

ENVIRONMENTAL ASSESSMENT**Pig's Puzzle Projects -
Reissue****Commercial Thinning and Regeneration Harvest,
and Road Decommissioning**

July 2006



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As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering economic use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interest of all people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

Environmental Assessment Number OR-086-97-13

ENVIRONMENTAL ASSESSMENT

Pig's Puzzle Projects - Reissue

Environmental Assessment Number OR-086-97-13

July 26, 2006

United States Department of the Interior
Bureau of Land Management, Oregon State Office
Salem District, Tillamook Resource Area
Columbia County, Oregon

Responsible Agency: USDI - Bureau of Land Management

Responsible Official: Brad Keller
 Field Manager
 Tillamook Resource Area
 4610 Third Street
 Tillamook, OR 97141
 (503) 815-1100

For Further Information, contact Bob McDonald
 Tillamook Resource Area
 4610 Third Street
 Tillamook, OR 97141
 (503) 815-1110

Abstract: This document is a reissue of the environmental analysis first documented in the Pig's Puzzle Project Environmental Assessment (EA) (EA# OR-086-97-13), dated February 18, 1998. This EA Reissue covers two projects. Project 1, the Pig's Puzzle Timber Sale, is a commercial thinning and regeneration harvest timber sale on 277 acres of federal lands in T4N R2W sections 29 and 31, and T4N R3W section 25, Willamette Meridian. This project would also include the following road work: approximately 0.6 miles of new road construction and 2.6 miles of road reconstruction, and decommissioning of approximately 0.6 miles of new and reconstructed roads after completion of the project. Project 2, Road Decommissioning, would decommission approximately 1.0 miles of existing natural-surfaced road in T4N R2W section 29 by removal of three culverts and subsoiling, waterbarring and blocking the road.

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1.0 PROJECT SCOPE

1.1 Background

This document reissues the environmental analysis first provided in the Pig's Puzzle Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) (EA# OR086-97-13), dated September 4, 1998. The project in that EA was subsequently divided into two commercial timber sales with some associated watershed restoration work in The Pig's Puzzle Project and Pisgah Progeny Project Decision Rationale, dated September 4, 1998. This EA Reissue covers only the portion of the original project called the Pig's Puzzle Project.

The original 1998 decision for the Pig's Puzzle Project was protested and the Bureau of Land Management's (BLM's) protest decision subsequently appealed to the Interior Board of Land Appeals (Board). In April, 2000, the Board set aside BLM's protest decision, remanding it back to the BLM due to pending resolution of Pacific Coast Federation of Fishermen's Association et al. v. National Marine Fisheries Service et al. and Oregon Natural Resource Council et al. v. Allen. The remand from IBLA gave BLM jurisdiction regarding a new decision on the protest, thus resolving the appeal filed.

The Pigs Puzzle Project was authorized under an individual decision but was never awarded because of the referenced administrative appeal and litigation. These legal issues have since been resolved. A new decision will be made regarding whether to implement the proposed action. This EA Reissue clarifies recent changes in policy and the original analysis, and has also been reformatted for clarity.

1.2 Project Location

The project area is approximately 35 miles northwest of Portland, Oregon in Township 4 North, Range 2 West, sections 29 and 31, and Township 4 North, Range 3 West, section 25, Willamette Meridian (Figure 1). Access to the projects is from the Scappoose-Vernonia Highway and the Pisgah Home Road. The project area is primarily within the GFMA (General Forest Management Area) portion of the Matrix land use allocation, as identified in the Salem District Record of Decision and Resource Management Plan (ROD/RMP) dated May, 1995. These lands are revested Oregon and California Railroad (O&C) Lands. The project area also includes approximately 30 acres of land within the Riparian Reserves land use allocation.

The project area is located within the Scappoose Creek watershed, within the Fall Creek and Brush Creek drainages in the North Scappoose Creek subwatershed. The project area falls within the Evolutionarily Significant Units (a distinct population segment) of Lower Columbia River steelhead, Lower Columbia River Chinook salmon, Columbia River chum salmon and Lower Columbia coho salmon which are federally listed as Threatened under the Endangered Species Act.

1.3 Conformance with Land Use Plans, Policies and Programs

Timber management on the Revested Oregon and California Railroad Lands (O&C Lands) managed by the Tillamook Field Office is principally authorized and guided by:

The Oregon and California Act of 1937: Section 1 of the O&C Act stipulates that suitable commercial forest lands revested by the government from the Oregon and California Railroad are to be managed for the sustained production of timber.

The Federal Land Policy and Management Act (FLPMA): Section 302 at 43 U.S.C. 1732(a), directs that

“The Secretary shall manage the public lands . . .in accordance with the land use plans developed by him under section 202 of this Act when they are available . . .”

Salem District Record of Decision/Resource Management Plan (ROD/RMP): The ROD/RMP (USDI, BLM 1995a), approved in accordance with the requirements of FLPMA, provides specific direction for timber management.

The Salem District timber management program and annual allowable sale quantity (ASQ) of 34.8 million board feet (MMBF) are predicated on the following assumptions. On lands allocated to the harvestable timber base in the GFMA and Connectivity/ Diversity Blocks within the Matrix, commercial thinning and regeneration harvest will be conducted in mature and late-successional forest (ROD/RMP, pp. 46-47).

The ROD/RMP assumed that suitable lands in the GFMA and Connectivity/Diversity Blocks would be managed in a manner consistent with the principles of sustained yield timber management. Once this decision was made, the primary unresolved issue regarding management of these lands is not if timber will be harvested, but when and how timber harvest will occur.

In the GFMA, regeneration harvest will be scheduled at or above the age of volume growth culmination (i.e., culmination of mean annual increment¹) (CMAI). In the planning area this is between 70 and 110 years of age (ROD/RMP, Appendix D-1). Commercial thinning will be considered in stands approximately 30 to 70 years in age (ROD/RMP, Appendix D-2).

The Salem District *Proposed Resource Management Plan/Environmental Impact Statement* (PRMP/EIS) assessed the cumulative effects of the Salem District timber management program. Based on this analysis, the ROD/RMP (p. A-1-1) anticipated 600 acres of regeneration harvest and 910 acres of commercial thinning/density management annually in support of the sustained yield assumptions for an annual ASQ of 34.8 MMBF of timber.

This EA will consider the environmental consequences of the proposed action and no action alternatives in order to provide sufficient evidence for determining whether the anticipated impacts would exceed those considered in the Salem District PRMP/EIS and require the preparation of a Supplemental Environmental Impact Statement (SEIS). In addition to the PRMP/EIS, this analysis is tiered to assumptions and analysis of consequences provided by:

-
- The *Final Supplemental Environmental Impact Statement (FSEIS) on Management of Habitat for Late-Successional and Old-Growth Related Species Within the Range of the Northern Spotted Owl* (USDA, USDI 1994a) (Northwest Forest Plan);
 - The *FSEIS for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines in Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* (USDA, USDI 2001a);
 - The *FSEIS to Clarify Provisions Relating to the Aquatic Conservation Strategy* (USDA, USDI 2004b).

Implementation of the proposed action would conform to the requirements of the ROD/RMP which incorporates as management direction the standards and guidelines of the *Record of Decision for Amendments (ROD) to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl*

¹ Culmination of mean annual increment, or CMAI, is defined as the age in the growth cycle of a tree or stand at which the mean annual increment for height, diameter, basal area, or volume is at a maximum. (The Dictionary of Forestry The Society of American Foresters 1998)

(USDA, USDI 1994b), as amended by the *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines in Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* (USDA, USDI 2001b (S&M ROD)) and *Record of Decision to Clarify Provisions Relating to the Aquatic Conservation Strategy* (USDA, USDI 2004c). Conformance with the 2001 S&M ROD includes implementation of the 2001, 2002, 2003 *Survey and Manage Annual Species Reviews*. Additionally, implementation of the proposed action would conform to the requirements of the *Coastal Zone Management Act* of 1974, as amended, and the *Endangered Species Act of 1972* (ESA), as amended. The proposed action also conforms with the *Scappoose Creek Watershed Analysis*, December 1996.

