generally girdling). Girdling would follow fire treatments where necessary to reduce canopy closure to the target condition. Thinning would take place in stages over a period of years in order to reduce fuel loading and lessen weed invasion. If necessary, a minimal amount of hand piling and burning would occur where more than 2 acres of Fuel Model 10 (heavy timber litter) or 12 (moderate slash) are created in any of the five project sites.

Table 1 Comparison of Action Alternatives

	ALTERNATIVE B Maintain Dispersal	ALTERNATIVE C Maintain Dispersal & Promote Structure	ALTERNATIVE D Promote Structure	ALTERNATIVE E (Proposed Action) Maintain Dispersal; limit harvest in AOC
Matrix Thinning ▪ Acres Prescription	**30-79 yrs** ▪ 6,400 ac From below; RD=mid-30's	**30-59 yrs** ▪ 3,200 ac From below; RD=mid-30's	**30-59 yrs** ▪ 2,800 ac From below; RD=mid-30's	**30-79 yrs** ▪ 3,800 ac From below; RD=mid-30's
LSR Thinning ▪ Acres Prescription ▪ Acres Prescription	**30-79 yrs** ▪ 5,700 ac From below RD=mid-30's	**30-59 yrs** ▪ 3,300 ac Proportional; tpa=60-80 ▪ 200 acres Proportional; tpa=40-60	**30-59 yrs** ▪ 3,500 ac Proportional; tpa=40-60	**30-79 yrs** ▪ 5,100 ac From below; RD=mid-30's ▪ 500 ac Proportional; tpa=40-60
Riparian Reserve Thinning (*acres*) ▪ Matrix ▪ LSR *same Rx as adjacent upland*	▪ Matrix: 2,400 of 6,400 ▪ LSR: 1,900 of 5,700	▪ Matrix 1,100 of 3,200 ▪ LSR 1,100 of 3,500	▪ Matrix 1,000 of 2,800 ▪ LSR 1,100 of 3,500	▪ Matrix: 1,300 of 3,800 ▪ LSR: 1,700 of 5,600
CWD/Snags ▪ Matrix ▪ LSR	▪ Matrix: Natural Recruitment ▪ LSR: Natural Recruitment	▪ Matrix: Natural Recruitment ▪ LSR: Add as needed to reach up to 240 ft/ac and 6 tpa based on pretreatment stand QMD	▪ Matrix : Natural Recruitment ▪ LSR: Add as needed to reach up to 240 ft/ac and 6 tpa based on pretreatment stand QMD	▪ Matrix: Natural Recruitment ▪ LSR: Add as needed to reach up to 240 ft/ac and 6 tpa based on pretreatment stand QMD
Yarding (*acres*) ▪ Cable ▪ Ground ▪ Helicopter	▪ Cable: 7,800 ac ▪ Ground: 3,900 ac ▪ Helicopter: 400 ac	▪ Cable: 6,700 ac	▪ Cable: 6,300 ac	▪ Cable 6,700 ac ▪ Ground: 2,300 ac ▪ Helicopter: 400ac
Road Construction *(miles)*	▪ 35-40 mi, as needed	▪ 10-15 mi, as needed; newly constructed spurs in LSR generally <200 ft	▪ 5-10 mi, as needed; newly constructed spurs in LSR & CHU generally <200 ft	▪ 20 - 30 mi, as needed
Road Renovation/Improvement (*miles*)	▪ 190 mi	▪ 170 mi	▪ 170 mi	▪ 170 – 190 mi
Road Decommissioning ▪ Matrix ▪ LSR	▪ Matrix: Natural surfaced roads; Roads that are rocked within late-successional stands ▪ LSR: Same as Matrix	▪ Matrix: Same as Alt B ▪ LSR: Same as Alt B, plus: Rocked new and non-inventoried roads	▪ Matrix: Same as Alt B ▪ LSR: Same as Alt B, plus: Rocked new and non-inventoried roads; Existing roads not needed for future management	▪ Matrix: Same as Alt B ▪ LSR: Same as Alt B, plus: Rocked new and non-inventoried roads; Existing roads not needed for future management
Barrier culverts (*# replaced*)	▪ 20 culverts	▪ *Same*	▪ Same	▪ Same
Non-Commercial Thinning (*acres*) (age 30+)	▪ 0	▪ 0	▪ 1,200 ac of blind lead, inaccessible, and/or not suitable areas to conduct stand management activities	▪ 400 ac of blind lead, inaccessible, and/or not suitable areas to conduct stand management activities
Aster Reserve treatments	▪ Up to 67 ac	▪ Same	▪ Same	▪ Same

**Quadratic Mean Diameter*

ALTERNATIVES CONSIDERED BUT NOT FULLY ANALYZED

VARIABLE DENSITY THINNING

This alternative was considered but not analyzed because prescriptions identified in the alternatives would produce variable densities within stands by varying tree distribution. Thin from below prescriptions would vary tree distributions and densities within stands by generally retaining the larger trees and thinning to a common Relative Density in different age stands.

Variability in tree distribution and density would not be so great as to reduce canopy closure below that required to maintain NSO dispersal habitat in most of the planning area. Some acres would be thinned heavily to produce more variability in tree distribution and would result in canopy gaps, therefore reducing canopy closure below that required for NSO dispersal habitat. Heavily thinned stands would be considered for underplanting with shade tolerant conifers, promoting the structural variability desired for future stand conditions. Random disturbance events subsequent to thinning are also expected to result in small canopy gaps in thinned stands. The overall objective of heterogeneity at the stand and landscape scales would be achieved.

REGENERATION HARVEST ON MATRIX LANDS

This alternative was considered but not analyzed because 1) Many stands proposed for thinning in the Matrix LUA have not attained Cumulative Mean Annual Increment (CMAI); and 2) Regeneration harvest of stands which have achieved CMAI has been deferred for future analysis.

NO ROAD CONSTRUCTION

This alternative was considered but not analyzed because it was determined that the objectives for management under the Upper Siuslaw Landscape Plan could not be met without construction of new roads.

AFFECTED ENVIRONMENT

This section describes key components of the existing environment. The resources in the planning area do not differ significantly from those discussed in the Eugene District Proposed Resource Management Plan/Environmental Impact Statement (RMP EIS) (Chapter 3). The following resources are also discussed in greater detail in the project file.

VEGETATION

Prior to the implementation of the Northwest Forest Plan, forest management for stands in the planning area was intended to produce high-density, even-aged stands of Douglas-fir to maximize the production of timber for commercial value. This past management emphasis has resulted in many acres of conifer plantations in the planning area.

About two-thirds of the acreage in the planning area are less than 80 years old and have regenerated following timber harvest. Most stands that are 60 to 79 years old regenerated naturally utilizing a "seed tree" silvicultural system in which a few scattered trees were left after harvest to naturally reseed the area. These seed trees were often harvested after the new stand was established. Beginning in the mid-1950s, harvest methods began to shift to clearcutting, with regeneration most commonly achieved through planting Douglas-fir seedlings. Many of the resulting plantations were subsequently pre-commercial thinned (PCT) to timber production stocking levels of 250-300 trees per acre, favoring Douglas-fir and generally cutting competing species. Since the mid-1990s and the establishment of LSR's under the Northwest Forest Plan, some of these younger stands have been PCT'd to wider spacings, leaving a variety of tree species, to promote late-successional structure development. Generally, riparian areas are dominated by hardwoods, primarily red alder and bigleaf maple.

Botanical Reserves

The planning area contains RMP-designated Botanical Reserves totaling 188 acres for *Eucephalus vialis* (wayside aster) and *Cimicifuga elata*. This EA includes analysis and recommended treatments for *Eucephalus vialis* only.

Eucephalus vialis occurs in areas with a historically high fire frequency (USDI-BLM 2006). It appears to be a slow growing species of chronically disturbed habitats, favoring more open conditions than those often found in forests subject to fire suppression and tree planting after timber harvest (USDI-BLM 2006). Excess canopy closure, can suppress the size and flowering of *Eucephalus vialis* (Kaye and Thorpe 2006). Competition from understory brush and noxious weeds, are inhibiting the long-term viability of the species in the designated reserves.

Weeds

Noxious weeds refer to species designated by a Federal, State or county government as particularly detrimental to agriculture, biodiversity, and other resources, and are subject to control measures. Invasive species are non-native species whose introduction is likely to cause economic or environmental harm or harm to human health (Executive Order 13112). Noxious weeds designated by the Oregon Department of Agriculture and other non-native invasive plant species are present on BLM-managed land in the planning area and on adjacent private and other government land.

Most weed occurrences are associated with roadsides, which are often cited as the primary path along which weeds disperse before entering more intact vegetation. A roadside weed inventory was conducted in the Eugene District, including the planning area, between 2003 and 2006. This inventory showed that weeds including Scotch broom, Himalayan blackberry, tansy ragwort, and St. Johnswort are prevalent, particularly in the eastern portion of the planning area. The greater weed abundance in the eastern portion may be due to local climatic conditions, proximity to urban areas, and a longer period of weed invasion and/or land use patterns. Table 2 shows the inventory results.

Table 2 Roadside weed inventory – 10th mile road sections ODA-listed noxious weeds presence (*percent*)

Species	Western Portion	Eastern Portion
Canada thistle	12.0	40.0
Bull thistle	50.0	43.0
Field bindweed	0.3	0.2
Scotch broom	50.0	86.0
Common St. Johnswort	78.0	88.0
Himalayan blackberry	26.0	65.0
Tansy ragwort	39.0	59.0
False brome	1.0	1.0
Meadow knapweed	0.1	2.0
Spotted knapweed	0.3	2.0
Average among species	*26.0*	*39.0*

Observations were made in 2007 to typify the percent cover of non-native invasive species and noxious weeds in other habitats within the planning area - refer to Table 3. Weed presence was found to a lesser degree in other disturbed areas, such as skid trails, decommissioned roads, and harvested forest stands. Areas with more canopy cover, such as older forest stands, generally have few or no non-native species. A few species are shade tolerant, such as false brome, which has been observed in increasing volume over the last several years. False brome is of particular concern, as it can dominate sites indefinitely once established.

Table 3 Approximate average cover of non-native vegetation in the planning area (*percent*)

	The non-native total includes Noxious weeds			
	Western Portion		**Eastern Portion**	
	Non-native Total	Noxious Weeds	Non-native Total	Noxious Weeds
Roadsides	50	5.0	75	40
Closed Roads	5	0.5	70	30
Underburns, Thinning	1	0.1	10	5

SOILS

Soils throughout the planning area have developed from sedimentary rocks and are deep, permeable and productive.

The western portion of the planning area is comprised of steep slopes and irregular ridges and valleys. It is located within the udic-mesic moisture regime (108 inches annual precipitation) and includes the Bohannon-Preacher-Digger and Peavine-Blachly-Honeygrove soil associations units.

Typically, the Bohannon-Preacher-Digger unit consists of 40 percent Bohannon, 25 percent Digger and 20 percent Preacher soils. Soils of minor extent in this unit include Peavine, Honeygrove, Klickitat and Blachly. Bohannon soil series are loamy, very porous, and easily compacted. Depth to weathered bedrock ranges from 20 to 40 inches. Preacher soils are loamy clays that are well drained, moderately permeable and easily compacted. Digger soils range from shallow to moderately deep, well-drained, loamy soils that are stony and porous.

The Peavine-Blachly-Honeygrove unit consists of 55 percent Peavine, 20 percent Blachly and 15 percent Honeygrove soils. Minor soils are the McCully, Cumley, Minniece, Klickitat and Kilchis. The Peavine series consists of moderately deep, well-drained, red, silty clay loam soils that are easily compacted, with depths to bedrock ranging from 40 to 50 inches. Blachly soils are clay loams with effective rooting depths to 60 inches and are easily compacted. The Honeygrove series are deep silty clay loams that are easily compacted.

Vegetation, slope, soil texture, soil infiltration rates and climate are the most important influences on the erosion hazards of a site; a variety of these combinations exist in the Coast Range and

contribute to a naturally high background erosion rate. In general, background erosion rates are documented to be two to four times higher in the Coast Range than in the Cascade Range (Larson and Sidle, 1980).

The eastern portion of the planning area is comprised of gentle slopes in fine-grained sediments. It is within a xeric-mesic moisture regime (50 inches annual precipitation) and includes the Bellpine-Nekia-Ritner soil association unit, which generally consists of 45 percent Bellpine, 25 percent Nekia and 15 percent Ritner. Minor soils include Jory, Panther, Hazelair, Dupee, Philomath, Witzel, Dixonville, Steiwer and Willakenzie soils. The Bellpine, Nekia and Ritner series are moderately deep, high in clay content, slowly porous, but are well drained and compact easily.

HYDROLOGY

The planning area is within the Upper Siuslaw River 5th-field Watershed, which is comprised of eight 6th-field sub-watersheds. The hydrologic, aquatic, and riparian conditions are described in detail in the Eugene District Siuslaw Watershed Analysis (BLM 1996) and are incorporated herein by reference.

Beneficial Uses in the Siuslaw Watershed include: private domestic water supply, irrigation, livestock, anadromous fish rearing, salmonid fish passage, resident fish and aquatic life, wildlife and hunting, fishing, water contact recreation, and aesthetic quality.

The planning area is characterized as a low elevation watershed (280 to 2,800 feet above sea level). Less than 3 percent is above 1,500 feet; proposed activities in this plan would harvest no more than 1 percent of this area. Less than 1 percent is in the rain-on-snow zone (above 2,000 feet). The watershed has been found to be at a low risk for impacts from rain-on-snow events using either the Oregon Watershed Enhancement Board (OWEB 1999) or Washington Forest Practices Board (WFPB 1997) methodologies.

Precipitation in this region is between 50 inches to 108 inches annually; the majority is in the form of rainfall between October and April. The areas of highest rainfall (above 60 inches annually) are located in the western portion of the planning area. Stream flow patterns are closely tied to precipitation patterns because of limited water storage capacity in the sedimentary materials that occupy much of the planning area. Peak flows are often more than 100 times greater than low flows, and year-to-year flows also can vary by a large amount.

Washington Forest Practices Board (WFPB 1997) methodology was used to characterize current vegetation conditions by land use and cover type in order to represent crown closure and hydrologic maturity in the planning area.

Table 4 Crown Closure and Hydrologic Maturity

Forested land characteristics		
Age Class	Crown closure density	Percent of planning area*
Immature <15 years	low	<10
Intermediate 15-39 years	moderate	30
Mature >39 years	high	50+
Non-forested lands use categories		
Residential/Agricultural		<4
Natural Meadow		
Water		

**Approximate*

There are approximately 1,325 miles of stream channel with an average stream density of 6.6 miles/square mile. The main drainages (5th order and greater streams) include Barlow, Esmond, Hawley, Kelly, Layne, Letz, Sandy, and Whittaker Creeks, and the Siuslaw River, including north and south forks.

Approximately 75 percent are 1st or 2nd order tributaries to larger streams. These streams are typically high gradient (average exceeding 20 percent) and usually have a confined channel. Approximately 230 miles of streams are low gradient (2 percent or less). These streams are the

most susceptible to fine sediment input from roads. They are typically 4th through 7th order streams and rivers, usually have unconfined channels, and are also usually fish bearing.

Previous management activities have changed stream channels from their historic condition, influencing water quality. Large wood is lacking in the larger streams, which has affected stream complexity, stream temperature and dissolved oxygen.

There are approximately 940 miles of road in the planning area. Road density averages 4.7 miles/square mile; BLM controls about 40 percent of these roads. Approximately 80 percent of the roads (BLM and private control) have a durable (gravel or paved) surface.

Timber hauling as a result of the action alternatives would include the use of roads outside the planning area boundary. Background sediment rates and effects of estimated haul were calculated for these haul routes. The results show little change from existing haul levels in most of the sub-watersheds. Seven sub-watersheds in two Watersheds (Upper Siuslaw River and Wolf Creek) required in-depth analysis of effects on hydrologic resources. A discussion of the model used for these calculations is in Appendix C.

There are two basic types of culverts in the planning area: stream culverts and cross drain (relief) culverts. Stream culverts are in place where roads cross stream channels. Most of the stream culverts do not meet current size and design standards. Stream culverts designed to today's standards can accommodate larger stream flows and are less likely to fail under extreme flow conditions than these older culverts. Cross drain culverts are in place intermittently along roads to allow road surface and ditch line water accumulation to flow under roads onto down slope terrain, preventing road damage or failure. Some cross drains can contribute sediment delivery to streams at localized points, generally where the cross drain culverts are in close proximity (approximately 200 feet or less) to stream channels located down slope. Some roads on projected haul routes have an insufficient number of cross drains to meet current standards.

