SOUTH DORENA THINNINGS PROJECT

UPPER WILLAMETTE RESOURCE AREA
BLM EUGENE DISTRICT
ENVIRONMENTAL ASSESSMENT
DOI-BLM-OR-E060-2013-0001-EA

1.0 INTRODUCTION

The Upper Willamette Resource Area, Eugene District BLM proposes to implement commercial thinning and projects on approximately 1,025 acres in the Row River, Mosby Creek and Upper Coast Fork Willamette 5th field watersheds. Project actions would include timber harvest and road construction, improvements and decommissioning. Project locations are as follows:

- Eagles Bluff in T. 21 S., R. 02 W., Secs. 9 and 15 (referred to as Eagles Bluff 9 or 15).
- Witt Butte in T. 22 S., R. 03 W., Secs. 27 and 35 (referred to as Witte Butte 27 or 35).
- Young Butte in T. 21 S., R .03 W., Sec. 25 (referred to as Young Butte 25).

The Land Use Allocations for these acres are Matrix and Riparian Reserve. The project area is also within 2012 final Critical Habitat for the Northern Spotted Owl.

1.0 PURPOSE AND NEED

The need for action in Matrix and Riparian Reserves has been established through the results of field reviews and stand examinations, which indicate that stands would benefit from thinning. Most stands are exhibiting moderate to high stem densities and generally uniform structure. These conditions are currently reducing tree growth and stand vigor; or would do so within the next decade. Treatment would increase stand vigor, growth rates, crown differentiation and stand complexity while removing mostly trees that would die due to suppression mortality.

Treatments would also be designed to enhance future Primary Constituent Elements (PCEs) of spotted owl Critical Habitat. These PCEs are the physical and biological features that support nesting, roosting, foraging and dispersal, and are determined to be essential for the conservation of the spotted owl. These elements, as they relate to this project, include stand characteristics such as moderate to high canopy closure, multi-storied and multi-species canopies, large trees with a high degree of deformities (i.e., cavities, broken tops), and large snags and down logs.

Within and adjacent to Bald Eagle Habitat Management Areas (T. 21 S., R. 2 W., sections 9 and 15) silvicultural prescriptions would be developed to promote habitat conditions favorable to Bald Eagles (RMP, p. 62). Proposed actions would be in alignment with the United States Fish and Wildlife Service's bald eagle recovery plan and the recommendations in the "McKenzie Resource Area Bald Eagle Habitat Management Plan" (1999).

The purposes of the actions in Matrix are to (1) produce a sustainable supply of timber, and (2) provide habitat for a variety of organisms associated with both late-successional and younger forests and maintain valuable structural components, such as down logs and snags (1995 ROD/RMP, p. 34). Additional direction for road management directs us to provide and manage the road system to serve resource management needs (1995 ROD/RMP, p. 98).

The purposes of the actions in Riparian Reserves are to provide for the conservation of and habitat for Special Status Species as well as other terrestrial species, and to meet Aquatic Conservation Strategy (ACS) objectives (1995 ROD/RMP, p. 23). Included in these purposes are the acceleration of tree size and growth due to thinning.

1.1 CONFORMANCE

This proposed action is in conformance with the Eugene District's 1995 Resource Management Plan (RMP) as amended.

On December 17, 2009, the U.S. District Court for the Western District of Washington issued an order in Conservation Northwest, et al. v. Rey, et al., No. 08-1067 (W.D. Wash.) (Coughenour, J.), granting Plaintiffs' motion for partial summary judgment and finding a variety of NEPA violations in the BLM and USFS 2007 Record of Decision eliminating the Survey and Manage mitigation measure. Previously, in 2006, the District Court (Judge Pechman) had invalidated the agencies' 2004 RODs eliminating Survey and Manage due to NEPA violations. Following the District Court's 2006 ruling, parties to the litigation had entered into a stipulation exempting certain categories of activities from the Survey and Manage standard (hereinafter "Pechman exemptions").

Judge Pechman's Order from October 11, 2006 directs: "Defendants shall not authorize, allow, or permit to continue any logging or other ground-disturbing activities on projects to which the 2004 ROD applied unless such

activities are in compliance with the 2001 ROD (as the 2001 ROD was amended or modified as of March 21, 2004), except that this order would not apply to:

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

Following the Court's December 17, 2009 ruling, the Pechman exemptions are still in place.

1.2 SCOPING

Scoping information about the South Dorena Project was first provided in the January 2011 Eugene District Planning Update.

1.3 ISSUES

1.3.1 Issues Analyzed in Detail

Comments received during public scoping and the project Interdisciplinary Team (IDT) brought forward the following additional concerns related to resources that had potential of being affected by the proposed actions. The resource concerns related to the issues are analyzed in Section 4.0: Affected Environment and Environmental Consequences.

ISSUE 1: What are the Effects of the Proposed Action on Water Quality and Aquatic Resources (Fish)?
ISSUE 2: What are the Effects of the Proposed Thinning Harvest and Road Actions on Soils?
ISSUE 3: What are the effects of the Proposed Action on Special Habitats; Special Status Species; and Migratory Birds and their Habitats?

1.3.2 Issues Considered, but Not Analyzed in Detail

Comments received during public scoping and the project IDT brought forward the following additional concerns related to resources that had potential of being affected by the proposed actions. For reasons described below, these issues were not carried forward to be analyzed in detail.

What are the effects of the proposed commercial thinning on greenhouse gas emissions?
Carbon analyses have been completed for similar projects (i.e., commercial thinning in conifer stands 30-70 years in age). Those analyses have shown that, in total, the action would result in the emission of approximately 6,800 tonnes in the short-term and an additional 3,500 tonnes over the long-term, for an approximate cumulative total of 10,300 metric tonnes. This would equate to the emission of approximately 38,000 metric tonnes of carbon dioxide.

Over the next 30 years, continued forest growth following harvest would result in an increase in live tree stand volume of an average 40 cubic feet per acre, or approximately 59,000 cubic feet across the project area. This equates to an increase in storage of approximately 500 metric tonnes of carbon per year. Forest growth would equate to the sequestration of approximately 14,000 metric tonnes of carbon dioxide over the long term. In conclusion, forest growth 30 years following harvest would result in carbon storage which would exceed the carbon directly and indirectly emitted from harvest, resulting in a net storage of carbon compared to current conditions.

The carbon analyses are incorporated here by reference (2011 Thinnings Project DOI-BLM-OR-E060-0001-EA, pp. 25-26). Other analyses have shown similar results (Hills Camp EA DOI-BLM-OR-E060-2010-0003-EA, pp. 6-8; Long Tom Landscape Plan EA; DOI-BLM-OR-E050-2009-0006-EA, pp. 39-41). This proposed action would result in a similar magnitude of short-term carbon emission and long-term carbon storage as analyzed in those similar projects, because the forest stand conditions and treatments for this proposed action are approximately similar in terms of carbon implications. Because the proposed action would result in only a small amount of carbon dioxide emissions for a small period of time before stand regrowth would result in a net storage of carbon, there is no potential for a significant impact related to greenhouse gas emissions from the proposed action, and this issue does not require more detailed analysis.

What are the effects of timber harvest and associated activities on the attainment of ACS objectives?
Aquatic Conservation Strategy (ACS) objectives established with the Northwest Forest Plan include nine specific objectives that establish criteria for management within Riparian Reserves. These nine objectives direct the maintenance and restoration of aquatic habitat characteristics through management actions. Initial evaluation of this potential issue determined that some ACS objectives would be maintained (no change expected) under both alternatives, whereas effects on other ACS objectives had potential for effects differences between alternatives. A point-by-point response to the nine ACS objectives and how effects of the alternatives impact them conducted for this analysis and is captured in a combined analysis report titled "Evaluation for Consistency with Aquatic Conservation Strategy" which is hereby incorporated by reference.

Presented in this EA are not the nine ACS objectives, but instead presents information that interrelates to the ACS objectives as presented though issues for this project. Elements of ACS objectives presented in detail in this document include water quality, snags and CWD, sediment delivery, and stream connectivity and protection of flow. These elements of the ACS objectives that would be meaningfully affected (water quality, sediment, etc.) through the specific issues identified related to those resources are presented in section 4.0. Effects to the resources associated with other ACS objectives are not analyzed in detail because those resources would not be meaningfully affected or are not present in the project area.

What are the effects of the proposed commercial thinning and road actions on the spread of invasive weeds?
Analyses of the effects of commercial thinning and road actions on the spread of invasive weeds have been completed for similar projects (i.e., commercial thinning in conifer stands 30-70 years in age). Those analyses have shown that, in total, the action would be expected to result in increases in populations with disturbance due to new areas of open ground and increased roading activity during project implementation. These actions can also provide a competitive advantage to weeds by reducing native vegetation. Weeds are most likely to exploit and maintain populations in disturbed areas along roads, forest edges, and larger openings within stands. Harvest actions have been found to also contribute to the size or location of weed populations by transporting seed and plants on vehicles and equipment. Project design features and mitigations have been developed and implemented on past projects to reduce the incidence of size and location spreads. These mitigations would also be applied to activities considered in this analysis.

Other analyses of weeds have shown similar results (Hills Camp EA DOI-BLM-OR-E060-2010-0003-EA, pp. 29-31; North Mohawk EA DOI-BLM-OR-E060-2011-0002-EA, pp. 31-35). This proposed action would result in similar effects as analyzed in these similar projects, because the forest stand conditions and treatments for this proposed action are approximately similar in terms of existing conditions and anticipated implications. Because past proven mitigations would be applied to this project, the proposed action would not be expected to result in unanticipated introductions or spread of existing weed populations outside of known parameters. There is no potential for a significant impact related to the spread of weeds from the proposed action, and this issue does not require more detailed analysis.

2.0 ALTERNATIVES
The section describes the alternatives analyzed and considered through this project.

2.1 ALTERNATIVE 1: NO ACTION
Under this alternative proposed project activities such as timber harvest and road construction would not occur.

2.2 ALTERNATIVE 2: THINNING HARVEST
This alternative is designed to treat the forested stands by thinning to meet the purpose and need. Overall stand ages range between 35-72 years old; with stands 42-62 years old in Eagles Bluff, 35-72 years old in Witt Butte and 38-67 years old in Young Butte. Thinning would produce residual basal areas ranging from 120-200 square feet (ft^2/acre).

Matrix Management
Approximately 760 Matrix acres would be thinned under this alternative. The following lists the Matrix acres proposed for treatment:

- Eagles Bluff 310 acres
- Witt Butte 300 acres
- Young Butte 150 acres

Stands would be thinned from below. Trees selected for harvest would mostly be intermediate and co-dominant conifers with a DBH less than 24 inches that are suppressed and of poor form. Larger trees of greater growth potential and wildlife value would be retained. This prescription would result in a stand with variable spacing

between remaining conifers and hardwoods. Minor conifers (incense cedar, western red cedar, grand fir) and deciduous/broadleaf (madrone, chinquapin, cottonwood, big leaf maple, alder, oak, ash) species would be retained; except where necessary to accommodate logging systems, safety or harvest objectives to enhance larger dominant conifers (primarily Douglas fir and western hemlock).

Riparian Reserve Management
Silvicultural treatments would occur in the middle to outer edges of most Riparian Reserves (75-200/400 feet). Due to the silvicultural similarity of Riparian Reserve and Matrix stands proposed for treatment, treatments in both areas would be the same. Due to the similarity of riparian and upland stands within proposed harvest units, treatments in a given unit would be the same for Matrix and Riparian Reserves. Areas of no harvest, in close proximity to streams, would vary between 75-400 feet and in close proximity to wetlands (standing wetlands and springs) would be 20-125 feet. Approximately 260 acres of Riparian Reserves would be treated. The following lists the approximate riparian acres proposed for treatment by unit:

- Eagles Bluff 130 acres
- Witt Butte 110 acres
- Young Butte 20 acres

Logging Systems
Thinning would be accomplished with a combination of cable and ground-based logging systems. Table 2-1 shows the approximate range of acres per logging system. Details on logging methods are shown on maps in maps in Appendix C.

Table 2-1: Acres by Logging System for Alternative 2.

Proposed Sale	Cable (ac)	Cable (% units)	Ground-Based (ac)	Ground-Based (% units)	Total (ac)*
Eagles Bluff	281-398	63%-89%	47-164	11%-37%	**445**
Witt Butte	123-214	30%-52%	196-287	48%-70%	**410**
Young Butte	67-119	40%-70%	51-103	30%-60%	**170**
Total	**471-731**	46%-71%	**294-554**	29%-54%	**1,025**

*Ranges in cable vs. ground-based acres are changes within total acres analyzed for each sale, not net increases.

Roads
Road system management and road improvements would occur to support timber harvest activities as described below and detailed in Appendix B (Tables B-2 through B-12) and Appendix C maps:

Construction, Renovation, and Improvements: Approximately 30 miles of existing BLM controlled roads would be utilized as part of the project. Of that, approximately 18 miles of road would need renovation including adding crushed rock and culvert replacements. There would be approximately 2.9 miles of proposed temporary road construction and approximately 1.7 miles of proposed permanent road construction. Of the 2.9 miles of proposed temporary road construction, approximately 0.8 miles would be available for optional rocking (Appendix B) to facilitate implementation options. If rocked, these roads would be permanent roads added to the landscape. Approximately 12 miles of private controlled road would be used for timber and rock haul.

Culvert Replacements & New Installations: Approximately 36 in-stream (non-fish) culverts and approximately 5 in-stream (fish) culverts have been identified for replacement. In addition, between 20 and 40 cross drain culverts have been identified for replacement. Approximately 30 culverts (both temporary and permanent) would be installed on newly constructed roads.

All culverts ranked as high priority for replacement due to concerns for fish, hydrology or road safety would be replaced if affected by the proposed action. Appendix Tables B-2 and B-3 depict the current and expected near future conditions of culverts and which types would be replaced by the proposed action.

Road Decommissioning: Approximately 6.2 miles of road would be decommissioned (long-term/blocked). Actions may include entrances barricaded, slopes water-barred, stream and cross drains removed, stream channels restored, and drain dips constructed. Approximately 3.5 miles of road would be fully decommissioned (permanent/tilled). Actions, in addition to decommissioning (long-term) actions, may include tilling of road bed and/or slash or brush placement, and mulching and planting of native species in disturbed areas.

2.3 ALTERNATIVES CONSIDERED, BUT NOT ANALYZED IN DETAIL

The following alternatives were considered by the IDT, but not analyzed in detail.

Reduced/No Permanent or Temporary Road Construction
Past issues regarding road reductions are well known and include overall road construction, road construction in Riparian Reserves, road decommissioning, and total road densities. In designing the proposed action, these past known issues were considered in the development where feasible. As such, road designs were developed at the minimum essential for accessing harvest units. Of total road miles proposed (new temporary and permanent, and use of existing), 3.8 miles would be fully decommissioned (tilled) and 5.6 miles would be decommissioned (blocked). This resulted in a net increase in road prisms of less than 4% of BLM roads after decommissioning activities occurred.

To consider an alternative to address an issue requesting road mile reductions would require the elimination of several hundred acres designated for management under the proposed action meeting stand silvicultural needs for thinning. The reduction in thinned acres was considered to not meet the purpose and need of this project and was, therefore, eliminated from further consideration. Effects of roads on the three issues presented are discussed in section 3.0.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS

3.1 TIMBER

3.1.1 Affected Environment

Methods for Assessing Current Stand Conditions and Developing Harvest Prescriptions
Background and historical information was derived from field surveys, photo interpretation, forest inventory GIS layers, and corporate stand data (Microstorms). Silvicultural metrics for stands were individually analyzed through stand exams processed through Eco Survey. Data were then modeled through the ORGANON Stand Simulator software.

Current Stand Conditions
Table B-1 in the Appendices describes in more detail current stand condition metrics of: birth date, basal area, trees per acres, quadratic mean diameter, Curtis relative density and canopy closure. These attributes are summarized below. Due to the manner in which stand exam data were collected and the similarities between Riparian Reserve and Matrix uplands forest, these areas are discussed together, except where noted. Riparian Reserves that were over 80 years old or that did not exhibit a need for thinning due to lack of expected benefits were dropped from consideration for harvest.

Proposed harvest areas are dominated by Douglas-fir, with smaller components of western hemlock, western red cedar, and grand fir. Minor amounts of advanced regeneration include western hemlock and western red cedar. Hardwoods such as golden chinquapin and madrone tend to exist on ridge tops and rocky areas. Big leaf maple, black cottonwood, and red alder are usually found in riparian or disturbed areas. Overall, hardwood amounts are variable with the greatest concentrations seen in Eagles Bluff. Minor amounts of Pacific yew are also present in scattered locations. The dominant shrub and groundcover vegetation consists of species such as salal, hazel, ocean spray, vine maple, Oregon grape, and sword or deer fern.

Overall stand ages range between 35-72 years old; with stands 42-62 years old in Eagles Bluff, 35-72 years old in Witt Butte and 38-67 years old in Young Butte. Occasional older and larger remnant trees exist throughout the project area. Any located patches of older stands were withdrawn from harvest considerations. Canopy closures range from 65%-95%. Overall trees per acre range from 86-300; with 86-206 in Eagles Butte; 88-300 in Witte Butte; and 195-275 in Young Butte. Overall basal areas range from 151-300 ft^2; with values of 151-250 in Eagle Butte; 220-300 in Witt Butte; and 215-240 in Young Butte.

All stands were previously clear-cut harvested. Approximately 35% were artificially regenerated (reforestation dates after 1965) and 65% were naturally regenerated. Stand management histories (after initiation) include a combination of post-harvest treatments: aerial fertilization, pre-commercial thinning, and no treatment.

Most stands are currently in, or close to, a stem exclusion phase due to high stocking (trees per acre). Stem exclusion occurs when densely-stocked overstory trees compete with each other as the stand canopy begins to close, resulting in suppressed growth, and eventual suppression mortality of smaller trees and understory vegetation. Stands are dominated by even-aged structurally homogenous conditions at the stand scale. The older stands are beginning to develop a seedling/sapling layer in the understory.

3.1.2 Environmental Effects

Alternative 1: No Action

Under this alternative, the project area would remain untreated. Over the next few decades, stand canopies would become more dense and closed, resulting in overall stagnated tree growth at the stand level. Dominant and co-dominant trees would experience a reduction in crown size and growth potential. Intermediate and overtopped co-dominant trees would experience increasing suppression and eventual mortality. Due to closed canopies and reduced sunlight reaching the forest floor, understory vegetation growth would slow and some species would disappear.

Alternative 2: Thinning Treatment
Appendix Table B-1 describes in detail the approximate basal area that would be removed by harvest actions as well as post-harvest stand condition metrics of: basal area, trees per acres, quadratic mean diameter, Curtis relative density and canopy closure.

Thinning would remove from 30-150 ft^2 of basal area. This would result in stands with canopy closure ranges of approximately 50%-65%, 45-152 trees per acre, and residual basal areas ranging from 120-200 ft^2/acre.

Thinning would accelerate tree growth, increase tree size, develop wind-firmness and capture anticipated mortality of suppressed trees (removal by harvest). Structural diversity (i.e., crown differentiation) would be enhanced. Shade tolerant and lower canopy tree growth and diversity would be enhanced. Sunlight reaching the forest floor would provide new growing space for remaining trees and understory vegetation.

Cumulative Effects
Forest stands and timber are managed on both federal and non-federal lands throughout the project areas' watersheds and are influenced by O and C land directives. Timber management under either alternative would not expect to be meaningfully distinguishable on the forest landscape within the watersheds. Additionally, reasonably foreseeable management of lands outside the project area would not be expected to cumulatively impact forested vegetation within the project area. As such, no cumulative effects are anticipated under either alternative.

3.2 ISSUE 1: WHAT ARE THE EFFECTS OF THE PROPOSED ACTION ON WATER QUALITY & AQUATIC RESOURCES (FISH)?

3.2.1 Affected Environment

Project Area 5th and 6th Field Watersheds
Table 3-1 displays the 5th and 6th field watersheds where the project area is located as well as major streams within or adjacent to proposed harvest areas; all within the Upper Willamette Sub-Basin.

Table 3-1: Watersheds (WA) and Major Streams In or Adjacent to Proposed Harvest Areas.

Proposed Harvest Unit	5th Field WA/ 10 Digit HUC[1]	5th Field WA Name	6th Field WA/ 12 Digit HUC[1]	6th Field WA Name	Stream Name
Eagles Bluff 9 & 15	1709000202	Row River	170900020205	Dorena Lake-Row River	Vaughan Cr. & Bluff Cr.
Witt Butte 27	1709000203	Upper Coast Fork Willamette River	170900020303	Combs Creek – Coast Fork Willamette River	Combs Cr.
Witt Butte 27 & 35	1709000203	Upper Coast Fork Willamette River	170900020302	Lower Big River	Martin Cr., Jasper Cr. & Big River
Young Butte 25	1709000201	Mosby Creek	170900020103	Lower Mosby Creek	Smith Cr. & Mosby Cr.

[1] HUC: Hydrologic Unit Code.

About a third of the 6th field watershed riparian areas are managed by BLM. Riparian Reserves within the project area comprise about 8% of the total BLM managed Riparian Reserves in the 6th field watersheds.