Tillamook Resource Area is aware of the August 1, 2005, U.S. District Court order in *Northwest Ecosystem Alliance et al. v. Rey et al.* which found portions of the *Final Supplemental Environmental Impact Statement to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines* (January, 2004) (EIS) inadequate. Tillamook Resource Area is also aware of the recent January 9, 2006, Court order which:

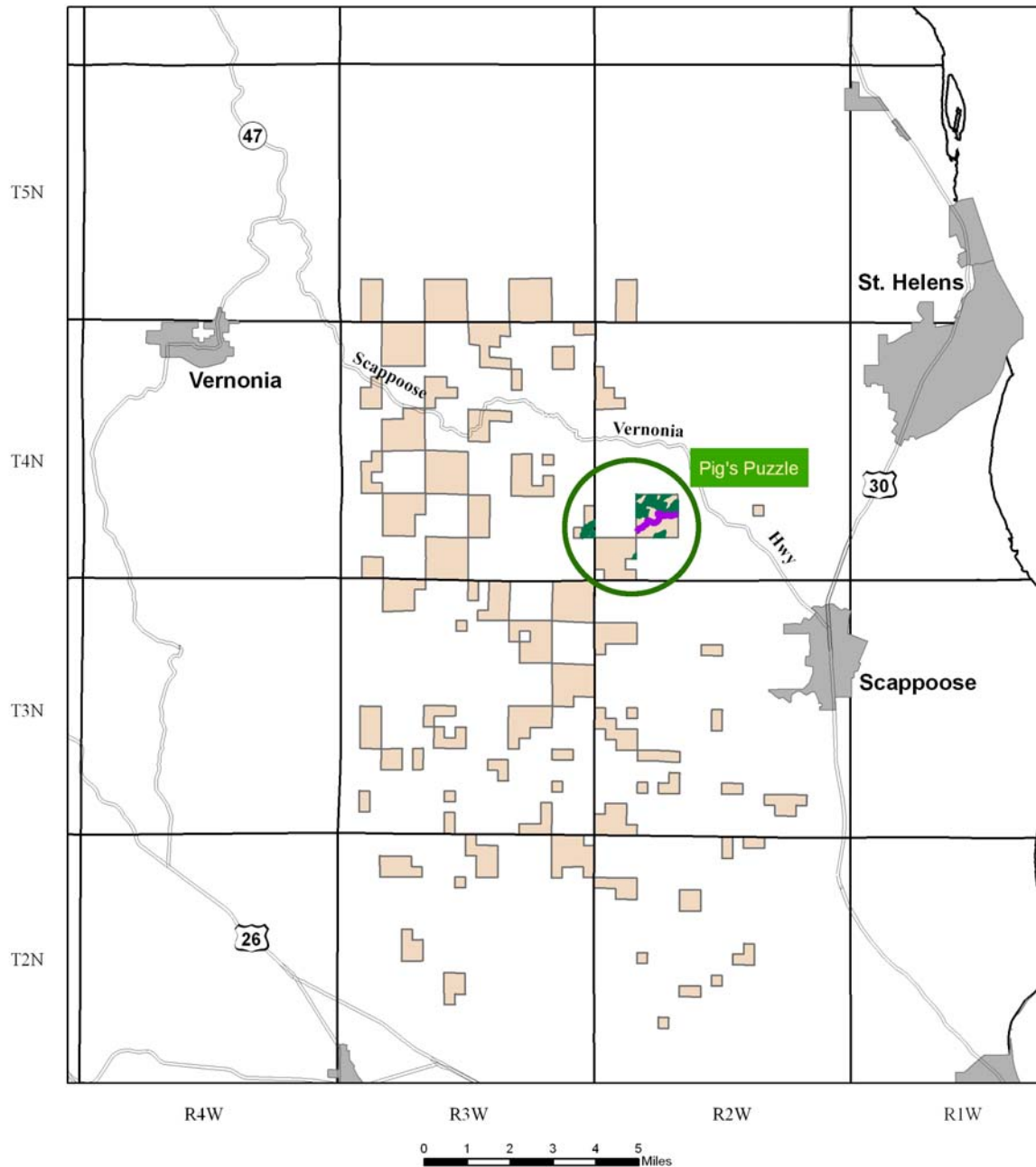
- set aside the 2004 *Record of Decision To Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines in Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern spotted Owl* (March, 2004) (2004 ROD) and
- reinstated the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measure Standards and Guidelines* (January, 2001) (2001 ROD), including any amendments or modifications in effect as of March 21, 2004.

The order further directs "Defendants shall not authorize, allow, or permit to continue any logging or other ground disturbing activities...unless such activities are in compliance with the provisions of the 2001 ROD (as amended or modified as of March 21, 2004)". The litigation over the amendment that eliminated the Survey & Manage mitigation measure from the Northwest Forest Plan does not affect the Pig's Puzzle Projects. This is because biological surveys for Survey & Manage species were completed prior to the 2004 ROD and meet the 2001 protocol (2001 ROD as amended or modified as of March 21, 2004). Therefore, these projects comply with the Northwest Forest Plan prior to that amendment (See S&M Compliance Forms , Appendix 4).

1.4 Decision to be Made

The Tillamook Field Manager is the official responsible for deciding whether or not to prepare an environmental impact statement (EIS), and whether to approve the commercial thinning and regeneration harvest project and the road decommissioning project as proposed, not at all, or to some other extent.

Figure 1 - Pig's Puzzle Projects Location Map



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-  Road Decommissioning Project
-  Timber Sale Project
-  BLM Lands



2.0 PROJECT 1 – PIG’S PUZZLE TIMBER SALE

2.1 Purpose and Need For Action and Decision Factors

2.1.1 Purpose and Need for Action

By comparing the existing conditions of the landscape in the project area to the management direction contained in the Salem ROD/RMP, the IDT identified a number of specific resource conditions that do not meet the long-term management objectives. The proposed action is designed to modify these conditions, and move towards achieving the management direction described in the ROD/RMP.

The objectives of the proposed action are to:

1) Implement the following management direction from the ROD/RMP, pertaining to timber management on lands in the Matrix land use allocations.

- Produce a sustainable supply of timber and other forest commodities (p. 46);
- Provide an annual ASQ for the Salem District of 34.8 MMBF (p. 46);
- Manage timber stands to reduce the risk of loss from disease (p. 46);
- Conduct regeneration harvest of forest stands in the General Forest Management Area that are beyond the age of CMAI (Appendix D-1);
- Manage developing stands to promote tree survival and growth and to achieve a balance between wood volume production, quality of wood and timber value at harvest (RMP page 46);
- Provide for the maintenance of ecologically valuable structural components such as down logs, snags, large trees (RMP page 20)

2) Address issues of effects to aquatic habitat, watershed condition, and Survey & Manage species that were subjects of appeals to the Interior Board of Land Appeals.

3) Proceed with the previously authorized timber sales in order to contribute a sustainable supply of timber in support of the PRMP/EIS (Vol. 1, p. xii) assumptions that BLM management programs (including timber sales) would support 544 jobs and provide \$9.333 million in personal income annually.

4) Comply with Section 1 of the O&C Act (43 USC § 1181a) which stipulates that O&C Lands be managed “... for permanent forest production, and the timber thereon shall be sold, cut, and removed in conformity with the principal of sustained yield for the purpose of providing a permanent source of timber supply, protecting watersheds, regulating stream flow, and contributing to the economic stability of local communities and industries, and providing recreational facilities...”

2.1.2 Decision Factors

Factors to be considered when selecting among alternatives will include:

- The degree to which the objectives previously described would be achieved including: the manner in which timber harvest would be conducted with respect to the type(s) of equipment and method of yarding to be employed, as well as the season(s) of operations; and the manner in which access would be provided, including road renovation, and the type and location of any road construction;
- The nature and intensity of environmental impacts that would result from implementation and the nature and effectiveness of measures to mitigate impacts to resources including, but not limited to wildlife and wildlife habitat, soil productivity, water quality, and air quality; and
- Compliance with: management direction from the ROD/RMP; terms of consultation on species listed and habitat designated under the Endangered Species Act; the Clean Water Act, Clean Air Act, Safe Drinking Water Act and O&C Act; and other programs such as Special Status and Survey & Manage Species.
- Economics
 1. Provide timber resources and provide revenue to the government from the sale of those resources; and
 2. Reduce the costs both short-term and long-term of managing the lands in the project area.