The roads and drainage structures (stream and relief culverts) vary in age and design, but the majority of them are more than 20 years old. A road and culvert inventory conducted in fall/winter 2006 covered approximately 85 percent of the projected haul routes; 250 miles of road and hundreds of culverts were evaluated. This inventory identified that approximately 200 stream crossing culverts and 650 cross drain culverts on the projected haul routes (BLM-controlled roads only) were suitable for replacement based on size, age, and/or condition. Many of these culverts are at high risk of failure in the next one to two decades because they are undersized, already past the lifespan of typical use, or are rusted or crimped. Some of the stream culverts are also barriers to fish and aquatic passage. Most culverts are constructed of corrugated metal pipe (CMP). These culverts have a useful life of approximately 25 years. Many of the existing culverts are older than this and/or are damaged, rusted, undersized, or in poor condition.

The Siuslaw River is subject to high and chronic turbidity during the winter months. A primary concern related to forest roads is the increased sediment delivery to streams and its potential impact on stream biota and water quality. It is hypothesized that the geologic substrates in the eastern portion of the planning area deliver fine sediment chronically to the stream systems. There is a high silt and sand content in the soils of the western portion of the planning area that cause colloidal-sized sediment to dominate the valley bottom.

The Siuslaw Watershed Analysis and the 2006 road inventory indicate that the majority of the road segments within the planning area and on projected haul routes are not connected to the stream system and do not deliver sediment to streams. Approximately 75 percent of the inventoried roads showed no potential to deliver sediment to streams. Of the non-paved roads, approximately 10 percent had the potential to deliver sediment to streams.

No management actions are proposed within the Upper Smith River Tier 1 Key Watershed; however, approximately 9 miles of probable haul routes would be within the watershed. Approximately 7.5 miles of these roads are aggregate-surface and 1.5 miles are bituminous-surface (chip-sealed); no native surface roads will be used within this watershed. There are no stream crossings on the roads being used, and cross drain culverts direct road drainage onto forest slopes. These roads are located just below the ridge line that separates this Key Watershed from the Upper Siuslaw River fifth field Watershed to the north.

FISHERIES

Most of the salmon species found in the planning area are fall chinook, coho salmon, and winter steelhead. The Siuslaw Watershed Analysis (BLM, 1996) describes the presence and distribution of many other salmon, trout and native fish species. Winter steelhead is a major fishery in the planning area. Historically, summer steelhead occupied parts of this area although currently their occupancy is unknown. Downstream of the planning area, within the lower basin, chum salmon were documented earlier in the century (Ecotrust et al., 2002).

Stream reaches of the Siuslaw River, once dominated by large wood, have since been reduced to simplified habitats. A lack of large wood has resulted in downcut channels, gradient discontinuities in tributaries, reduced ground water storage capability and a loss of ability to retain (in channel) trees recruited from riparian areas. Due to alteration of the riparian community, few large conifers are available for stream channel recruitment (USDI-BLM, 2000).

Barrier culverts can reduce fish migration into areas with habitat suitable for spawning and rearing. Use of habitat by coho salmon is currently restricted by barrier culverts; currently 20 culverts blocking approximately 10.4 miles of critical habitat have been identified, and are shown in Appendix B, Table 17. Other barrier culverts are likely to be identified in coming years.

Major emphasis has been placed on replacing failing road infrastructural components, specifically large culverts. Since 2005, major culverts have failed and have been replaced or scheduled for replacement at Hawley, Camp, and Luyne Creeks.

The Upper Siuslaw Aquatic Habitat Restoration Plan and Environmental Assessment (HMP) [BLM EA OR090-98-17, 1998] identified opportunities to restore degraded riparian and aquatic habitats within the Siuslaw River basin. A number of restoration actions have been implemented. Within Riparian Reserves, BLM has converted small plots (2 acres or less) totaling nearly 20 acres from hardwood-dominated stands to native-conifer stands for future large woody debris recruitment to streams.

Mainstem Siuslaw River cascade installations were completed recently to improve the connectivity of the river and floodplain, decrease water temperature and increase ground water retention. Many of the cascade placements were located near the confluences of major tributaries to the Siuslaw. During the warm summer months, cool water from the tributaries collects upstream of the cascades, providing an oasis of cool water for salmonids, other fish and aquatic species.

Additional actions could be implemented under the HMP. Future barrier culvert replacements conducted under this environmental assessment and referenced in EA numbers OR-090-98-17 (HMP) and OR-090-00-14 (Middle Siuslaw – Esmond Creek Aquatic Habitat Restoration Plan) would be analyzed for NEPA adequacy prior to the action being conducted.

WILDLIFE

Threatened and Endangered Species

Northern Spotted Owl (*Strix occidentalis caurina*)

Suitable habitat is generally considered to be conifer dominated stands 80 years old or older, multi-storied in structure, and containing sufficient snags and down wood providing opportunities for nesting, roosting and foraging. The canopy closure generally exceeds 60 percent and average tree diameters typically are 18 inches or greater. Approximately 11,850 acres within the planning area are considered suitable habitat.

Dispersal habitat lacks the forest components needed for nesting, but provides resources for roosting and foraging, allowing transient owls (juveniles or displaced adults) to survive in these areas indefinitely. Dispersal habitat is generally considered to be conifer-dominated stands 40 years and older with 40 percent canopy closure. Suitable habitat also serves as dispersal habitat. Approximately 23,540 acres (including the 11,850 acres of suitable habitat) of the planning area are considered dispersal habitat.

Critical Habitat is a designation of lands meant to support “owl clusters” at a level to ensure a stable population over time and to allow dispersal of owls to new territories. Critical habitat was designated by the U.S. Fish and Wildlife Service in August, 2008 based on stand conditions and

spatial arrangement of habitat across the landscape. Approximately 11,200 acres of critical habitat are located within the planning area (6,700 acres in CHU-34 and 4,500 in CHU-35). Locations of these CHUs can be found on Map 5.

There are 18 spotted owl home ranges located within the planning area; in addition, 24 spotted owl home ranges are located within 1.5 miles (the radius of a circular spotted owl home range) of the planning area boundary. The U.S. Fish and Wildlife Service considers an owl to be at risk (reproductive failure or mortality) when its home range contains less than 40 percent of suitable habitat. There are owl home ranges within the planning area which contain less than 40 percent of suitable habitat within their home range.

The eastern portion of the planning area is located within the South Willamette-North Umpqua Area of Concern. The Willamette Valley has long served as an ecological boundary between the Coast and Cascade mountain ranges (provinces). Spotted owl movement has been documented between these two mountain ranges, but valley grasslands have limited such movements to a certain degree. Over the years, human development has resulted in degradation of forested stands on the valley fringe, further widening this gap and impeding owl movements. To help facilitate owl dispersal between the two provinces, AOCs were identified in locations where forested stands from each province closely converge and provide areas for genetic exchange between them. Three AOCs serving as "habitat bridges" between the mountain ranges have been delineated in western Oregon. The northern-most of these, the South Willamette-North Umpqua Area of Concern, encompasses parts of both the Siuslaw and Upper Willamette resource areas within the Eugene District, as well as parts of the Roseburg District to the south. Approximately 9,770 acres located in the eastern portion of the planning area are located within this AOC, including 860 acres considered to be suitable habitat and 6,645 acres considered to be dispersal habitat.

Marbled Murrelet (*Brachyramphus marmoratus*)
The range of the marbled murrelet extends to 50 miles inland from the Pacific Ocean coastline. Most of the planning area except for approximately one mile of the eastern portion is within this range. The range is comprised of two zones: Zone 1, which extends 35 miles inland from the coast, where most nesting takes place; and Zone 2, which lies between 35 and 50 miles of the coastline. The western portion of the planning area lies within Zone 1 and most of the eastern portion within Zone 2.

There are 14 sites located within the planning area that are considered "occupied" by marbled murrelets, all of which fall within the western portion. Occupancy is determined by confirmed or probable nesting. Once occupancy has been determined, all suitable habitat and stands that will attain suitable status in 25 years within 0.5 mile of the activity center is designated as occupied. (ROD p. C-10)

Suitable habitat is generally mixed Douglas-fir stands 80 years of age or older, contains multiple canopy layers, and contains platforms or nesting branches >5.9 inches in diameter (USDI, 2004).

Approximately 11,850 acres within the planning area are considered marbled murrelet suitable habitat. There are some stands younger than 80 years-old within the planning area that have older, remnant trees with suitable nesting structure. These trees would be identified during field reviews and would be subject to specific mitigation measures as required by the U. S. Fish and Wildlife Service.

Critical habitat is a designation of lands meant to support nesting murrelets at a level to ensure a stable population over time. Critical habitat was designated by the U.S. Fish and Wildlife Service in 1996. Approximately 16,650 acres of critical habitat are located within the planning area (1,625 acres in OR-04-c and 15,025 acres in OR-04-i).

Special Status Species
The planning area falls within the ranges of 14 Special Status Species. They are either unlikely to occur in the vicinity or anticipated effects would be minimal or beneficial. These species would be specifically addressed and subject to any required mitigation measures at the time of project implementation.

Migratory Birds
Neotropical species known or suspected to occur in the planning area would be specifically addressed at the time of project implementation. Appendix E lists these species and potential effects resulting from proposed activities under the action alternatives.

FUELS

Approximately 16,610 acres of the 32,800 acres of BLM-managed lands within the planning area are identified as being within the Wildland Urban Interface (WUI), currently defined as being within 1.5 miles of structures (Lane County Community Wildfire Protection Plan, 2005). The fuels profile on BLM-managed lands is generally light dead fuels with a large brush component. BLM lands are dominated by Fuel Models 5, 8, and 10, with small components of 9 and 11. A description of fuel models is identified in Table 5 below.

The ownership and fuels on adjacent lands are variable and mixed, with the majority owned by large private timber companies. The fuels profile on adjacent lands is represented by Fuel Models 2, 5, 8, 10, 11, and 12. Some areas of heavy Scotch broom are also present, which under some weather conditions may behave like a Fuel Model 6 fuel.

Fire occurrence within the planning area is low. The western portion is fire regime IV, 35-200 year fire return interval with patchy arrangement stand replacing burn severity. The eastern portion of the planning area has a low to moderate fire occurrence and is fire regime III, 35-100 year fire return interval with mixed burn severity.

Fuel model descriptions used in this analysis are from the *Fire Behavior Field Reference Guide, PMS 436-4*, and are described below.

Table 5 Fuel Model Descriptions

Fuel Model (FM)	Description
2 *(Mixed grass and conifer)*	Fire spread is primarily through the fine herbaceous fuels, either curing or dead. These are surface fires where the herbaceous material, in addition to litter and dead down stemwood from the open shrub or timber overstory, contributes to the fire intensity. Generally fires are low intensity ground fires with pockets of higher fuel loading and increased fire intensity.
5 *(brush)*	Fire generally carried in surface fuels, made up of litter, shrubs and the grasses or forbs in the understory. Can exhibit intense fire behavior under severe weather conditions involving high wind, high temperature and low humidities.
6 *(dormant brush)*	Fires carry through the shrub layer where the foliage is more flammable than fuel model 5, but this requires moderate winds, greater than 8 mi/h (13 km/h) at midflame height. Fire will drop to the ground at low wind speeds or at openings in the shrub layer. Generally fires are low intensity slow moving ground fires unless winds over 8 mi/hr are present. If winds over 8 mi/hr are present then fires may become high intensity with high spread rates.
8 *(closed timber litter)*	Slow burning ground fires with low flame lengths; fires may encounter heavy fuel concentrations that can flare up.
9 *(hardwood litter)*	Generally low intensity surface fires. Hardwood stands tend to not sustain fire in the Oregon Coast Range except under the most severe weather conditions.
10 *(heavy timber litter/understory)*	Fires burn in surface and ground fuels with greater intensity than other timber models due to higher fuel loadings. Crowning, spotting and tree torching is frequent.
11 *(light logging slash)*	Fires fairly active in slash and intermixed herbaceous material. Relatively light fuel load, overstory shading and rapid aging of the fine fuels generally limit fire potential. Fuel model 11 while in a 'red slash' condition generally burns like the heavier FM 12.
12 *(moderate logging slash)*	Rapidly spreading fires with high intensities capable of long range spotting. If a fire starts, it is generally sustained until a fuel break or change in fuel type is encountered.

ENVIRONMENTAL CONSEQUENCES

This section explains and summarizes the direct, indirect, short-term, long-term, and cumulative effects of all the alternatives in relation to the identified issues.

This environmental assessment incorporates the analysis of environmental consequences, including cumulative effects, in the USDA Forest Service and USDI Bureau of Land Management "Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl," February 1994, (Chapters 3 & 4) and in the Eugene District "Final Proposed Resource Management Plan/Environmental Impact Statement," November 1994 (Chapter 4). These documents analyze most effects of timber harvest and other related management activities. None of the alternatives in this assessment would have effects on resources beyond the range of effects analyzed in the above documents. The following section supplements those analyses, providing site-specific information and analysis particular to the alternatives considered here.

PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS

BLM commercial timber sales completed within the last ten years in the planning area include Tucker Creek 2 (1999), Tyrrell (2001), Douglas Creek (2005), and Tucker Creek and Norris Divide (2007), all within the eastern portion. Management activities within the adjacent LSR EIS planning area would continue to occur, consisting of density management thinning and riparian restoration projects. Actions proposed and analyzed under existing NEPA documentation would occur; specifically, the Upper Siuslaw Aquatic Habitat Restoration Plan and Environmental Assessment (HMP) [BLM OR090-EA98-17, 1998] in the mainstem Siuslaw River and tributaries, and the Bottomline Density Management Study timber sale located in T. 21 S., R. 5 W., Section 1, which is scheduled to complete harvest by April, 2010. On private lands, intensive timber management actions including clearcutting and broadcast burning are occurring and are likely to continue in the foreseeable future. Other present and reasonably foreseeable actions include agriculture, livestock, grazing, and irrigation, mainly in the eastern portion of the planning area.

UNAFFECTED RESOURCES

The following resources are either not present or would not be affected by any of the alternatives: Areas of Critical Environmental Concern; prime or unique farm lands; wetlands; Native American religious concerns; cultural resources; solid or hazardous wastes; Wild and Scenic Rivers; and Wilderness.

ENVIRONMENTAL JUSTICE

Executive Order 12898 requires that federal agencies identify disproportionately high and adverse human health or environmental effects on minority populations and low-income populations. A two-step screening process was used to determine the extent that EO 12898 might apply to the Upper Siuslaw Landscape project, as shown below.

Minority Populations and Low Income Populations: Guidance from the Council on Environmental Quality (CEQ 1997) states that minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent; or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. U.S. Bureau of Census data from the year 2000 were used at three scales to examine minority populations: the State of Oregon, Lane County, and the Lorane zip code (this zip code area is adjacent to the planning area). The information is shown in Table 6 below.

Table 6 Minority Populations

	Oregon	Lane County	Lorane
2000 population (total)	3,472,867	324,316	389
Black/African-American	1.6%	0.8%	0%
American Indian/Alaska Native	1.3%	1.1%	2.6%
Asian/Pacific Islander	3.2%	2.2%	0.8%
Hispanic	8.0%	4.6%	0.5%

Data from the above table illustrates that the minority populations in Oregon, Lane County, and the Lorane zip code area do not exceed 50 percent, and that the minority population of the affected area is not meaningfully greater than that at the next higher scale.

Low Income Populations: CEQ guidance identifies "low income populations" as persons living below the poverty level as defined annually by the Bureau of Census (CEQ 1997). According to 1999 data from the Bureau of Census, the poverty rates for Oregon, Lane County, and the Lorane zip code area are 12%, 15%, and 4%, respectively.

Disproportionately High and Adverse Impacts: Guidance from CEQ (1997) equates "disproportionately high" impacts as being analogous to "significant," as used by NEPA. The alternatives considered in this environmental assessment could affect two segments of low-income populations. One segment includes those individuals who seek employment in the logging industry. Implementation of any of the action alternatives is expected to provide job opportunities within Lane County. Low-income populations within Lane County may benefit from the additional job opportunities created by the action alternatives.

AQUATIC CONSERVATION STRATEGY

ISSUE 1: What are the effects of timber harvest and associated activities on the attainment of Aquatic Conservation Strategy (ACS) objectives?

Actions proposed within the Riparian Reserves and adjacent uplands may affect attainment of ACS objectives. Initial evaluation of this issue determined that ACS objectives 1, 4, 6, 7 and 9 would be maintained under all action alternatives, whereas effects on ACS objectives 2, 3, 5, and 8 could differ by alternative. Analysis of this issue will compare how each alternative contributes toward attainment of ACS objectives 2, 3, 5, and 8. The Siuslaw Watershed is designated critical habitat for Oregon Coast coho salmon, and actions are proposed that may affect critical habitat. Analysis of this issue will compare how each alternative may affect coho salmon critical habitat.