General Water Quality within the 6th Field Watersheds and Project Area
The Oregon Department of Environmental Quality (DEQ) developed Total Maximum Daily Loads (TMDLs) for temperature, bacteria, dissolved oxygen, and turbidity for the Upper Willamette Sub-basin in September 2006. The Salem and Eugene District BLM Willamette Basin Water Quality Restoration Plan was approved by Oregon DEQ in July 2008 and outlines a comprehensive strategy for implementing, monitoring, and evaluating management to address water quality on BLM lands in the Willamette basin.

Table 3-2 shows tributaries within, or adjacent to, proposed harvest units that flow into major streams and lakes listed as 303(d) temperature impaired waters by the Oregon DEQ. Although temperatures for project area streams are not available, many are likely temperature impaired because of similar environmental conditions found within the larger tributary streams and lakes.

Table 3-2: Oregon DEQ Designated Impaired Waters within the 6th field watersheds.

Proposed Harvest Unit	Stream/Lake	Temperature Impaired?*	Temperature Standard	Distance of Proposed Harvest Unit to 303(d) Stream
Eagles Bluff 9, 15	Dorena Lake	No	64.4° F (18.0° C)	0.6 miles
Eagle Bluff 15	Row River	Yes	64.4° F	1.3 miles
Young Butte 25	Mosby Creek	Yes	55.4° F	0.5 miles
Witte Butte 35	Martin Creek	Yes	64.4° F	Adjacent
Witt Butte 27	Upper Coast Fork Willamette River	Yes	64.4° F	2.0 miles

*"Yes" for Temperature Impaired means a stream currently exceeds its temperature standard.

Major road construction and timber harvest began in the project area and watersheds in the 1940s, peaking in the 1970s and 80s. Clear cut harvesting of riparian stands, road construction parallel to streams and urbanization have contributed to increased temperature and sediments in many watershed streams, most being perennial. These assessments also apply to many project area streams. Many of the soils within the project area are prone to extensive erosion (discussed in the Soils portion of this EA).

Additional known impacts to streams within the project area include degrading or failed log and metal culverts and sedimentation from old skid roads. Sedimentation specifically caused by old skid roads was not quantified due to the time and difficulty associated with locating these features and assessing or monitoring any sediment inputs into nearby streams.

Some older roads now carry water during winter storm events, thereby increasing stream sediments and extending and diverting streams beyond their historic/natural channels. Some stream reaches have been completely covered by logging debris resulting in impeded or altered channel flows.

All project area sections and surrounding 5th and 6th field watersheds have high road densities (over 3.5 road mi/mi^2) as shown in Table 3-3. Road densities over 3.5 mi/mi^2 are considered "Not Properly Functioning" (FEMAT, 1993) with respect to a variety of factors influencing water quality and the timing of peak flows.

Table 3-3: Existing Road Densities in Project Area 5th & 6th Field Watersheds & Sections.

Scale	Watershed Name	Road Miles/Mi^2*	Average*
5th Field Watershed	Mosby Creek	5.8	5.3
	Row River	4.1	
	Upper Coast Fork Willamette	6.0	
6th Field Watershed	Combs Creek-Coast Fork Willamette River	5.6	6.6
	Dorena Lake-Row River	12.6	
	Lower Big River	5.1	
	Lower Mosby Creek	3.2	
Section	Eagles Bluff – Section 9	4.9	4.9
	Eagles Bluff – Section 15	5.6	
	Witt Butte – Section 27	5.5	
	Witt Butte – Section 35	4.1	
	Young Butte – Section 25	4.5	

*Based on BLM corporate data for known existing roads/prisms. Actual road densities are higher due to unavailable data for non-federal lands (therefore densities are above 3.5 mi/mi^2 at all scales.

Sediment outputs from roads in project area sections were estimated using field observations to calibrate inputs for the roads module of the Watershed Erosion Prediction Project (WEPP) model. The current sediment yield from roads is estimated at 219 cubic yards per year for the project area. Actual yields cannot be calculated due to the lack of numerous annual and inter-annual variations at various scales (i.e., precipitation, timing of peak flow events). WEPP sediment prediction values are appropriately used only for relative comparisons between project alternatives (i.e., not as actual or precise values).

Fish Species: Presence and Distribution

Fish presence for most project area streams has not been verified by survey. Five project area streams were assumed to have fish using ARIMS and GIS data, including those with gradients under 20% with a large enough basin to provide adequate spring time water for cutthroat trout spawning in smaller order streams. These assumptions could not account for barriers (e.g., waterfalls) or other stream attributes that could prevent fish use.

Table 3-4 displays anadromous and resident fish species that occur within the project area 5th field watersheds and therefore could occur in project area streams. Cutthroat trout have the widest distribution; and therefore highest likelihood of being in the project area.

Table 3-4: Fish Species Assumed Present in/near Project Area due to Known Presence in 5th Field Watersheds.

Common Name	Scientific Name	Anadromous/Resident Species
Chinook Salmon	*Oncorhynchus tshawytscha*	anadromous
Rainbow Trout	*Oncorhynchus mykiss*	anadromous
Cutthroat Trout	*Oncorhynchus clarkii*	resident
Mountain Whitefish	*Prosopium williamsoni*	resident
Largescale Sucker	*Catastomus macrocheilus*	resident
Sculpin Species	*Cottidae spp.*	resident
Dace	*Rhinichthys osculus*	resident
Redside Shiners	*Richardsonius balteatus*	resident

The Upper Willamette River Chinook ESU was federally listed as threatened under the Endangered Species Act on June 28, 2005 (70FR37160) and its critical habitat was designated on August 2, 2005 (70FR52630). Chinook salmon are part of the Upper Willamette River Chinook Evolutionary Significant Unit (ESU). Young Butte 25 is the only part of the project area vicinity accessible to anadromous fish due to dams on Cottage Grove and Dorena Lake Reservoirs. Mosby Creek is the only critical habitat stream for Upper Willamette River Chinook that could be affected by project actions because of its proximity (0.5 miles) to proposed harvest units and haul routes. The Final Environmental Impact Statement for the Revision of the Western Oregon Resource Management Plans describes the status of the species, including life history, populations, status and distribution, and key limiting factors for the Upper Willamette River Chinook salmon ESU (USDI 2008; Appendix J-Fish, pp. 338-342). The Oregon Chub was listed as threatened under the Endangered Species Act on April 23, 2010. No known populations exist on BLM managed lands. The species is present in larger back water sloughs of the Willamette River and would not be affected by project actions.

Fish Habitat in the Project Area and Watersheds

Salmon and trout species are analyzed in this EA because they have a potential to be affected by project actions due to their distribution, habitat requirements and sensitivity to changes in water quality. Salmon and trout require cool water temperatures, hiding cover, clean spawning gravels, rearing pools and an adequate food supply for good fish production. Other fish species in Table 3-4 would probably not be affected by project actions due to their tolerance for a greater array of stream conditions, including higher water temperatures compared to salmonids. Except for discussion of general effects to all fish species, these species are not specially addressed in this EA. The key fish habitat attributes that could be affected by project actions are discussed below: large woody debris, stream temperature, sediments, and fish passage and connectivity.

In-Stream Large Woody Debris (LWD)

LWD is important to fish because it provides cover, forms pools, stabilizes channels, traps and sorts fine sediment (Meehan 1991). LWD also adds channel roughness (complexity) to dissipate stream energy and thereby reduce bank erosion and increase channel width (Montgomery and Buffington 1997). Riparian vegetation provides in-stream LWD, cover for fish, bank stability, stream nutrients and habitat for invertebrates-an important food source for fish. Most of the Riparian Reserves on federal lands, and equivalent areas on non-federal timber lands, were clear-cut harvested one or more times and heavily planted with Douglas-fir. This has resulted in most being dominated by younger Douglas-fir cohorts with more simple and homogenous structure compared to historic conditions. This past management throughout the project area and surrounding watershed has reduced LWD and contributed to declining fish production (Meehan 1991). However, since implementation of the Northwest Forest Plan on federal lands, Riparian Reserves are slowly returning to older, more complex and diverse historical conditions.

Desired LWD levels in the project area are at least 50 pieces per stream mile; with less than 17 pieces per stream mile considered low (Moore 1997). Oregon Department of Fish and Wildlife (ODFW) stream surveys show 12, 17, and 54 average pieces per stream mile in project area 5th field watersheds.

Water Temperature

Water temperature is one of the most important variables controlling habitat suitability for salmonids. Optimum temperatures for Chinook salmon and cutthroat trout are 55 to 60°F, with temperatures over 84°F considered lethal (Meehan 1991). Absorption of solar radiation is the largest cause of increases in stream temperatures.

Riparian vegetation regulates and reduces stream temperature. Timber harvest that removes enough shade trees

has been shown to increase stream temperatures (Beschta et al. 1987). Other influences on stream temperature include climate, stream size, elevation and groundwater.

Sediments
Clean gravel is important for spawning, with favorable sizes for salmon and trout being 0.5 to 4.0 in. (Meehan 1991). Fine sediments are typically defined as particles (sand, silt, and clay) less than 0.08 in. (2mm). When high amounts of interstitial fine sediments occur in spawning gravels, less spawning occurs, eggs tend to suffocate, and emerging fry become trapped, resulting in mortality and reduced production (Philips et al. 1975, Tappel and Bjornn 1983, Chapman 1988, Meehan 1991).

Concentrations of suspended sediment and turbidity also have direct effects on fish behavior, physiology, and growth (Anderson et al. 1996). ODFW considers properly functioning substrates to have <20% fines, sands or sediment. The average sediment levels in project area 5th field watersheds is above 20%; with only 5 of 23 sampled streams having levels below 20%. Project area streams likely exhibit similarly high percentages.

Forest transportation systems can harm salmonids and their habitats because of fine sediments released into streams (Meehan, 1991). Most road segments within the project area have not been adequately maintained and would continue to be chronic sediment sources until properly fixed and maintained. As discussed above and shown in Table 3-3, all 5th and 6th field watersheds within the project area sections are “Not Properly Functioning” with road densities above 3.5 road miles per square mile. High road densities are degrading fish habitat at all landscape scales due to sediment inputs and other effects to water quality.

A project area road inventory area included an assessment of approximately 170 culverts (stream and cross-drain) in the project area, including probable haul routes. Approximately 18% of existing culverts were rated as being in poor condition (current or imminent failure); and 37% were rated as being in fair condition (diminished function with risk of failure in the near future). All of the poor, and many of the fair condition culverts, are contributing to one or more of the following: increased sediments into nearby streams, rerouting of historic stream channels; and increased chances of major washouts or road failures.

Fish Passage and Connectivity
Habitat connectivity is important for fish production. It is common, and necessary, for fish to move within and between stream systems throughout the year (Kahler et al. 1998). Restoring fish passage increases the amount of habitat (Roni et al. 2002).

Of the 170 total culverts detected by inventory, 49 are in streams. Approximately 33% of these stream culverts are in fair condition and 41% are in poor condition. All of the poor, and many of the fair condition stream culverts, are at risk of blocking fish passage, if present.

Many culverts in the project area and surrounding watershed have been upgraded to accommodate 100 year flood events and reduce risk of major washouts and fill failure. However, funding levels and other priorities have resulted in many culverts not being replaced.

3.2.2 Environmental Effects
Effects to water quality are most known and notable at a localized scale. The geographic scale of the five project area sections is used to analyze effects, unless otherwise noted.

Alternative 1: No Action
Under this alternative no actions related to harvest, roads (construction, improvement, decommissioning) or culverts (installation, removal, replacement) would occur.

Large Woody Debris
Densely stocked Riparian Reserve stands currently shade out almost all light before it can reach the forest floor. Because of this, there is reduced herbaceous vegetation. The stands were planted with Douglas-fir which is still the dominant species, and there is minimal structural diversity throughout the stand.

Alternative 1 would continue to provide small diameter wood in Riparian Reserves at current rates for up to the next 40 years. This recruitment would be provided mostly by mortality of smaller trees in overstocked stands, stem mortality from competition, disease, wind and snow downed trees. Most riparian stands in the project area, however, are composed of small diameter trees (<20 inches diameter). The benefit of small diameter wood is limited, due to its inability to store in-stream sediment and its shorter life span compared to large woody debris (>20 inch diameter). Natural stem development of even-aged riparian trees may be expected to exceed 40 years and delay the availability of large wood.

Most in-stream LWD recruitment would occur within 75 feet of streams. The small amount of LWD recruitment

that could occur from the outer portions of Riparian Reserves would continue at current recruitment sizes, amounts, and rates due to suppression mortality in untreated stands.

Water Temperature
Current water quality conditions trends would be maintained. Continued growth of vegetation within the Riparian Reserves would provide on-going shade to maintain stream temperatures. Road maintenance activities would not disconnect road drainage from streams and would not prevent sediment transport and the risk of future fill failures. This alternative would not increase solar radiation within the outer portions of Riparian Reserves for 10-15 years and would not expect to lead to an increase in stream temperatures.

Sediments
Chronic sediment sources would continue to provide inputs to streams at current rates. The total number of culverts as well as just stream culverts with conditions rated good would be expected to decrease within the next ten years, with increases of the number of culverts rated as poor (Tables B-2 and B-3).

Existing roads would continue to be connected to the stream network. The current and future sediment inputs into streams would continue at current rates. Sediment inputs from lead-off ditch and problem culverts would continue to occur.

Overall, there would be no change in the current amounts of acute and chronic sediment sources into project area streams. Future amounts could increase as culverts continue to deteriorate and more decrease towards poor conditions.

Fish Passage and Connectivity
Existing limitations on fish passage, and therefore the amount of fish habitat would continue to occur under this alternative.

Effects to Listed Fish Species
This alternative would result in **no effect** to Upper Willamette River Spring Chinook Salmon. Critical habitat in Mosby Creek would not be improved by culvert installations and upgrades. There would be no net increase in, or improvement to, fish habitat due to implementing project actions. Turbidity in project area streams would not be improved. Current and future sources of acute or chronic sources of sediment inputs into streams would continue. Some sediment sources would worsen and further degrade fish habitat over time. The overall health of Riparian Reserve stands would not be improved by accelerating tree growth and improving stand structure.

Alternative 2: Thinning Harvest
Under this alternative, actions related to harvest, roads (construction, improvement, decommissioning) or culverts (installation, removal, replacement) would occur as described in section 3.2 of this EA.

Large Woody Debris
Approximately 260 acres of Riparian Reserves would be treated by thinning. This represents about 8% and 39% of the 6th field watersheds and project area Riparian Reserves.

Effects to untreated (inner) portions of the Riparian Reserves (< 75 feet) would the same as for the Alternative 1. The outer portions of Riparian Reserves (> 75 feet) would be treated under this alternative and would experience the Alternative 2 benefits of: accelerated growth rates for dominant trees and a corresponding accelerated time when the stands would exhibit large trees and other late-seral forest characteristics, as well as increases in tree species and structural diversity. However, the diameters of LWD would be smaller due to lack of enhanced growth by thinning and that most falling trees would not reach the stream channel.

Riparian Reserve stands as a whole would recruit lesser amounts of larger diameter terrestrial down logs compared to the Alternative 1. The amount, rate and diameters of recruited down logs within the no-harvest buffers would be the same as for Alternative 1. Slower rates of recruitment of larger diameter trees would occur within treated areas that capture natural mortality but accelerate tree growth. Overall, stands would progress towards more historic conditions at a faster rate compared to the Alternative 1.

Based on tree sizes and distances from streams, most in-stream LWD recruitment would occur within 75 feet of streams. The amount, diameters and rates of LWD recruitment in no-harvest buffers ($\geq$ 75 feet) would be the same as described for Alternative 1. The small amount of LWD recruitment from the outer portions of Riparian Reserves would occur at a slower rate due to thinning harvest that would remove natural mortality. However, the diameters of recruited trees would be slightly larger sooner due to enhanced growth from thinning and these taller trees would have a greater chance of reaching the stream channel.

The eventual increase in the amount of in-stream LWD would benefit in-stream habitat, influence the size,

location of pools, the formation of deeper pools, sediment retention, creation of backwater and off-channel habitat, and the deposition and sorting of gravels thereby providing suitable spawning habitat. All of these factors would improve aquatic organism habitat – including fish habitat.

Water Temperature

Proposed treatments within riparian areas are designed to comply with the Salem and Eugene District BLM Willamette Basin Water Quality Restoration Plan to achieve and maintain stream temperature water quality standards. Riparian Reserves can be thinned without changing stream temperatures by retaining trees that shade streams during the peak sun hours of 10:00 am to 2:00 pm (USDA and USDI 2004).

Table 3-2 shows major 5th field watershed streams in/near the project area with summer temperatures exceeding the Oregon DEQ water quality standard of 64.4° F for fish bearing streams. The only stream close enough to have its stream temperature affected by project actions is Martin Creek (adjacent to Witt Butte 35). Thinning actions in the Riparian Reserves would not water affect stream temperature because no vegetation would be modified within no-harvest buffers (> 75 feet) and at least 50% canopy closure would be retained in any remaining portions of the primary and secondary shade zones. Streams with low-stocking and canopy closures were dropped from harvest consideration. Although thinning could result in a slight increase in solar radiation, this would not be enough to cause an increase in stream temperatures and canopy conditions would recover to pre-harvest levels within 10-15 years.

Stream crossing culvert replacements could result in the loss of some over story vegetation (a few trees) but not to the level of affecting stream temperature.

All new roads in Riparian Reserves would be temporary and most would be located on ridge tops or gentle slopes. Road segments within the Riparian Reserves would be well outside of the primary shade zone or cross perpendicular to the stream and only negligible increases in solar radiation would occur.

The approximate 0.35 miles of new road construction in Riparian Reserves (outer portions) would be decommissioned by blocking or fully decommissioned by tilling. Due to their locations, lengths and post-project disposition these roads would not increase solar radiation to a degree that would affect stream temperatures.

Sediments

Collectively, harvest and landing use in all areas would contribute only minor amounts of sediments to streams. Cable yarding landings would be mostly located on ridge tops. Various BMPs and PDFs would minimize the number of common cable settings-unless necessary due to topography, the size of landings, disturbance of ditch lines and disturbed areas adjacent to roads (when and where sediment could be generated and transported into streams). Common settings would be limited to the amount dictated by topography (to reduce size of total landings footprint). Roadside decking would be minimized to avoid drainage issues as well as other methods to minimize sedimentation as outlined in the PDFs. Stream headwalls, streams with steeper banks, or those with soil instability conditions, were assigned larger no-harvest stream buffers (75-300 feet) or were dropped as proposed harvest areas to avoid sediment increases to streams.

Overall, culvert installation would contribute low volume short term sediment inputs into nearby streams. The long term effect of this action would be a reduction in high volume or chronic sediment inputs into streams. Culvert actions would also reduce chances of road and culvert failures and create greater separation between more stable roads and stream networks.

Road work associated with the project would include replacing approximately 41 culverts currently in good (1), fair (19), or poor (21) condition as shown in Appendix Table B-2. Replacement would include all in-stream culverts ranked as high priority for replacement (if used for project actions) due to current or near-future conditions and effects to water quality or fish passage. All of these culverts would be enlarged to accommodate 100-year flood flows and therefore reduce the risk of major sediment events due to catastrophic road or culvert failure.

In-stream culvert replacement would contribute short-term low volume pulses of sediment into streams during renovation durations of a few days to a few weeks. Work would occur during non-flow periods for intermittent streams and low-flow periods for perennial streams. PDFs such as sediment barriers and flow bypass would minimize sediment production into perennial streams.

It is not possible to conduct culvert replacement without some short-term sediment delivery. Precise quantified values of sediment production due to culvert replacement cannot be calculated, but approximate predicted ranges are shown in Table 3-5. Depending on weather behavior and other variable site-specific factors, sediment yields would be between 0.2 and 1 cubic yard per culvert installation.

Table 3-5: Approximate Culvert Replacements and Resulting Fill and Sediment Yields by Alternative.

	Culvert Type	# Culverts Managed	Fill Stabilized (yd^3)	In-Stream Sediment Yields (yd^3)
Alt. 1	None	0	0	N/A
Alt. 2	Stream	26	5,840	5.4 – 27.0*
	Cross-drain	15	2,100	0
	Total	**41**	**7,940**	**5.4 – 27.0***

* Calculated using 0.2 – 1.0 yd^3 sediment yield per stream culvert installation, replacement or removal.

Table 3-5 provides a summary of these replacements and the potential amount of fill material that would have a reduced risk of entering streams. It also estimates the amount of sediment produced from the culvert replacements. The maximum estimate of sediment yields from the culvert replacements would be 27 cubic yards in comparison to the estimated volume of fill stabilized – 7,940 cubic yards.

Short term increases in stream sediment and turbidity from culvert replacement would cause fish (cutthroat trout), if present, to avoid the area for a few days during and after culvert installation, until turbidity levels are reduced. Other fish species would not be affected by culvert replacement due to being far enough downstream from these actions. Brake et al. (1997) found that on established logging roads within the Oregon Coast Range, the maximum observed distance sediment traveled below a ditch relief culvert with vegetation filtering, or a stream crossing culvert with stream material present (LWD, boulders, debris, etc.), was typically not more than 20 feet (6.2 meters). However, when stream flow increases, short periods of sediment transportation and turbidity could occur to within 500 feet (152 meters).