2.2 Alternatives

2.2.1 Alternative Development

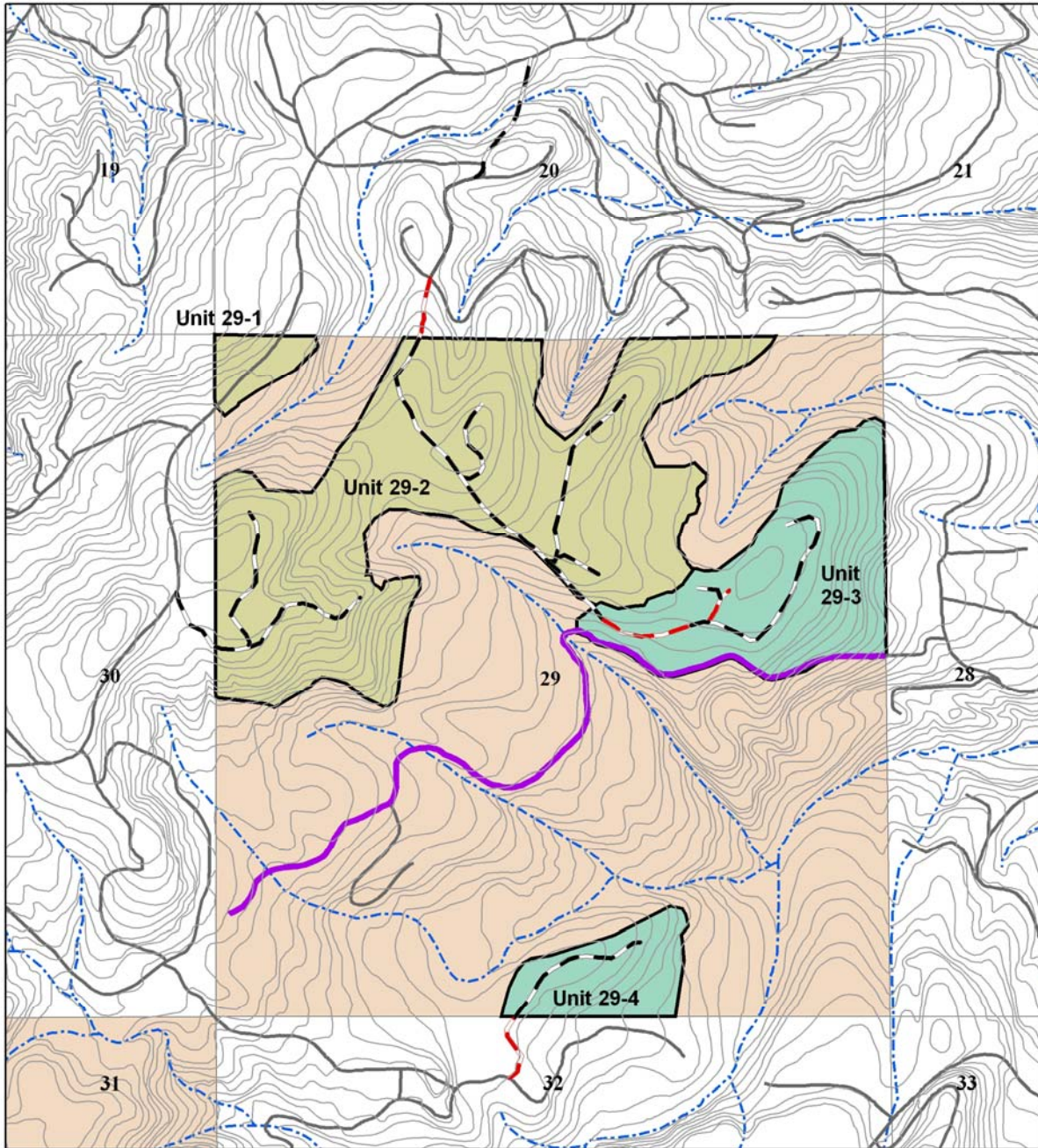
The decision process for the Salem District RMP has resolved issues related to the land use allocations. No unresolved conflicts concerning alternative uses of available resources (section 102(2) (E) of NEPA) were identified. The BLM developed alternatives for this project based on the identified purpose and need in Section 2.1. This EA will analyze the effects of the “Proposed Action” and the “No Action Alternative”. No additional alternatives were identified that would meet the purpose and need of the project.

2.2.2 Alternative 1 - Proposed Action

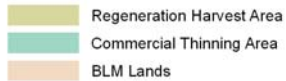
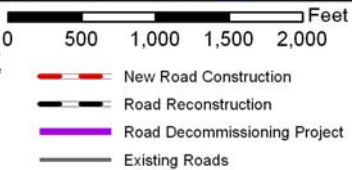
The Proposed Action is to perform commercial thinning and regeneration harvest on approximately 277 acres of 68- to 75-year-old conifer and mixed conifer stands within the Matrix and Riparian Reserve land-use allocations (Figure 2). The proposed action is anticipated to be implemented in 2007 to 2009. The proposed treatments are summarized in Table 1. A combination of ground-based and cable yarding systems would be used. In addition, approximately 0.6 miles of new road (0.2 miles of rocked and 0.4 miles of natural-surfaced road) would be constructed and 2.6 miles (2.4 miles of rocked and 0.2 miles of natural-surfaced road) would be reconstructed. The roads to be reconstructed include a privately owned road in T4N R2W section 20 with a washed-out culvert that would be replaced under this alternative. At the completion of harvest activities, approximately 0.6 miles of road (0.4 miles of newly constructed and 0.2 miles of reconstructed road) would be decommissioned. There would be no net change in road mileage in the project area from the existing condition as a result of implementation of the proposed action for this project.

Figure 2 - Pig's Puzzle Projects

T4N R2W Section 29



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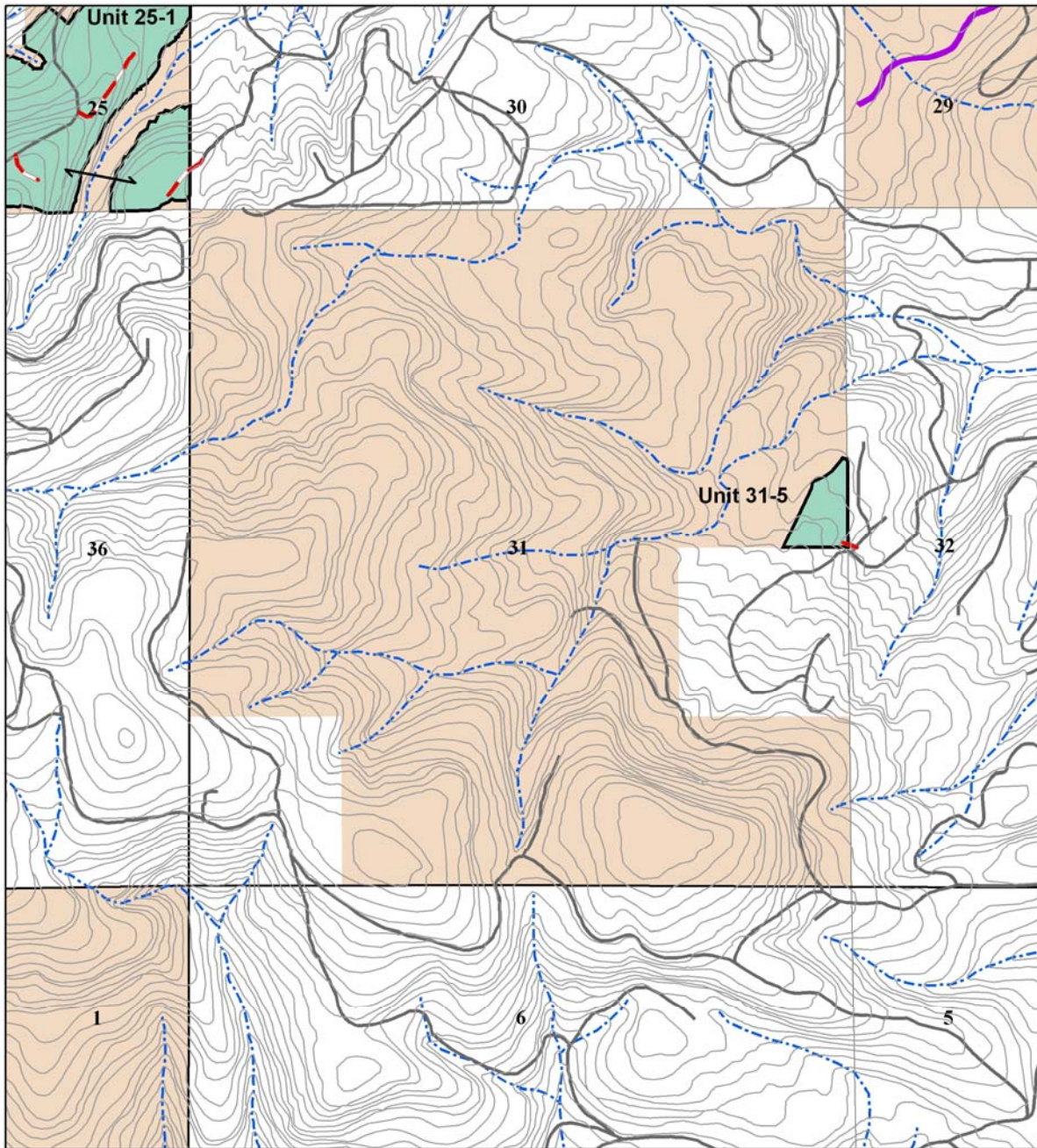


BLM Lands (tan shaded area)



Figure 2 (cont.)- Pig's Puzzle Projects

T4N R2W Section 31



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- 0 500 1,000 1,500 2,000 Feet
- New Road Construction
 - Road Reconstruction
 - Road Decommissioning Project
 - Existing Roads
 - Regeneration Harvest Area
 - Commercial Thinning Area
 - BLM Lands