ACS NO. 2: *Maintain and restore spatial and temporal connectivity within and between watersheds, and drainage network connections including 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.*

Measures:
Connectivity within watershed maintained, restored, or degraded by measuring:

- Number of barrier culverts removed and/or replaced
- Miles of aquatic habitat made available
- Miles of coho salmon critical habitat made available

ALTERNATIVE A

Under Alternative A, spatial and temporal connectivity within most of the planning area would be maintained. Twenty culverts that are barriers to aquatic habitat have been identified. Four of these barrier culverts have a high probability of failure within the next 8-15 years, and would likely be replaced for safety reasons. Replacement of these 4 culverts would restore approximately 4 miles of aquatic and 2 miles of critical habitat. The remaining 16 culverts would continue to disconnect spatial and temporal connectivity within the planning area, and approximately 16 miles of aquatic potential habitat and 9 miles of coho salmon critical habitat would remain inaccessible.

ALTERNATIVES B, C, D, AND E

The action alternatives include proposals to remove and replace 20 identified barrier culverts. Replacement would depend on available funding. Spatial and temporal connectivity for anadromous and resident fish as well as other aquatic species would be maintained if culvert removal and/or replacement do not occur.

Spatial and temporal connectivity would be restored where barrier culverts are removed and/or replaced with passage friendly culverts, bridges or crossings. The potential restoration would include:

- Barrier culverts removed: 20
- Miles of aquatic habitat made available: 20
- Miles of coho salmon critical habitat made available: 10

Appendix B, Table 18 details the locations where habitat would be restored by replacement of these culverts.

ACS Nos. 3 and 5

Table 7 shows the comparison of alternative for ACS Nos. 3 and 5. Analysis follows the table and is specific to ACS Nos. 3 and 5.

Table 7 Comparison of Alternatives for ACS Nos. 3 and 5

	Alternative			
Effects – short term	**B**	**C**	**D**	**E**
Number of stream crossing culverts: 1) existing replaced 2) existing removed 3) added temporarily 4) added permanently *	 165-240 0-25 10-20 0-15	 155-215 0-10 5-15 0-10	 155-215 0-10 5-15 0-10	 158-220 0-15 7-17 0-13
Increase in sediment delivery from replacing, removing, or adding stream culverts- cy/year *	20-60	15-50	15-50	17-53
Miles of road with sediment delivery potential: 1) Renovation/improvement † 2) New construction	 30-45 0-3	 20-35 0-1.5	 20-35 0-1	 28-42 0-2.5
Increase in failure risk from adding new stream crossing & over-wintered temporary culverts (cy) ‡	0-7000	0-5,000	0-5,000	0-6,000
Percent Increase in sediment delivery – heavy traffic use versus existing traffic use. **	< 42	< 30	< 30	< 34
Effects – long term				
Number of stream crossings: 1) Existing replaced 2) Existing removed	 165-240 0 -25	 155-215 0 -10	 155-215 0 -10	 158-220 0 -15
Number of cross drains culverts added: 1) Gravel or native surface 2) Chip seal surface	 130-200 45-95	 120-180 45-95	 120-180 45-95	 130-200 45-95
Number of cross drain culverts replaced	600-750	450-600	425-575	540-700
Reduction in stream crossing failure risk by replacing stream crossings (cy).	15,400 – 20,900	15,000-19,300	15,000-19,300	15,200-20,700
Reduction in stream crossing failure risk from removing existing stream crossings (cy). §	0-5,000	0-2,000	0-2,000	0 -3,000
Miles decrease of roads that deliver sediment from adding cross drains: 1) Gravel/dirt surface 2) Chip seal surface	 6 -9 4 -7	 5 -8 4 -7	 4.5 -7.5 4 -7	 6 -9 4 -7
Miles of existing roads with potential sediment delivery decommissioned.	1 -3	0.5 -1.5	0.5 -1.5	0.5 -2.0
Percent decrease in sediment delivery after project completion. ††	12.5	12.8	12.8	12.7
Number of stream reaches with large woody debris added. (ACS 3 only)	242	NA	NA	175
Acres Riparian Reserves thinned (ACS 3 only)	4,300	2,200	2,100	2,900

Notes: Numbers for Alternative A would be zero for all effects.
Numbers of stream crossing and cross drain culverts and associated effects are based on BLM-controlled roads only.

Assumptions:

* Culverts would be added, replaced, and/or removed relatively evenly over 5 to 10 years (life span of the project).

† Does not include sediment delivery from chip seal surfaced roads (these roads would have sediment delivery primarily on the cut and fill slopes and would be negligibly impacted by timber haul).

‡ Assumes average risk of 200 cubic yards per site (increased risk of catastrophic fill failure).

§ Assumes average benefit of 200 cubic yards per site (decreased risk of catastrophic fill failure).

** This is a yearly increase. Assumes a 1-3 year increase for secondary roads that access a single harvest unit and 2-10 year increase for mainline haul routes that access multiple harvest units. Analysis based on road inventory surveys and estimated haul route. Assumes cross drain culvert additions are made prior to haul on chip seal, gravel, and native surface BLM roads.

†† This reduction is due to the addition of cross drains and road decommissioning and is a permanent yearly decrease. Assumes a return to existing (pre-project) traffic use with an upgraded road drainage system.

ACS NO. 3: *Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.*

Measures:
Physical integrity of the aquatic system maintained, restored, or retarded by measuring:

- Number of stream crossings removed or added.
- Number of culverts upgraded.
- Number of stream reaches with large woody debris added.

ALTERNATIVE A

Under Alternative A, the physical integrity of the aquatic system would initially be maintained. No stream culverts or cross drain culverts would be replaced, removed, or added. As a result, eventual fill or stream crossing failures could contribute large volumes of sediment to the stream system which would retard the attainment of ACS Objective 3. Riparian stands would continue to develop naturally, and restoration of the physical integrity of stream channels would take place slowly over the long term. Stream complexity and cover components would remain similar to current conditions until riparian stands develop and contribute to natural recruitment into streams.

ALTERNATIVES B, C, D, AND E

Stream crossing culverts and cross drain (relief) culverts

Using the 2006 road and culvert inventory of projected haul routes, the estimated acres to be accessed, and the type of access required, the number of stream crossing culverts or cross drains to be removed, replaced, or added was estimated for each alternative.

All new or replaced permanent stream crossings culverts and temporary stream crossing culverts in place for more than 1 summer season would be sized to accommodate 100 year storm events (RMP, p161) to preclude direct sediment to streams and mitigate the risk of failure in major storm events. Where feasible, temporary culverts would be left in place for only 1 summer season in order to eliminate fill failure risk.

Damaged, undersized, or rusted stream crossing and cross drain culverts would be replaced on haul routes where needed. Replacing culverts would reduce the risk of fill failures and lead to a long-term reduction in the risk of chronic and/or catastrophic failure of fill, which would help to maintain the physical integrity of the stream channels. The removal, replacement, or addition of stream crossing culverts would produce a pulse of sediment (see ACS objective 5) but it would be unlikely to affect the physical integrity of the stream channels.

There would be a small increased risk of stream crossing failures where new permanent or temporary, over-wintered culverts are added. This would be partially or fully offset by a decreased risk of stream crossing failures where existing stream culverts are removed on decommissioned roads. Few new stream crossing culverts would be needed on projected haul routes; the number approximates that of culverts that would be removed during road decommissioning (see Table 7). To minimize the risk of failure, design would be based on site-specific analysis.

Replacing cross drains reduces the risk of road-related landslides, which would reduce the risk of sediment delivery to streams, thus maintaining the physical integrity of the stream channels. Additional cross drain culverts would further reduce the risk of chronic catastrophic stream crossing failures, road-related landslides, and direct sediment delivery to streams, thus maintaining the physical integrity of the stream channels. Refer to table 19 in Appendix C.

Stream Buffers

Proposed thinning in the Riparian Reserves would accelerate the development of large trees more quickly than if left untreated. Thinning would increase the potential for more large woody debris recruitment in the future. As large trees eventually fall into stream channels, the physical integrity of the streams would be restored under all action alternatives. Under Alternatives B and E, trees would also be felled into third order, fish-bearing stream reaches in close proximity to proposed harvest areas, which would restore the physical integrity of the streams more quickly than under Alternatives C and D.

Untreated stream buffers would maintain the physical integrity of stream banks and channels. Buffer widths would be a minimum of 75 feet under all Alternatives. Buffers would be designed on a site-specific basis to protect stream temperature and sediment delivery. Factors used to determine stream buffers widths are included in the Design Features.

Overall comparison among the alternatives on the effects of attainment of ACS objectives shows only slight differences resulting from the proposed replacement, removal or addition of stream crossing and cross drains culverts. Such comparison is based on the number of culvert sites and the associated risk offset by resulting long term improvements.

ACS NO. 5: *Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.*

Measures:
Sediment regime maintained, restored, or retarded by considering:

- Miles of existing road with sediment delivery potential decommissioned
- Number of high risk culverts replaced or removed
- Percent increase in short-term sediment delivery due to an increase in timber haul
- Percent decrease in long-term sediment delivery due to the addition of cross drains
- Miles of road construction and road improvement with sediment delivery potential

ALTERNATIVE A

Under Alternative A, the sediment regime would be maintained in the short term. There would be no increase in road use from haul, so there would be no associated increases in sedimentation in the 5 to 10 year time span of the proposed project. The road segments that currently deliver sediment would continue to deliver at the existing rate, which would vary based on future use and the condition of the roads in the planning area. There would be no direct sediment pulses from removing and replacing stream culverts; installing new temporary or permanent stream crossing culverts; or renovating, improving, or constructing roads. There would be no added risk of fill failure from having new temporary or permanent stream crossing culverts in place.

The risk of culvert failure and chronic or catastrophic sedimentation would be higher under this alternative than under Alternatives B, C, D, or E because old, damaged, and/or undersized culverts would not be upgraded. As a result, eventual fill or stream crossing failures could contribute large volumes of sediment to the stream system which would retard the attainment of ACS objective 5. Reduced sediment delivery from adding cross drains, decommissioning roads, removing stream crossing culverts, and upgrading road surfacing would not occur.

ALTERNATIVES B, C, D AND E

Activities proposed under all the action alternatives would affect the sediment regime:

Increases in sediment delivery would be caused by:

- yarding
- increased road use from timber hauling and related activities
- adding temporary and/or permanent stream crossing culverts
- removing and replacing existing culverts
- renovating, improving, or constructing roads

Decreases in sediment delivery would be caused by:

- upgrading existing stream and cross drain culverts
- adding cross drains
- upgrading existing roads by adding rock
- removing existing stream crossing culverts
- decommissioning existing roads that currently deliver sediment

Table 7 shows the factors used to evaluate the effects of these activities. For each alternative the quantities for many of the factors were estimated using field survey of roads and culverts on the projected access routes.

The risk of sedimentation from yarding would be minimal. Appropriate BMPs would be followed and untreated stream buffers would be designed to minimize sedimentation risk. See discussion under ACS 3.

Direct sediment pulses would be possible from removing and replacing stream crossing culverts or adding temporary or permanent stream crossing culverts. Estimated added sediment delivery would be 1 cubic yard or less for each instance based on previous field experience with these activities (USDI-BLM 2003). It is assumed that activities would be spread out evenly over 5 to 10 years.

Road construction would have the potential to deliver sediment pulses from installing stream crossing culverts. An estimate of the number of new stream crossings needed was determined by the roads and transportation analysis which was based on the potential access routes. Most new temporary stream crossing culverts would be on new spur roads constructed to access individual harvest areas. New stream crossing culverts (temporary or permanent) that are in place for one or more winter seasons pose a risk of fill failure that could add tens to hundreds of cubic yards of sediment from catastrophic failure per site. Installing culverts sized to accommodate 100 year storm events and leaving temporary stream crossing culverts in place for only one summer season where feasible would reduce or eliminate the potential for large fill failures at these sites.

Site-specific analysis and design and following appropriate BMPs would help to reduce the potential risk of failure. Permanent stream crossings would be maintained similarly to existing stream crossings on BLM-controlled roads. The roads and transportation analysis indicates that a similar number of existing stream culverts would be removed during decommissioning as compared to the estimated number of new temporary and permanent stream culverts installed (see Table 7 above and restoration section below) under each action alternative. The increased risk of sedimentation from the installation of new culverts would be partially to fully offset by the decreased risk of sedimentation from the removal of existing stream culverts when roads are decommissioned.

Road renovation and/or improvement could include clearing vegetation, upgrading road surfacing and culverts, grading, and/or widening the road grade. These activities could increase sediment delivery to streams where roads are connected directly (via stream crossing culverts) or indirectly (via cross drain culverts in close proximity to streams) to stream channels. The proposed design features and adherence to BMPs would minimize sedimentation from these activities.

Increased road use for timber haul and associated activities would cause road surface erosion and have the potential to deliver sediment to streams. Road surface erosion from haul was estimated using data from the 2006 road and culvert inventory. A modified version of the road surface model from the Washington Standard Methodology for Conducting Watershed Analysis (Washington Forest Practices Board, 1997) was used for this analysis. This model was used to determine the relative differences in delivery among alternatives and to highlight the road segments with the greatest sediment production potential. The data from the road analysis is high quality and includes information on approximately 85 percent of the projected haul routes.

This information was used to prioritize areas for road and culvert upgrades or additions to reduce sediment delivery. Road segments with high delivery rates would be restricted to dry season haul to minimize increases in sedimentation.

Table 7 shows modeled increases in sediment delivery from haul on BLM-controlled roads over existing conditions. The base line represents existing traffic use with existing cross drain culverts. The change represents a percent increase in cubic yards of sediment delivery on a year-to-year basis. The modeled change assumes that needed cross drain culverts are installed prior to timber haul.

The WFPB model, which provides the closest comparison to local conditions, uses some simplifying assumptions that cause modeled results to overestimate sedimentation increases. The

complexity of the road network and the landscape scale plan for a multiple-year project contribute to the overestimation.

- The predicted change was based on the assumption that all haul roads would have increased traffic use simultaneously. This is unlikely because many of the secondary roads and some of the main line roads would only be used for 1 to 3 years. Simultaneous use of all, or even most roads, is very unlikely.
- The model has a small number of traffic use categories. The increased use in main line and secondary roads is likely to be more sporadic than could be modeled. The actual difference in sedimentation between current use and predicted use is likely to be smaller than predicted by the model.
- The traffic factors in the model did not separate summer and winter haul. Winter haul rates are factored into the model. Restricting winter haul on road segments with high delivery potential would result in a smaller increase in sedimentation than indicated by the model.
- No attempt was made to quantify the miles of existing native surface road, upgraded to rock surfacing prior to haul and their sediment delivery potential. Adding gravel surfacing to any of these roads would reduce the overall sedimentation and be lower than the modeled results.

Despite these simplifying assumptions, the modeled results are sufficient to provide an approximation for analysis.

Analysis:
The risk of stream crossing failures and road related landslides would be lowered. The replacement of damaged, rusted, or undersized cross drains would also reduce the probability of road related landslides which could potentially add large volumes of sediment to streams.

Sediment increases from activities associated with installing cross drains; yarding; road construction, renovation/improvement, and decommissioning; and removing or replacing stream crossing culverts would have a minor effect on total sediment delivery because mitigation measures and appropriate BMPs would be followed. The sediment regime from these activities is likely to be maintained under the action alternatives. The estimated sediment pulses from adding, removing, or replacing culverts represent less than 1 percent of the natural background rate. The sediment increases would occur over an estimated span of 5 to 10 years. These effects would occur primarily within 6 of the 8 sub-watersheds (sixth field) of the Upper Siuslaw River fifth field watershed; very few acres would be treated in the other two sub-watersheds.

Alternatives B and E would require the most road construction, renovation or improvement, and treat the greatest number of acres, would be expected to produce the highest levels of sedimentation.

Similarly, sediment increases from haul would be highest under Alternatives B and E because the longer haul routes under these alternative equates to higher connectivity of road drainage to streams. Surveys of projected haul routes in the Upper Smith River Tier 1 Key Watershed indicate that there would be no potential for direct or indirect sediment delivery from haul in this watershed under any of the action alternatives.

In the long term, there would be some restoration of the sediment regime. Sediment reduction would correlate to the number of road miles upgraded during the project. The proposed road and culvert updates and removal of existing stream crossing culverts would result in lower levels of sedimentation (post haul) than existing conditions. Replacing damaged, rusted, and/or undersized stream crossing culverts with larger culverts would reduce the amount of chronic erosion and the risk of catastrophic failure of thousands of cubic yards of fill at these sites (Table 7). Permanently removing existing stream crossing culverts would also have a beneficial effect of reducing the risk of catastrophic failure of hundreds to thousands of cubic yards. Where feasible, the decommissioning of roads that have a high risk of sediment delivery to streams would further reduce the potential for sedimentation.