In areas where year-round timber haul would be allowed, any effects due to sediment production from road use and haul would vary by season of use and road surface. Existing haul routes are predominately gravel surfaced roads leading to paved roads for the majority of the timber haul. Dry season use typically results in less sediment production. Inventoried road segments that could produce sediments during hauling (due to inadequate relief drainage or road surfacing aggregate) would receive additional rock, blading and relief culverts (new or replaced) before project actions begin. A project design feature would ensure no haul during periods of heavy rain to keep sediment minimized and road drainage in good condition. Sediment inputs into streams would be minimized by the above PDF, however some inputs of sediment would result as a consequence of improving the road drainage and winter haul. These inputs would be small short term pulses of sediment during the first winter rains, but would improve overall sediment production by improving drainage off the forest roads.

BMPs, PDFs and engineering standards for road construction, improvement, renovation and decommissioning would collectively reduce sediment inputs into nearby streams to minor and acceptable amounts that would not meaningfully affect water quality.

All proposed new permanent roads and optional rocked roads would be rocked and located outside of Riparian Reserves on stable ridge tops.

New road construction would limit road prism disturbance by only removing stumps necessary to build the running road surface and ditch line. New cut and fill slopes would be seeded and mulched. Most new construction would be temporary roads and these would be weatherized, blocked to vehicle access and decommissioned as soon as possible after harvest. Most road work would occur during the dry season; only maintenance (adding rock and grading) would be done as needed. Collectively, road renovation, construction and decommissioning (tilling) would result in a low volume short duration increases in sediment delivery to streams until soils are stabilized by vegetation, mulch or rip-rap or flushed out by subsequent seasonal rains.

One new temporary road and new stream crossing would be built across an intermittent portion of stream 4B in Unit 9C of Eagles Bluff 9. The crossing location would be approximately 90 feet upstream of a fish bearing reach. The road would be constructed during the dry (no-flow) period, not used during the wet season, and weatherized and blocked if it would be maintained over winter (wet season). Disturbed areas would be seeded and mulched to minimize the amount of bare soil that could be transported to the stream. A small wetland (< 1 acre) approximately 100 feet downstream of the crossing would help filter out any sediment and pollutants from equipment. Some sediment inputs to stream 4B would occur during the first wet season. Due to mitigations and natural ‘’adjustments” by the stream channel, sediment inputs would not be expected to continue past the first winter.

An analysis of total estimated sediment outputs from roads in the project area was completed using the roads module of the Watershed Erosion Prediction Project (WEPP) model. The same analysis was conducted for the project area road systems for each and incorporated all project related road maintenance, temporary road construction activities, and haul route activity. Estimates of sediment production rates during implementation of all

types of project actions as well as conditions following completion of the project are shown in Table 3-6.

Table 3-6: Estimated Annual Sediment Yields from Project Alternatives (all actions).

	Gross Yield (yd ^{3})	Net Change (yd ^{3})	Percent Change
Alternative 1	219	0	0
Alternative 2: During Project Actions*	484	+ 265	+ 121 %
Alternative 2: After Project Actions	180	- 38	- 18%

* Project actions would occur for up to 3-4 consecutive years.

Annual sediment yield increases during the life of the project approximately 484 cubic yards per year as a result of project activities such as road building, renovation, culvert replacement, increased traffic from haul, etc. This represents an incremental of over 200% increased contribution of sediment that cumulatively adds to sediment already produced under the existing road system. This would be spread out over the 3 years of the harvest activities.

Road related actions of constructing, renovating and improving roads; adding upgrading or replacing culverts; and removing existing stream crossings would collectively reduce chronic low amplitude sources of stream sediment inputs and reduce the chance of future high volume acute stream sediment inputs due to catastrophic culvert or road failures. Overall project area chronic sediments would be reduced by 18% compared to pre-harvest conditions.

Fish Passage and Connectivity

All fair and poor condition culverts are proposed for replacement unless they are inaccessible (i.e., no road access for equipment). As shown in Appendix B, Table B-3, at least 24 stream culverts would be replaced, including: 80% of culverts in poor condition and 50% of culverts in fair condition; and all culverts ranked as high priority for replacement due to site specific concerns for fish, hydrology or road safety. This replacement of fish passage barrier culverts would restore many of the migration corridors of suitable spawning and rearing habitat for fish species (mostly cutthroat trout) and other aquatic organisms. Culverts would be sized to meet a 100 year flow event and would be stream simulated in design to coincide with surrounding channel characteristic and meet the passage criteria for all life stages of fish. Over the long-term, this type and size culvert would greatly reduce upstream and downstream channel erosion, stabilize existing sites, and would eventually mimic the natural stream channel characteristics.

Effects to Listed Fish Species

Except for Young Butte - Section 25, all proposed harvest areas are above dammed reservoirs that block anadromous fish passage and therefore any direct effects to these species. Young Butte 25 proposed harvest units are 0.5 miles above Critical Habitat in Mosby Creek.

Approximately 6 undersized, poor condition culverts would be replaced on streams above Mosby Creek. Replacement would generate up to 6 cubic yards of sediment into nearby streams (1.2- 6.0 yds^3). Most sediment would initially settle and be stored upstream of Mosby Creek; with a negligible amount ultimately reaching Mosby Creek before it is flushed out during high flows.

All potential haul routes near enough to potentially affect Mosby Creek are already paved. Approximately 67-119 acres of Young Butte section 25 harvest units are proposed for year round cable logging. An estimated 71 loaded log trucks could haul during the winter months. Due to the small number of trucks hauling on paved roads in the winter time, most harvest and hauling occurring in the summer, no-harvest stream buffers and PDFs to minimize sediment production, sediment inputs downstream to Mosby Creek from harvest and hauling actions would be minimal and not negatively affect water quality.

Overall, effects to water quality in Mosby Creek would be minimal and short-term; with long term improvements. Due to the short term effects of project actions being negligible and long term effects being beneficial to Mosby Creek, project actions in Young Butte units **may affect, but are not likely to adversely affect** Upper Willamette River Spring Chinook Salmon. Project actions in Eagles Bluff and Witte Butte units would have **no effect** on Willamette River Spring Chinook Salmon because fish passage is blocked by dammed reservoirs to these units. Project actions would meet all requirements generated from ESA consultation with NOAA Fisheries.

Cumulative Effects

The amount, location and timing of reasonably foreseeable actions that could occur on BLM lands in the project area watersheds are not known at this time. BLM actions would likely include thinning harvest similar to the proposed actions and potentially a small amount of regeneration harvest. Depending on BLM actions, funding and staff, stream restoration and improvements to some roads in the watershed could occur (i.e., road maintenance, culvert replacement). However, at most scales these actions would be minimal and uncertain if and where they

would occur, and would address only a small number of known or potential water and fish habitat issues. Riparian Reserve forest stands would continue to grow and improve towards historical conditions. This would occur more quickly on stands thinned to achieve ACS Objectives and Riparian Reserve management direction in the RMP.

More than half of the lands in the project area watersheds are managed by non-federal land owners. Most of these are continually managed for timber production. Non-federal timber lands in the project area watersheds would likely continue to be clear cut harvest stands approximately 40 years and older and renovate or construct additional forest roads. Riparian Management Areas are managed in compliance with the Oregon Forest Practices Act, which applies basal area targets based on stream size, use, and occupancy by fish. Small, non-fish bearing streams have no Riparian Management Area management requirements under this act and are often not buffered on non-Federal lands. These harvest methods and reduced riparian buffers would continue to degrade water quality and fish at all scales, including on federal lands. Actions that would improve water quality and fish habitat would be limited to a small number of culvert replacements and road improvements. Most riparian stands would be clear cut harvested approximately every 40 years and would not recover to historical conditions.

The cumulative effects of both alternatives on water quality or aquatic resources within the project area watersheds are not anticipated to be measurable, maintaining current conditions and trends under Alternative 1 and trending towards improved conditions under Alternative 2. The cumulative effects of on-going and future land management within the project area watersheds outside the project area are not anticipated to contribute measureable impacts to water quality or aquatic resources in the project area under either alternative.

3.3 Issue 2: What are the Effects of the Proposed Thinning & Road Actions on Soils?

3.3.1 Affected Environment

Elevations within the project area range from 1,000 feet in Eagles Bluff, Sec. 9 to 2,700 feet in Witt Butte, Sec. 27. Average annual precipitation ranges from 40”-60” at lower elevations, and 60”-100” at highest elevations.

The project area exhibits clay-rich soils with shallow surface horizons which are easily compacted and can erode with concentrated water flows. Subsoil clay contents are very high for most of the dominant soils described below: 40% to 55% for Bellpine and Cumley, 45% to 60% for Peavine, and 50% to 60% for Honeygrove profiles. Because permeability can be easily impeded by disturbance, subsurface flows often appear as springs and seeps in road cuts during winter months when soils are saturated. Runoff can be rapid and the risk of erosion is high, especially when surface soils are removed. Existing abandoned compacted skid roads and trails can become entrenched and act as intermittent streams during winter months. In all five project area sections, soils exhibit symptoms of compaction and displacement of surface soils resulting in increased water runoff, surface erosion, and reduced soil productivity. These symptoms are severe in some locations. The surface horizon layer, including topsoil and organic matter, is often reduced or missing due to past scarification. Natural amelioration of compaction due to soil movement is rare because the project area experiences mild winters with little or no periods of deep freeze. Residual compaction in most units in the project area exceeds the RMP 2% growth loss standard and spatial extent of compaction is as high as 10% in localized areas. These conditions were primarily caused, or exasperated by, past actions such as: cat and tractor logging on slopes up to 50%, deeply excavated and well-traveled skid roads spaced too close to each other, and ground based logging on saturated soils.

This EA describes soils in terms of their resiliency, permeability and productivity. Resiliency denotes an overall measure of the sustainable range of response of a soil to disturbance based on attributes such as nutrient capital, physical and chemical properties, hydrologic function and rates of erosion. Permeability is a measure of the rate that water passes through soils. Productivity describes the capacity of a soil to provide for vegetative growth, especially conifers. Seven soils types are present and sensitive to the types of actions considered in this analysis within the project area (Table 3-7).

Table 3-7: Attributes of Soil Series Present in the Project Area.

	Soil Attributes (Low-Moderate-High)			Soil Series Presence & Attributes			
Soil Series	**Resiliency**	**Permeability***	**Productivity**	**Eagles Bluff 9 & 15**	**Witt Butte 27**	**Witt Butte 35**	**Young Butte 25**
Bellpine	Moderate	Low	Moderate	Yes			Yes
Cumley	High	Moderate	High		Yes		
Honeygrove	High	Moderate	High			Yes	
Kinney	High	Moderate	High		Yes		
Klickitat	Moderate	Moderate	Moderate		Yes		
Peavine	High	Moderate	High		Yes	Yes	Yes

*The rate of water movement through soil.

Bellpine: A moderately deep and well-drained soil series usually seen on slopes of 0-50% in the project area in Eagles Bluff 9 and 15 and Young Butte 35. Permeability of the subsoil is low due to high clay contents and few coarse fragments within the profile. The risk of water erosion is high when soils are compacted. Productivity and resiliency are both classified as moderate. Slopes less than 35% are generally suitable for ground base logging systems when BMPs are employed to reduce the severity and spatial extent of severe compaction. Bellpine is the dominant soil in Eagles Bluff 9 and 15 and occupies the east half of the Young Butte 25 section.

Cumley: The most widespread soil series in Lane County, it is a deep (60 or more inches), somewhat poorly drained soil usually found on slopes less than 20% and on depressed topography adjacent to streams. Productivity and resiliency are classified as high, with moderate permeability. The topsoil is a silty clay loam with silty clay and clay subsoils. Cumley soils have a seasonal high water table of 2 to 3 feet. Root growth tends to be horizontal due to the saturated subsoil which makes the trees susceptible to wind throw. A large contiguous block of this soil series occurs in the southwest portion of the Witte Butte 27, including on old landslide topography with benches and short steep slopes.

Cumley sites are perennially moist, somewhat poorly drained and usually found near drainages. Soils are dry between 4 to 12 inches for less than 40 days during the summer months. The narrow window for dry soils presents a high risk for detrimental soil impacts, especially deep compaction. Severe compaction and deformation of soil structure often extends beyond the effective reach of standard decompaction equipment. Cumley soils are prone to slumping when road cuts are made in the steeper areas. Slumping can be minimized with properly designed drainage systems and heavy base rock when needed for use year-round.

Honeygrove: A deep (50-60 inches), well drained silty clay loam soil series with silty clay loam topsoil over clay subsoil. Productivity and resiliency are both classified as high, with moderate permeability. These soils usually occur on broad ridges and stable landforms where slopes are less than 25%. High amounts of clay and organic matter with minimal coarse fragments create a high water holding capacity and high susceptibility to compaction. It is found in Witte Butte 35. In Honeygrove sites, moisture drawdown may not occur until August or later due to the high water holding capacity and moderate permeability of the clay rich subsoils.

Kinney: A cobbly loam soil series that is deep (up to 60 inches) and well drained with cobbly loam topsoil over very cobbly clay subsoils. Productivity and resiliency are both classified as high, with moderate permeability. Kinney soils are present in Witte Butte 27 where they occur in old stabilized slump terrain on uplands where slopes are typically less than 30%, including in the southeast quarter and along west and south section lines. In some areas the soil is only moderately well drained because areas are subject to seepage and runoff from adjacent higher areas and drainages are not well defined. Slopes less than 35% are suitable for ground base logging systems when BMP's are employed to reduce the severity and spatial extent of severe compaction.

Klickitat: A well-drained soil series with coarse content greater than 50% throughout the soil profile. Productivity and resiliency are both classified as moderate, with moderate permeability. It is present in Witte Butte 27. The surface soil is stony loam over very cobbly clay loam subsoils. Fractured basalt is usually at a depth of 50 inches, but shallow inclusions are fairly common. In Witte Butte 27, Klickitat soils mostly occupy steep slopes of 50% to 70% in the west half of the section, south of stream 30 and moderately steep slopes of 30% to 50% north of stream 30 and in the southeast corner of the section. Runoff is rapid and the risk of water erosion is high. South facing slopes are particularly droughty due to the excessive coarse content.

Trees in Klickitat soils are subject to wind-throw because of shallow roots. Compaction of skid trails and temporary roads on Klickitat soils cannot be effectively decompacted due to the high content of stones and large cobbles. It is present in Witte Butte 27 and 35, and Young Butte 35.

Peavine: A moderately deep (30-40 inches) and well-drained soil series with silty clay loam topsoil over silty clay and clay subsoils. Coarse content is typically less than 20% within the profile and surface rock is uncommon. Productivity and resiliency are both classified as high, with high water holding capacity in the upper 20 inches. These soils have moderate permeability. This is the most common soil series in Witte Butte 27 and 35, and Young Butte 25 where it occurs on 0-60% slopes. Peavine soils comprise the western third of the Young Butte 35 section. Slopes less than 35% (some up to 50%) are generally suitable for ground base logging systems when all BMP's are employed to reduce the severity and spatial extent of severe compaction.

3.3.2 Environmental Effects

Alternative 1: No Action
No additional compaction or displacement would occur due to harvest and road management actions. Harvest areas with residual compaction in excess of RMP standards would continue to impair water storage and

accelerate erosion during the next rotation and beyond. Legacy compaction and reduced soil productivity would persist into the future along existing skid roads and trails.

Alternative 2: Thinning Harvest
Most thinning would occur on soils with moderate to high resiliency. These soil types can sustain substantial manipulation and still maintain nutrient capital, inherent physical and chemical properties, hydrologic function, natural rates of erosion and pretreatment capabilities for tree growth. PDFs would minimize the potential for accelerated erosion throughout all phases of operation. All hydric soils and most soils with low resiliency were excluded from proposed harvest units and surface disturbing activities. No harvest or road building is proposed in areas identified as high potential for slope failure and accelerated mass movement.

Thinning
Table 3-1 displays the amount of cable and ground-based yarding that would occur under this Alternative.

Cable yarding pattern and landing sizes were planned to achieve a maximum of approximately 3% of surface area disturbed. Design features would limit the spatial extent and severity of direct effects and the potential for prolonged accelerated erosion. Water-bars or woody material would be required in corridors where increased erosion would be likely. Some units designated for cable systems contain smaller portions where slopes are less than 35%. Ground-based harvest and/or skidding equipment would not be permitted on these inclusions.

With the implementation of identified PDFs, bare soil exposure and measurable compaction in corridors and associated landings after harvest actions would be expected to occupy about 3% of the cabled yarded areas.

Direct effects of cable yarding would be displacement of surface soils and organic matter and discontinuous localized compaction within yarding corridors. These effects would mostly be confined to strips less than 10 feet wide. Compaction would be deeper and more continuous for areas harvested in the winter when soils are wet and near landings (where yarding corridors converge).

Full vegetative recovery is expected within 10 years for all soils. Recovery would occur within five years for the highly resilient Cumley, Honeygrove, Kinney, and Peavine soils, and within 10 years for the moderately resilient Bellpine and Klickitat soils.

Assessing the extent, intensity and duration of effects to soils due to ground based systems is difficult due to a combination of factors, including unknown or unpredictable site-specific variables and conditions. Key factors relevant to effects to soils include: past compaction, soil types, soil moisture, the type of felling and yarding equipment, the amount of equipment passes over a given piece of ground, the direction of equipment travel (uphill, downhill, sideslope), the amount and location of skid trails and landings, topography, and the success of post-harvest decompaction actions.

Ground based logging systems have the inherent potential for more severe and extensive compaction than cable systems because trails are wider and more equipment is in contact with the ground. Several BMPs and PDFs would be implemented to reduce short and long-term effects to soils. Ground based logging would mostly occur on soil types with moderate-high resistance to compaction, slopes less than 35% and when soil moisture is low and most resilient to compaction. Soil moisture content would be monitored prior to machine activities in ground based units. Directional felling would be used on small portions of ground based units with slopes greater than 35%. Areas that would require additional or unique yarding specifications to minimize or reduce effects to soils are designated and mapped as “Special Yarding Areas”. Skid trails and landings would be designed to occupy an average of approximately 10-15% of a ground based unit, including skid trails no more than 12 feet wide spaced approximately 150 feet apart on average. Re-use of already compacted old skid trails would occur when they meet other selection criteria. When necessary to reduce effects to soils, mechanized harvesting system equipment would be limited to a single pass over the same piece of ground and/or would travel on slash created by the harvest process. Up-hill equipment travel would be discouraged on steeper slopes. Where possible and necessary, skid trails would be decompacted and/or covered with logging slash after harvest. Effects to soils are analyzed in this EA based on the assumption that BMPs and PDFs would be administered on the ground with only infrequent exceptions for unique situations.

Conventional ground based skidding equipment is designed to be equipped with a winch capable of pulling logs up to 75 feet from designated skid trails, landings and haul roads in order to achieve the desired skid trail spacing and to avoid unnecessary travel of ground based skidding equipment off of skid trails and roads (SALHI 2006). The types and combinations of equipment used for ground based logging vary by operator and situation and are not always predictable. New equipment and methods are allowed and employed by operators to reduce cost and environmental effects. Alternative ground based logging equipment include mechanized harvesters for felling and processing and mechanized forwarders. Equipment type, weight, weight distribution, tire pressure, reach, travel

location (i.e., on or off of skid trails and landings), travel amount (i.e., the number of passes) and whether it must travel over a slash mat would be assessed prior to use. The specifics of equipment use would then be approved on-site to achieve desired effects to soils consistent with PDFs and BMPs. Evaluation of the impacts of new equipment and methods is adaptive and conducted as part of contract conformance and RMP compliance.

The exact locations of new or re-used skid trails and landings and the effectiveness of post-harvest decompaction cannot be fully determined in advance. Some historic trails and landings would be re-used. Doing so would reduce new compaction, but increase the difficulty (lessen the amount) of post-harvest decompaction. The net amount of new and total un-ameliorated compaction after project actions would vary.

Despite mitigations, use of skid trails and landings could result in soils with reduced productivity or severe and lasting compaction that cannot be ameliorated after harvest. Organic matter and topsoil are necessarily bladed off and displaced when trails are created.

Depending on purchaser optional logging systems implemented, between 19-74 acres (15%) of ground based units would be occupied by skid trails and landings: 6-24 acres in Eagles Bluff, 5-34 acres in Witt Butte, and 8-16 acres in Young Butte.

Ground based skidding, like truck haul, requires more machine energy and results in more effects of compaction, displacement and erosion when operating in adverse conditions (e.g., uphill). Although such actions would be discouraged, they could occur is some portions of Eagles Bluff units 9A, 9C and 9D and 15A. Up to 22 acres (12%) of Eagle Bluff 9 harvest acres; and 24 acres (13%) of Eagle Bluff 15 harvest acres could experience additional compaction due to operating in adverse conditions.

Certain soil types and topographic settings do not typically reach fully dry levels considered optimal for operations to avoid impacts. Cumley soils in Witt Butte Unit 27I (approximately 20 acres) are probably perennially too moist to allow ground base logging without substantial compaction occurring at depth, beyond the reach of standard tillage equipment.

Road Actions
Soil productivity would be irreversibly lost on up to approximately 5.5 acres of forested land due to new permanent rocked road construction, including roads that could be optionally rocked (operators discretion).