Figure 2 (cont.)- Pig's Puzzle Projects

T4N R3W Section 25

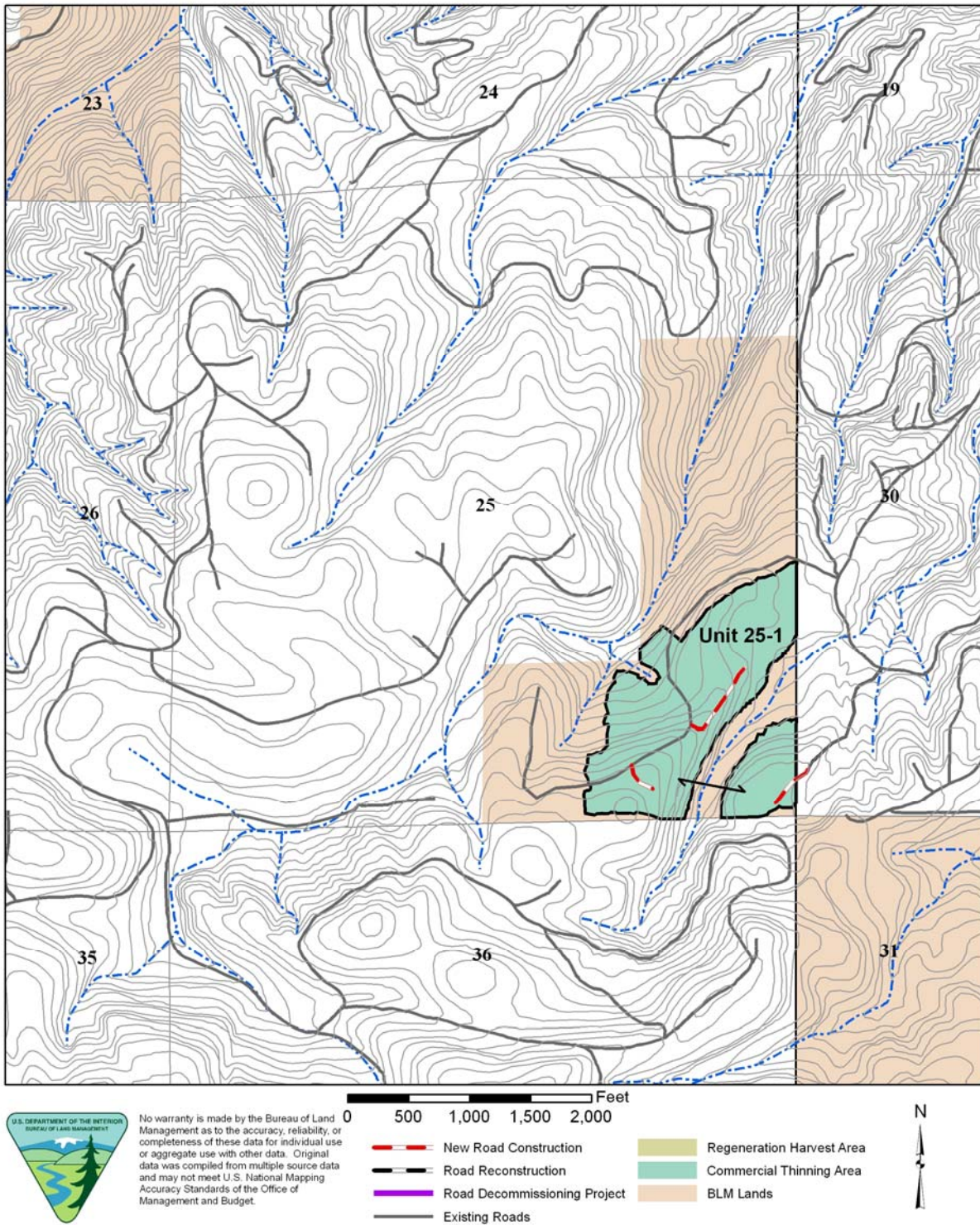


Table 1. Treatment Area Summary

Unit Number	Harvest Type	Matrix GFMA Acres	Riparian Reserve Acres	Total Acres	Logging Systems (acres)	
					Ground-based	Skyline
25-1	Thinning	25.9	24.5	50.4	14.7	35.7
29-1	Regeneration	7.2	0	7.2	3.7	3.5
29-2	Regeneration	140.2	0	140.2	5.6	134.6
29-3	Thinning	54.0	1.2	55.2	0	55.2
29-4	Thinning	15.9	2.7	18.6	0	18.6
31-5	Thinning	5.0	0	5.0	5.0	0
Totals		248.2	28.4	276.6	29	247.6

The following design features will be incorporated into the proposed action:

The following is a summary of the design features that reduce the risk of effects to the affected elements of the environment. The proposed action(s) would be implemented consistent with the Best Management Practices (BMPs) contained in Appendix C of the RMP.

The design features are organized below by benefiting resource.

Desirable Stand Features, Diversity, and Protection

- Log lengths would be limited to 40 feet plus trim to reduce the potential for excessive residual stand damage.
- In *Phellinus weirii* root disease centers within the commercial thinning areas, favor more disease-tolerant trees (western redcedar, western hemlock, and hardwoods) even if they are smaller in diameter than the Douglas-fir. If suitable alternative species are not present, try to leave a one-tree spacing from symptomatic Douglas-fir trees. Where no suitable less-susceptible species or non-symptomatic Douglas-fir trees exist in *P. weirii* infections centers outside of Riparian Reserves, patch cut root disease centers greater than or equal 0.5 acres in size (the majority of the *P. weirii* patches, however, will be 0.25 to 0.5 acres in size). Reforest these areas with red alder.
- In the commercial thinning areas, reserve hardwood trees (red alder and bigleaf maple).
- In the commercial thinning areas, do not rip skid roads used in the ground-based logging areas because of concerns for root damage to the residual trees and subsequent attack by opportunistic root diseases and insects.
- In the regeneration harvest areas, retain a minimum of 240 linear feet of conifer logs per acre that: (1) are at least 20 inches in diameter at the large end, (2) are at least 20 feet long, (3) have intact bark, and (4) represent the current species mix of the area on the site after harvest. To accomplish this, leave an average of 17 reserve trees per acre (8 wildlife trees and 9 additional conifer trees for coarse woody debris needs), two of which can be bigleaf maples over 16 inches DBH. Look for opportunities to enclose bigleaf maples in a clump of 10 or so other trees to benefit mollusks. Emphasize retention of western redcedar or hardwoods in root disease centers. Wildlife trees should generally be left in scattered clumps and single trees located away from unit edges. Wildlife trees, however, should be left along property boundaries with other land owners or previous clearcut units less than 20 years old.
- Plant areas infected with *P. weirii* in the regeneration harvest areas with conifer species that are not considered to be highly susceptible to this disease.

Seasonal Restrictions

- Felling and yarding operations would be restricted during the peak bark-slip period (generally May 1

to July 15) if excessive leave tree damage occurs (Table 2). Western hemlock is particularly prone to damage. .

Coarse Woody Debris (Snags and Down Wood)

- Retain green trees that have significant defect such as cavities, or dead, forked or broken tops.
- In the regeneration harvest areas infested with *P. weirii* root rot, western redcedar and western hemlock should be selected as wildlife trees because they would have a much greater chance of remaining standing than Douglas-fir or grand fir, which are readily infected and killed by this disease. In addition, leaving live Douglas-fir or grand fir in infection centers would increase the amount of disease on the site because the fungus would invade living root systems and these trees also would likely serve as seed sources, which would further increase the amount of inoculum on the site unless the regeneration is periodically removed from disease centers.
- In the commercial thinning areas, reserved trees within Riparian Reserves that would be cut to create skyline corridors would be left on site to augment coarse wood.
- If reserve trees must be topped for operational purposes (e.g. lift or tail trees) they would be maintained on site to augment snag and downed woody debris habitat if possible.
- Existing coarse woody debris in both the commercial thinning and regeneration harvest areas would be retained to the extent possible, and snags that are cut or knocked over during logging would remain on site.

Water, Fisheries and Soil Resources

- A minimum “no-harvest” buffer would be placed along both sides of streams and small wetlands less than one acre in size. In the commercial thinning areas the minimum size of this buffer would be 50 feet for non-fish bearing streams and 100 feet for fish bearing streams or to the outer edges of any unstable areas. In the regeneration harvest areas there would be no timber harvest within Riparian Reserves.
- To protect water quality, trees would be felled away from all no-harvest buffers within the harvest area.