ACS NO. 8: *Maintain and restore the species composition and structural diversity of plant communities in riparian areas 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 distribution of coarse woody debris sufficient to sustain physical complexity and stability of streams and riparian conditions.*

Measures:
S*tructural diversity maintained, enhanced or restored by considering*:

- Number of acres of Riparian Reserves treated to accelerate late-successional characteristics.

ALTERNATIVE A

Structural diversity of Riparian Reserves would be maintained as stands continue to grow in a suppressed condition.

ALTERNATIVES B, C, D AND E

Structural diversity of Riparian Reserves would be enhanced by the proposed density management thinning, which would open the canopy to improve growing conditions and accelerate the attainment of late-successional characteristics. The proposed proportional thinning on LSR lands under Alternatives C, D and E would restore structural diversity by promoting the rapid development of late-successional characteristics with large trees and a diverse understory of conifers and hardwoods.

Table 8 Riparian Reserves treated (*approximate acres*)

	Alternative			
LUA	**B**	**C**	**D**	**E**
Matrix	2,400	1,100	1,000	1,300
LSR	1,900	1,100	1,100	1,700

Botanical surveys would be conducted prior to treatment. Special status species would be protected in accordance with policy in place at the time of implementation.

WILDLIFE

ISSUE 2: What are the effects of management activities on the functionality of the South Willamette-North Umpqua Area of Concern (AOC) located in the eastern portion of the planning area?

All lands within the eastern portion of the planning area fall within the South Willamette- North Umpqua AOC. The Interagency Scientific Committee (pre-Northern Spotted Owl, Record of Decision {pre-NSO-ROD}) determined that the AOC constituted a "habitat bridge" on federal land that they considered to be essential for owl movement and genetic interchange between the Oregon Coast and Cascade ranges. Actions are proposed that could affect the functionality of the AOC. Analysis of this issue will compare how proposed timber harvest and other activities under each action alternative may affect the AOC's ability to function as a dispersal corridor for owls.

Measure:

- Acres of northern spotted owl dispersal habitat thinned within the AOC.

ALTERNATIVE A

No harvests would occur under this alternative and there would be no alteration of spotted owl habitat within the AOC. The remainder of the stands would continue to grow in an overstocked condition and tree growth would slow over time. There would be an increase of small snags and coarse woody debris (CWD) created through suppression mortality.

ALTERNATIVES B, C, D, AND E

Table 9 Treatments in the Area of Concern

	Alternative			
	B	C	D	E
Age classes of treated dispersal habitat	40-79	40-59	40-59	40-79
Dispersal habitat treated (*acres*)	4,766	1,597	1,404	2,071
% of AOC within Planning Area	49	16	14	21
% of AOC within Eugene District	10	4	4	5
30-39 year age class treated (*acres*)	664	643	631	664

Each of the action alternatives proposes moderate thinning of owl dispersal habitat in the AOC. Canopy closure would remain above 40% post-harvest and the thinned stands would continue to provide dispersal habitat. Each alternative would also treat stands between 30-39 years old that currently are not functioning as dispersal habitat.

Thinning would improve growing conditions by reducing competition between trees, which would result in faster growth and development of desirable components for dispersal habitat, and improved roosting and foraging habitat conditions. Treatments in stands aged 30-39 years would also accelerate the development of dispersal habitat characteristics.

Thinning under Alternatives C and D would include stands within spotted owl home ranges, but treatments would be confined to stands aged 40-59, and fewer acres are proposed for treatment than in Alternative B and E. Impacts in either alternative would be expected to be minimal to moderate. Because stands aged 60-79 years old would not be thinned, habitat conditions within them would not be improved as a result of treatment for these two alternatives.

Alternatives B and E include thinning in stands 60-79. Alternative B, which also proposes thinning in dispersal habitat within spotted owl home ranges, would treat the greatest number of acres and would have the greatest impact on dispersal habitat.

Under Alternative E more acres would be thinned than under Alternatives C and D. Harvest would occur in non-habitat stands (with a birth date of 1968 or younger) within spotted owl home ranges. Changes in resident owl movements would be minimal, since the non-habitat areas are less frequented by those owls. There would be no treatment of existing dispersal habitat within spotted owl home ranges; therefore, Alternative E would not adversely affect owls. Compared to the other action alternatives, Alternative E would have the least impacts to owls and their habitat within the AOC.

There is evidence that spotted owls tend to avoid thinning units in the short term, for up to ten years, modifying their movements and expanding or altering home ranges (Meiman, 2004). Harvest under each of the alternatives would occur in scattered locations over a period of ten years, thereby minimizing disturbances to owls that may use the AOC as a land bridge between the Oregon Coast and Cascade ranges.

Under all action alternatives, accelerated development of dispersal and suitable habitat due to thinning outside home ranges would enhance future dispersal opportunities for juvenile and transient owls. Improved dispersal conditions outside home ranges would allow transitory owls dispersal opportunities where competition from resident owls would be lessened. These improved opportunities would increase the likelihood of dispersal across the valley floor, thus improving genetic interchange within the species. In addition, thinning of stands aged 30-39 under all action alternatives would accelerate development of habitat and enhance future dispersal opportunities for juvenile and transient owls.

ISSUE 3: <u>What are the effects of management activities on spotted owl habitat within Critical Habitat Units and the western portion of the planning area?</u>

A portion of lands within the western portion of the planning area fall within Critical Habitat Units (CHUs) for the northern spotted owl. The management objectives for CHUs are to provide suitable habitat in adequate quantities and proper spatial arrangement across the landscape as well as owl movement (dispersal) that is essential for the conservation of the northern spotted owl. Each of the alternatives treat dispersal habitat in northern spotted owl CHUs. Analysis of this issue allows for comparison of these treatments.

The majority of lands within the western portion of the planning area do not fall within Critical Habitat Units (CHUs) for the northern spotted owl. Each of the alternatives may affect owl movement (dispersal) through the LSR and Matrix LUA. Analysis of this issue allows for comparison of these effects throughout the western portion not including CHUs.

Measure:

- Acres of northern spotted owl dispersal habitat thinned within the CHUs and the western portion of the planning area.

ALTERNATIVE A

No harvests would occur under this alternative and there would be no alteration of spotted owl habitat within the CHUs or the western portion of the planning area. The stands would continue to grow in an overstocked condition and tree growth would slow over time. There would be an increase of small snags and coarse woody debris (CWD) created through suppression mortality due to natural disturbances.

ALTERNATIVES B, C, D, AND E

Table 10 Treatments in CHUs and western portion

			Alternative			
			B	C	D	E
CHU-34	Moderate Thins	Dispersal habitat treated (*acres*)	151	115	101	151
		% of CHU within Planning Area	17	13	12	17
		% of CHU	1	1	1	1
	Heavy Thins	Dispersal habitat treated (*acres*)	NA	NA	14	NA
		% of CHU within Planning Area	NA	NA	2	NA
		% of CHU	NA	NA	<1	NA
CHU-35	Moderate Thins	Dispersal habitat treated (*acres*)	448	267	0	383
		% of CHU within Planning Area	10	6	0	9
		% of CHU	1	1	0	1
	Heavy Thins	Dispersal habitat treated (*acres*)	0	4	271	65
		% of CHU within Planning Area	0	<1	6	1
		% of CHU	0	<1	1	<1
Western Portion	Moderate Thins	Dispersal habitat treated (*acres*)	4,556	2,559	386	4,177
		% within Western Portion	20	11	2	18
	Heavy Thins	Dispersal habitat treated (*acres*)	0	101	2,169	378
		% within Western Portion	0	<1	9	2

Moderate thinning proposed in all action alternatives would improve growing conditions by reducing competition between trees, resulting in accelerated diameter growth and promote rapid development of forest structure required for suitable habitat. Moderate thinning would result in post-treatment canopy closures of 40 percent or greater, and the thinned stands would continue to provide dispersal habitat.

Heavy thinning proposed in Alternatives C, D, and E would create wider and more variable spacing, which would result in accelerated growth of remaining trees and structural characteristics of suitable habitat, promote the establishment of understory conifers, as well as produce higher quality habitat. Heavy thinning would result in post-treatment canopy closures between 30 and 40 percent, and temporarily (10 to 15 years) bring treated stands below dispersal habitat thresholds.

Under Alternatives C and E heavy thinning would occur only where more than 40 percent of the area consists of suitable habitat; however, heavy thinning may occur within owl home ranges with less than 40 percent suitable habitat. Because heavy thinning in owl home ranges under Alternative C, D and E could occur where less than 40 percent of the owl home range consists of suitable habitat, adverse affects to owls may occur. In the long term, the heavy thinning under Alternative C, D and E would produce higher quality suitable habitat faster than moderate thinning.

ISSUE 4: What are the effects of management activities on the conservation of the marbled murrelet in Late Successional Reserves?

The planning area is within the nesting range of the marbled murrelet. Habitat types (suitable and potential nesting structure within younger stands) are defined by interagency policies. Management actions could affect murrelet habitat. Analysis would focus on the development of local murrelet habitats over time.

Measure:

- Change in acres of marbled murrelet suitable habitat over time.

ALTERNATIVE A

No harvests would occur under this alternative. Stands would continue to grow in an overstocked condition and tree growth would slow over time. Stands that currently function as suitable habitat would continue to function as such. A few acres would gradually develop characteristics suitable for marbled murrelets over the next 100 years; however this would occur at a much reduced rate than if the stands are thinned. Refer to figure 1.

ALTERNATIVES B, C, D, AND E

Table 11 Treatments in marbled murrelet habitat

	Alternative			
	B	C	D	E
Ages Thinned	30-79	30-59	30-59	30-79
Moderate Thins (*acres*)	5,700	3,300	0	5,100
Heavy Thins (*acres*)	0	200	3,500	500

Marbled Murrelet nesting structure and habitat would not be thinned. Stands which may have potential marbled murrelet structure would be evaluated for the presence of murrelets, or potential structure within a stand would be retained on a case by case basis where potential structure may be present in the treatment areas.

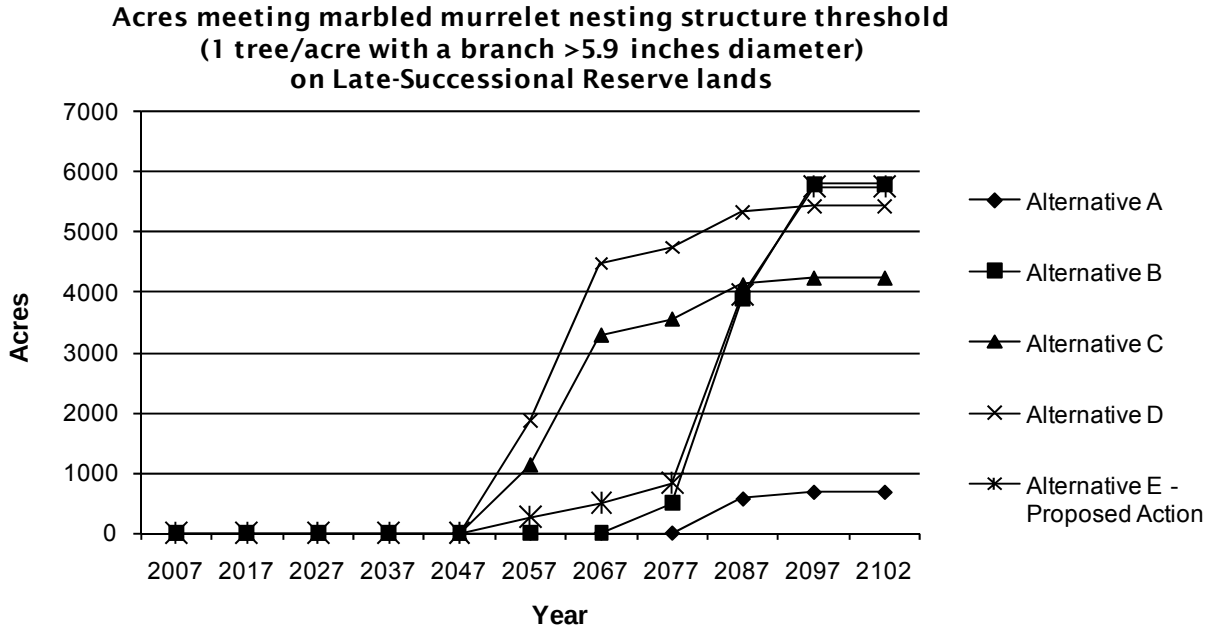
Thinning proposed under the action alternatives would result in stands attaining suitable characteristics for nesting structure approximately 40 to 60 years after treatment. The intensity of thinning would determine how quickly results could be achieved:

- Moderate thinning Alternative B: 60 years.
- Moderate and heavy thinning Alternatives C and E: 40 years
- Heavy thinning Alternative D: 40 years

Under Alternative D, the heavy thinning-only prescription would produce the largest number of acres with potential nesting structure for marbled murrelets at a more rapid rate than the other alternatives. Under all action alternatives, all thinned stands would achieve the target habitat characteristics suitable for nesting structure in approximately 95 years.

In the long term, all the action alternatives would contribute more acres of improved marbled murrelet structure more quickly when compared to Alternative A (no action).

Figure 1



BOTANY/INVASIVE SPECIES

ISSUE 5: <u>What are the effects of management activities on the spread of invasive species?</u>

Ground disturbance and a decrease in canopy closure generally lead to an increase in invasive non-native and noxious weeds, as evidenced in literature review and observations on the Eugene District. Analysis of this issue will determine the increase of non-native and noxious weed cover resulting from ground disturbing activities and a decrease in canopy closure proposed in the action alternatives.

Measure:

- Acres with probable cover of noxious weeds caused by thinning, road work and landings.

ALTERNATIVE A

Management actions under this plan would not occur and therefore would not contribute to increased acreage of potential weed coverage over background amounts. It would be likely that noxious weeds would continue to spread on BLM-managed land within the planning area through seed dispersal and road use. As forest shade increased over time, weed coverage could decline. It is expected that the current Eugene District weed management program would probably continue weed inventories and treatments on an annual basis, consistent with applicable policies.

ALTERNATIVES B, C, D, AND E

Proposed management actions would be likely to cause a temporary increase in weed cover. Resulting weed cover is hard to predict due to local conditions and the vagaries of seed dispersal and establishment. Weed cover observed on recently decommissioned roads was used to estimate resulting cover from road construction and road renovation. The possible percent increase was modeled using observations of weed abundance at various site types and is shown in Table 12.

Table 12 Estimated average increase of weed cover (*percent*)

	Non-Native Invasive Weeds		Noxious Weeds	
	Western Portion	Eastern Portion	Western Portion	Eastern Portion
Existing Roads Within Units	25	37.5	2.5	20.0
New Road Construction	5	70.0	0.5	30.0
Renovate Non-inventoried Roads	5	70.0	0.5	30.0
Ground Based Logging	2	10.0	0.2	5.0
Cable Logging	1	5.0	0.1	2.5
Helicopter Logging	1	5.0	0.1	2.5
Heavy thin	2	NA	0.2	NA
Aster Reserve Treatment	NA	2.0	NA	1.0

The estimated average percent cover was multiplied by the approximate acres of disturbance caused by proposed management actions to obtain resulting dispersed acreage of weeds.

Table 13 Weed increase as dispersed over total area of disturbance (*acres*)

	Alternative			
	B	C	D	E
ODA Noxious Weeds	286	92	88	156
Total Non-native weeds	677	259	273	418

The largest increase of weed cover is expected to occur from ground-based logging, road construction and renovation of roads within harvest areas that are thinned. Moderate thinning treatments proposed for the majority of stands would cause less of an increase in weed cover than heavy thinning prescriptions. Alternatives B and E include ground-based operations and could have a greater increase in weed cover than Alternatives C and D. However, Alternatives C, D and E include heavy thinning prescriptions which may also encourage weed invasion due to resulting open stand conditions.

Cleaning equipment prior to entry onto BLM-managed land would minimize the introduction of weeds into harvest areas. After completion of management activities, weed coverage could decrease to zero on decommissioned roads and thinned stands as canopy cover recovers. This decrease could take approximately 15 to 30 years in thinned stands (Muir et al., 2002), The majority of weeds in most areas would eventually be shaded out, but not before providing a seed source for other newly opened roads and timber harvest areas, while competing with native early-successional species and seedling trees.

Weed coverage could persist where shade tolerant weeds, including false brome, are introduced. False brome is favored by disturbance when opening up habitat, but it is shade tolerant and can potentially dominate a forest understory.