Topsoil loss and potential severe compaction would occur on approximately 5 to 10 acres of forested land due to temporary native surface roads and landings. The amount and severity of compaction in these areas would depend on road width, the amount of equipment travel, the amount and duration of log decking on or near roads, the effectiveness of drainage systems and other factors described above. Decompaction would be attempted on all temporary native surface roads as soon as possible after harvest. If decompaction is not possible before the next wet season, these roads would be blocked and left in an erosion resistant condition until decompaction could occur. Woody debris and slash would be placed on decompacted roads and landings to enhance soil productivity, reduce erosion and prevent vehicle access. Even with these mitigations, soil function and long term soil productivity could be impaired for 50 to 100 years largely due to the loss of topsoil. Deeply excavated portions could take hundreds of years for soils to return to pre-harvest productivity.

Cumulative Effects
Cumulative effects to soils are considered for this project at the project scale. Actions analyzed here combined with comparable practices on private land may alter water storage and erosion rates on a broad scale, but a data gap exists at the watershed scale to be able to produce a meaningful comparison.

Harvest activities would be expected to continue to produce effects similar to those that have occurred in the past. The spatial extent of severe compaction from ground based equipment that is not ameliorated would accumulate in individual harvest units with this and subsequent entries. Conifer growth in these units would be reduced for individual trees, as well as site class for stands at the project scale. Effects to site productivity would not be anticipated at the same levels in cable yarded units. Similar effects to timber lands would be expected by logging systems; however, these total effected acres are unknown.

Road management would increase the total miles of road within the project area by approximately 1.6 to 3.5 miles of permanently rocked roads. These roads would add to the overall acres of the landscape converted out of timber production for transportation/access routes. These new permanent roads combined with roads on other ownerships within the watershed would contribute to total watershed road densities; however, the proportional contribution is unknown.

3.4 ISSUE 3: WHAT ARE THE EFFECTS OF THE PROPOSED ACTION ON SPECIAL HABITATS, SPECIAL STATUS SPECIES, AND MIGRATORY BIRDS AND THEIR HABITATS?

3.4.1 Special Habitats

3.4.1.1 Affected Environment

Special habitats are habitat elements that provide a variety of habitat needs for multiple species or are unique habitat contributions on the landscape (i.e., caves, rock gardens, rock outcrops). Special habitats considered in this analysis include: coarse woody debris (CWD) and snags. Several wetlands exist in or are adjacent to the project area; however, all would receive buffers. No-harvest buffers have been determined to be sufficient to protect water quality and other wildlife habitat values in wetlands, and, as such, this habitat will not be discussed further in this document. No other special habitats were identified within the project area.

Coarse Woody Debris

CWD is an important habitat feature for many wildlife species. CWD provides refugia, foraging and reproduction sites, and travel corridors for species with low mobility and small home ranges (i.e., invertebrates, small mammals, and amphibians). Additionally, CWD provides important basic ecological function like moisture retention, nutrient cycling, and microclimate buffering. Stand exam data show CWD distributed across a variety of diameters and decay classes; with most being recent suppression mortality (small-diameter/low decay class) or residue from the previous harvest (large-diameter/high decay class) (Table 3-8). Field review of the proposed harvest units indicates that CWD is more regularly distributed in Riparian Reserves and irregularly distributed in upland areas, with the greatest amounts of CWD present in Riparian Reserves.

CWD and snag data collected during stand exams indicate that amounts of CWD vary widely among the proposed harvest areas. However, because sample transects were placed based on preliminary unit boundaries, and samples from several units were pooled, the resulting figures should be used only very generally.

Table 3-8: CWD and Snags in Proposed Harvest Units (values averaged for all units).

	CWD (linear ft./ac.)				Snags (#/ac.)			
Decay Class	**8-15"**	**16-19"**	**20"+**	**Total**	**8-15"**	**16-19"**	**20"+**	**Total**
1	49	5	4	**58**	1.6	0.00	0.00	**1.6**
2	78	9	11	**98**	2.53	0.00	0.03	**2.56**
3	66	23	24*	**114**	0.37	0.00*	0.00*	**0.37**
4	87	53	423*	**564**	0.00	0.00*	0.03*	**0.03**
5	57	54	107	**217**	0.00	0.00	0.00	**0**
Total	337	144	569	**1,050**	4.49	0.00	0.07	**4.56**

*Values are key habitat features that could provide the most life history uses for associated wildlife species.

The proposed harvest units contain an average of 1,050 linear feet per acre of CWD at least 8" DBH. As is typical in managed stands of this age, the CWD is composed primarily of recent, lower decay class, smaller diameter suppression mortality; and older, higher decay class, large diameter pieces remaining from previous disturbances.

CWD in decay class 3-4 and ≥ 20" diameter provides the best currently available wildlife habitat features. Proposed harvest areas contain an average of 447 linear ft/ac of such CWD, generally as residue from the previous harvest. Field inspection indicates that such CWD is more abundant in the Witt Butte units.

Hard CWD provides much less function for wildlife and generally represents potential future wildlife habitat after further decay. However, most of the low decay class CWD has been recruited in the past few decades and is of small diameter and therefore less useful as future habitat. Proposed harvest areas contain approximately 29 linear ft/ac of decay class 1-2 CWD that is > 16" diameter.

Snags

Snags are especially important to primary and secondary cavity nesting birds (songbirds, woodpeckers, owls) and roosting bats. Stand exam data show an average of 4.56 snags per acre in the proposed units. However, more than 95% of these snags are in small diameters (8-15 inches) that do not provide the variety of wildlife life history needs that large snags do, because of their small size and/or short lifespan. Large, moderately decayed snags are most important to wildlife. Stand exam data show an average of only 0.07 snags per acre that are 16" diameter or greater.

3.4.1.2 Environmental Effects

Alternative 1: No Action

Existing CWD and snags would not be physically degraded or removed, nor would their quality or function change due to alteration of surrounding microclimate. Stands would continue to recruit small to medium-sized CWD and snags, primarily through suppression mortality. Although the numbers recruited would be higher and occur at a faster rate than in treated stands, diameters would be smaller than in stands where tree growth was accelerated

by thinning. These smaller diameter CWD and snags (especially) would have shorter life spans as lower quality habitat for wildlife (compared to larger diameter features). Existing large-diameter CWD and snags would continue to decay and disappear from the stand. These features would not be replaced until natural processes created the necessary growing space for the development of large-diameter trees.

Alternative 2: Thinning Harvest
PDFs would physically retain most existing CWD and snags in proposed units. However, harvest operations would damage or destroy some down logs (particularly those in advanced decay classes), and some snags could be felled for safety reasons or be inadvertently knocked over. Changes in microclimate due to overstory removal could also adversely affect CWD and snag function and quality at least until stand canopy conditions recover in 10-15 years.

In addition to damaging some existing CWD and snags, thinning would remove trees that would soon suffer suppression mortality and become snags or down wood and existing material would disappear from the stands as decay continues. As a result, less small-diameter CWD and snags would be recruited (compared to Alternative 1) until mortality of residual trees occurs. Enhanced tree growth would result in recruitment of large CWD and snags sooner than the Alternative 1. However, this would not occur for many decades because residual trees would continue vigorous growth until competitive (i.e., density-induced mortality) processes act on larger trees. Sporadic mortality from wind, disease, or insects could occur at any time but is not predictable. Snags and CWD would be created from reserve trees throughout Matrix units and in portions of treated Riparian Reserves to partially mitigate this effect. Retention of unthinned riparian buffers and deferred areas in and around the proposed units would also moderate this effect at the project scale. Thinning would accelerate the development of large trees, and therefore long-term recruitment of large CWD and snags compared to Alternative 1.

Cumulative Effects
Snags and CWD are generally considered deficient in the most valued size and decay classes across the project's watersheds. Forest land management on non-federal lands predominately implements clear cuts on upland and riparian forested stands, contributing to cumulative deficiencies for CWD recruitment opportunities across the landscape. Both alternatives would be expected to continue the trend of providing increased levels of snags and CWD on the landscape, at slightly different rates. The cumulative contributions of management for snags and CWD would continue to provide for these features on the landscape but would not cumulatively provide measurable improvements outside the project areas.

3.4.2 Special Status Species

3.4.2.1 Affected Environment
No known Special Status fungi sites exist in or near the project area. Consistent with BLM Information Bulletin No. OR-2004-145, pre-disturbance fungi surveys in proposed project areas are not practical and therefore not required. Sensitive species that could occur in the project area based on habitat include: *Albatrellus avellaneus, Arcangeliella camphorata, Boletus pulcherrimus, Chamonixia caespitosa, Choiromyces venosus, Cortinarius barlowensis, Cystangium idahoensis, Dermocybe humboldtensis, Gomphus kaufmanii, Helvella crassitunicata, Mythicomyces corneipes, Phaeocollybia californica, P. gregaria, P. oregonensis, Pseudorhizina californica, Ramaria amyloidea, R. rubella var. blanda, R. spinulosa var. diminutiva, Rhizopogon chamaleontinus, R. ellipsosporus, R. exiguus, R. inquinatus*. If present, these species could be impacted by timber harvest activities. Consistent with the above Informational Bulletin, protection of previously known fungi sites and other larger scale inventories, are adequate to assure that project level impacts to species would not contribute to the need to list species under the Endangered Species Act. Also, because project actions are consistent with "Pechman exemptions" (see Section 2.1); pre-project surveys for Survey and Manage species are not required and none were conducted. None of these species are discussed further in this document.

Consideration of 39 wildlife species including mammals, birds, mollusks, insects, and reptiles was given in determining effects of this project. Table B-15 displays the animals considered and reason for exclusion from detailed analysis. Only the 7 species determined to hold potential for effects are discussed further.

Surveys for vascular plants, bryophytes and lichens were completed during the 2011 and 2012 field seasons. Wayside aster was the only Special Status lichen, bryophyte or vascular plant species found during surveys.

Wayside Aster (*Eucephalus vialis*) - Bureau Sensitive
Wayside aster is a vascular plant species, endemic to the southern end of the Willamette Valley. Wayside aster is an "edge habitat" species, typically found where dry meadows meet forest. Forest roads create similar habitat. Although roadside edge habitat is common, Wayside aster is rare across the District and usually found on roadsides that connect to current or historic meadows. Historic meadows often no longer exist (due to conversion to forest by planting, natural succession, and displacement of water by roads) and often roadside Wayside aster

populations are all that remain in an area.

Six Wayside aster sites were found in Eagles Bluff 9 in or near proposed harvest areas and/or along roads that would be used by project actions. Five sites are located along roads and one site is approximately 150 feet into a forested stand.

Northern Spotted Owl - Federal Threatened
The Northern spotted owl (*Strix occidentalis caurina*) is a long-lived owl species that ranges from northern California to British Columbia. Spotted Owls prey on a variety of small mammals and typically nest and forage in older forest stands. The species was listed as 'Threatened' by the Fish and Wildlife Service in 1990.

General Habitat
Suitable habitat for spotted owls provides for all the species' life history requirements, and is also called nesting/roosting/foraging (NRF) habitat. Within the Eugene District landscape, it is generally described as conifer forest greater than 80 years old with sufficient mature or late-seral characteristics such large-diameter trees with nesting structure (broken tops, cavities, or platforms), multiple canopy layers, large down logs and snags, and a somewhat open understory for movement. Stands that show some of these characteristics except nesting structure, and that provide roosting and hunting opportunities, are called foraging habitat. While not optimal, some moderate quality foraging habitat can be found in younger 40-80 year stands, depending on their attributes. Stands without NRF components but with sufficient canopy cover and sub-canopy space for spotted owl movement are referred to as dispersal habitat. These stands are used to facilitate owl movement at both the site and landscape scale with little foraging opportunities. Dispersal habitat is generally found in stands 40 to 80 years old. Forested areas that currently provide no function for spotted owls due to small, dense trees are called unsuitable habitat, and areas that will never provide for spotted owl use (e.g., rock outcrops or water bodies) are called non-habitat.

Generally, the proposed units show relatively small tree size, high tree density, uniform age distribution, and low amounts of useful large CWD and snags. The units also lack nesting structure, well-developed understory and shrub layers, sub-canopy flying space, and a variety of roosting choices for thermoregulation. The proposed units are considered primarily spotted owl dispersal habitat with limited foraging opportunities due to these stand conditions. Approximately 165 acres of suitable habitat exist within 0.5 mile of proposed units, occurring as scattered stands of less than 50 acres.

Critical Habitat
Critical Habitat for a species is defined by the US Fish and Wildlife Service as the areas containing, or capable of containing, the physical or biological features (Primary Constituent Elements or PCEs) essential to the conservation of the species. PCEs of critical habitat for the spotted owl generally correspond with those described above for suitable nesting habitat. Similar to Threatened and Endangered species, effects to Critical Habitat are regulated under the Endangered Species Act.

The current Critical Habitat designation for the spotted owl was released in 2012, and all of the proposed timber harvest units are within newly added portions of current Critical Habitat. The proposed treatments were designed to be compatible with Critical Habitat objectives; specifically, harvest prescriptions were designed to accelerate (and not preclude) the rate at which the proposed units would become minimally suitable nesting habitat for spotted owls. A characterization of key components of such minimally suitable nesting habitat is referred to as the ''target condition'' in this EA. Harvest prescriptions and their effect on achieving the target condition were evaluated versus no treatment via computer modeling. The quality of PCEs in a stand was evaluated only after the objectives for achieving a faster rate PCE development was achieved. This was done in order to avoid harvest prescriptions that would benefit the quality of PCEs but would not be realized for many decades later compared to the No Action alternative. The rate of achieving PCEs was prioritized over the quality due to the general decline of spotted owl populations at most scales and the need for PCEs in Critical Habitat as soon as possible.

The target condition was developed by evaluating stand exam data in an adjacent stand approximately 100 years old that is not proposed for treatment. This stand was evaluated by Area wildlife biologists to represent the intended target condition of minimally suitable nesting habitat typically found on the District. Tree diameters were examined and totaled in three size classes to define the target condition: 49 trees per acre with a DBH of 10-21 inches; 18 trees per acre with a DBH of 22-29 inches; and 4 trees per acre with a DBH ≥ 30 inches. When modeled stands (under treat and no-treat scenarios) first achieved the minimum number of trees in each of the three classes, they were classified as meeting the target condition.

Owl Sites
Information on the location and status of spotted owl sites in the project area is available from surveys conducted beginning in the 1990s. All spotted owl sites in the project area are thought to have been identified, but survey

efforts have been sporadic from year to year. The effects of habitat modification to spotted owl sites in the Western Cascades physiographic province are assessed by assigning generalized Nest Patches, Core Areas, and Provincial Home Ranges with radii of 300 meters (0.19 mile), 0.5 mile, and 1.2 miles respectively (USDI 2008). The quality, amount, and orientation of habitat in these three areas were analyzed with survey data to determine the pre-harvest habitat conditions and analyze treatment effects to site occupation and reproductive capability. The Provincial Home Ranges (PHRs) of five known sites (Combs Creek, Hoodoo Mountain, Jasper Creek, Shortridge Creek, and Youngs Butte) and one predicted site (68NEWITS) overlap the proposed units. None of the proposed units occur within a known spotted owl Core Area or Nest Patch. Existing habitat conditions for these sites are detailed in Appendix Table B-13, and survey and occupation histories are shown in Table B-14. The affected sites have very little suitable habitat (0-7%). All sites have low chances of facilitating successful reproduction based on the amounts of suitable habitat being well below minimum thresholds of 40% in the PHR and 50% in the Core Area (Table B-13). Additionally, varying levels of thinning (up to 90 acres) within the last 15 years have already affected dispersal habitat in these home ranges.

Bald Eagle – BLM Sensitive
Bald eagles are large raptors that feed on a variety of prey, including fish, waterfowl, and carrion. They are a migratory species that both overwinters and nests on the District. Bald eagles typically choose to nest in the upper portions of large trees with open canopies near large bodies of water, and are sensitive to disturbance while nesting (Buehler 2000, Isaacs and Anthony 2003). A known bald eagle nest exists near enough to be disrupted by project actions if not mitigated. No known communal winter roosting areas are located in or near the project area.

Proposed treatment areas in Eagles Bluff 9 and 15 are in or adjacent to Bald Eagle Habitat Areas (BEHAs). BEHAs were designated in the District RMP to manage and develop bald eagle nesting and winter roosting habitat, and are to be managed as described in the McKenzie Resource Area Bald Eagle Habitat Management Plan (USDI 1998); including general objectives to facilitate nesting and/or winter roosting. The primary management goals for BEHAs are to maintain and develop mature or late seral habitats that are not subject to noise or visual disturbance from humans. Managing human disturbance includes minimizing permanent road locations within 0.25 mile or more (depending on local topography) of BEHAs. Other actions that could disturb nesting are also discouraged. Road management objectives include not creating new permanent roads, blocking or fully removing existing roads, and generally minimizing opportunities for human access and disturbance.

Harlequin Duck – BLM Sensitive
This diving duck breeds along large-medium size fast-flowing inland streams before migrating to coastal Canada and Alaska to overwinter. Typical food items include terrestrial and aquatic invertebrates and fish eggs (Thompson et al 1993, Robertson and Goudie 1999). Harlequin ducks nest on the ground, in tree cavities, on cliffs or on stumps, usually within 5 meters of water although distances of up to 45 meters have been recorded. The main stems of Combs (Witt Butte 27), Martin (Witt Butte 35) and Vaughn (Eagle's Bluff 15) Creeks provide suitable nesting and foraging habitat based on stream size, prey availability, and availability of logs and rocks as loafing sites. However, the areas of potential habitat are small and the probability of harlequin ducks using the project area is low.

Purple Martin – BLM Sensitive
The purple martin is the largest North American swallow. It breeds throughout the eastern U.S., coastal areas of the Pacific Northwest, and the southern Rocky Mountains. Although many purple martin populations nest in birdhouses or other artificial structures, other populations nest in tree cavities. Snags with woodpecker cavities are thought to be the most important habitat features for these populations (Brown 1997). Purple martin nests are typically found in open areas near water (Brown 1997, Horvath 2003) but also nest on the District in upland areas apparently not associated with water. The project area could provide nesting opportunities for purple martins where large snags or trees with woodpecker holes are in or adjacent to the proposed units.

Cascades Axetail Slug – BLM Sensitive
Little is known about the life history and habitat requirements of the Cascades axetail slug. It is suspected to occur on the District, but has not been detected during species-specific surveys (T. Young, USFS, data on file). Sites where Cascades axetail slugs have been found contained moist conditions and abundant Douglas-fir, western hemlock, and vine maple litter; species abundance does not appear to be correlated with stand age (Stone 2010). Similar mollusk species require leaf litter, fungus or detritus as food sources and refugia from desiccation during dry periods. Other possible refugia include interstices in rock habitat, soil fissures, or the interior of large woody debris. The Cascades axetail slug likely uses herbaceous vegetation, ferns, leaf litter, or moss mats in moist, shaded areas near refugia when active. Potential habitat for the species exists throughout the project area, although habitat quality is difficult to assess due to lack of detailed knowledge of habitat requirements.

Fringed Myotis & Townsend's Big-eared bat – BLM Sensitive
The fringed myotis is an insectivorous bat species found throughout the western U.S. that appears to utilize a range of habitats, from sagebrush to Douglas-fir forest (reviewed in Verts and Carraway 1998). Known hibernacula and roost sites include caves, mines, buildings, and large snags (Weller and Zabel 2001). Although definitive evidence is lacking, it is thought that fringed myotis populations in Oregon migrate in winter. Townsend's big-eared bat is an insectivorous species is found throughout the western U.S. and the Ozark and Appalachian Mountains. It is associated with a variety of habitats, including desert scrub, pinyon-juniper, and coniferous forest (reviewed in Verts and Carraway 1998). Townsend's big-eared bat typically roosts and hibernates in mines and caves, but it has been found roosting in hollow trees as well (Fellers and Pierson 2002).

3.4.2.2 Environmental Effects

Alternative 1: No Action

Wayside aster
The site located within a forest stand would experience increasing, and eventually full, canopy closure in the surrounding stand for at least several decades. Habitat suitability would decrease and the number of individuals and their vigor would decline. The five sites along roads would be unaffected by this alternative. However, one road side site would not experience the benefits of reducing the nearby forest canopy by thinning (under Alternative 2). All sites have the potential to be out-competed by weeds. An existing gate into the area would continue to reduce some impacts to roadside populations due to human vehicle traffic.

Wildlife Species
No direct or indirect effects to special status wildlife species or their habitat would occur under this Alternative. Stands would not be modified and there would be no potential for noise or line-of-sight disturbance to nesting. The project area would continue to provide for wildlife use at current levels, and habitat development would continue along current trajectories.

Alternative 2: Thinning Harvest

Wayside aster
The site located within a forest stand would experience the same effects described under the Alternative 1 (no affect from project actions). Project actions (including harvest unit boundaries and road locations) were delineated to avoid negative effects to these sites.