Seasonal Restrictions (See Table 2 for a summary of seasonal restrictions)

- *Ground-Based Equipment:* The use of ground-based equipment would be restricted to periods of low soil moisture. Operations would be suspended during periods of heavy precipitation if resource damage would occur.
- *Cable Yarding:* Cable yarding would be permitted year-round except where log haul is restricted by natural-surfaced roads. Operations would be suspended during periods of heavy precipitation if resource damage would occur.
- *Road Work:* All road decommissioning, construction and reconstruction would occur during the dry season. All work required in live streams (culvert replacement) would be limited to the ODFW instream work window (July 15 to August 31).
- *Haul:* Hauling would be restricted to the dry season on natural-surfaced roads. Gravel-surfaced roads would be available for year-long hauling, under the conditions stipulated below.
- All hauling and road maintenance work would be subject to the following stipulations to minimize negative impacts to water quality and fish habitat:
 - Hauling and maintenance activities would be suspended when conditions exist that may cause the generation of excessive sediment, such as intense or prolonged rainfall; or when the road surface is deteriorating due to freeze-thaw cycles or from excessive use.
 - Spot rocking and/or sediment traps would be employed as needed to reduce the potential sediment inputs to area streams and to protect the road surface. Sediment traps would be inspected weekly during the wet season and trapped sediments would be removed once the trap has filled to $\frac{3}{4}$ capacity.

To the extent feasible, road maintenance activities that could result in sediment leaving the roadway would be scheduled during periods of dry weather.

Yarding

- Ground-Based: Designated skid trails would be used in order to limit the extent of skid trails and landings to less than 10% of the unit. Skid trail and landing cutting limits would be kept to the narrowest width and size necessary to reasonably harvest the unit (for analysis purposes, assume a 12-foot-wide impact area for skid trails and a 50-foot-diameter impact area for landings). Use existing skid trails and landings to the extent possible.
- At least one-end suspension on all logs would be required in cable logging areas.
- Skyline corridors would generally be not more than 12 feet in width and located at least 150 feet apart at one end.
- Riparian Reserves: Riparian “no-harvest” buffers may have yarding corridors cut through them if necessary; however any trees cut in the “no-harvest” buffers would be left on site to augment CWD.
- Logs yarded over streams would be fully suspended within 25 feet of designated stream channels.
- Ground-based equipment would not be permitted to enter Riparian Reserves except where they are able to operate from existing roads or skid trails.
- Yarding would be restricted in Riparian Reserves to corridors that are perpendicular to streams (or as close as possible to 90 degrees).

Road, Skid Trail and Landing Construction, Renovation and Decommissioning

- Landings: The number of landings and their size would be kept to the minimum required to reasonably harvest the units. Landings would be located by the purchaser and approved by the BLM.
- New roads and skid trails: New roads and skid trails would be located outside of Riparian Reserves, with the exception of 760 feet of natural-surfaced road in treatment area 25-1. This road is approximately 300 feet from the nearest stream and located on a broad, gently-sloping ridgetop.
- Decommissioned roads: All newly constructed natural-surfaced roads and the skid trails in the regeneration harvest areas would be decommissioned and blocked to vehicle traffic. Skid trails in the commercial thinning areas would not be treated because of concerns for root damage to residual trees. Decommissioning would consist of decompacting, water barring, seeding or planting with native species, and restricting OHV use. Restricting OHV use may include the strategic placement of boulders or root wads, or other types of earthen barriers.
- Regeneration harvest areas: Subsoiled roads and landings would be planted with a mix of red alder and conifer seedlings.

Invasive / Non-Native Plants

- Prior to entering the sale area each work season, or before returning to the watershed after leaving it, any heavy machinery (with the exception of log trucks and pick-up trucks used for daily personnel travel) would have all dirt and adhering vegetation removed by power-washing.

Cultural Resources

- Survey techniques for cultural resources are based on those described in the *Protocol for Managing Cultural Resource on Lands Administered by the Bureau of Land Management in Oregon*. A post-project survey would be conducted according to standards based on slope defined in the Protocol appendix. Ground disturbing work would be suspended if cultural material is discovered during project work until an archaeologist can assess the significance of the discovery.

Fire Risk

- Hand piling and burning of piles would be used to treat fuels in the regeneration harvest areas where fuel loading would be heavy enough to affect tree planting or maintenance.

- Lopping and scattering of fuels may be incorporated in areas where fuel loading is relatively heavy but not heavy enough to warrant hand piling or burning.
- Pullback of fuels may be incorporated in areas where fuel loading is relatively light (especially along roads) and not heavy enough to warrant hand piling or burning
- Burning would be conducted under good atmospheric mixing conditions to lessen the impact on air quality in designated areas.
- Landing piles should be located as far as possible from reserve trees to minimize damage.
- Hand piles should be located at least 25 feet from reserve trees, where possible, to minimize damage.
- Hand piles and landing piles would be covered to facilitate the consumption of fuels during the high moisture fall/winter burning periods.
- To prepare the sites for planting in both the commercial thinning and regeneration harvest areas, slash all brush and unreserved hardwoods over three feet tall to a 6-inch stump height, and hand pile and burn (“swamper burn”) the slash concentrations where the slash depth exceeds 12 inches.

Table 2 – Seasonal Restrictions Incorporated into the Pig’s Puzzle Projects

***Restricted Times are Shaded**

Activity	JAN		FEB		MAR		APR		MAY		JUN		JUL		AUG		SEP		OCT		NOV		DEC		
	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15	
Project 1 – Pig’s Puzzle Timber Sale																									
Falling and Bucking**																									
Ground-based Yarding																									
Cable Yarding																									
Road Construction, Reconstruction and Decommissioning																									
Log Hauling on Natural-Surfaced Roads																									
Project 2 – Road Decommissioning																									
Road Decommissioning																									

* All dates are dependent on actual weather conditions

** Bark slip restrictions may be conditionally waived

2.2.3 Alternative 2 - No Action

For this project the no action alternative is defined as not implementing any of the proposed vegetation management in the Pig's Puzzle Project area contained in Alternative 1. There would be no commercial thinning and no regeneration harvest at this time. No new road construction, existing road improvements or road decommissioning associated with this project would occur at this time. This would not, however, constitute a decision to reallocate the lands to non-commodity uses. These forest stands are located within the General Forest Management Area land use allocation, within the Matrix, where the majority of timber harvest and silvicultural

activities are scheduled to occur. Future harvest would not be precluded and could be analyzed under a subsequent EA.

2.2.4 Alternatives Considered and Dropped from Detailed Analysis

2.2.4.1 No Regeneration Harvest Alternative

An alternative was considered which would involve thinning of all the forested stands proposed for treatment under Alternative 1; no regeneration harvest would occur. This alternative was dropped from further consideration because it would not meet the purpose and need for action as stated in Section 2.1. Specifically, it would not allow for managing timber stands to reduce the risk of loss from disease. Commercial thinning stands of highly susceptible species with *P.weirii* infection levels of 20% or more is not generally considered to be a sound silvicultural practice. Thinning such stands may result in excessive losses from windthrow because of their decayed root systems. Subsequent losses from Douglas-fir beetles are also quite likely. These beetles readily breed in windthrown Douglas-fir trees. The beetles then often successfully attack Douglas-fir trees already weakened by root disease infection.

2.3 Affected Environment and Environmental Effects

2.3.1 Forest Vegetation

2.3.1.1 Affected Environment

Commercial thinning units (stand type 1): Stands contained within the units planned for thinning (Units 25-1, 29-3, 29-4, and 31-5) range in age from about 71 to 75 years, are single-storied Douglas-fir-dominated stands, are currently overstocked as indicated by Relative Density Index values above 0.6 (the approximate density level where competition-related mortality in Douglas-fir stands begins), and are expected to respond favorably to thinning (live crown ratios of the residual trees appear to be 30% or more and the trees appear to be generally stable). Thinning these stands would be appropriate to maintain stand growth, increase tree vigor, increase average tree size, and capture mortality that would have occurred as a result of increasing tree-to-tree competition on upland sites for timber production purposes, and to increase tree size for future coarse woody debris input in a portion of the Riparian Reserves. Scattered pockets of *Phellinus weirii* root rot occur throughout these units, with infection levels estimated at less than 15%.

The most abundant understory species are vine maple, sword fern, salal, dwarf Oregon grape and red huckleberry. Understory density varies inversely with the amount of overstory canopy closure. Where the overstory canopy consists of a dense mixture of shade-tolerant and shade-intolerant conifers, the understory is rather sparse. However, the understory is often well developed where openings occur.

Coarse woody debris levels (includes both down wood and snags) for the proposed thinning treatment units are shown in Table 2. The total coarse wood volumes estimated in Units 25-1, 29-3, 29-4, and 31-5 are 1,063, 1,913, 1,435, and 1,334 cubic feet per acre, respectively. Approximately 34% of the total down wood volume is in decay classes 1, 2, and 3, and about 66% is in decay classes 4 and 5. Infection with *P. weirii* root disease appears to be an important agent contributing to the total coarse wood volume, particularly the more recent decay class material. On the average, approximately 90% of the total coarse wood volume is down wood. Most of the conifer snags appear to be the smaller-sized trees that died as a

result of suppression. Larger Douglas-fir snags are probably the result of infection with *P. weirii* root disease. All snags recorded on the stand exam plots were in decay classes 1 and 2. On the average, approximately 10% of the total coarse wood volume is from snags. In Unit 25-1, however, about 56% of the total coarse wood volume is from down wood and 44% is from snags.