Measures to slow the spread of weeds are described in Appendix A, Project Design Feature 22 and would be implemented as needed based on site-specific evaluation. It is expected that the current Eugene District weed management program would continue consistent with policies in effect at the time of implementation which includes weed inventories and treatments that are conducted by field office personnel on an annual basis.

Proposed treatments in *Eucephalus vialis* Botanical Reserves would be designed to minimize intense disturbance.

ISSUE 6: What are the effects of management activities within botany reserves on *Eucephalus vialis*?

Eucephalus vialis (wayside aster) is a Bureau-Sensitive species that grows more vigorously in relatively open sites. Approximately 67 acres of RMP-designated botanical reserves with Eucephalus vialis are proposed for treatment in the planning area. Actions are proposed in these reserves to reduce vegetative competition and to maintain an open canopy. Analysis of this issue will help determine the effects and risks of these treatments to aster populations.

Measure:

- Effectiveness of treatment methods used to improve growing conditions for *Eucephalus vialis*.

ALTERNATIVE A

Risks associated with implementing the action alternatives would not occur. However, the risk of decline of some *Eucephalus vialis* sites due to possible increasing shade, especially where trees are densely stocked or brush is highly competitive, would continue. Benefits from treatments would not occur.

ALTERNATIVES B, C, D AND E

No management actions are proposed for *Eucephalus vialis* in stands over age 80. Five sites totaling 67 acres of *Eucephalus vialis* reserves in younger stands are proposed for treatment:

Table 14 Location of *Eucephalus vialis* treatments

Legal Location (TRS)	Stand Birth Date	Acres
20S-4W-7	1950	11
20S-4W-19	1967	1
20S-4W-15	1966	12
20S-4W-21	1966	40
20S-4W-35	1965	3

Reserves would be treated where excess competition, excess canopy cover, or noxious weeds are found to be inhibiting growth or reproduction of *Eucephalus vialis*. Treatments would include prescribed fire (underburning) to lessen the competition from understory brush, which is thought to affect *Eucephalus vialis* (USDI-BLM 2006); or thinning to reduce canopy cover. Excessive canopy closure can suppress the size and flowering of *Eucephalus vialis* (Kaye and Thorpe 2006). Where plants are suppressed due to excessive shading and competition, treatments would be beneficial: plants could become larger, flower more often, and have a reduced risk of local extirpation.

Under Alternative B, prescribed fire (underburning) would be used to reduce competition from understory brush. Fire treatment would consist of low intensity underburning conducted in early summer or late fall. Burning would result in a reduction of the amount of the existing live fuel component (shrubs, forbs and moss). Low tree mortality would be expected. Where needed, hand piling and burning could occur.

Because seedling recruitment appears to be largely restricted to mineral soil (Kaye and Cramer 2002), fire should provide enhanced conditions for seedling recruitment. A series of studies of the effects of burning *Eucephalus vialis* are being conducted (Kaye and Thorpe 2006). Risks of fire treatment include direct disturbance of *Eucephalus vialis* plants, and indirect effects of vegetation change. Prescribed fire, especially pile burning, could kill plants, although the deep rhizomes of the plants should be resistant to lower intensity fire. Non-native invasive weed invasion and native plant competition can be a risk. Invasive weeds can increase in *Eucephalus vialis* habitat after treatments (Kaye and Thorpe 2006). Overall, the benefits resulting from fire treatment would outweigh the risk. A regimen of removal and fire treatments would be utilized as necessary to control competing weed species.

Prescribed fire alone would not be likely to reduce canopy closure to the open condition preferred by *Eucephalus vialis*

Under Alternative C, commercial timber harvest would improve conditions for *Eucephalus vialis* by reducing excess canopy cover. Yarding skid trails and pile burning of residual slash would cause a

greater disturbance to habitat and a higher potential of non-native invasive weed invasion and native plant competition than the other action alternatives. Because thinning treatments would be a one-time activity, disturbance would be concentrated in time. Although benefits of a more open canopy would accrue, this alternative poses the highest level of risk to the species due to weed invasions. The benefits provided by underburning would not occur.

Under Alternative D, non-commercial thinning, generally through girdling, would provide more open canopy to the benefit of *Eucephalus vialis*. The risk of non-native invasive weed invasion and native plant competition would be lower than under Alternative C. Disturbance would be less because trees would not be yarded. Staging thinning treatments over time would gradually decrease canopy cover and slow the invasion of competitive plants. The benefits provided by underburning would not occur.

Alternative E would use a combination of under-burning and non-commercial thinning. This would provide the complementary benefits of both treatments. Fire treatments would provide a burned soil surface seed bed and remove competing plant species that are less adapted to fire. Some hand piling and burning could be necessary to reduce fuel loading after non-commercial thinning. Effects of the under-burning would be similar to Alternative B. Hand piling and burning could kill plants that have burn piles placed on top of them; the number of plants destroyed by this action is expected to be minimal. A regimen of removal and fire treatments would be utilized as necessary to control competing weed species. Non-commercial thinning would reduce canopy cover more gradually than in Alternative C; the effects of the non-commercial thinning would be similar to Alternative D.

LOGGING

ISSUE 7: What are the effects of alternative design features on the cost of yarding, road construction and road renovation?

Each of the action alternatives employs a different combination of logging systems due to design constraints, environmental concerns, and the extent of area treated. Costs of yarding, road construction, and road renovation would vary by alternative. Analysis of these costs would provide a means to compare cost-effectiveness among alternatives.

Measure:

- Cost per acre and cost per thousand board feet (MBF).

Appendix D details the assumptions and calculations used in analyzing costs.

For the purposes of analysis, average logging costs per MBF were determined by using the appraised logging system costs for partial harvest projects sold in the Siuslaw Resource Area between March 2007 and March 2008.

Ground-based	Cable	Aerial
$96/MBF	$135/MBF	$360/MBF

Table 15 Summary of Yarding and Roading Features and Costs

	Alternative			
	B	C	D	E
Treatment acres	12,100	6,700	6,300	9,300
Miles of road construction *(maximum of estimated range)*	40	15	10	30
Miles of renovation/improvement *(maximum estimated)*	190	170	170	190
Percent yarding system				
Ground-based	32			25
Cable	65	100	100	71
Aerial	3			4
Cost per acre and MBF				
per acre	$1,950	$1,800	$1,900	$1,950
per MBF	$148	$158	$157	$156

Alternative B estimates the highest volume per acre and proposes the highest number of acres for harvest among the alternatives, as well as the greatest percentage (32%) of ground based yarding, which costs the least. Aerial logging contributes $8 per MBF, or 8 percent, to the total cost per mbf and road rocking contributes 9 percent.

Alternatives C and D propose cable yarding all of the acres being treated. The slight difference in cost per acre between Alternatives C and D is accounted for because costs are spread over a greater number of acres in Alternative C than D.

Alternative E, compared to Alternative B, estimates a lower volume per acre because Alternative E has fewer acres proposed for harvest, has a lower percentage of ground-based yarding (15%), and a higher percentage of cable and aerial yarding. Aerial logging contributes $10 per MBF, or 10 percent, to the total cost per MBF. Road rocking contributes 9 percent. The combination of these factors causes Alternative E to cost more per MBF than Alternative B, although the relative cost per acre would be the same.

Alternatives B and E include approximately 400 acres proposed for aerial yarding, which increases the estimated costs of logging. The cost of aerial logging would undergo detailed evaluation at the time of implementation to ensure fiscal feasibility. It is possible that the areas proposed for helicopter logging would not be harvested, based on this evaluation.

FUELS

ISSUE 8: How will management activities affect the amount of hazardous fuels in the Wildland-Urban Interface (WUI)?

Approximately 16,610 acres of the planning area are identified as WUI, where wild fire is of particular concern. Proposed management activities in the action alternatives could alter the amount of hazardous fuels within the WUI, thereby affecting the risk of catastrophic loss of property and resources should a fire occur. Analysis of this issue allows for comparison of the fire risk among alternatives.

Measure:

- Acres of hazardous fuel models (12, 11 and 10) in WUI over time.

ALTERNATIVE A

There would be no immediate impact on fuels, but within an estimated 20 to 30 years, increased mortality would begin to occur. This would eventually result in the acreage moving from a FM 8 to a FM 10, increasing the potential for a high intensity stand replacing fire, including crown fires, than if the stands were thinned.

ALTERNATIVE B, C, D AND E

Table 16 shows the estimated acres and duration of hazardous fuels created within the WUI.

Under all alternatives, thinned stands would move from a mixed FM 5 and 8 to a FM 12 for 1 to 2 years after harvest. After the needles fall off the residual slash it would become a less volatile FM 11 that would persist for another 5 to 7 years, after which it would return to a mixed FM 5 and 8.

The large acreage of untreated stands in Alternatives C and D would lead to increased tree mortality due to stem exclusion, and the acreage would move to a FM 10 condition within an estimated 20 to 30 years.

Aerial logging proposed under Alternatives B and E could result in a deeper, more uniform fuel bed because very little of the slash (tops and limbs) would be brought to the landings where it could be piled and burned. Aerial logging slash would be a persistent FM 12 that could last for 5 to 7 years before returning to a mixed FM 5 and 8.

The non-commercial thinning of 600 acres in stands aged 30-39 in the WUI under Alternative D would result in a deep, heavy fuel bed containing both fine dead fuels and large dead fuels. This would create the most hazardous fuel bed of any proposed management activities. It is likely the treated acres would create FM 12 fuels that would persist 5 to 7 years before transitioning into FM 10 as the fine fuels decompose and return to a natural level. The FM 10 fuel condition would likely persist for several decades.

Retention or creation of snags and coarse woody debris at the levels proposed under all alternatives would not significantly change the fuel loadings and does not change Fuel Model designations.

Table 16 WUI Fuel Model Types and Duration (acres)

		Alternative				
	Fuel type duration	**A**	**B**	**C**	**D**	**E**
FM 12 (*moderate slash*)	1-2 yrs	0	7,300	3,800	3,300	5,400
	5-7 yrs	0	200	0	600	200
FM 11 *(light slash)*	1-2 yrs	0	0	0	0	0
	2-7 yrs	0	7,300	3,800	3,300	5,400
FM 10 *(heavy timber litter)*	20+ yrs (after 2 yrs)	0	0	3,500	600	300
	Within approx 20 years*	7,500	0	0	3,000	1,200

*Untreated stands that reach the stem exclusion stage and begin to self thin depositing large amounts of dead fuel on to the forest floor.

CONSULTATION AND COORDINATION

LIST OF PREPARERS

The Proposed Action and alternatives were developed and analyzed by the following interdisciplinary team of BLM specialists.

Name	Title	Discipline
Peter O'Toole	Planning Forester	Forester
Steve Steiner	Forest Hydrologist	Hydrology
Eric Meyers	Engineer	Roads/Transportation
Don Meckley	Engineer	Roads/Transportation
Eric Greenquist	Wildlife Biologist	Wildlife
Dan Crannell	Wildlife Biologist	Wildlife
Leo Poole	Fish Biologist	Fisheries
Doug Goldenberg	Botanist	Botanical Resources
Janet Zentner	Forester	Logging systems
Dave Reed	Fuels Specialist	Fuels
Karin Baitis	Soil Scientist	Soils
Rick Colvin	NEPA/Landscape Planner	Planning and Environmental Coordination
Sharmila Premdas	NEPA/Landscape Planner	Planning and Environmental Coordination
Debra Wilson	NEPA/Landscape Planner	Planning and Environmental Coordination

U. S. FISH AND WILDLIFE SERVICE (USFWS)

ESA CONSULTATION

Consultation with the USFWS is required for the Proposed Action. Consultation will be initiated and completed prior to making a final decision on this action.

NATIONAL MARINE FISHERIES SERVICE

ESA CONSULTATION

On February 4, 2008, NOAA Fisheries Service announced that it was listing the Oregon Coast coho salmon Evolutionarily Significant Unit as threatened under the Endangered Species Act (73FR7816). A federal notice was published on February 11, 2008 for designation of coho critical habitat. The listing determination, protective regulations, and designated critical habitat became effective on May 12, 2008. Consultation will be initiated and completed prior to project implementation.

ESSENTIAL FISH HABITAT

The Magnuson-Stevens Fishery Conservation and Management Act requires Federal agencies to consult with the Secretary of Commerce regarding any action or proposed action authorized, funded, or undertaken by the agency that may adversely affect Essential Fish Habitat (EFH) under the Act. The proposed alternatives, as described and analyzed in this environmental assessment would have "No Effect" on waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.

Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians

The Bureau of Land Management Siuslaw Resource Area consulted with the Confederated Tribes of Siletz, and the Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians. No response was received.

Cultural Resources

The project area occurs in the Coast Range. Pre-disturbance survey is not required. Post-disturbance survey requirements are conducted according to standards based on slope defined in *Protocol for Managing Cultural Resource on Lands Administered by the Bureau of Land Management in Oregon*. These standards only mandate post-disturbance on slopes of 10% or less.

Survey and Manage Species

On July 25, 2007, the Under Secretary of the Department of Interior signed a new Survey and Manage Record of Decision that removed the survey and manage requirements from all of the BLM resource management plans (RMPs) within the range of the northern spotted owl. In any case, this

project falls within at least one of the exceptions listed in the modified October 11, 2006 injunction: thinning projects in stands younger than 80 years old are not subject to surveys.

Special Status Species

Under all action alternatives, Special Status Species surveys would be conducted as required consistent with survey protocols applicable at the time of the action, and known sites of Special Status Species would be managed consistent with the policies applicable at the time of the action.

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APPENDIX A – DESIGN FEATURES FOR ACTION ALTERNATIVES

The following general design features would be implemented in conjunction with the Proposed Action and other action alternatives. Project design features are operating procedures normally used to avoid or reduce adverse environmental impacts as developed by the interdisciplinary team, or are required standards and guidelines included in a timber sale contract.

GENERAL

1. All Pacific yew would be retained to the extent possible, to maintain diversity of tree species.
2. Un-merchantable tree tops and limbs would not be yarded to the landing and would be left on site to contribute to soil productivity where feasible.
3. Additional rock may be placed on existing rocked roads to accommodate timber haul.

SILVICULTURE

4. For the purpose of long-term productivity and maintenance of biological diversity, all down coarse woody debris of advanced decay (Decay Class 3, 4, or 5) would be retained on site.
5. To provide habitat for cavity dependent wildlife and to protect the future source of down logs, snags not posing a safety hazard would be reserved. Directional felling and yarding would be utilized to protect residual green trees and snags consistent with State of Oregon safety practices. Snags felled for safety reasons would be retained as downed wood.
6. Harvest activities would not occur during sap flow season (generally April 15-June 15) to limit bark/cambium damage to residual trees, unless waived by the Authorized Officer. Log lengths would be restricted to a maximum of 40 feet in order to protect residual trees during yarding, unless waived by the Authorized Officer.
7. In order to maintain stream temperature, harvest activities would generally not occur within the primary shade zone. However, yarding corridors and cable corridors could occur in Riparian Reserves, and would be designed to have no effect on stream temperature. Thinning within the primary shade zone would be in accordance with the standards recommended by sufficiency analysis. On-site factors that would be analyzed to determine stream buffers widths include, but are not limited to: topography; soil characteristics; canopy cover; under and over story species/density; aspect; stream size, substrate, and flow; fish presence; slope stability; yarding method; proximity to roads, skid trails, and landings; and silvicultural prescription.

LOGGING SYSTEMS

Cable Yarding (Upland and Riparian)

8. Aerial yarding would be used when access limitations preclude conventional logging systems. Access limitations may include, but are not limited to: seasonal concerns; stream crossings; or inaccessibility by conventional road construction and/or renovation due to topography or legal access constraints.
9. All cable yarding would be to designated or approved landings. Landings would be located to minimize impacts to reserve trees and soils.
10. Cable corridors would be kept approximately 150 feet apart at one end, where possible, to minimize impacts to reserve trees, and would be limited to 12 feet in width. A cable system capable of lateral yarding 75 feet would be used.
11. A minimum of one-end suspension would be required when cable yarding. Intermediate supports could be necessary to achieve the required suspension.
12. Full suspension of logs would be required when yarding logs across streams.
13. Skyline cable corridors could be necessary through Riparian Reserves, including untreated stream buffers, in order to gain additional lift or deflection of the skyline, and to attain the required suspension of logs during yarding. Intermediate supports or lift trees could be needed to attain the required suspension. Trees in the skyline cable corridors located within the untreated stream buffers would be felled, left parallel to the stream to the extent possible, and retained on site to provide down wood.

14. Directional felling and yarding away from streams would be required where feasible to provide for streambank stability and water quality protection.