The five sites along roads would experience negative effects from project actions if not mitigated. Wayside aster individuals and patches could be disturbed or destroyed by project road actions such as: blading or adding rock to roads, ditch clearing, brushing (mowing), log decking, vehicle parking. Slash piling and burning could also disturb or destroy plants. These actions could cut, crush, bury or kill plants. Vehicle movements that create dust during the flowering season would reduce or prevent pollination and photosynthesis. Dust affects pollination by clogging the stigmatic surface, coating the anthers so that bees do not gather pollen and making it undesirable or difficult for pollinators to visit flowers. Dust can also smother seedlings. Dust coats the leaves, reducing photosynthesis, reductions in photosynthesis would affect plant health and vigor. Even minor reductions in site health and reproduction could be meaningful to these small populations. The five roadside sites would receive one or more population-specific mitigations (PDFs) to reduce or eliminate the potential for the above effects and avoid negative impacts to plants and their reproduction (Appendix A).

No roadside sites would be negatively affected by thinning. Based on its location, topography and distance from harvest actions (within approximately 50 feet); one roadside site would benefit from thinning of the forest canopy under this Alternative. Thinning overstory vegetation, including forest canopy, has been shown to increase vigor in Wayside aster plants (Newton etal. 2010). This thinning would be beneficial to plant vigor and reproduction due to an increase in solar exposure for 10-15 years (until canopy conditions return to pre-harvest conditions).

Northern Spotted Owl
Approximately 967 acres of dispersal-only habitat with scattered, low-quality foraging opportunities would be affected under Alternative 2. Vertical and horizontal cover would be reduced in treated areas through overstory tree removal, with varying levels of residual tree density. Harvest would also damage existing shrub and herb layers, and may also damage or destroy some coarse woody debris and snags.

Spotted owls would likely continue to use harvested areas after treatment because canopy closures would remain 50% or greater; a higher level than the 40% widely used as a threshold for dispersal function (Thomas et al. 1990). However, spotted owls would likely utilize thinned stands much less than untreated stands for approximately 15-20 years until canopy closure and shrub-understory layers recover and develop further.

Untreated riparian buffers, and other nearby areas dropped from harvest consideration, would provide a narrow network of denser canopy cover that could facilitate spotted owl movement through thinned areas.

The proposed action would improve the development trajectory of habitat features used by both spotted owls and their prey, such as large (≥ 30' DBH) trees and snags, deep crowns with large branches, multiple canopy layers, herbaceous and shrub vegetation, and large CWD. These features would develop in varying timeframes. For example, response from understory vegetation would take only years, while recruitment of large CWD could take hundreds of years. Development of dominant trees with larger boles and crowns as well as growth of mid-story conifers would occur at faster rates than if not treated.

Critical Habitat

The accuracy of the analysis of effects to spotted owls and their habitat, including achieving Critical Habitat objectives, is dependent on implementation of Project Design Features and other standards, including protection of existing late-seral features (large snags/CWD, remnant trees, large hardwoods, conifer species diversity), reserve marking of trees consistent with the prescription, and operational impacts not exceeding those analyzed and intended (i.e., the number of yarding corridors, amount of soil compaction and road dispositions. Because the project area is designated as Critical Habitat, no final regeneration harvest would be planned and habitat features would be allowed to develop in the future. Additionally, the goal of any future treatments would be to further enhance the quality or development of suitable spotted owl habitat. Therefore, it is assumed that the proposed action would be a first step in contributing to the long-term conservation needs of the spotted owl in the project area.

Treatment of all stands would achieve the described objectives for spotted owl habitat, including Critical Habitat PCEs. All treated stands would achieve the target condition at a rate approximately 5 years faster than if not treated except for stands EB15B and YB25A. Modeling indicates that treatment would not accelerate the achievement of the target trees per acre in these stands; however, metrics of habitat quality would be achieved sooner. For example, these stands would shift the bulk of their basal area into larger DBH classes (1-3" DBH increases), and would support 20-44% more trees per acre in the largest diameter classes. This would represent larger, more developed crowns in larger trees within a more complex and diverse stand. This would result in the general benefits of larger trees with more structure for spotted owl nesting and foraging. Additionally, in all treated stands, smaller diameter trees (10-21" DBH) would be vigorous based on height, crown size, and live crown ratio data. These trees represent a beneficial development of a secondary canopy layer that would further enhance the overall complexity and heterogeneity of a stand resulting in improved conditions for prey and spotted owl roosting.

Because project actions would inadvertently modify only minor amounts of existing PCEs (i.e., some CWD), would maintain dispersal habitat post-harvest, and would accelerate the rate and quality of future PCEs in treated stands, project actions **may affect, but would not likely adversely affect** spotted owl Critical Habitat while being beneficial in the near term.

Owl Sites

Amounts of existing spotted owl habitat and proposed treatment are detailed in Appendix Table B-13. No harvest would occur in any spotted owl Nest Patch or Core Area. As used below, "degrading of habitat" due to thinning means that the quality and function of dispersal-only would be reduced to the lowest quality dispersal-only habitat (i.e., little/no forage qualities); at least until treated stands begin to recover in 10-20 years.

Potential noise disruption to successful spotted owl nesting or other critical life history functions from project activities would be mitigated at the Shortridge Creek site through seasonal operating restrictions in Witt Butte Unit 27A from March 1 to July 15. No other project activities would be close enough to known or predicted spotted owl sites or usable suitable nesting habitat to cause noise disruption. Project actions **may affect, but would not likely adversely affect** spotted owls with regard to disruption to nesting.

68NEWITS: Effects to this site would be insignificant, as only approximately one acre at the extreme periphery of the PHR would be treated. Therefore, the proposed action **may affect, but would not likely adversely affect** the site.

Combs Creek: No treatment would occur in the Core Area of this site, and 101 acres (21% of all habitat) in the PHR would be degraded under Alternative 2 in the Witt Butte sale. The stands affected would be dispersal-only habitat with limited foraging function at the periphery of the home range, and the probability of pair occupation or nesting at the site is low. Therefore, the proposed action **may affect, but would not likely adversely affect** the site.

Hoodoo Mountain: No treatment would occur in the Core Area of this site and approximately 79 acres (10% of all habitat) would be degraded in the PHR in the Young's Butte sale. The habitat to be treated is dispersal-only with

little foraging function, located at the periphery of the home range. Based on the amount of available habitat alone, and survey history, the probability of occupation or reproduction at the site is low. Therefore, the proposed action **may affect, but would not likely adversely affect** the site.

Jasper Creek: No treatment would occur in the Core Area of this site and approximately 178 acres (21% of all habitat) of dispersal-only habitat would be degraded in this site's PHR in the Witt Butte sale. The stands affected would be dispersal-only habitat with limited foraging function. This site has not been occupied since 2004, and there are low to moderate amounts of dispersal habitat available on BLM and adjacent private lands. The likelihood of occupation is low and the proposed thinning **may affect, but would not likely adversely affect** the site.

Shortridge Creek: No treatment would occur in the Core Area of this site and approximately 16 acres (2% of all habitat) of dispersal/foraging habitat would be degraded in the PHR by the Witte Butte units. This site has a moderate amount of contiguous dispersal/foraging habitat available in the adjacent section that would not be treated. Due to the amount of existing habitat and low amount of habitat treated at the periphery of the PHR, the proposed action **may affect, but would not likely adversely affect** the site.

Youngs Butte: No treatment would occur in the Core Area of this site and approximately 149 acres (15% of all habitat) of dispersal-only habitat with no foraging function would be degraded in the 'A' site PHR; approximately 168 acres (22% of all habitat) would be degraded in the 'O' site PHR. This site contains very little nesting habitat and both of the site centers have been previously harvested. Due to the existing habitat conditions and lack of recent occupation of the site and low chance of occupation, the proposed action **may affect, but would not likely adversely affect** the site.

Overall, project actions **may affect, but would not likely adversely affect** spotted owls or their critical habitat.

Bald Eagle

Thinning treatment in BEHAs (Eagles Bluff units 9A, 9B, and 9C) would be designed specifically to improve bald eagle roosting and nesting habitat and to generally accelerate the development of late-seral characteristics. Treatment prescriptions for these units would include variable density thinning, targeting individual trees for release, and creating snags and coarse woody debris throughout the units. Treatments would accelerate the development of large conifers for nesting. Other general stand benefits to eagles would be similar as those described for spotted owls under general habitat. There would be little to no impact to eagles due to treating stands because these are mostly young-mid seral in age and are not being used by eagles for nesting or near-nest roosting.

Any noise or visual disruption to nesting would be mitigated by seasonal operation restrictions on harvest actions in units with the potential to affect the Baker Creek nest site (Eagle's Bluff units 9A, 9B, 9C, 9D, and portions of 9F) from January 1 to August 15.

Consistent with the Bald Eagle Management Plan, the Bald and Golden Eagle Protection Act, and the McKenzie Bald Eagle Management Plan, several PDFs have been designed directing the decommissioning of roads within BEHAs identified for use in proposed thinnings to limit post-harvest access and minimize the density of open roads in and near BEHAs in attempt to mitigate potential impacts from noise and visual disturbance to nesting. These actions would be beneficial in reducing impacts from human access and would be a net improvement compared to Alternative 1.

Harlequin Duck

No-harvest buffers of at least 200 feet along the suitable nesting reaches of Combs, Martin, and Vaughn Creeks would protect the small area of potential nesting and foraging habitat from both direct modification and noise or visual disturbance. Given that the small amount of habitat in the project area, the potential for adverse effects to harlequin ducks is low.

Purple Martin, Fringed myotis, & Townsend's Big-eared Bat

Trees and snags providing suitable habitat for these species are rare in the project area, and those that are known would be painted for explicit reservation. Unknown large remnant trees would generally be reserved from harvest via PDFs. However, some of these trees could be felled for safety or operational reasons, which would have a direct negative effect on the species. Additionally, harvest operations adjacent to suitable nest or roost trees (either in or outside of the project area) during the breeding season could cause negative effects to purple martins through noise disturbance or to bats through changes in microclimates inside roosts. It is unknown if these bat species are using the project area, and in many cases would be difficult to determine before felling if large trees or snags were truly suitable roost trees. Effects would be negligible throughout most of the project area because suitable nest sites are scattered and rare, and these effects would be small when considered at the

watershed scale and insignificant to the purple martin population as a whole. Thinning would indirectly benefit purple martins and bats by accelerating the development of large-diameter trees that would eventually provide suitable features like cavities, woodpecker holes, and deeply fissured or sloughing bark.

Cascades Axetail Slug
Effects to this species are difficult to analyze due to lack of detailed knowledge on its behavior and habitat use. Potential habitat in needle/leaf litter and other detritus could be negatively impacted, but this type of habitat is likely to remain abundant in the project area post-harvest. The greatest impact from thinning would likely be a reduction in canopy cover and drier microclimate conditions for 10-20 years until canopy and shrub/herbaceous vegetation recovers. It is unknown if and how this could affect species persistence in treated areas. Habitat in the untreated portions of Riparian Reserves would remain unaffected.

Cumulative Effects

Wayside Aster
No cumulative effects are anticipated to wayside aster populations within the project area's watersheds. Project actions were designed to avoid or otherwise protect known populations. It is reasonable to expect all future BLM land management to implement similar protection measures. Wayside aster populations on non-federal lands are not protected by the Endangered Species Act. Land and road management (especially herbicides) on those lands would have a potential to impact populations. .. Most private timber companies use herbicides to manage roadside vegetation. Most of the Wayside aster occurs along roadsides, making it especially vulnerable to being killed by herbicides. Companies that control and spray many miles of roads could reduce the number of Wayside aster populations along their road system, decreasing the species numbers and potentially increasing the need to federally list this species under the Endangered Species Act.

Northern Spotted Owls
The amount, location, and timing of reasonably foreseeable actions that could occur on BLM lands in the project watersheds are currently unknown. BLM actions would likely be thinning harvest of similar habitats and/or regeneration harvest of mature or late seral stands. Non-federal lands in the project watersheds generally provide some short term dispersal or low quality foraging habitat because most of these lands support previously managed young or mid-seral habitat that lacks late-seral characteristics. Spotted owl habitat on non-federal lands is generally not expected to improve temporally or spatially due to typical industrial forest management practices.

Bald Eagles
Off-highway vehicle (OHV) routes for intrusion into Eagle's Bluff 09 and 15, and adjacent BEHA stands occur on both BLM and private land. The use of unauthorized user-created OHV trails in Eagle's Bluff is a known source of noise and visual disturbance that presumably would continue in the future, or potentially increase as forested stands are opened and off-road motorized use disperses off of existing user-created trails. The amount, timing and intensity of these actions, or how proposed thinning management would change this in the future, are not fully known. Foreseeable future projects to protect the active nests within the project area include the installation of gates to restrict access to these sections and other actions to discourage OHV use. Considered at a landscape scale, there are no anticipated cumulative effects to bald eagles from either alternative.

Harlequin Duck, Purple Martin, Cascades Axetail Slug, Fringed myotis, & Townsend's Big-eared Bat
Consideration of cumulative effects for both alternatives includes on-going and foreseeable land management on federal lands and non-federal lands at a larger landscape scale. While the amount, location, and timing of reasonably foreseeable actions that could occur on these land ownerships in the project watersheds are currently unknown, it is reasonable to assume that future management would be consistent with past management actions for each ownership type. Non-federal lands provide mostly previously managed young or mid-seral habitat that lacks late-seral characteristics due to typical industrial forest management practices. These lands in the watershed primarily provide short-lived, low quality mid-seral habitat for Special Status wildlife species, but little high quality or even stable habitat. Such non-federal lands may serve as population sinks or barriers to landscape-scale movements for species with low motility, like slugs. Habitat quality and availability for these wildlife species is generally not expected to improve on non-federal lands. However, when considering cumulative effects across a landscape scale, none are anticipated to these species as a result of either alternative or of other known activities on either alternative.

3.4.3 Migratory Birds and their Habitat

3.4.3.1 Affected Environment
Guidance for Federal agencies whose actions could impact migratory birds was issued in Executive Order 13186 (2001), which directs agencies to ensure that environmental analysis considers the effects of agency actions and plans on migratory birds, with emphasis on species of concern. Additional guidance for migratory birds was

issued in BLM Instruction Memoranda Nos. 2008-050, Migratory Bird Treaty Act – Interim Management Guidance (USDI 2008) and 2009-018, Migratory Bird Treaty Act—Clarification of WO IM 2008-050 for Western Oregon. These memos identify "Birds of Conservation Concern" and "Game Birds Below Desired Condition," as defined by the Service (2008), as species to be addressed in project-level NEPA documents. Six of these species (bald eagle, harlequin duck, marbled murrelet, peregrine falcon, streaked horned lark, and vesper sparrow) are addressed as BLM Sensitive species. Habitat for five other species (black swift, mourning dove, rufous hummingbird, willow flycatcher, and wood duck) would not be affected by the proposed action. The remaining four species (band-tailed pigeon, northern goshawk, olive-sided flycatcher, and purple finch) that could potentially be affected by the proposed modification of mid-seral habitat are discussed below, as is the osprey, another known resident of the project area that is addressed under the District RMP.

The band-tailed pigeon is a fruit- and seed-eating bird that is widely distributed across North and South America. Nesting in Oregon is generally in mature, closed canopy conifer stands, while more open forest stands and agricultural lands are used for foraging. Band-tailed pigeons travel widely in search of food, giving the species a nomadic nature. Mineral springs and deposits are also thought to be key habitat features.

Northern goshawks prefer to nest in mature to late seral stands with characteristics such as larger trees with large limbs, multistory canopies, large down logs and snags, and a relatively open understory. Nests are usually built on mistletoe brooms, large branches, or branch whorls near the boles of younger trees. Most nests located on the Eugene District have been in lower quality mid-seral stands as young as 50 years old that have only some of the preferred late seral characteristics. However, the local significance of such stands, especially their likelihood of facilitating repeated successful reproduction, is unknown. Goshawks forage in nesting stands as well as younger mid-seral stands with ample flying room and lower amounts of brush. The proposed units provide scattered low quality foraging and nesting habitat.

The olive-sided flycatcher is an aerial insectivore associated with edge habitats between mature and early-seral stands, and large openings in late-seral habitat. It uses tall trees and snags for singing and foraging perches.

The purple finch is widely distributed and breeds in the Pacific states, the northeastern US, and Canada. The species typically uses early- to mid-seral coniferous habitat, but may also be found in agricultural and suburban settings. Purple finches' main diet is seeds, supplemented by fruit and insects. Competition with the house finch is thought to be reducing purple finch numbers.

The osprey is a widespread raptor associated with aquatic habitat due to their primarily piscivorous diet. Prominent nesting structures near water are key habitat features for the species. Three known osprey nest sites are in or near the proposed project in Eagle's Bluff 15.

3.4.3.2 Environmental Effects

Alternative 1: No Action
Current conditions of habitat for migratory birds would continue to persist under Alternative 1. There would be no change to the occurrence or availability of wildlife habitat.

Alternative 2: Thinning Treatment
The proposed thinning would have direct and indirect effects on migratory birds and their habitats. Partial removal of overstory trees would reduce canopy cover and volume, and operations would remove or some damage understory vegetation, snags, and existing coarse woody debris. This would reduce nesting and foraging opportunities for the species listed above in the short term, particularly the olive-sided flycatcher and purple finch. Nests could be removed or destroyed by project actions; and adverse effects to nesting behavior from noise and visual disruption could also occur during felling and yarding actions. However, thinning would beneficially stimulate growth in residual trees, understory trees, shrubs, and herbaceous vegetation over the course of several decades.

Trees and snags providing suitable habitat for osprey are rare in the project area, and those that are known would be painted for explicit reservation. Any unknown large remnant trees would generally be reserved from harvest via PDFs. Thinning would ultimately benefit osprey by accelerating the development of tall, large-diameter trees suitable for nesting. Noise disruption to the known osprey nests near the proposed units and haul routes in Eagle's Bluff 15 would be mitigated by seasonal operating restrictions from March 1 to July 15. All project activities would be restricted in units 15A, 15D, 15E, portions of 15F, 15J, 15K and roads adjacent to these units.

PDFs that are intended, in part, to mitigate effects on migratory birds include: favoring a diverse residual tree species mix, retention of large remnant trees where they exist, retention of snags and coarse woody debris where not prevented by operational and safety concerns, and creation of snags and coarse woody debris.

Cumulative Effects

The amount, location, and timing of reasonably foreseeable actions that could occur on BLM lands in the project watershed are currently unknown. BLM actions would likely be thinning harvest of similar mid-seral habitats and/or regeneration harvest of mature or late seral stands. Other federally managed lands would also be expected to provide similar management actions. For most species, cumulative effects at the landscape scale are unpredictable due to lack of specific information on individuals or local habitats (i.e., down logs and snags) as well as specific project locations. Non-federal lands in the watershed primarily provide short-lived, low quality mid-seral habitat for Special Status wildlife species, but little high quality or even stable habitat. These lands provide mostly previously managed young or mid-seral habitat that lacks late-seral characteristics due to typical industrial forest management practices. Habitat quality and availability for the wildlife species described above is generally not expected to improve on non-federal lands. Management anticipated on BLM and other federal lands would be expected to continue to provide for or improve habitat conditions for migratory birds.

4.0 LIST OF PREPARERS

Name	Title	Contributions
Mike Blow	Wildlife Biologist	Team Lead/EA preparation
Cheryl Bright	Fuels Specialist	Fuels
Chris Langdon	Wildlife Biologist	Wildlife
Aaron Eklund	Engineer	Engineering
Steve Liebhardt	Fisheries Biologist	Fisheries
Bonny Hammons	Hydrologist	Hydrology/Soils
Laura Miller	Logging Engineer	Logging Design
Chrissy Cate	Logging Engineer	Logging Design
Cheshire Mayrsohn	Botanist	Botany
Bruce Stevens	Forester	Silviculture
Heather Ulrich	Archeologist	Archeology

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APPENDIX A – PROJECT DESIGN FEATURES

Project design features include design criteria, mitigation measures, and monitoring developed to provide for resource protection. PDFs are mitigations or designs to project actions developed to protect resource values and ensure conformance with regulations, laws, and policies. PDFs are presented by the primary resource discipline for which the PDF was identified as needed to protect resource values when conducting affects analysis; however, some PDFs provide benefits to multiple resources. Site-specific waiver of PDFs during implementation would be infrequent and require review by affected resources' specialists to determine that single or aggregated extent of the site-specific waiver would not produce effects outside of those analyzed. Review results would be reported to sale Authorized Officer to implement through contracts. The following PDFs are applicable to proposed actions and associated actions. Unless otherwise stated, PDFs are applicable on all units or roads.