Regeneration harvest units (stand type 2): Stands contained within the units planned for regeneration harvest (Units 29-1 and 29-2) average about 70 years of age. They are mixed-species stands, with Douglas-fir being the dominant conifer species and red alder being the dominant hardwood species. Western redcedar and western hemlock are the major conifer associates, and bigleaf maple is the major hardwood associate. There is a substantial amount of *P. weirii* root disease infection throughout the area, with the estimated infection level being at least 30 to 40%. Disease centers occur throughout the stands in discrete pockets as well as in a diffuse pattern. These units are capable of producing well-stocked stands of conifers. At the present time, however, they have a significant hardwood component. The current timber volume production is well below the potential. Hardwoods, brush, western redcedar and western hemlock trees have filled in and are continuing to fill in the openings created by this root disease as Douglas-fir, which is highly susceptible to *P. weirii*, dies standing or is windthrown as a result of infection.

The understory vegetation in the areas proposed for regeneration harvest is similar to that previously described for the areas proposed for thinning. The most abundant understory species are vine maple, swordfern, salal, dwarf Oregon grape and red huckleberry.

Outside of the Riparian Reserves, regeneration harvest and reforestation with disease-resistant conifers would be appropriate to restore current and future timber production capacity on these sites.

There is a total of 1,585 cubic feet per acre of coarse wood (1,454 cubic feet per acre from down wood and 131 cubic feet per acre from snags). There is an average of only 69 lineal feet per acre of decay class 1 and 2 logs that met the RMP standards in the Matrix for regeneration harvest units, however. There are nearly 4 Douglas-fir snags per acre averaging nearly 14 inches DBH. Down wood accounts for approximately 92% of the total coarse wood volume and snags account for about 8% of the coarse wood volume.

The site-potential tree height for determination of the Riparian Reserve widths for the proposed treatment units (both the thinning and regeneration harvest units) is 200 feet.

Forest health: The major agent affecting stand health is laminated root rot, caused by the native fungus *Phellinus weirii*. It is estimated that in the units planned for commercial thinning, the percentage of the area in disease centers is less than 15%. The average level of infection in the units planned for regeneration harvest, however, appears to be at least 30 to 40%. The disease is continuing to cause mortality of the Douglas-fir component. The actual levels of infection, however, may actually be somewhat higher because it is not possible to detect all of the infection with on-the-ground survey techniques.

Douglas-fir and grand fir are highly susceptible to *P. weirii*, (readily infected and killed by it); western hemlock is intermediately susceptible; western redcedar is tolerant or resistant; and all hardwoods are immune (Hadfield et al. 1986). *P. weirii* kills trees directly or makes them prone to windthrow because the disease decays their root systems. Diseased stands usually contain twice as many infected trees as those that are dead or exhibiting crown symptoms (Thies 1984). Tree-to-tree spread is through root contacts with infected trees or stumps (Hadfield et al. 1986). Disease centers are believed to expand radially at the rate of about one foot per year (Nelson and Hartman 1975). *P. weirii* attacks susceptible hosts regardless of tree size, age, or vigor.

The disease can have a major influence on the character of many Douglas-fir stands. Tree killing creates

openings in the canopy where shrubs, hardwoods, or shade- and disease-tolerant conifer species occupy these various-sized gaps (Thies and Sturrock 1995). Because infected trees are windthrown or die standing, the disease can be a major source of coarse woody debris and snags. Disease centers range in size from less than one acre to several acres in size.

On-the-ground surveys in commercial-sized Douglas-fir stands on BLM lands in the general area revealed that approximately 11% of the area within these stands was infested with this disease. Therefore, the level of infection in the sale area greatly exceeds the local average. In addition, the survey showed that the amount of Douglas-fir volume production in laminated root rot centers was less than half of that in healthy stand portions. Losses in diseased stands may double every 15 years (Nelson et al. 1981). It is generally not recommended to commercially thin in stands of highly susceptible species, such as Douglas-fir, when disease is present in 20% or more of the stand (Thies and Sturrock 1995).

Fresh down Douglas-fir trees also encourage the build-up of Douglas-fir beetle populations, which subsequently attack and kill Douglas-fir trees. Douglas-fir trees weakened by root disease infection are more likely to be attacked by Douglas-fir beetles (Hadfield 1985).

There are few other significant potential threats to forest health other than the risk of windthrow from severe winter storms, or to some extent, wildfire. Following partial-cut harvest, the potential for windthrow would be greater for the next decade (generally the first few years following thinning).

15% Standard and Guide: On January 14, 1999, an analysis was done of late-successional forest (LSF) stands on federal lands within the Scappoose Creek fifth-field watershed. In that analysis, LSF was defined as those stands that are 80-years old or greater. The analysis showed that 6,062 acres of federal land are forested and of these lands, 328 acres (5%) meet the definition of LSF. This is below the level identified in the 15% retention S&G (Standard and Guideline found in the Northwest Forest Plan Record of Decision, page C-44). The stands proposed to be treated in this project are not included in the stands identified to meet the 15% S&G because they do not meet the 80-year age criteria for LSF stands.

2.3.1.2 Environmental Effects on Forest Vegetation – Alternative 1 (Proposed Action)

Direct and Indirect Effects Associated with Thinning

The stands are recommended to be thinned from below (retention of the larger-sized trees) to a level that will increase tree growth and maintain full site occupancy over the next 30 years. The recommended levels of thinning should increase overstory tree diameter growth, increase crown development (increase crown length, crown width, and branch size), promote stand stability because of reduced height:diameter ratios, reduce competition-related mortality (decreased production of smaller-sized snags), and result in a greater level of understory development than would occur without thinning. Retention of species other than Douglas-fir (and grand fir) in and adjacent to *P. weirii* root rot centers will also reduce current and future impacts from this disease as well as increase the relative proportion of the other species; therefore, increasing the general diversity of the units. On the average, the recommended thinning treatments are expected to remove 54% of the trees per acre and 35% of the basal area. Immediately after thinning, the overstory canopy closure is expected to average between 40-60%, but is not expected to fall below 40%. Bailey and Tappeiner (1998) compared the effects of thinning in 40- to 100-year-old Douglas-fir stands in the Coast and Cascade ranges of western Oregon. Thinned stands had higher tree seedling density and frequency, understory tree density, tall shrub density and frequency, and low shrub cover (%) than unthinned stands. They concluded that the findings in their study were strong evidence that thinning, even when done primarily to manage overstory/crop tree spacing (thinnings done for commercial wood production), promotes tree regeneration, shrub growth, and multi-storied stand development. In the long

term (>30 years) the larger-sized trees could result in higher quality down logs and snags as the trees eventually die or are converted to snags or down logs through planned management actions. The increase in the Douglas-fir quadratic mean diameter averages 19% (ranges from 13 to 26%). The increase in mean tree volume, however, averages 57% (ranges from 43 to 70%).

Direct and Indirect Effects Associated with Regeneration Harvest

Regeneration harvest will initially create relatively open stand conditions. It is estimated that the residual overstory canopy closure immediately after harvest will be around 20%. The Relative Density Index is expected to be reduced to about 0.124. The crowns and diameters of the approximately 17 overstory trees left for wildlife and coarse wood enhancement will increase as these trees accelerate their growth in response to the additional growing space created. Over the next 30 years following harvest it is expected that some of these residual overstory trees will become snags or down wood as a result of planned management actions or through disease-related mortality or windthrow. It is anticipated that there would be approximately 11 of these residual overstory trees still alive and standing after 30 years. The growth of the newly planted and naturally regenerated trees along with the understory shrubs and herbs will also be stimulated by the increased available growing space. The crowns of the planted and naturally regenerated trees are expected to close after approximately 10 to 12 years, but a precommercial thinning to approximately 200 trees/acre at age 15 would temporarily open up the young developing stand.

After 30 years, the canopy closure of the total stand is expected to be around 75 to 80%, with about 30 to 35% of the total canopy closure being contributed by the 11 residual overstory trees left for wildlife and coarse wood expected to still be alive and standing at that time. The Relative Density Index is expected to have increased to about 0.451. The quadratic mean diameter of the residual overstory trees after 30 years is estimated to be nearly 30 inches, with almost 8 trees/acre that are 24 inches DBH or larger. The quadratic mean diameter of the conifer-dominated stand developing beneath the residual overstory trees is predicted to be about 9 inches. The average height of the residual overstory trees is estimated to be about 142 feet and the average height of the conifer-dominated stand developing beneath them is expected to be about 48 feet. Therefore, a two-storied stand will have developed over the 30 years following harvest, with a total canopy closure expected to be around 75 to 80%. The residual overstory trees will actually reduce the potential growth of particularly the shade-intolerant trees in the second canopy layer beneath them. The current and future disease-related losses of Douglas-fir volume should be greatly reduced by emphasizing retention of western redcedar or hardwoods in *P. weirii* root disease centers and reforesting disease centers with species that are not highly susceptible to this disease. The future Douglas-fir-growing potential of the managed disease centers may be largely restored after a rotation of disease-resistant species.