Ground-based Yarding

15. New ground-based yarding trails would be limited to slopes less than 35 percent. All ground-based yarding would be to designated or approved landings. No ground-based yarding would occur on sensitive soils.
16. Ground-based yarding operations would only occur when soil moisture content provides the most resistance to compaction (generally during the dry season), as approved by the Authorized Officer.
17. All skid trails would be pre-designated, approved by the Authorized Officer, and would occupy less than 10 percent of the ground-based yarding area. Existing skid trails would be used wherever possible. Trees would be felled to lead to the skid trail. Ground-based yarding could occur in Riparian Reserves, but no ground-based yarding equipment would be operated within 75 feet of the harvest unit boundary.
18. All skid trails would be limited to 12 feet in width or less. Excavation (gouging) on skid trails would not exceed one foot in depth. After project completion, as needed, compacted skid trails would be tilled using appropriate decompaction equipment, and covered with slash.

Road Construction and Decommissioning

19. Natural surfaced renovated roads, newly constructed natural surfaced spur roads, and landings requiring operation during more than one dry season would be placed in an erosion-resistant condition and temporarily blocked prior to the onset of wet weather. This could include construction of drainage dips, water bars, lead-off ditches, or barricades.
20. Natural surfaced roads would be decommissioned as needed after project completion. Decommissioning could include any of the following measures:
    - discontinuing road maintenance
    - tilling the road surface with dozer and subsoiler implement or a track mounted excavator
    - scarifying roads for creation of planting areas
    - removing side cast soils from fill slopes along existing roads with a high potential for triggering landslides
    - filling and contouring cut slope ditch lines to the adjacent hill slope
    - removing stream crossing culverts
    - stabilizing stream crossings (e.g. re-contouring stream channels, placing mulch or mats and seeding for erosion control, placing rock and logs)
    - installing water bars, cross sloping or drainage dips to ensure adequate drainage into vegetated areas and away from streams or unstable road fills
    - blocking using barricades, gates, or earth berm barriers
    - placing slash, boulders, and/or root wads where available on the road surface to deflect runoff, discourage motorized vehicle use, and promote vegetative growth
    - seeding or planting for erosion control
21. Surfaced roads to be decommissioned would be left in an erosion-resistant condition by removing culverts and establishing water bars where needed to eliminate diversion potential away from stream channels, and by removing fills on unstable areas along existing roads. Rock would be left in place. Exposed soils would be treated to reduce sedimentation if needed. Roads would be closed using barricades or gates.

Noxious Weeds

22. In order to slow the spread of noxious weeds, all yarding and road construction equipment would be cleaned prior to arrival on BLM-managed land. Other measures that may be implemented on a case-by-case basis include:
    - pre-treating areas of concentrated invasive species adjacent to haul roads
    - pioneering roads outward from within the stand to keep weed seed from further entry into the stand
    - avoiding construction of truck turn-arounds or equipment staging in known noxious weed populations
    - using native seed and weed-free straw for restoration of disturbed soil areas

Fuels Reduction

23. To reduce potential sources of intense fire behavior and long-range spotting in event of a wildfire, landing piles not utilized for material to scatter over decommissioned roads would be covered and burned.
24. If necessary to reduce roadside fire intensity and increase safe ingress and egress for the public and fire fighters in the event of a wildfire, slash within 25 feet of roads remaining open after harvest would be piled, covered and burned. Material larger than 9" in diameter would be left out of the piles.

APPENDIX B – FISHERIES

Table 17 Barrier Culverts to Aquatic Species

Location (T-R-S)	Stream Name	Culvert Type	Dia. (*inches*)	Length (*feet*)	Low Flow Outfall Drop (*inches*)	Install Date	Culvert Condition	Drain-age Acres	Rustline/ Scour Height (*inches*)	Comments
19-7W-22	Luyne Creek	CMP	96	84	18	1955	Temp. Bridge installed over	1,700	Rusted Out	Temporary Bridge installed in 2007
19-7W-22	No Name at Saragosa	CMP Bituminous coating	84	84	18	1955	OK	480	NA See Coating	Undersized culvert creates velocity Barrier
19-7W-21	Burntwood	CMP Bituminous coating	90	78	0	1955	OK	510	23	A cascade was built downstream of this pipe and reduces the outfall height at low flow.
19-7W-20	Edris	CMP	91	69	23	1955	OK	664	25	Undersized culvert creates a velocity barrier for fish at most flows
19-7W-19	Clay CC Access Rd	CMP	36	52.5	8	1955	OK	146	9	Undersized culvert creates a velocity barrier for fish at all flows
19-7W-19	Clay Creek Camp Ground 1	CMP	28	20	6	1965	OK	146	6	Undersized
19-7W-19	Clay Creek Camp Ground 1	CMP	36	20	0	1965	Rusted	146	24	Undersized
19-7W-27	Farman Flat Siuslaw Trib	CMP	36	50	30	Pre-1972	Fair	320	30	Undersized, plugs up
19-8W-21	Esmond Tributary	CMP	46	70	29	1955	OK	279	19	Undersized culvert creates a velocity barrier for fish at all flows
19-8W-28	Esmond Tributary	CMP	36	40	12	1958	Bad	128	18	Undersized
19-8W-28	Esmond Tributary	CMP	30-36 smashed	40	NA	1958	End Gone	80	NA	Replace soon
19-4W-33	Hawley Creek	CMP	78	62	11	1964	Rusted Much Wear	1086	24	Undersized culvert creates a velocity barrier for fish at most flows
19-4W-33	Hawley Creek Trib	CMP	24	40	Buried	1964	Gone	134	Rusted Out	Undersized
19-4W-33	Hawley Creek Trib	CMP	18	40	–	1964	Rusted out	57	Replace	Undersized
20-4W-29	Kelly Cr	CMP	100	56	0	Pre-1979	OK	2358	32	Undersized culvert creates a velocity barrier for fish at some flows
20-4W-3	Barlow Creek	CMP	24	30	60	Pre-1972	Rusted	107	12	Headwaters
20-4W-30	Kelly Creek	CMP	18	30	24	Pre-1972	Fair	35	NA	Mainline road
20-4W-30	Kelly Creek	CMP	18	35	60	Pre-1972	Fair	58	6	Mainline road
20-4W-30	Kelly Creek	CMP	96	40	36	Pre-1972	Rusted	2325	38	Undersized, old, beaver dams (mainstem culvert)

Table 18 ACS No. 2 – Miles of aquatic and Coho Critical Habitat made available

Location (TRS)	Stream Name	Aquatic Habitat made available (*miles*)	Coho Critical Habitat made available (*miles*)	Drainage (*acres*)
19-7W-22	Luyne Creek	2.56	1.70	1,700
19-7W-22	No Name At Saragosa	1.20	0.90	480
19-7W-21	Burntwood	1.10	0.70	510
19-7W-20	Edris	1.40	1.05	664
19-7W-19	Clay CC Access Rd	0.25	0.01	146
19-7W-19	Clay Creek Camp Ground 1	0.28	0.03	146
19-7W-19	Clay Creek Camp Ground 1	0.36	0.12	146
19-7W-19	No Name Siuslaw Tributary	0.50	NA	93
19-7W-27	Farman Flat Siuslaw Trib	1.33	0.77	320
19-8W-21	Esmond Tributary	0.80	0.70	279
19-8W-28	Esmond Tributary	0.30	0.28	128
19-8W-28	Esmond Tributary	0.30	NA	80
19-4W-33	Hawley Creek	2.55	1.41	1,086
19-4W-33	Hawley Creek Trib	0.28	NA	134
19-4W-33	Hawley Creek Trib	0.20	NA	57
20-4W-29	Kelly Creek	5.60	2.70	2,358
20-4W-3	Barlow Creek	0.13	NA	107
20-4W-30	Kelly Creek	0.25	NA	35
20-4W-30	Kelly Creek	0.14	NA	58
20-4W-30	Kelly Creek	0.40	NA	161

APPENDIX C – SEDIMENTATION ANALYSIS METHODOLOGY

ROAD SURFACE EROSION

METHODS

A road and culvert inventory was conducted during fall/winter 2006 on haul routes projected to be used for the proposed project (approximately 250 miles, or 2,551 road segments). Fine sediment delivery was estimated based on this inventory, 62.34 miles of road, or 575 road segments, where found to have sediment delivery potential.

Using the Washington Standard Methodology for Conducting Watershed Analysis (WFPB, 1995), road segments were examined for road prism characteristics and drainage deliverability. Factors were applied for differing conditions of the road prism. Surface erosion from roads is primarily a function of road length, widths of road elements (tread, cutslope and fillslope), cutslope and fillslope vegetative cover, rate of delivery to streams, traffic rates, sediment texture, road configuration, and road surfacing (Reid, 1984). Research has shown that heavily trafficked roads are estimated to produce substantially more sediment than low-use roads (Reid and Dunne, 1984; Bilby et al., 1989; Foltz, 1999). Road models predict that mainline roads produce more fine sediment per mile of road in a watershed than primary or spur roads due to increased usage, and that streamside roads are significant producers of fine sediment per mile of road. Basic erosion rates established by various researchers reflect the erodibility rates for roads built in different geologic materials (WFPB, 1995). The planning area is composed of volcaniclastic and sedimentary geology. The rates represent erosion from the bare road prism surfaces. Road surfacing material determines the erodibility of the surface tread during traffic, particularly during heavy haul, and is adjusted according to the type and depth of surfacing material.

Quantifying the sediment yield of a road segment is useful to determine how much sediment may be coming from a particular road prism type. The numbers should not be used as a surrogate for actual sedimentation amounts. This model was derived using erosion rates that may or may not accurately reflect local geology. The rate of sediment delivery from roads was evaluated using a model that simplifies a complex road system. Given limitations in the simplicity of this model and limitations in averaging road prism characteristics, it is assumed that any estimation errors would be uniformly applied to all inventoried roads and any errors in scale would not drastically change any of the preceding conclusions.

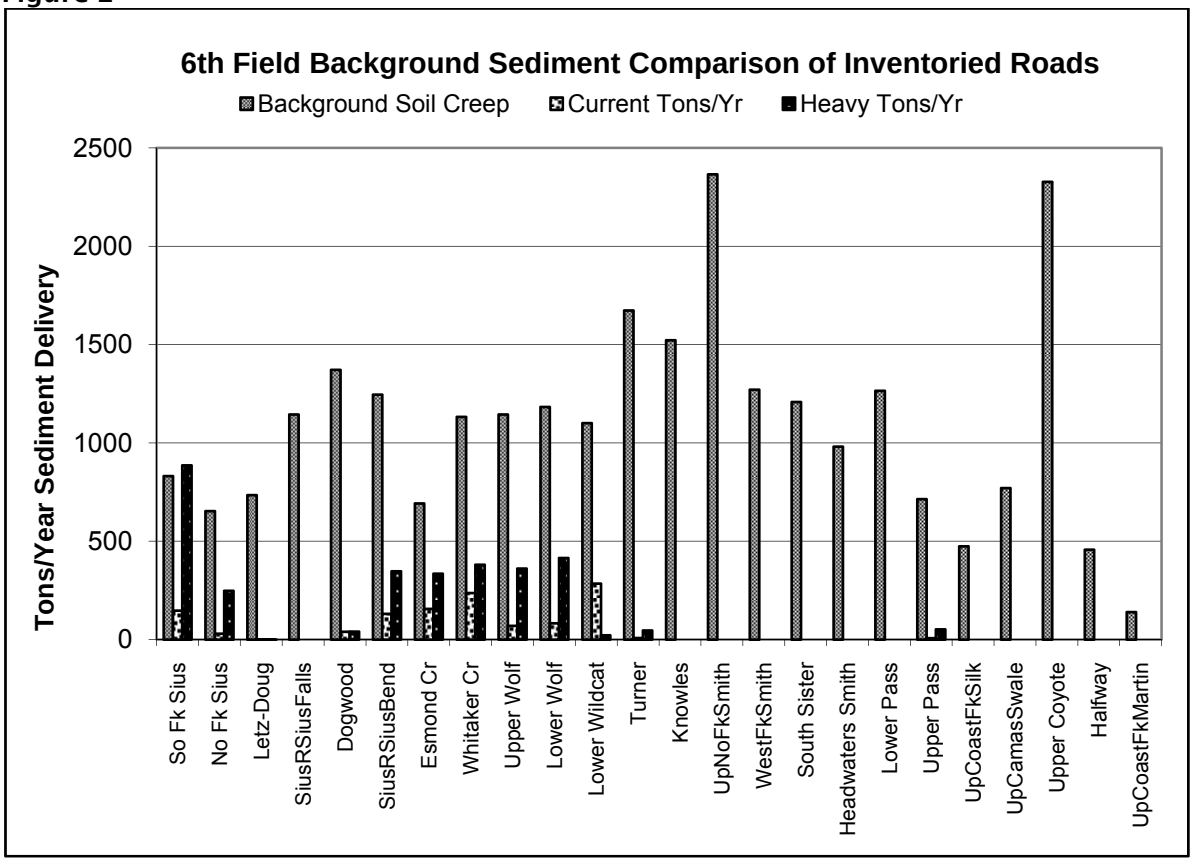
Because factors used in the Washington methodology were based on a combination of studies performed in the Idaho Batholith area and elsewhere, there was one deviation made to the traffic factor, to more accurately reflect the local lithology:

Deviation

The deviation is a change in the traffic factors. The calculations in this assessment were calibrated to data from unpublished research performed in southwestern Washington (Mack Creek in the Chehalis Headwaters), which is expected to more accurately reflect sediment yields for roads built on the lithology found in southwestern Washington (Sullivan and Duncan, 1980) and the Oregon Coast Range. The base erosion rate derived for each road segment in the watershed was multiplied by a factor based on the level of traffic projected for that road segment over the next five years. These factors are provided in the standard methodology for no traffic, light, moderate, and heavy traffic levels (WFPB 1995). Using the standard methodology, the traffic factors were varied until the results matched the field data for the same set of road segments at Mack Creek. The calibration resulted in traffic factors that are approximately 1/10th of the standard WFPB methodology traffic factors (Kate Sullivan, Jeffrey Clark, Weyerhaeuser, 1996, pers. communication). It is these calibrated traffic factors that are used here.

Background fine sediment yield from soil creep comparison to inventoried roads.
The total estimated background fine sediment yield from soil creep for 6th Field Watersheds is presented in Figure 2. Twenty-four sub-watersheds were initially identified as potential areas for forest road sedimentation to occur as a result of proposed management activities. The graph represents a comparison among inventoried roads that were modeled using the standard WFPB methodology. The sedimentation amounts shown in Figure 2 and Table 20 are limited to those miles of road inventoried for this analysis, and do not include all roads in the project area. Current use is considered light haul; heavy haul has been modeled for precipitation and three or more logging trucks driving over the running surface of the road within a twenty-four hour period.

Figure 2



This graph represents background rates from soil creep compared to modeled sediment yields from inventoried roads by sixth field watershed. Sediment yields are presented in tons/year and include current traffic and estimates during heavy haul. These rates are not extrapolated to all roads found in the watershed and do not reflect proposed improvements to the roads or restrictions on haul.

Table 19 Total 6th Field drainage densities, background rates and sediment yields from inventoried roads

6th Field #	6th Field Sub Watershed	5th Field Watershed	Soil Depth (*feet*)	Stream Length (*miles*)	5th Field (*acres*)	5th Field (*mi2*)	Drainage Density (*mi/mi2*)	Background Soil Creep (*tons/yr*)	Current Haul Inventoried Rd (*tons/yr*)	Heavy Haul Inventoried Rd (*tons/yr*)	Inventoried Miles of Rd (*tons/yr*)
1	South Fk Sius	U. Sius River	3	163	16,392	26	6	832	147	886	42
2	North Fk Sius	U. Sius River	3	128	12,704	20	6	653	30	248	18
3	Letz-Douglas	U. Sius River	3	144	13,690	21	7	735	1	1	3
4	Siuslaw R. Sius Falls	U. Sius River	3	182	17,130	27	7	1145	0	0	0
5	Dogwood	U. Sius River	3	218	20,464	32	7	1371	40	40	5
6	Siuslaw R. Sius Bend	U. Sius River	3	198	18,694	29	7	1246	131	347	56
7	Esmond Cr	U. Sius River	3	110	10,878	17	6	692	156	335	35
8	Whitaker Cr	U. Sius River	3	180	17,799	28	6	1132	237	381	46
9	U. Wolf	Wolf Creek	3	182	19,564	31	6	1145	70	361	3
10	L. Wolf	Wolf Creek	3	188	18,377	29	7	1183	83	415	15
11	L. Wildcat	Wildcat Creek	3	175	20,937	33	5	1101	3	22	2
12	Turner	L. Sius River	3	266	26,321	41	6	1673	8	46	4
13	Knowles	L. Sius River	3	242	34,245	54	5	1522	0	0	3
14	U. North Fork Smith Lower Umpqua	L. Smith River	3	376	28,450	44	8	2365	0	0	2
15	W. Fork Smith L. Umpqua	L. Smith River	3	202	16,856	26	8	1271	0	0	2
16	South Sister	U. Smith River	3	192	16,096	25	8	1208	0	0	5
17	Headwaters Smith	U. Smith River	3	156	21,996	34	5	981	0	0	1
18	L. Pass	Elk Creek	3	248	22,509	35	7	1265	0	0	0
19	U. Pass	Elk Creek	3	140	17,612	28	5	714	7	52	1
20	U. Coast Fork Silk	U. Coast Fork Willamette	3	93	16,411	26	4	475	0	0	2
21	U. Camas Swale	L. Coast Fork Willamette	3	89	15,313	24	4	770	0	0	1
22	Upper Coyote	Long Tom River	3	182	21,496	34	5	2327	0	0	2
23	Halfway	U. Smith River	3	349	27,353	43	8	457	0	0	0
24	U. Coast Fork Martin	U. Coast Fork Willamette	3	82	27,353	43	2	140	0	0	0

Table 20 illustrates the reduction in sediment yield from adding additional cross-drains approximately 200 feet from a delivery point. The sample data was from inventoried roads only and includes seven sub-watersheds with potential impacts to water quality.