Wildlife

1) Except where necessary to accommodate safety, road construction, landings, and logging systems (i.e., yarding corridors); retain all snags, down logs in decay classes 3 through 5, and existing rootwads.
2) Except when marked for removal and where necessary to accommodate safety, landings and logging systems (i.e., yarding corridors); retain minor conifer trees (incense cedar, Western red cedar, grand fir, Pacific yew, pines) and deciduous/broadleaf tree species (madrone, cottonwood, big leaf maple, chinquapin, alder, oak, ash) and all tree species with a DBH $\geq$ 24 inches. If trees with a DBH $\geq$ 24 inches are cut, they would be left on site as CWD, except within clearing limits for road rights-of-way (see PDF #3). Such trees may count towards the total number of trees to be cut for CWD creation, and may be cut into sections ($\geq$ 20 feet in length) and/or moved within the harvest area to facilitate operations or safety.
3) Within road rights-of-way, if trees with a DBH $\geq$ 28 inches are cut they would be left on site as CWD. Such trees may count towards the total number of trees to be cut for CWD creation, and may be cut into sections ($\geq$ 20 feet in length) and/or moved within the project area to facilitate operations or safety.
4) Apply seasonal restrictions, modification, or suspension of all harvest and road activities within 1/4 mile or more of: known nesting great blue herons, peregrine falcons, bald or golden eagles, spotted owls, great grey owls, accipiter hawks, and other owls, hawks, or raptors or other "E-4 Special Provision or BLM Special Status species" if they are located at any time during project activities and such modifications are deemed necessary to avoid adverse effects to species or their habitats.
5) Disruption to spotted owls would be minimized through seasonal restrictions. Project activities in Witt Butte Unit 27A (including pre- and post-harvest road work, falling, yarding, and loading) would not occur between March 1 to July 15. Hauling of timber from other units that passes this unit would not be restricted. The above restriction may be modified (reduced or extended) or reviewed for waiver by the Area wildlife biologist based on relevant survey information regarding occupation or nesting activity.
6) Disruption to bald eagles at the Baker Creek nest site would be minimized through seasonal restrictions. Project activities (including pre- and post-harvest road work, falling, yarding, loading and hauling) in Eagle's Bluff Units 9A, 9B, 9C, 9D, and those portions of 9F northwest of Road EB9-1 would not occur from January 1 to August 31. The above restrictions may be modified (reduced or extended) or reviewed for waiver by the Area wildlife biologist based on relevant survey information regarding occupation or nesting activity.
7) Disruption to osprey in Eagle's Bluff section 15 would be minimized through seasonal restrictions. Project activities (including pre- and post-harvest road work, falling, yarding, loading and hauling) in Eagle's Bluff Units 15A, 15D, 15E, 15F (west of the junction of roads 21-2-14 and -15), 15J, 15K and in roads adjacent to these units would not occur from March 1 to July 15. The above restrictions may be modified (reduced or extended) or reviewed for waiver by the Area wildlife biologist based on relevant survey information regarding occupation or nesting activity.
8) When operationally feasible, falling and yarding techniques would be utilized for the protection of retention trees, existing coarse woody debris, snags, rootwads, mapped TPCC areas and other reserve areas. Placement of cable corridors and skid trails would take all feasible measures to avoid these habitat features.
9) In treated Matrix and Riparian Reserve areas, retain all tail hold, lift, and intermediate support trees used in the harvest operations as future snags. Such trees may count towards snag goals if sufficiently girdled.
10) Limit log lengths to 40' in length where necessary to minimize damage to residual trees, snags and coarse woody debris during yarding.
11) Create snags and CWD from reserved live conifer trees in treated Matrix and selected portions of treated Riparian Reserves. Within these areas, create an average of 2 trees per acre for CWD and 2 trees per acre for snags. CWD and snags would be created from Douglas-fir or western hemlock species; between 16-24 inch dbh; and would not contain visible bird or mammal nests, sloughing bark, cavities, broken leaders, or other notable deformities; and must be at $\geq$ 75 feet from streams. If trees of such diameter are not available, use trees of typical diameter for the area.

a) Matrix and Riparian Reserve areas would be evaluated within 3 years after harvest to examine the diameters and amounts of CWD and snags consistent with the above specifications. If necessary, BLM would create additional CWD and snags in Matrix within 2 years after evaluation (i.e., within 5 years after harvest).

Botany/Weeds

12) Prevent the spread of noxious weeds from other locations, by washing logging, road construction, and tilling equipment prior to entry on BLM lands.
13) Native grass seed would be sewn on decommissioned tilled roads after operations have been completed.
14) False brome and Herb robert infestations would be treated prior to project actions. Existing or new sites would be monitored and controlled for five consecutive years during and after project actions.
15) Roadside weeds would be treated prior to harvest to limit their spread into the project area.
16) Within the mapped and numbered Special Botany Areas (SBA) and Roads(#1-4 & road 21-2-9.1) in Eagles Bluff section 9; the following requirements apply to prevent injury to plants or disruption of seasonal flowering. In places where rocking is prohibited for Special Botany Areas, spot or maintenance rock only is allowed along existing road surface width only:
    a) SBA1 and Road 21-2-4A1: dust abatement required; parking of all vehicles or equipment prohibited within marked “no parking” signed areas; rocking prohibited; blading on or near road surface prohibited; brushing and mowing adjacent to roads prohibited; decking and brush/slash piling on or near site prohibited.
    b) SBA2 and Roads 21-2-4, 21-2-9: dust abatement required; parking of all vehicles or equipment prohibited within marked “no parking” signed areas; rocking prohibited; blading on or near road surface prohibited; brushing and mowing adjacent to roads prohibited; decking and brush/slash piling on or near site prohibited.
    c) SBA3 and Road 21-2-9.5: dust abatement required; parking of all vehicles or equipment prohibited within marked “no parking” signed areas; rocking allowed; blading on or near road surface allowed; brushing and mowing adjacent to roads prohibited; decking and brush/slash piling on or near site prohibited.
    d) SBA4 and Road 21-2-4.1: dust abatement required; parking of all vehicles or equipment prohibited within marked “no parking” signed areas; rocking allowed; blading on or near road surface allowed; brushing and mowing adjacent to roads prohibited; decking and brush/slash piling on or near site prohibited.
    e) Road 21-2-9.1: dust abatement not required; parking of all vehicles or equipment prohibited within marked “no parking” signed areas; rocking prohibited; blading on or near road surface prohibited; brushing and mowing adjacent to roads prohibited; decking and brush/slash piling on or near site prohibited.
17) Dust abatement would be required from June 15 to September 1 each year. Dust abatement can be done using water; or a dust abatement chemical that is non-toxic to plants, such as 50% lignin sulfonate and 50% water. The dust abatement chemical used would need to be approved by the botanist. Dust abatement chemicals applications would be applied based on the following requirements:
    a) The initial application would occur when seasonal rains stop and there is a forecast of 3 subsequent days without rain. If rain occurs during the forecasted dry period, an additional application(s) dust abatement chemicals may be required.
    b) Application would be applied only to the existing road surfaces (i.e., not in ditchlines).
    c) If roadside vegetation becomes dust covered, additional application(s) of dust abatement chemicals would be applied.
    d) Dust abatement chemicals would not be applied within 100 feet of stream crossings.
    Dust abatement measures would occur during the flowering season (June 15 – September; If water is using for dust abatement (no chemicals) applications would be applied as often needed based on project actions (as frequently as one or more times per day); including all times when vehicle traffic could generate dust.
18) Areas proposed for borrow and to deposit fill would be reviewed by the Area botanist for special status plants prior to their use.

Cultural

19) Cultural resource sites would be flagged and avoided during harvest operations and road construction. No entry would be permitted for operational needs.

Soils

20) For cable yarding areas and systems:
    a) One-end suspension of logs shall occur while cable yarding. Intermediate supports may be required to accomplish this objective.

b) Cable yarding corridors would be left in an erosion resistant condition by the use of hand water barring or placement of wood debris when trenching is greater than 1 foot depth with bare soil, determined on a case-by-case basis in consult with the Area soils specialist.
c) Generally, use of common settings would occur only when topography dictates their necessity.
d) Cable yarding would occur only to designated landings, with landing size average being 60' x 40'.
e) Spacing of cable corridors should be kept to 150 feet apart on average and limited to 12 feet in width.

21) Mechanized harvesting systems may only be approved off of designated skid trails when:
a) A harvest unit has been analyzed for ground based yarding.
b) Slopes are <35%.
c) Soil moistures are low (typically <25%) and provide resistance to compaction (typically July 1 – October 1). Soil measurements would be taken to determine moisture levels prior to ground disturbance in a unit.
d) Traveling on a cushion of slash it creates by the harvest process.
e) Equipment is limited to one pass over the same ground when operating off of approved skid trails.

22) Apply the following requirements to ground based yarding areas:
a) Yarding would occur only when soil moistures are low (typically < 25%) and provide resistance to compaction (typically July 1 – October 1) as approved in consultation with Area soil scientist.
b) Ground based yarding/skidding equipment would remain on designated skid trails at all times.
c) Require felling of trees to lead of the skid trails and maximize winching distances, including when slopes are >35%.
d) Logs would be skidded only to approved landings, with landing size average being 60' x 40'.
e) Placement of skid trails would:
i) Not occur within 75 feet of posted sale unit boundaries.
ii) Avoid rocky or shallow soils. Compaction on these soil types cannot be mitigated and should not be used.
iii) Use existing OHV, skid trails, or already compacted road prisms where possible and outside of reserve areas and consistent with other requirements for ground based logging.
iv) Occur only on slopes <35%.
v) Would be spaced 150 feet apart on average.

23) At the completion of harvest activities within ground based yarding areas:
a) Decompact all skid trails, landings and roads to a depth of 18-24" with equipment capable of lateral shatter of the compacted layer while minimizing damage to residual tree roots. Decompaction would be reviewed for any requested waiver by the Area soil scientist and would be based on the soil type, the amount of compaction and whether mechanized equipment travelled on a slash mat that resulted in low amounts of compaction, erosion and a low potential for invasive weed growth.
b) Decompaction of designated skid trails shall occur during the same summer dry season as ground based harvesting or completion of native surface road use.
c) To restore soil productivity, pull existing post-harvest slash, logging debris and brush from the adjacent forest floor onto skid trails after decompaction. Site-specific requests for waiver of this PDF would be reviewed by the Area soil scientist and would be based on the soil type, expected site-specific productivity levels after decompaction actions, erosion and a low potential for invasive weed growth.
d) All decompacted skid trails and landings without a post-harvest slash cover would be seeded with appropriate BLM-provided seed.

24) On Honeygrove soils (found in Witte Butte 35), delayed felling of trees is recommended to reduce soil moisture content through evapotranspiration processes prior to entry of ground based equipment.
25) Piling would be avoided on sensitive soils (shallow, skeletal soils with low organic content).
26) Burning would occur when soil and duff moistures are high.

Aquatics

27) Keep a Spill Contamination Kit (SCK) on-site during any operation within the project area; prior to starting work each day, all machinery would be checked for leaks and necessary repairs would be made.
28) Removal, notification, transport and disposal of any diesel, hydraulic fluid, or other petroleum product released into soil and/or water would be accomplished in accordance with all applicable laws and regulations.
29) Position fill or waste material from road construction, renovation, and decommissioning in a location that would avoid sediment discharges to streams or wetlands with a minimum distance of 50 feet. Borrow and waste material shall be placed in designated areas approved by the Area hydrologist or soil scientist.
30) Use of native surfaced road would occur only in the dry season (typically July 1 and September 30).
31) Waterbars, drain dips, and/or lead-off ditches shall be required to create an erosion resistant condition on roads during seasonal closures. Access to such roads shall be blocked during closures.

32) Construction of roads would not occur when soils are saturated, in order to minimize soil compaction, erosion and sedimentation. Maintenance of roads would not occur during periods of surface flow, to minimize erosion and sedimentation.
33) Right-of-way stumps shall be grubbed out only within the road prism (running surface, ditchline, and 10' both sides) and not within other portions of the posted right-of-way unless necessary to facilitate intended function of the road (i.e., turnarounds, curve widening).
34) Implement the following combination of methods year round to maintain drainage and minimize sedimentation from the gravel surfaced roads into stream channels:
    a) Keep ditch line, cross drains, and leadoff ditches clean and free to flow, while minimizing disturbance to existing ditch line vegetation.
    b) Sediment traps (which may include rock armor of ditch, bales, silt fences, and/or waddles) may be installed in ditch lines lacking vegetation and having the potential to deliver sediment to streams.
    c) Prior to and during haul operation, rock surfacing and road maintenance would be assessed for road damage, drainage, and erosion throughout the project and haul route to determine if haul may continue, what corrective actions may be needed, or if any damage has occurred that would require corrective actions (e.g., grading, crowning, adding rock) before haul may resume.
    d) If erosion and road degradation occurs during or after freeze and thaw or rainy periods, log haul operations may be discontinued. Erosion and road degradation would be evaluated by Area hydrologist.
35) Remove and dispose culverts appropriately in conformance with BMPs.
36) Require the following along streams:
    a) Stream flow would be routed around the construction activity as much as possible (e.g., temporary flow diversion structure).
    b) Sediment containment structure placed across the channel below the work section (e.g., weed free mulch) as needed.
    c) Work site would be pumped free of standing water as applicable.
    d) If present, fish and other aquatic species would be removed from the project area and block nets placed above and below the worksite by Area fisheries biologist.
    e) After installation, disturbed ground would be planted with appropriate BLM-provided seed or straw/wood mulch before the first rains.
    f) Countersink culverts in fish bearing streams at least 6-8 inches below the streambed to minimize scouring.
37) Revegetate all cut and fill slopes by seeding and/or mulching all areas of exposed soil along cut and fill slopes associated with road renovation/improvement with appropriate BLM-provided seed and/or mulch.
38) Slash and logging debris would be removed from road ditches prior to the start of the wet season (typically October 1 to June 30). Slash piles would not be located in in a way that blocks drainage features.
39) To protect fish species during critical life cycle functions, apply the ODFW in-water guidelines for all stream culvert placement and removal. All in-stream work would be completed during the following times:
    a) Eagles Bluff and Witt Butte harvest units: May 15 - Nov 30.
    b) Young Butte harvest units: June 1 – Oct 31.
40) When removing stream crossing structures, apply the following measures:
    a) Remove all fill material down to original channel bottom.
    b) Dig the channel to its bank-full width with a natural gradient.
    c) Shape and pullback channel side-slopes to gradual enough angle to facilitate seeding and mulching.
    d) Erosion control would be accomplished prior to fall rains using appropriate seed and straw mulch provided by BLM.
41) For roads listed in Table B-8, decommission roads upon completion of harvest activities by blocking motorized vehicle access with earthen barricades, boulders, brush and/or slash additions.
42) For roads listed in Table B-9, fully decommission road sub-grades, where conditions warrant, using the following criteria and methods:
    a) When soil moisture is appropriate (generally < 25 percent).
    b) De-compact to a depth of 18-24 inches and across the entire surface width at the completion of project activities with equipment capable of lateral shatter of the compacted layer.
    c) If decompaction is not possible for short segments then waterbars and lead-off ditches would be constructed to reduce sedimentation to streams and wetlands.
    d) If decompaction cannot be accomplished the same operating season, all temporary native surface roads would be left in an erosion resistant condition and blocked prior to the onset of wet weather. This would include construction of drainage dips, water bars, lead off ditches, and barriers (rootwads or brush piles) to prevent vehicle access until final blockage and/or decompaction.

e) After decompaction, logging debris and brush/slash or high amounts of organic debris (e.g., portions of some landings) would be placed along the entire length of tilled roadbed to reduce erosion, block access, and improve soil productivity.
f) Decompacted areas, roads, and landings without brush/slash would be seeded with appropriate BLM-provided seed when areas are determined to be high risk for erosion and sediment distribution or high risk for occupation for new weed population.

43) In cable harvest units, full suspension would be required if absolutely necessary to yard over streams or wetlands. Corridors would be located as close to perpendicular as possible, and no less than 45 degrees.

Fuels

44) Cover all landing piles along roads for burning.
45) Piled slash material adjacent to roads would be burned post-harvest.
46) Pile and cover slash, less than 6" in diameter and greater than 3' in length, within 25 feet of either side of designated (typically permanent) roads within harvest areas for burning.
47) Scatter landing piles along temporary roads on top of the road surface to remove the fuel concentrations, deter OHV use, and slow erosion. Resulting fuel bed would not be deep and continuous. Piles along temporary roads not scattered on the road surface would be covered for burning.

APPENDIX B – TABLES

Table B-1: Current and Post-Harvest Stand Conditions.

				CURRENT CONDITION					BA Removed	POST-HARVEST CONDITION				
Unit	**TRS**	**Approx. Birthdate**	**Previous Treatments**	**BA**	**TPA**	**QMD**	**Curtis RD**	**CC %**		**BA**	**TPA**	**QMD**	**Curtis RD**	**CC %**
Eagles Bluff														
9A-D	T21S, R2W, S9	1960	FTA, PCT	250	203	15	65	90	100	150	95	17	36	60
9B-C	T21S, R2W, S9	1960	FTA, PCT	213	152	16	53	80	60	150	66	18	35	55
9E-F	T21S, R2W, S9	1967	FTA, PCT	185	173	14	49	85	55	130	97	16	33	60
9G	T21S, R2W, S9	1969	FTA, PCT	190	142	12	55	90	60	130	80	14	35	60
15A	T21S, R2W, S15	1967; 1970	FTA, PCT	190	206	13	53	90	60	130	81	14	35	60
15B	T21S, R2W, S15	1955	FTA, PCT	180	102	18	42	65	40	140	64	20	31	50
15C	T21S, R2W, S15	1960	FTA, PCT	235	149	17	57	80	85	150	76	19	34	55
15D	T21S, R2W, S15	1950	NONE	151	86	19	35	65	30	120	45	22	26	50
15E, J-K	T21S, R2W, S15	1950	FTA, PCT	211	151	16	53	85	60	150	85	18	35	60
15F, H-I	T21S, R2W, S15	1950	FTA, PCT	216	176	15	56	85	65	150	85	18	35	60
15G	T21S, R2W, S15	1960	NONE	202	145	16	51	80	52	150	85	18	35	60
Witt Butte														
27A	T22S, R3W, S27	1940	FTA	252	88	23	53	70	60	190	56	25	38	50
27B	T22S, R3W, S27	1940	FTA	348	220	17	84	95	150	200	102	19	46	60
27C1	T22S, R3W, S27	1977	FTA, PCT	200	300	11	60	90	60	140	152	13	39	65
27D-E	T22S, R3W, S27	1960, 1965	FTA, PCT	240	225	14	64	90	90	150	115	16	38	65
27F	T22S, R3W, S27	1969	FTA, PCT	220	240	13	61	90	70	150	122	15	39	65
27C2, G-J	T22S, R3W, S27	1960	FTA, PCT	300	215	16	75	95	120	180	102	18	42	65
35A-E	T22S, R3W, S35	1950	FTA, PCT	300	230	16	75	95	120	180	102	18	42	60
Young Butte														
25A-F, H-I	T22S, R2W, S25	1945, 1950	FTA, PCT	240	195	15	62	90	100	140	91	17	34	55
25G	T22S, R2W, S25	1974	FTA, PCT	215	275	12	62	90	75	140	152	14	37	65

* TRS: Township, Range, Section; BA: Basal Area; TPA: Trees per acre; QMD: Quadratic mean diameter; Curtis RD: Curtis Relative Density; CC%: Canopy Cover percentage; FTA: Aerial fertilization; PCT: Precommercial thinning

Table B-2: Culverts (stream & cross-drain) – Current & Future Conditions & Proposed Action.

	Amount				% of Existing/Future Condition		
Condition[1]	**Good**	**Fair**	**Poor**	**Total**	**Good**	**Fair**	**Poor**
Existing	77	63	30	170	45%	37%	18%
Near Future (w/i 10 years)	45	67	58	170	26%	39%	34%
Condition[2]	**Good**	**Fair**	**Poor**	**Total**	**Good**	**Fair**	**Poor**
Replaced by Proposed Action: Immediately Post-Implementation	1	19	21	41	1%	30%	70%
Replaced by Proposed Action: Near Future Conditions (w/i 10 years)	0	4	37	41	0%	6%	64%

[1] Good: full or adequate function; Fair: diminished function; Poor: current or imminent failure
[2] All culverts ranked as high priority for replacement due to concerns for fish, hydrology or road safety would likely be replaced by the Proposed Action.

Table B-3: Stream Culverts – Current & Future Conditions & Proposed Action.

	Amount				% of Existing/Future Condition			
Condition[1]	**Good**	**Fair**	**Poor**	**Total**	**Good**	**Fair**	**Poor**	**Total**
Existing	13	16	20	49	27%	33%	41%	100%
Near Future (w/i 10 years)	5	11	33	49	10%	22%	67%	100%
Condition[2]	**Good**	**Fair**	**Poor**	**Total**	**Good**	**Fair**	**Poor**	**Total**
Replaced by Proposed Action: Immediately Post-Implementation	0	8	16	24	0%	16%	33%	49%
Replaced by Proposed Action: Near Future Conditions (w/i 10 years)	0	0	24	24	0%	0%	49%	49%

[1] Good: full or adequate function; Fair: diminished function; Poor: current or imminent failure
[2] All culverts ranked as high priority for replacement due to concerns for fish, hydrology or road safety would likely be replaced by the Proposed Action.

Table B-4: Temporary Road Construction.