2.3.1.3 Environmental Effects on Forest Vegetation – Alternative 2 (No Action)

No forest management activities would occur within the proposed project areas at this time. Forested stands within the project area would continue to grow and develop without management intervention, although at a slower rate in areas heavily infected with *Phellinus weirii* root disease. The identified effects of the action alternatives would not occur at this site at this time.

Direct and Indirect Effects Associated with Thinning

The units proposed for thinning are overstocked, as indicated by Relative Density Index levels above 0.6. Above a Relative Density Index value of 0.6, Douglas-fir growth and vigor begin to decline as tree-to-tree competition intensifies and mortality begins. In addition, development toward late-successional forest conditions in the Riparian Reserves in these stand types is expected to continue to slow (except in *P. weirii* root rot centers where less-susceptible conifers are filling in the gaps created by dead and dying Douglas-

fir) unless some form of disturbance occurs that creates openings in the stand to permit accelerated growth of some overstory trees and provides an opportunity for understory trees, shrubs, and herbs to develop. As the density increases over the next 30 years or so, live crown ratios will decrease, diameter growth can be expected to decline, competition-related mortality will increase, and growth of understory conifers and other vegetation will be limited. Most of the mortality will be from the smaller-sized trees that were not able to successfully compete with the larger trees for the available site resources.

Direct and Indirect Effects Associated with Regeneration Harvest

Because of continuing Douglas-fir growth reduction and mortality caused by *P. weirii*, and relatively low conifer stocking over much of the area, timber volume production in the units recommended for regeneration harvest will remain at levels far below potential. Losses because of *P. weirii* can be expected to increase as disease centers continue to expand, particularly where there are insufficient numbers of non-host species to break up root continuity with susceptible host trees. Douglas-fir volume in *P. weirii* disease centers is generally about half of that in healthy stand portions. Because local population of Douglas-fir beetles are often higher in the vicinity of root disease centers, additional losses from Douglas-fir beetles are expected as they preferentially attack and cause the mortality of Douglas-fir trees already weakened by root disease infection. Timber volume data for these units was collected in 1998 and again in 2006. The data shows that over this 8-year period, the overall volume gain was about 13% for all species. The volume gain from the Douglas-fir component, however, was only 4%. In contrast, the Douglas-fir volume in the thinning units (stand type 1) has increased an average of 12% over this same period. The species composition of Douglas-fir has also decreased over this 8-year period in the regeneration harvest units as Douglas-fir is continuing to fall out of the stand and other species are filling in.

2.3.2 Wildlife

2.3.2.1 Affected Environment

Where appropriate, discussions and/or analysis of the affected environment relative to wildlife and wildlife habitat are conducted at several spatial scales. The larger scales include the landscape or watershed scale; a project-specific Wildlife Analysis Area was developed to address an intermediate spatial scale; and finally the smaller spatial scale discusses species-specific habitat conditions within the individual treatment units or project areas.

Landscape or Watershed Scale

The following general landscape or watershed scale discussion of wildlife habitat applies to both of the Pig's Puzzle projects to provide a general context to more project-specific analyzes. Where appropriate, additional species-specific discussions at the landscape, watershed or Analysis Area scale are included within the species-specific discussions.

The Federal lands that include the proposed Pig's Puzzle project areas are located within the Scappoose Creek 5th field watershed, specifically, within the Fall Creek and Brush Creek drainages in the North Scappoose Creek 6th field subwatershed. Relative to wildlife resources, the pertinent issues or concerns identified within the *Scappoose Creek Watershed Analysis* (USDI - BLM, December 1996) with a likelihood for cumulative effects relate to factors affecting the distribution of sensitive species. These issues are closely related to ownership patterns and past management practices resulting in a very high degree of forest fragmentation, small patch sizes and the associated limited amount of interior habitat, and a general lack of late-seral habitat. These factors can result in dispersal problems for some species and/or a high degree of regional isolation for some species of concern. Another commonly discussed and related issue within the Watershed Analysis is the general lack of late-seral habitat and/or some late-seral habitat

features such as “forest legacies” (e.g. large trees, snags and down logs). For additional information on the wildlife and wildlife habitat within the watershed, see the *Scappoose Creek Watershed Analysis*.

As in most areas, ownership patterns of the northern Coast Range of Oregon strongly influence the character of the landscape. Management practices on private lands generally dominate the character of the landscape containing the Pig’s Puzzle Projects. The majority of forest land in that portion of the state which includes the project area is privately owned and managed with short rotations for timber production. While private lands within the northern portion of the Oregon Coast Range containing the proposed projects support some dispersal habitat for the northern spotted owl, the suitable habitat for the spotted owl, marbled murrelet and bald eagle on these lands is very limited in quantity and marginal in quality thereby not notably contributing to the viability of the species.

The Pig’s Puzzle projects are set in a context of Federal lands being distributed in a scattered, non-contiguous or “checkerboard” fashion with parcels of Federal lands commonly being less than a full section in size. These Federal lands, managed by the BLM are surrounded by and intermingled with private forestland generally managed by industrial timber companies. Within that portion of the Tillamook Resource Area’s Columbia Planning Unit referred to as the “Scappoose Block”, BLM’s 18,020 acres of ownership are scattered into 72 different parcels. These parcels range in size from approximately 40 to 640 acres (averaging approximately 250 acres) and are contained within 60 different (odd-numbered) sections. The nearest larger block of public ownership is located within the Tillamook/Clatsop State Forests, managed by the Oregon Department of Forestry, approximately 18 miles west of the project area. The nearest larger block of Federal LSR within the coast range (the “Nestucca Block”) is approximately 40 miles south-west of the project areas; it is similar distances to larger Federal LSR blocks in the Washington and Oregon Cascades.

Approximately 44% of BLM ownership within the “Scappoose Block” is within the Matrix LUA where the management emphasis is the sustainable production of forest commodities including timber. In addition, management within the Matrix LUA addresses concerns for other objectives such as to provide for connectivity, habitat for both early and late-seral stage species and the maintenance of ecologically valuable structural components such as down logs, snags and large trees. Approximately 44% of the “Scappoose Block” is within the Riparian Reserve LUA where management actions primarily promote the attainment of the Aquatic Conservation Strategy Objectives. Approximately 11% of the BLM land within the “Scappoose Block” is within the LSR (Late Successional Reserve) LUA. These acres of LSR are located in seven scattered parcels of land ranging from approximately 80 to 640 acres in size (averaging approximately 280 acres). Based upon the ownership pattern and size of these LSR parcels they do not lend themselves to the management of species requiring large blocks of late-seral habitat. Rather, these parcels contribute toward general landscape connectivity and function more as refugia for late-successional associated species with smaller home ranges, or habitat for those species which may utilize other habitat types but are dependent upon some specific late-successional habitat features. These Land Use Allocations are identified within the NWFP (Northwest Forest Plan or *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl, and Standard and Guidelines for Management of Habitat for Late-successional and Old-growth Forest Related Species Within the Range of the Northern Spotted Owl* – USDA & USDI April 1994) and Salem District RMP (Resource Management Plan) (USDI May 1995).

Pig’s Puzzle Wildlife Analysis Area - For the purposes of analysis, a “Pig’s Puzzle Wildlife Analysis Area” was delineated and defined as an aggregated area of land located in portions of four adjacent townships, equal in size to 20 legal sections - approximately 12,400 acres in size. This Analysis Area was used for a portion of the impact analysis of the Pig’s Puzzle Projects upon wildlife resources (including spotted owl dispersal habitat). The Analysis Area as defined is centered on and buffers the three sections containing the proposed Pig’s Puzzle treatments by approximately one mile. Approximately 19% of the Analysis Area is

managed by the BLM while 81% is privately owned – primarily by industrial timber companies (Pig’s Puzzle Projects Wildlife Biological Evaluation, Pig’s Puzzle Project - Project Record Document #5, Figure 1)

The Pig’s Puzzle Wildlife Analysis Area currently contains a negligible amount of habitat for those species dependent upon mature or late-seral stage habitat including snags and other coarse woody debris and/or large blocks of interior forested habitat. Based upon a GIS sort of BLM’s FOI (Forest Operations Inventory) database, there are only five acres of forested stands greater than 80-years-old on BLM land within the Analysis Area; this represents .002% of the 2,380 acres of BLM land within the Analysis Area. The amount of mature or late-seral habitat on non-Federal land within the Analysis Area is unknown but it is considered to be negligible. The trend for mid-seral aged stands on non-Federal land, that is forest stands greater than 40 to 60-years-old, is one of decreasing quantities as merchantable stands are harvested – primarily through clearcut harvesting. Conversely, there is currently a great deal of habitat within the Analysis Area for those species which depend upon or utilize early-seral stage habitats, smaller forested patches, and/or the high contrast edges resulting from the juxtaposition of different habitat types. While many riparian corridors have been completely harvested or reduced to thin strips of red alder, the in-stream habitat conditions for aquatic species within the area are generally quite variable.