Table 20 Sediment yield reduction from added cross drains

Roads	Miles of Delivery	Reduced Miles with adding cross-drains	Inventoried Rd Heavy Haul *tons/yr*	Inventoried Rd Heavy Haul with adding cross-drains *tons/yr*	% Reduction in sediment yield
Inventoried Paved	7.99	2.32	189.69	54.50	71
Inventoried BLM controlled	30.30	12.74	1296.70	555.34	57
All Inventoried Roads/all ownerships	52.71	21.51	3,079.94	1,253.60	59

Determination of Winter Haul Routes
A determination was made as to where mitigation measures would be insufficient to significantly reduce fine sediment yield from the road prism during heavy haul. This determination included the following methods: 1) prioritization using the sediment model to map high delivery segments, 2) known areas of concern close to streams, 3) experience and observations of road characteristics from the field, 4) the assumption that only BLM-controlled roads would receive additional cross drain culverts, 5) width of riparian area and sediment filtration capacity, 6) number of stream crossings and lengths of delivery, and 7) amount of haul for size of proposed harvest unit. Recommendations for dry weather haul were made based on these determinations.

Landslides/Sedimentation from Culvert Failure/Replacement
The 2006 road and culvert inventory identified approximately 200 culverts on BLM-controlled roads that are at risk of failure in the next one to two decades because of culvert age, size, or condition. The risk (cubic yards of sediment) of mass wasting for these stream crossing failures was estimated using the procedure in the Upper Siuslaw Late-Successional Reserve Restoration Plan (USDI BLM 2004). Approximately 500 to 700 relief culverts (cross drains) on BLM-controlled roads were also identified for replacement because of age and condition. No effort was made to quantify the reduction in risk from failed cross drains, as it is unknown how much of the total quantity would reach stream channels. There was no effort made to quantify mass wasting from debris flows or any other catastrophic road drainage problem.

A temporary flux of sediment can be expected to occur during the removal and replacement of culverts. Few studies have been conducted that report suspended sediment and stream discharge monitoring during culvert removals; however, some monitoring reports do exist. Monitoring results from Quartz Creek, Montana revealed that different equipment operators affect the amount of sediment generated, but overall, the monitoring showed that the in-stream effects are of short duration and do not affect beneficial uses (Wegner, 1999). Monitoring results from the Lolo National Forest, Montana, indicate that between 1 to 2 cubic yards were introduced into the stream during and after culvert removal (Lolo, 2000). BLM oral communications, 2002, indicate that little sedimentation has been observed in the past during BLM culvert removals and replacement. The BLM follows best management practices including dewatering, straw bales, and numerous bio-engineering techniques, which reduce sediment production substantially.

APPENDIX D – LOGGING COSTS

Probable logging systems for each action alternative were determined by considering percent slope and access availability based on GIS analysis of potential harvest areas.

- Ground-based yarding would be suitable on slopes less than 35 percent.
- Cable yarding would be required on slopes greater than 35 percent, where accessible.
- Aerial (e.g. helicopter) yarding could be necessary where conventional logging systems are precluded by: access limitations; winter haul restrictions; difficult stream crossings; or inaccessibility by conventional road construction or renovation.

Average yarding costs per MBF were determined by using appraised yarding system costs of recently sold partial harvest projects in the Siuslaw Resource Area. For each alternative, these costs were then multiplied by the estimated MBF/acre, then by the approximate number of acres for each yarding system by alternative. The yarding costs were then totaled for each alternative.

Average costs per mile of road construction and renovation were determined by using the current BLM road appraisal system. For each alternative, the costs per mile were then multiplied by the estimated number of miles of new construction or renovation. The roading costs were then totaled for each alternative.

The resulting yarding and roading costs were added together to determine the total logging cost, then divided by acreage and volume to derive cost per acre and cost per MBF.

	Cost	Unit
Yarding		
Cable*	$ 135.00	MBF
Ground*	$ 96.00	MBF
Aerial**	$ 360.00	MBF
Roading		
Construction***	$ 12,710.00	Mile
Construction w/rocking***	$ 59,000.00	Mile
Renovation***	$ 4,120.00	Mile
Renovation w/additional rocking on surfaced roads***	$ 21,500.00	Mile

**Average of five recent timber sales appraised and sold: Trivial, Nutmeg, Poolside, Last Hurrah, Mark Time*
***Most recent helicopter appraisal (Mark Time)*
****Generic cost per mile generated by BLM engineer November 2007*

Migratory Bird Treaty Act Review Form

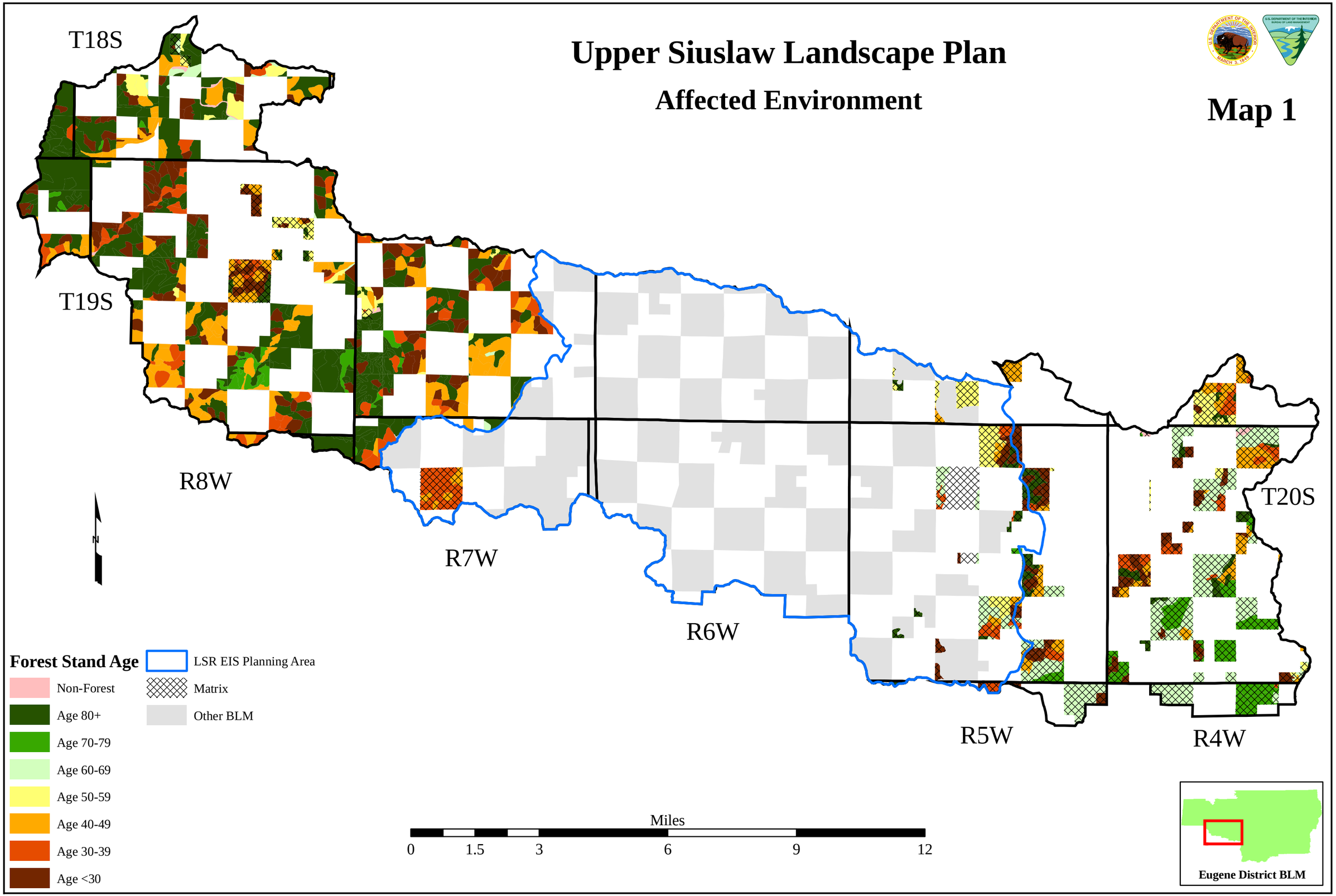
Bird Species of Conservation Concern (Siuslaw Resource Area, Eugene District, BLM)							
Species	**Within Range?**	**Habitat Present?**	**Effect to habitat by Proposed Action?**	**How would habitat be affected?**	**How prevalent is this habitat in the watershed?**	**What would be the impacts of Proposed Action?**	**Comments**
American bittern	Yes	No	NA	NA	NA	NA	
Black-throated gray warbler	Yes	Yes	Yes	Removal Degradation (negative) Increased edge effect (positive)	Ubiquitous	Nesting and foraging habitat would be removed or degraded and possible disturbance to nesting birds.	Proposed Action would initially remove or degrade habitat, but resulting edge effect and subsequent growth of brush would provide additional habitat in near future
Horned Lark (*strigata*)	No	NA	NA	NA	NA	NA	
Lewis's woodpecker	No	NA	NA	NA	NA	NA	
Northern goshawk	Yes	Yes	Yes	Removal Degradation of habitat	Ubiquitous	Nesting and foraging habitat would be removed or degraded and possible disturbance to nesting birds.	Adequate habitat would remain in the vicinity post-harvest
Northern harrier	Yes	No	NA	NA	NA	NA	
Olive-sided flycatcher	Yes	Yes	Yes	Removal Degradation of habitat	Ubiquitous	Nesting and foraging habitat would be removed or degraded and possible disturbance to nesting birds	Adequate habitat would remain in the vicinity post-harvest
Peregrine falcon	Yes	No	NA	NA	NA	NA	
Rufous hummingbird	Yes	Yes	Yes	Removal Degradation of habitat	Ubiquitous	Nesting and foraging habitat would be removed or degraded and possible disturbance to nesting birds	Adequate habitat would remain in the vicinity post-harvest
Short-eared owl	Yes*	No	NA	NA	NA	NA	*Extreme edge of range
Vesper Sparrow	No	NA	NA	NA	NA	NA	

Game Birds Below Desired Condition (Siuslaw Resource Area, Eugene District BLM)							
Species	**Within Range?**	**Habitat Present?**	**Effect to habitat by Proposed Action?**	**How would habitat be affected?**	**How prevalent is this habitat in the watershed?**	**What would be the impacts of Proposed Action?**	**Comments**
Mourning dove	Yes	Yes	Yes	Removal of roosting/nesting habitat	Ubiquitous	Habitat modification and disturbance to nesting or roosting birds	Adequate habitat would remain in the vicinity post-harvest
Harlequin duck	Yes	No	NA	NA	NA	NA	
Ring-necked duck	Yes	No	NA	NA	NA	NA	
Wood duck	Yes	No	NA	NA	NA	NA	
Cackling Canada goose	No	NA	NA	NA	NA	NA	
Dusky Canada goose	No	NA	NA	NA	NA	NA	
Mallard duck	Yes	No	NA	NA	NA	NA	
Band-tailed pigeon	Yes	Yes	Yes	Removal of foraging/nesting habitat	Ubiquitous	Habitat modification and disturbance to nesting birds	Adequate habitat would remain in the vicinity post-harvest
Northern pintail duck	Yes	No	NA	NA	NA	NA	

Upper Siuslaw Landscape Plan

Affected Environment

Map 1



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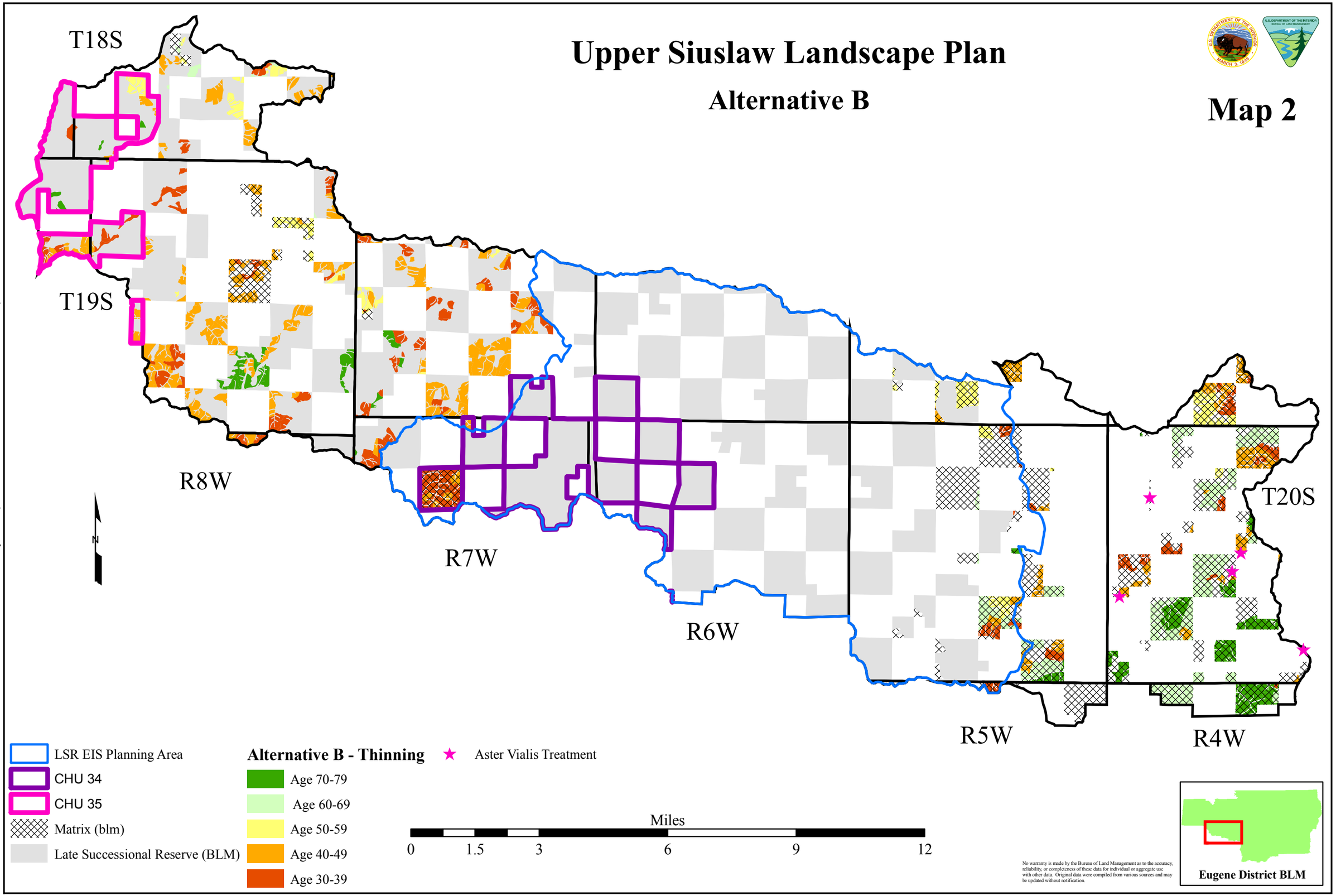
Upper Siuslaw Landscape Plan