Road	Length (mi)	Comments
EB15B[1]	0.03	Optional surfacing
EB15D	0.11	Native surfacing
EB15D1	0.02	Native surfacing
EB15F[1]	0.31	Optional surfacing; Purchaser locate; 2-3 temporary culverts
EB15H	0.21	Native surfacing; 1-2 temporary culverts
EB15K	0.04	Native surfacing; 1 temporary culvert
EB9C	0.16	Native surfacing; spot rock on wet soil areas; 1-2 temporary culverts
EB9E	0.09	Native surfacing
EB9E1	0.05	Native surfacing
EB9F	0.07	Native surfacing
EB9G[1]	0.13	Optional surfacing; Purchaser locate
WB27A	0.05	Native surfacing; 1 temporary culvert
WB27B	0.24	Native surfacing; 2-3 temporary culverts
WB27C[1]	0.05	Optional surfacing; 1 temporary culvert
WB27E	0.32	Native surfacing; 4-5 temporary culverts
WB27F	0.18	Native surfacing
WB27H	0.03	Native surfacing
WB35B	0.17	Native surfacing
YB25A[1]	0.17	Optional surfacing
YB25A1[1]	0.13	Optional surfacing
YB25C	0.22	Native surfacing; Purchaser locate; 1 temporary culvert
YB25D[1]	0.07	Optional surfacing
YB25F	0.15	Native surfacing; spot rock on wet soil areas; 1 temporary culvert
Approx. Total:	**3.0**	

[1] One of 7 optional rock surface roads totaling 0.8 miles.

Table B-5: Permanent[1] Road Construction.

Road	Length (mi)	Comments
EB9B	0.14	Rock surfacing; 6"-8" lift
EB9D	0.14	Rock surfacing; 6"-8" lift; 1 temporary culvert
EB9H	0.04	Rock surfacing; 6"-8" lift; 1 temporary culvert
EB15A	0.31	Rock surfacing; 6"-8" lift; 1-2 temporary culverts
EB15A1	0.06	Rock surfacing; 6"-8" lift
EB15C	0.07	Rock surfacing; 6"-8" lift
EB15E	0.07	Rock surfacing; 6"-8" lift
EB15G	0.02	Rock surfacing; 6"-8" lift; 1 culvert
EB15I	0.16	Rock surfacing; 6"-8" lift; 1-2 culverts
EB15J	0.11	Rock surfacing; 8"-12" lift; 1 culvert
WB35A	0.05	Rock surfacing; 6"-8" lift
WB35C	0.05	Rock surfacing; 6"-8" lift
YB25B	0.18	Rock surfacing; 6"-8" lift 2-3 culverts
21-2-9.5 Seg. B	0.18	Rock surfacing; 8"-12" lift; 1-2 culverts
21-2-15.5 Seg. B	0.13	Rock surfacing; 6"-8" lift
22-3-34.1 Seg. B	0.04	Rock surfacing; 8"-12" lift; 1-2 culverts
Approx. Total:	**1.8**	

[1] Permanent roads are permanent features on the landscape (not full decommission).

Table B-6: Road Renovation.

Road	Length (mi)	Comments
21-2-4[1]	0.73	0"-4" lift of rock; grade; 3-4 culvert replacements
21-2-4.1	1.54	0"-4" lift of rock; grade; brush; 4-6 culvert replacements; 2 new culverts
21-2-9[1]	0.71	0"-4" lift of rock; grade; brush
21-2-9.2	0.10	0"-4" lift of rock; grade; brush
21-2-9.5	0.51	0"-4" lift of rock; grade
EB9-2	0.25	Native surface; grade; brush
21-2-14	2.23	0"-4" lift of rock; grade; 8-10 culvert replacements; 2-4 new culverts
21-2-15	0.78	0"-4" lift of rock; grade; 1-2 culvert replacements; 0-2 new culverts
21-2-15.2	0.43	0"-4" lift of rock; grade; brush
21-2-15.3	0.86	0"-4" lift of rock; grade; brush; 1-2 culvert replacements; 0-1 new culverts
21-2-15.4	0.13	0"-4" lift of rock; grade; brush; 0-1 new culverts
21-2-15.5	0.30	0"-4" lift of rock; grade, brush
21-2-18	0.12	0"-4" lift of rock; grade
EB15-2	0.09	Grade; brush; spot rock
EB15-3	0.05	0"-4" lift of rock; grade
21-3-25	0.90	0"-4" lift of rock; grade; 3-4 culvert replacements; 2-3 new culverts
21-2-30	1.60	0"-4" lift of rock; grade; 7-8 culvert replacements; 2-3 new culverts
22-3-8 Seg. B	1.30	0"-4" lift of rock; grade; 3-4 culvert replacements; 1-2 new culverts
22-3-8 Seg. D	0.64	0"-4" lift of rock; grade; 3-4 culvert replacements; 0-1 new culverts
22-3-8 Seg. F	0.27	0"-4" lift of rock; grade; 0-1 culvert replacements; 0-1 new culverts
22-3-26 Seg. A-C	1.64	0"-4" lift of rock; grade; brush; 2-4 culvert replacements; 0-2 new culverts
22-3-26 Seg. D2	0.39	0"-6" lift of rock; grade; brush; 0-2 culvert replacements; 0-1 new culverts
22-3-27	0.45	Native surface; grade; brush; 0-2 new culverts
22-3-27.4	0.67	Native surface; grade; brush; 0-3 new culverts
22-3-27.5	0.27	Grade; brush; spot rock
22-3-34.1 Seg. A	0.10	Grade; brush; spot rock
WYWB1	0.38	Grade; brush; spot rock
WB35-1	0.02	0"-4" lift of rock; grade, brush
WB35-2	0.22	Native surface; grade; brush
WB35-3	0.33	Native surface; grade; brush; 2-3 new temporary culverts
Approx. Total:	**18.0**	

[1] No renovation activities within wayside aster zones 1 & 2 (lengths not included).

Table B-7: Road Improvement.

Road	Length (mi)	Comments
EB9-1	0.32	Native surface existing; 6"-8" lift of rock; grade; brush; 0-2 new culverts
EB15-3	0.08	Native surface existing; 6"-8" lift of rock; grade; brush
WYEB1 (21-2-9.5C)	0.03	Native surface existing; 6"-8" lift of rock; grade; brush
YB25-1	0.05	Native surface existing; 6"-8" lift of rock; grade; brush
Approx. Total:	**0.5**	

Table B-8: Road Decommission (long-term)[1].

Road	Length (mi)	Comments
21-2-4.1	0.57	Barricade; remove culverts; ditchout; waterbar
21-2-9	0.19	Barricade
21-2-9.5 Seg. B	0.19	Barricade both ends; ditchout; waterbar
22-3-26 Seg. D1	0.40	Barricade both ends
22-3-26 Seg. D3	0.26	Barricade
22-3-27	0.59	Barricade; ditchout; waterbar
22-3-27.4	0.69	Ditchout; waterbar
EB15-2	0.09	Barricade; ditchout
EB15-3	0.17	Barricade; ditchout; waterbar
EB15A	0.24	Barricade; ditchout; waterbar
EB15A1	0.04	Ditchout
EB15B[2]	0.05	Ditchout; waterbar; barricade
EB15C	0.06	Barricade; ditchout; waterbar
EB15F[2]	0.31	Barricade; remove culverts; ditchout; waterbar
EB15I	0.20	Ditchout; waterbar
EB9-1	0.31	Barricade; ditchout; waterbar
EB9D	0.12	Barricade
EB9G[2]	0.13	Barricade; ditchout; waterbar
EB9H	0.04	Barricade
WB27C[2]	0.04	Ditchout
WB27E Seg. A	0.13	Barricade; remove culverts; ditchout; waterbar
WB35-1	0.14	Barricade; ditchout
WB35-2	0.22	Barricade; ditchout; waterbar
WB35-3	0.33	Remove culverts; ditchout; waterbar
WB35A	0.04	Barricade; ditchout
WB35C	0.05	Ditchout
YB25-1	0.05	Barricade; ditchout
YB25A[2]	0.17	Barricade; ditchout; waterbar
YB25A1[2]	0.13	Barricade; ditchout; waterbar
YB25B	0.19	Ditchout
YB25D[2]	0.07	Barricade; ditchout; waterbar
Approx. Total:	**6.2**	

[1] Decommission (long term) activities place roads in an erosion-resistant condition.
[2] Decommission (long term) if Purchaser rocks surface; full decommission if not rocked.

Table B-9: Road Full Decommission (permanent)[1].

Road	Length (miles)	Comments
EB9C	0.16	Barricade; remove culverts; decompact
EB9E	0.17	Barricade; decompact
EB9E1	0.02	Decompact
EB9F	0.02	Decompact
EB9-2	0.25	Decompact
EB15D	0.11	Barricade; decompact
EB15D1	0.02	Decompact
EB15H	0.21	Remove culverts; decompact

Road	Length (miles)	Comments
EB15K	0.03	Barricade; remove culvert; decompact
YB25C	0.22	Barricade; remove culvert; decompact
YB25F	0.15	Barricade; remove culvert; decompact
YB25-1	0.17	Decompact
YB25-2	0.04	Decompact
WB27A	0.04	Barricade; remove culvert; decompact
WB27B	0.23	Barricade; remove culverts; decompact
WB27E Seg. B	0.19	Remove culverts; decompact
WB27F	0.18	Decompact
WB27H	0.03	Decompact
WB27-2	0.20	Decompact
WB35B	0.17	Decompact
Approx. Total:	**2.6**	

[1] Full decommission (permanent) activities remove the road prism from the landscape.

Table B-10: New Construction in Riparian Reserves.

Road	Length (mi)	Disposition
EB9B	0.02	Rocked surface; Open
EB9C	0.16	Native surface; full Decommission
EB9E	0.13	Native surface; full Decommission
EB9E1	0.02	Native surface; full Decommission
EB15H	0.02	Native surface; full Decommission
EB15H1	0.04	Native surface; full Decommission
WB27B	0.09	Native surface; full Decommission
WB27H	0.03	Native surface; full Decommission
WB35B	0.09	Native surface; full Decommission
Approx. Total:	**0.6**	

Table B-13: Amounts and Types of Habitat Treated by Thinning and in Affected Spotted Owl Core Areas and Provincial Home Ranges (no treatments would occur within Nest Patches).

Scale	Site Name	Non-Habitat		Suitable Nesting Habitat 80+ yrs		Dispersal/ Forage Habitat 40-79 yrs		Non-Habitat 0-39 yrs old		TOTAL		Acres Previously Thinned in last 15 yrs	Thinning Proposed
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%		
Core Area	68NEWITS	0	0%	0	0%	420	84%	0	0%	420	84%	78	0
	COMBS CREEK	0	0%	0	0%	48	10%	0	0%	48	10%	0	0
	HOODOO MOUNTAIN	0	0%	21	4%	129	26%	196	39%	345	69%	0	0
	JASPER CREEK	0	0%	24	5%	187	37%	0	0%	211	42%	0	0
	SHORTRIDGE CREEK	0	0%	37	7%	274	54%	40	8%	351	70%	0	0
	YOUNGS BUTTE - A	0	0%	3	1%	86	17%	65	13%	154	31%	0	9
	YOUNGS BUTTE - O	0	0%	18	4%	211	42%	101	20%	330	66%	39	9
Home Range	68NEWITS	0	0%	0	0%	1,080	37%	35	1%	1,115	39%	86	1
	COMBS CREEK	0	0%	0	0%	478	17%	89	3%	567	20%	0	101
	HOODOO MOUNTAIN	0	0%	103	4%	697	24%	385	13%	1,186	41%	90	79
	JASPER CREEK	0	0%	33	1%	828	29%	57	2%	918	32%	35	178
	SHORTRIDGE CREEK	0	0%	37	1%	895	31%	131	5%	1,064	37%	0	16
	YOUNGS BUTTE - A	6	0.2%	127	4%	882	30%	583	20%	1,598	55%	62	149
	YOUNGS BUTTE - O	0	0%	59	2%	704	24%	322	11%	1,085	37%	63	168

Table B-14: Northern Spotted Owl Site Survey Histories.

Site Name & MSNO	Monitoring and Nesting History, 2001-2011	Comments
COMBS CREEK 4371O	Located in 1994, surveyed from 2002-present. Pairs detected in 1996 and 1999, nest attempt in 1996, sporadic detections of resident single owls in other years.	Low chance of pair occupation or nesting due to lack of nesting habitat and low amounts of overall habitat. Female detected in 2011 probably the same individual detected at Shortridge Creek site in 2011. Most of PHR is private land that has been heavily harvested since 2000.
HOODOO MOUNTAIN 2110O	Located in 1981, period of no survey until 2011, surveyed in 2012. Last detection in 1990, last pair detection and last nest attempt in 1982.	Site center habitat clear-cut harvested by BLM in late 1980's. Low but sufficient amount of nesting habitat for nesting, but overall habitat is patchy and fragmented. Low probability of pair occupation or nesting.
JASPER CREEK 2370O	Located in 1990, surveyed most years from 2002-2010. Last NSO detection in 2004, no responses, barred or unidentified owls detected since 2007. Last pair in 1994, no nest attempts ever observed.	Low but sufficient amount of suitable habitat for nesting. Since 2005 most private habitat has been harvested. Low probability of pair occupation or nesting.

Site Name & MSNO	Monitoring and Nesting History, 2001-2011	Comments
SHORTRIDGE CREEK 2367O	Located in 1990, surveyed in 2002 and 2011-2012. Last detection in 2011, last pair in 1992, no nest attempts ever observed.	Female detected in 2011 and male detected in 2012 are probably the individuals detected at/associated with the Combs Creek site. Small amount of lower quality suitable nesting habitat, but relatively large blocks of contiguous dispersal habitat also available. Little private habitat available. Moderate probability of pair occupation or nesting, will be surveyed in 2012.
YOUNGS BUTTE 0165O & 0165A	Located from 1977, surveyed sporadically from 2002 to present. Last detection and pair in 2004, only nest attempt in 1992.	Original site center (0165O) clear cut harvested in 1980's. Alternate site center on private (0165A) clear cut harvested in 2011. Small amount of lower quality suitable nesting habitat available at periphery of PHR. Low amount of habitat available on private land. Low probability of pair occupation or nesting.

Table B-15: Special Status Species and Migratory Birds evaluated for South Dorena Thinning.

Common Name	Scientific Name	Status[1]	Occurrence[2]	Reason Eliminated	Habitat/Range	Citations
SPECIAL STATUS SPECIES						
Fender's blue butterfly	*Plebejus icarioides fenderi*	FE	D	No Habitat	Associated strongly with Kincaid's Lupine. Meadow/prairie habitat	Applegarth 1995
marbled murrelet	*Brachyramphus marmoratus*	FT, BCC	D	Out of Range	Within 50 miles of coast.	U.S. Fish & Wildlife Service 1997
Northern spotted owl	*Strix occidentalis caurina*	FT	D	**Analyzed**	Mature/late-successional forest with nesting structure, canopy layers, large CWD.	Forsman 1984
Mardon skipper	*Polites mardon*	FC, SEN	S	No Habitat	Grassland, prairie.	Kerwin & Huff 2007
Taylor's checkerspot	*Euphydryas editha taylori*	FC, SEN	S	No Habitat	Grassland, prairie.	Black et al. 2005
Oregon red tree vole	*Arborimus longicaudus*	FC, SEN	D	Exempted	Mature conifer forest	
fisher	*Martes pennanti*	FC, SEN	D	No Habitat	Large contiguous blocks of mature forest with structural complexity	Verts & Carraway 1998
Crater Lake tightcoil	*Pristiloma arcticum crateris*	SEN	S	Protected by Riparian Reserves	Wet habitats above 2000 feet.	Duncan et al. 2003
evening field slug	*Deroceras hesperium*	SEN	S	Protected by Riparian Reserves	Perennially wet meadows or rock gardens	Burke & Duncan 2005
Cascades axetail slug	*Carinacauda stormi*	SEN	S	**Analyzed**	Needle & duff layer in conifer forest.	Stone 2010
Haddock's rhyacophilan caddisfly	*Rhyacophila haddocki*	SEN	S	Protected by Riparian Reserves	Small, cool mountain streams & adjacent riparian areas.	Brenner 2005a

Common Name	Scientific Name	Status[1]	Occurrence[2]	Reason Eliminated	Habitat/Range	Citations
Oregon plant bug	*Lygus oregonae*	SEN	S	No Habitat	Ocean dunes.	Scheurering 2006
California shield backed bug	*Vanduzeeina borealis californica*	SEN	S	No Habitat	Mid to high elevation balds & prairies.	Applegarth 1995
Roth's blind ground beetle	*Pterostichus rothi*	SEN	S	Out of Range	Moist mature Coast Range forest.	Applegarth 1995, Brenner 2005b
Western bumblebee	*Bombus occidentalis*	SEN	S	No Habitat	Diverse habitats that provide nectar, pollen, & suitable colony sites.	Thorp et al. 2008
hoary elfin	*Callophrys polios maritma*	SEN	S	No Habitat	Ocean bluffs & dunes.	Ross et al. 2005
insular blue butterfly	*Plebejus saepiolus littoralis*	SEN	S	No Habitat	Extremely restricted coastal range.	Miller & Hammond 2007
Johnson's hairstreak	*Callophrys johnsoni*	SEN	D	No Habitat	Mistletoe on western hemlock in late-successional forest.	Miller & Hammond 2007
foothill yellow-legged frog	*Rana boylii*	SEN	D	No Habitat	Low-gradient streams with bedrock or gravel substrate	Corkran & Thoms 1996
Pacific pond turtle	*Actinemys marmorata*	SEN	D	No Habitat	Ponds, lakes, larger streams with emergent vegetation & basking sites & nearby nesting habitat.	Rosenberg et al. 2009
painted turtle	*Chryemys picta*	SEN	S	No Habitat	Slow water; rivers, marshes, ponds with abundant vegetation & basking sites	Bury 1995
Aleutian Canada goose	*Branta hutchinsii leucopareia*	SEN	S	No Habitat	Pasture, harvested agricultural fields, marshes.	U.S. Fish & Wildlife Service 1991
American peregrine falcon	*Falco peregrinus anatum*	SEN	D	No Habitat	Cliffs & other sheer vertical structure.	White et al. 2002
bald eagle	*Haliaeetus leucocephalus*	SEN, BCC	D	**Analyzed**	Large nest trees & snags near large water bodies.	Buehler 2000, Isaacs & Anthony 2004
black swift	*Cypseloides niger*	SEN	S	No Habitat	Nests under waterfalls	
dusky Canada goose	*Branta Canadensis occidentalis*	SEN, GBBDC	D	No Habitat	Willamette Valley agricultural fields & wetlands.	Bromley & Rothe 2003
California brown pelican	*Pelecanus occidentalis californicus*	SEN	S	No Habitat	Coastal & estuarine habitats.	NatureServe 2008
grasshopper sparrow	*Ammodramus savannarum*	SEN	D	No Habitat	Grassland, prairie.	NatureServe 2008
harlequin duck	*Histrionicus histrionicus*	SEN, GBBDC	D	**Analyzed**	Fast-flowing streams with boulders & logs, adjacent riparian habitat.	Thompson et al. 1993, Robertson & Goudie 1999

Common Name	Scientific Name	Status[1]	Occurrence[2]	Reason Eliminated	Habitat/Range	Citations
Lewis' woodpecker	*Melanerpes lewis*	SEN	D	No Habitat	Open woodlands with ground cover & snags	Tobalske 1997
Oregon vesper sparrow	*Pooecetes gramineus affinis*	SEN, BCC	D	No Habitat	Grassland, farmland, sage. Dry, open habitat with moderate herb & shrub cover	Jones & Cornely 2002
purple martin	*Progne subis*	SEN	D	**Analyzed**	Snags & trees with suitable nest cavities, typically open areas near water.	Brown 1997, Horvath 2003
streaked horned lark	*Eremophila alpestris strigata*	SEN, BCC	S	No Habitat	Prairies, dunes, beaches, pastures; areas with low grassy vegetation.	Pearson & Altman 2005
white-tailed kite	*Elanus leucurus*	SEN	D	No Habitat	Low-elevation grassland, farmland or savannah & nearby riparian areas	Dunk 1995
fringed myotis	*Myotis thysanodes*	SEN	S	**Analyzed**	Known hibernacula & roosts include caves, mines, buildings, large snags. Forages in variety of habitats.	Weller & Zabel 2001
pallid bat	*Antrozous pallidus*	SEN	S	No Habitat	Arid or semi-arid habitat with rock, brush, or forest edge; Roosts in caves, mines, bridges, buildings, & hollow trees or snags	Lewis 1994
Townsend's big-eared bat	*Corynorhinus townsendii*	SEN	D	**Analyzed**	Roosts in mines & caves, forages in variety of habitats	Verts & Carraway 1998, Fellers & Pierson 2002
MIGRATORY BIRDS						
northern goshawk	*Accipter gentilis*	BCC	D	**Analyzed**	Mature & late-successional forest.	
olive-sided flycatcher	*Contopus cooperi*	BCC	D	**Analyzed**	Edge habitats, tall snags & trees important	
purple finch	*Carpodacus purpureus*	BCC	D	**Analyzed**	Moist conifer forest, conifer woodlands	
Rufous hummingbird	*Selasphorus rufus*	BCC	D	No Habitat	Shrubby, early-successional habitat. Nectar-producing plants important	
willow flycatcher	*Empidonax trailli*	BCC	D	Protected by Riparian Reserves	Brushy or forested habitat in riparian areas	
band-tailed pigeon	*Colomba fasciata*	GBBDC	D	**Analyzed**	Nests in mature forest	
mourning dove	*Zenaida macroura*	GBBDC	D	No Habitat	Forest, woodland, shrub habitats.	
wood duck	*Aix sponsa*	GBBDC	D	Protected by Riparian Reserves	Nest cavities near water.	