Alternative B

Map 2



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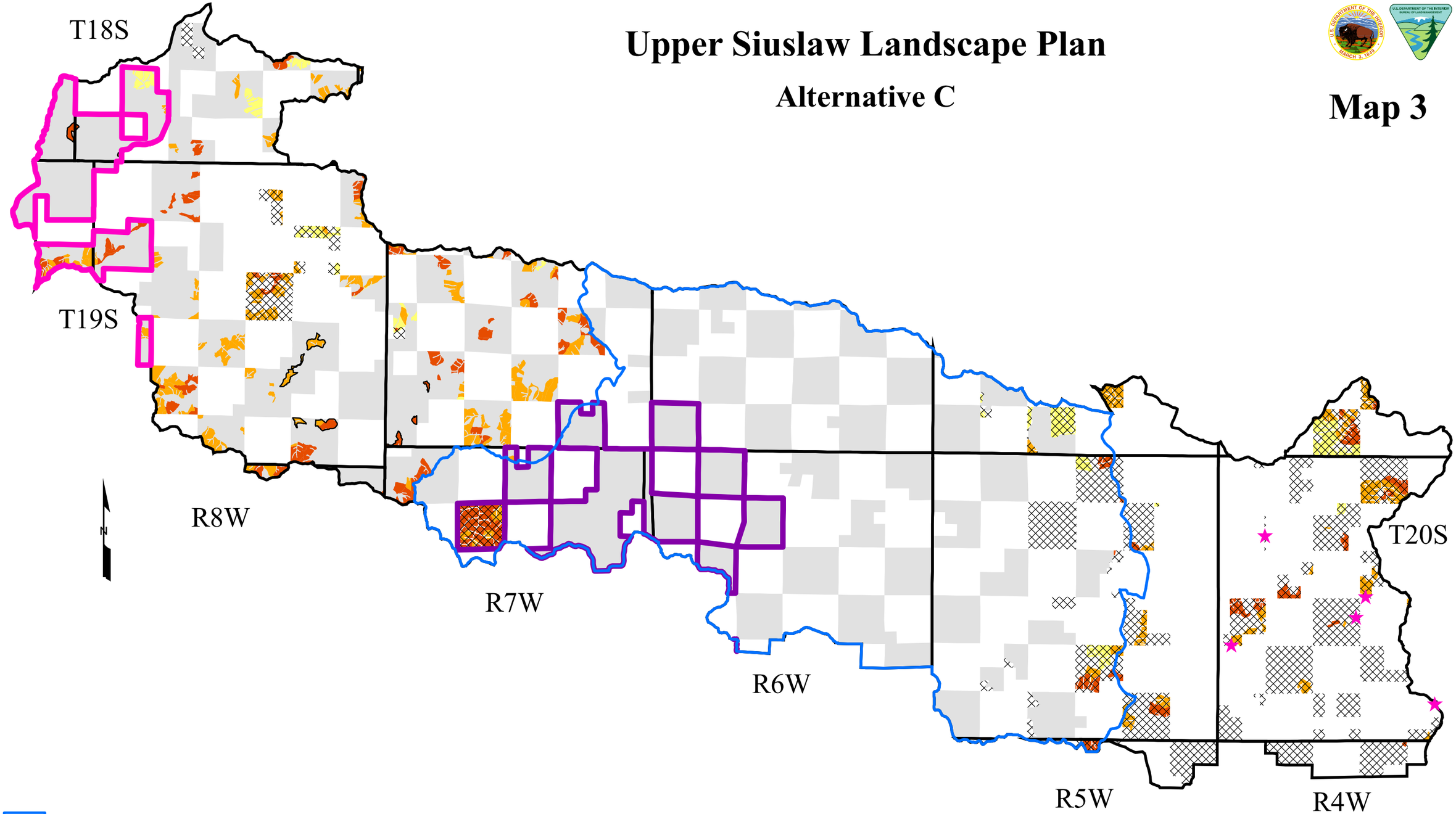
Upper Siuslaw Landscape Plan

Alternative C

Map 3



LSR EIS Planning Area

Matrix (BLM)

Late Successional Reserve (BLM)

NSO Critical Habitat

CHU 34

CHU 35

Alternative C - Thinning

Age 50-59

Age 40-49

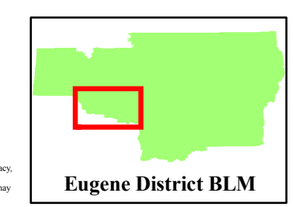
Age 30-39

Heavy Thin

Aster Vialis Treatment

Miles

0 1.5 3 6 9 12



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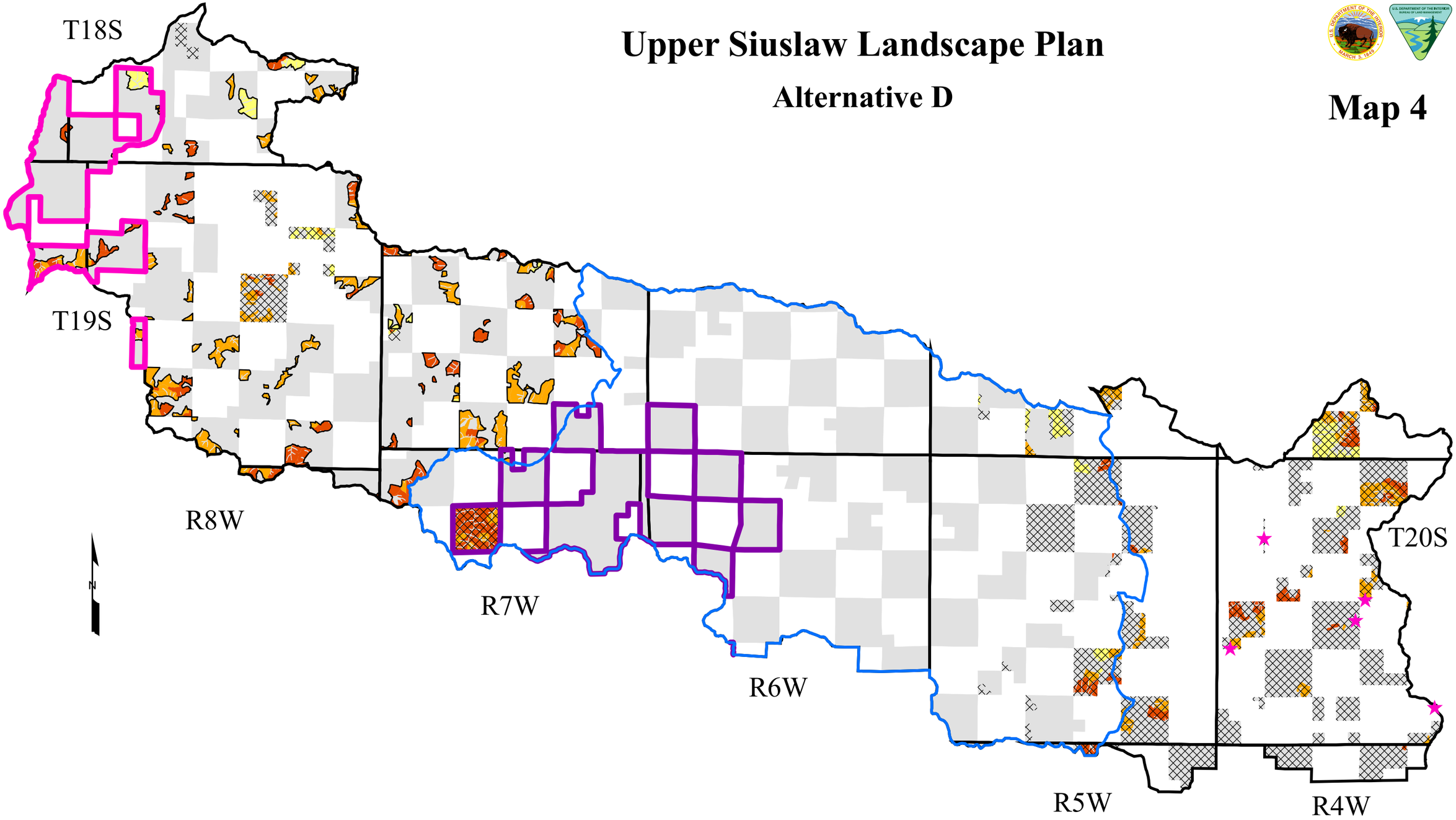
Upper Siuslaw Landscape Plan

Alternative D

Map 4

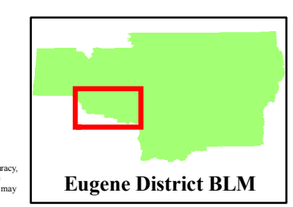


LSR EIS Planning Area
CHU 34
CHU 35
Matrix (BLM)
Late Successional Reserve (BLM)

Alternative D - Thinning
Age 50-59
Age 40-49
Age 30-39
Heavy Thin

Aster Vialis Treatment

Miles
0 1.5 3 6 9 12



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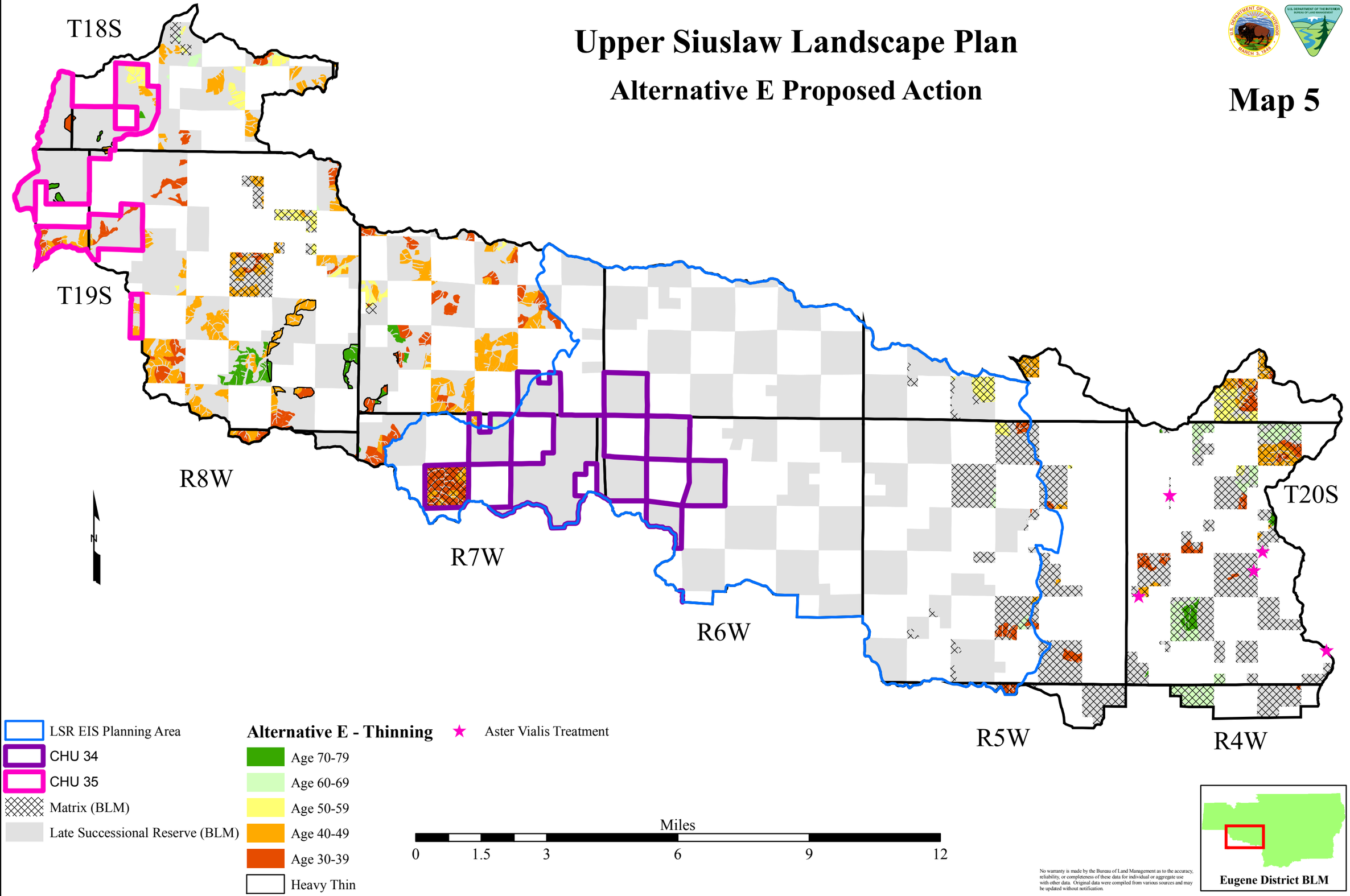
Upper Siuslaw Landscape Plan

Alternative E Proposed Action

Map 5



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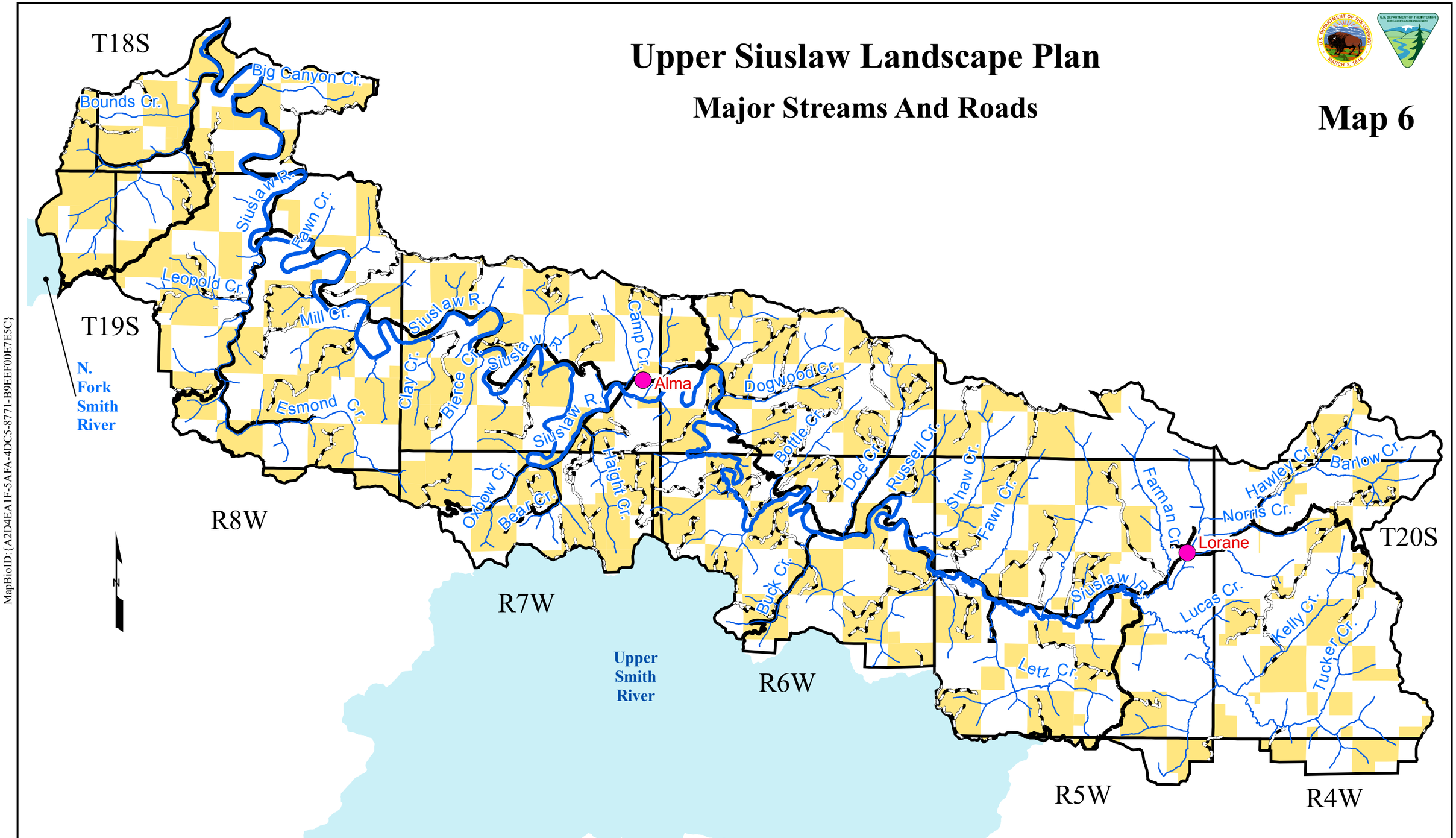
Upper Siuslaw Landscape Plan

Major Streams And Roads

Map 6



BLM

Key Watersheds

Paved Roads

Major Gravel Roads

Third Order and Higher Streams

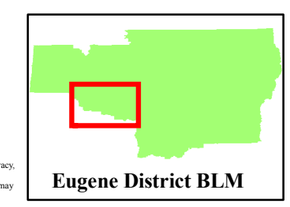
Siuslaw River

Other Streams

Towns

Miles

0 1.5 3 6 9 12



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