[1] FE = Federal Endangered; FT = Federal Threatened; FC = Federal Candidate; SEN = BLM Sensitive Species; BCC = Bird of Conservation Concern; GBBDC = Game Bird Below Desired Condition.
[2] D = Detected on District; S = Suspected on District.

APPENDIX C – MAPS

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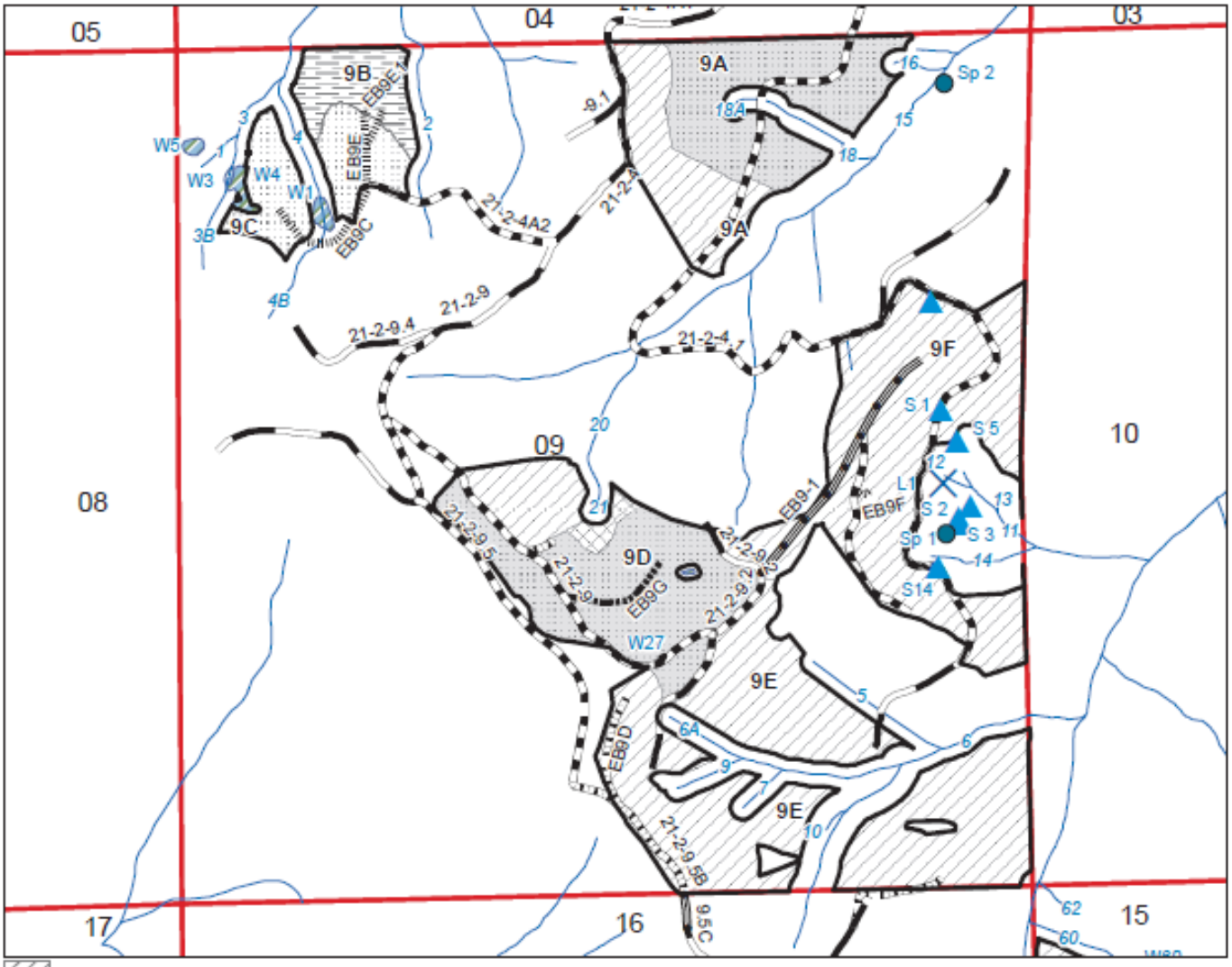
ENVIRONMENTAL ASSESSMENT

Eagles Bluff, T. 21 S., R. 2 W., SEC. 9



Cable
Summer Cable
Ground Base
Optional - Preferred Ground Base
Special Yarding Area
Partial Harvest Area
Section
Landslide
Seep
Spring
Waterfall

Stream
HydroPolys
<all other values>
100 Foot Contour
Existing Road
New Road Construction - Rock
New Road Construction - Native
New Road Construction - Optional Rock
Road Renovation
Road Improvement

N

1/22/2013

0 500 1,000 1,500 Feet

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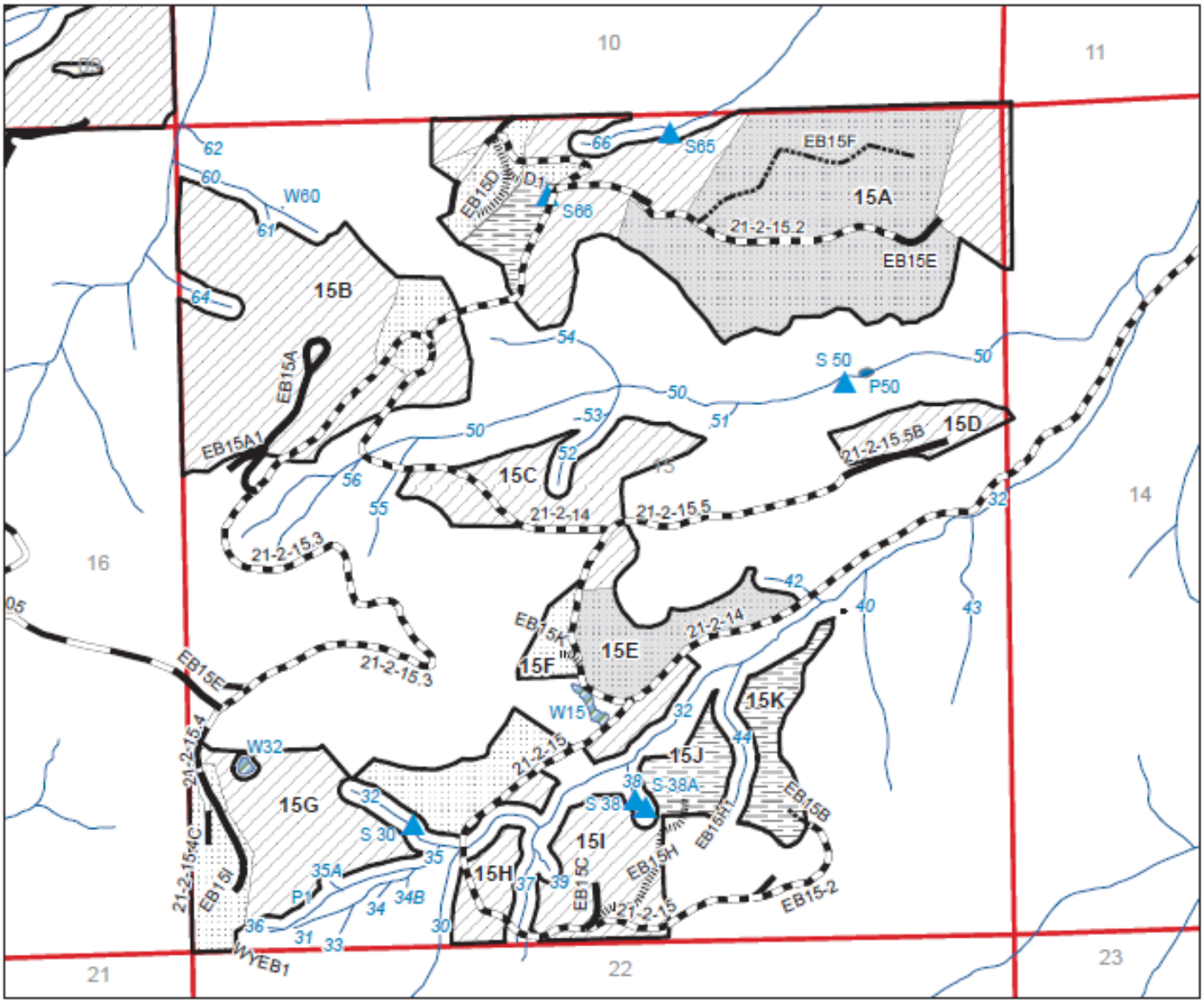
Eagles Bluff, T. 21 S., R. 2 W., SEC. 15



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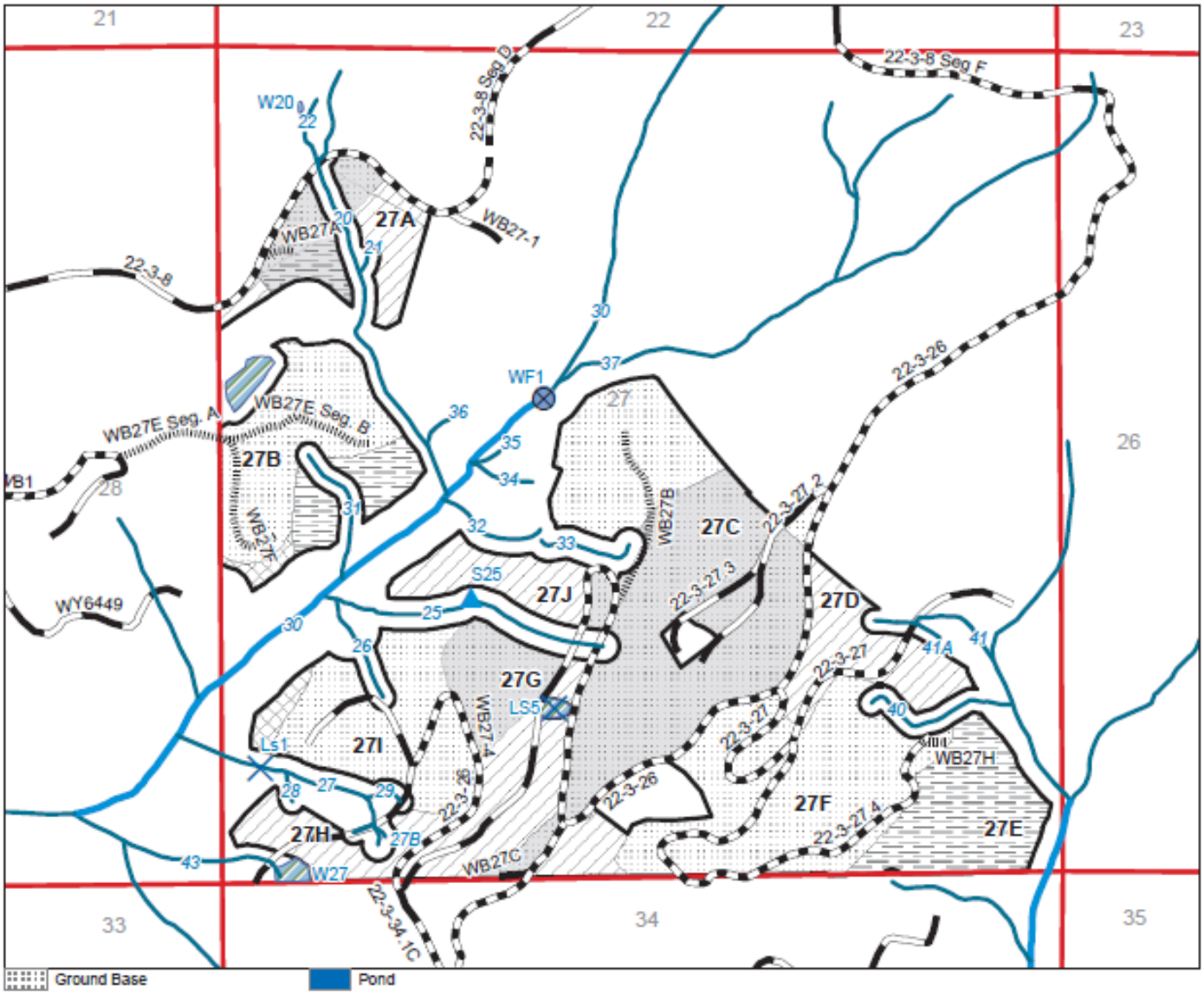
Witt Butte, T. 22 S., R. 3 W., SEC. 27



- Ground Base
- Optional - Preferred Ground
- Special Yarding Area
- Cable
- Summer Cable
- Optional - Preferred Summer Cable
- Partial Harvest Area
- Section
- Landslide
- Seep
- Waterfall
- Pond
- Wetland
- Fish Bearing
- Not Fish Bearing
- Existing Road
- Road Renovation
- New Road Construction - Rock
- New Road Construction - Native
- New Road Construction - Optional Rock

N

0 500 1,000 1,500 Feet

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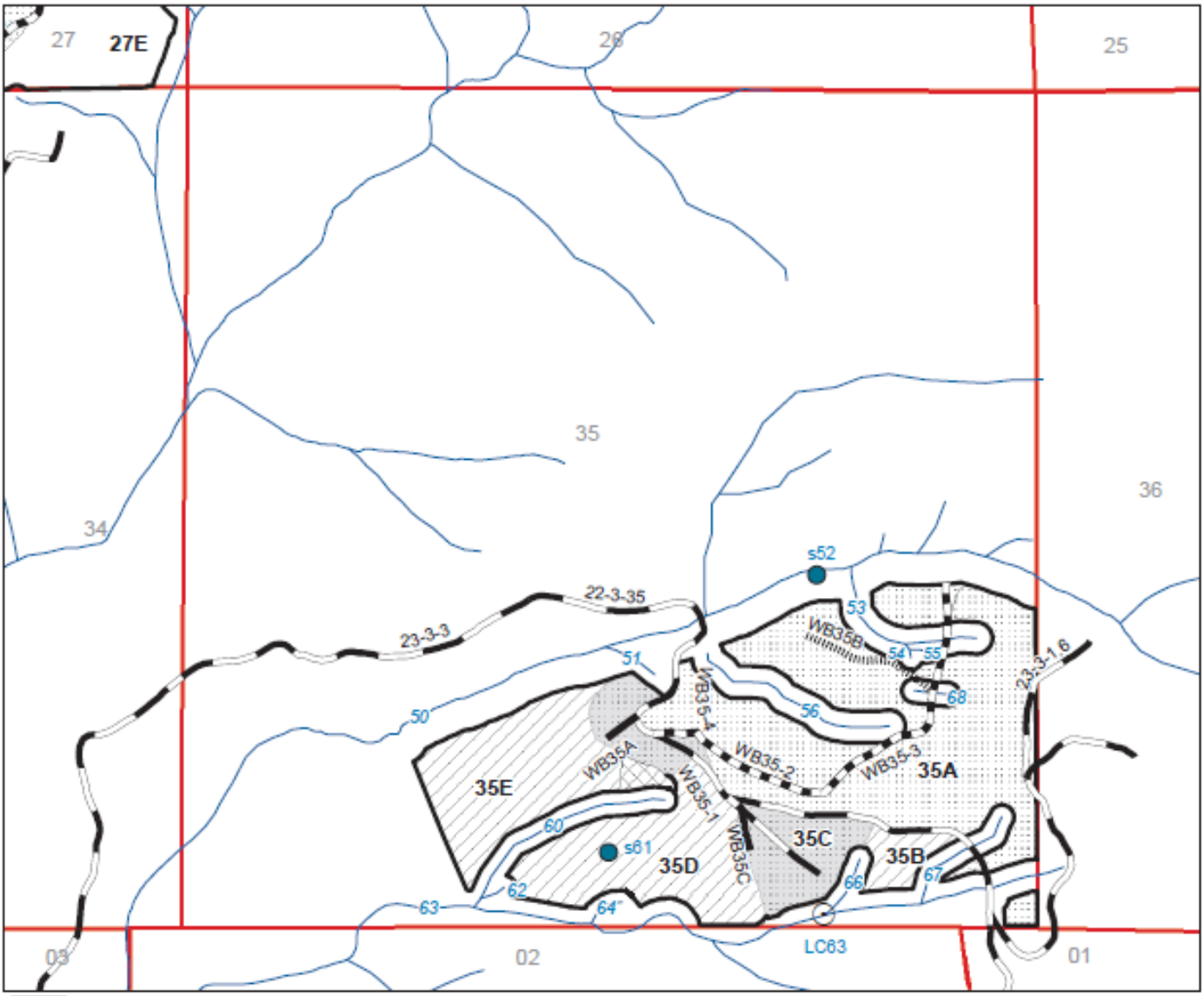
Witt Butte, T. 22 S., R. 3 W., SEC. 35



Cable
Ground Base
Optional - Preferred Ground Base
Special Yarding Area
Partial Harvest Area
Section
Culvert
Spring
Stream
Pond
Wetland
Road Renovation
New Road Construction - Native
New Road Construction - Rock
Existing Road

N

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0 500 1,000 1,500 Feet

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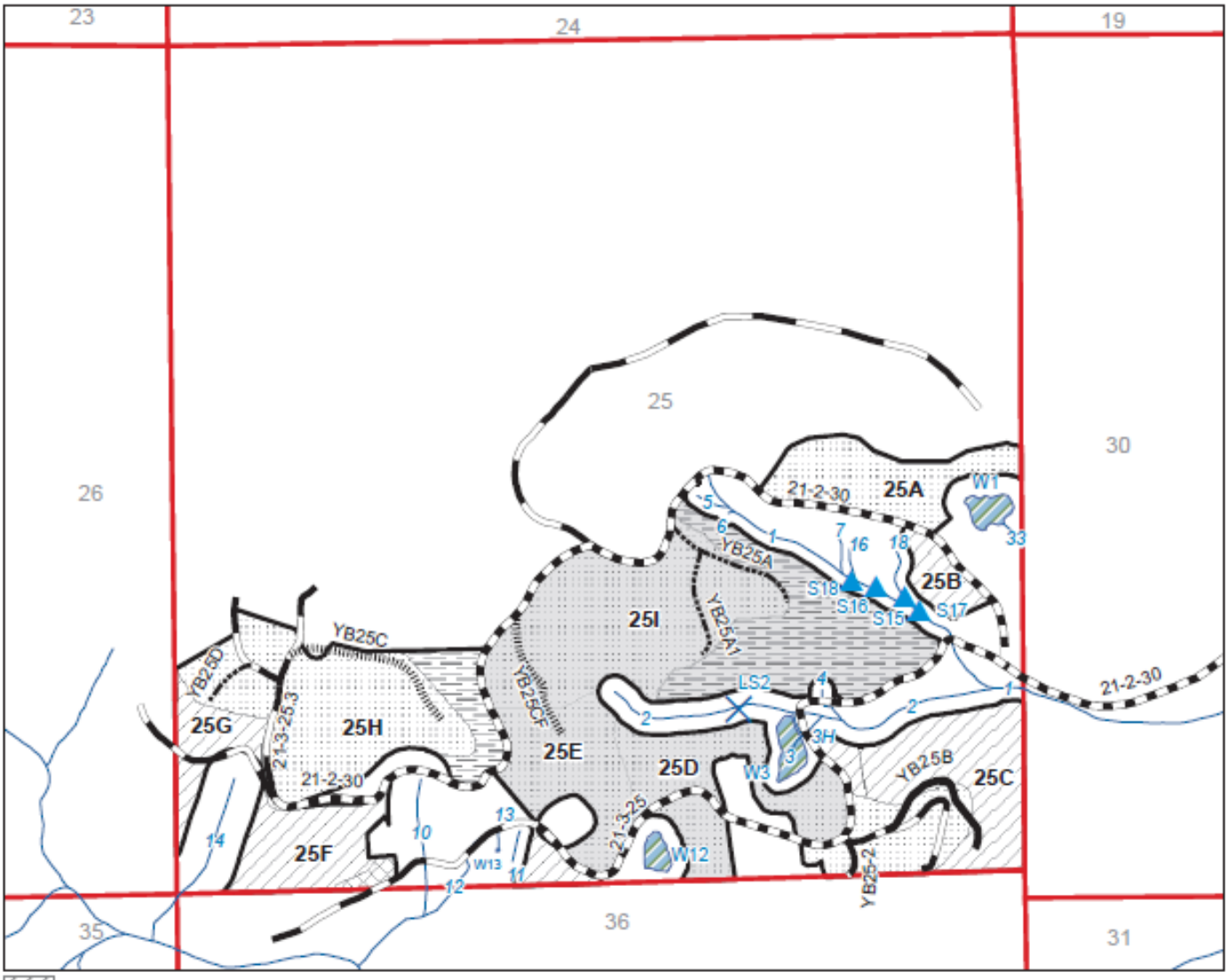
Young Butte, T. 21 S., R. 3 W., SEC. 25



- Cable
- Ground Base
- Optional - Preferred Ground
- Special Yarding Area
- Summer Cable
- Optional - Preferred Summer Cable
- Partial Harvest Area
- Section
- Landslide
- Seep
- Stream
- Pond
- Wetland
- Existing Road
- New Road Construction - Native
- New Road Construction - Rock
- New Road Construction - Optional Rock
- Road Renovation

N

1/22/2013

0 500 1,000 1,500 Feet

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