Disturbance and Roads Past and present management actions within or near the Analysis Area have resulted in some portions of the area being highly disturbed by periodic human activities. These actions include forest management activities largely occurring on private industrial lands (primarily clearcut harvesting), activities associated with road construction or maintenance, and plantation management. (see Appendix 2 of the EA - Past, Present and Reasonably Foreseeable Future Actions).

The potential for and amount of disturbance within an area is often correlated to the amount of roads within an area. The Federal lands that include the proposed Pig’s Puzzle project areas are located within the Scappoose Creek 5th field watershed - specifically, within the North Scappoose Creek 6th field subwatershed. The current road density of the North Scappoose Creek 6th field subwatershed is relatively high - approximately 6.7 miles/mi². However, roads located behind locked gates or earthen barriers, or overgrown with brush and hardwoods are less accessible and therefore commonly result in less potential for disturbance to wildlife. Due primarily to locked gates on private roads that restrict the general public’s access to both private and Federal lands, a large but unquantified portion of the roads within the North Scappoose Creek 6th field subwatershed is not accessible by the public and/or drivable. This results in a reduced amount of recreational activities which are common in many other areas such as 4x4 and OHV usage, target shooting, hunting and dispersed camping.

Similar Projects within the Analysis Area Approximately 282 acres of relatively recent, past Federal projects within the Analysis Area have been identified that have had similar impacts as expected to result from the Pig’s Puzzle Forest Management Project. Since 1994, approximately 250 acres of BLM forested stands within the Wildlife Analysis Area have been treated with commercial thinning or density management, and 32 acres have been treated with a regeneration harvest. These past BLM projects within the Analysis Area include the Pisgah Progeny and McLafferty projects (see Appendix 2 of the EA - Past, Present and Reasonably Foreseeable Future Actions). There are no specific additional BLM forest management projects currently identified for treatment within the Resource Area’s internal planning processes.

Less information is available on habitat altering management activities that have recent occurred or are scheduled occur on non-Federal lands within the Analysis Area or across the larger landscape however, the general trend on private land is one of harvest activities which result in decreasing quantities of mid- and

late-seral habitat. The majority of the non-Federal forestland within the Analysis Area is owned by industrial timber companies and is managed for timber production on relatively short rotations. This effectively results in the private land base being maintained in a continual condition of earlier seral stage habitats and generally precludes the development and/or maintenance of mid- or late-seral habitats. There has been a great deal of recent clearcut harvest operations implemented on non-Federal lands within the Analysis Area; based upon 2005 aerial photos it is estimated that within approximately the last 10 years approximately 2,400 acres or approximately 24% of the non-Federal ownership has been clearcut harvested. Considering all ownerships, this represents approximately 20% of the entire Analysis Area.

Project 1 - The Pig's Puzzle Forest Management Project

The proposed Pig's Puzzle forest management harvest units, totaling 276 acres, are located within two adjacent townships in three different sections. These sections are Township 4 North, Range 3 West, section 25 and T4N., R2W., sections 29 and 31, W.M.. Approximately 90% of the proposed Pig's Puzzle forest management project (248 acres) would occur in stands within the Matrix/GFMA LUA and approximately 10% of the project (28 acres) would occur within the Riparian Reserve LUA as described in the NWFP and Salem District RMP.

The proposed treatment units are forested with trees which primarily range in ages from approximately 71- to 75-years-old. The QMDs (Quadratic Mean Diameters) of the stands proposed for treatment range from 15.0 to 17.4 inches. In general, the stands are strongly dominated by densely stocked Douglas-fir and are fairly homogenous in tree sizes and stand structure. Although fir dominates most of the stands proposed for treatment, some stands contain various levels of hardwoods, primarily big-leaf maple and red alder that are present in variously sized patches and as single scattered trees. In addition, limited amounts of western redcedar, western hemlock, grand fir and cherry are also present in some units. A few of the stands contain or are in the vicinity of a few scattered individual or small clumps of larger trees - primarily larger "second-growth" Douglas fir. Some stands contain appreciable levels of *Phellinus weirii*, a laminated root disease. As a result some portions of the treatment areas have greatly reduced stocking levels (especially the fir component) and resultant canopy closure; this is most notable in two of the treatment units (29-2 and to a lesser extent 29-3).

There is considerable variation in the amount and condition of down wood, snags, and total CWD (Course Woody Debris) volume within the proposed treatment units. In general there are moderate levels of CWD volume within the areas proposed for treatment, the majority (up to over 90%) of the existing CWD volume is in the form of down logs rather than snags, and the bulk of the down logs are in the later decay classes (decay classes 4 and 5). Snags, especially larger snags of a higher habitat quality are generally deficient within the treatment areas and across the larger landscape.

There are no known special habitats (e.g., talus slopes, cliffs, caves, or mines or abandoned wooden bridges) within the vicinity of the proposed projects.

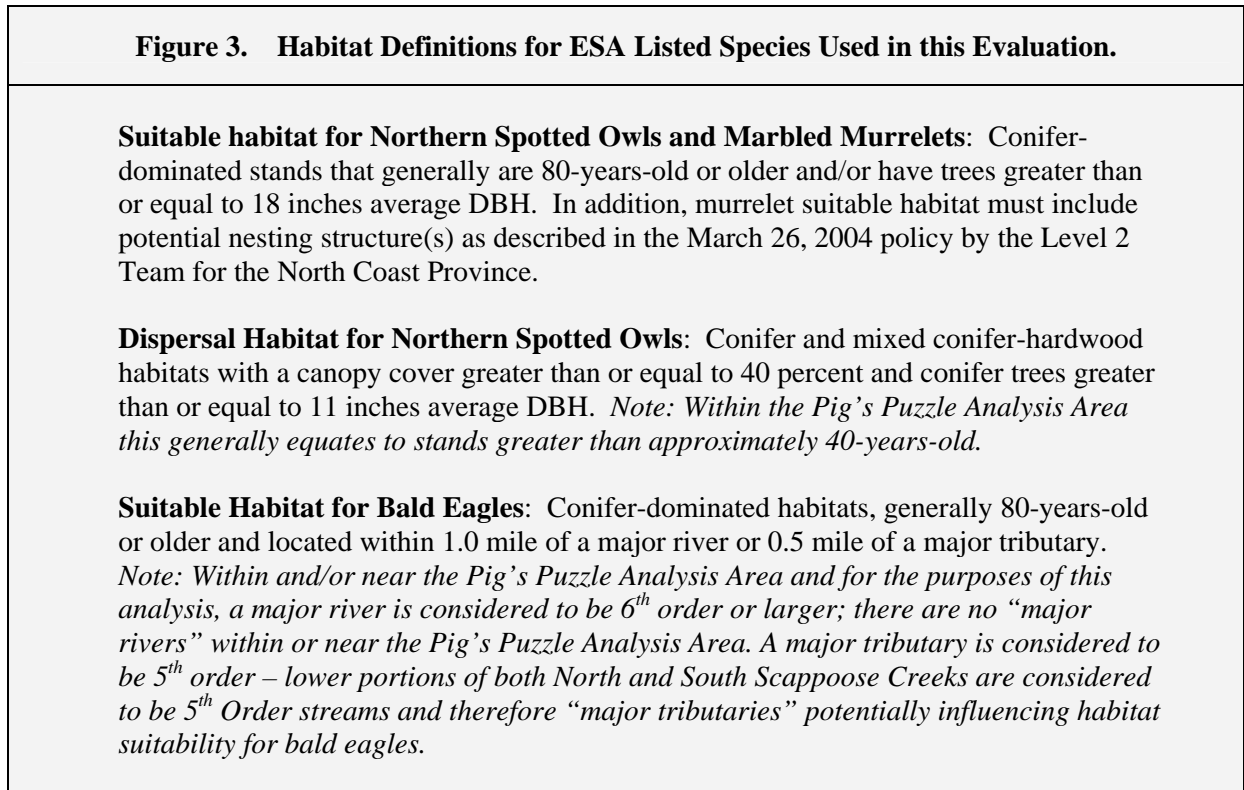
Additional details of the affected environment are located within the Silvicultural Prescription for the Pig's Puzzle Timber Sale Project (Pig's Puzzle Projects - Project Record Document #4), and the *Scappoose Creek Watershed Analysis*.

Pig's Puzzle Projects Wildlife Biological Evaluation, (Pig's Puzzle Projects - Project Record Document #5) identifies all "wildlife species of concern" that have such a status that the potential for impacts resulting from the Pig's Puzzle Projects is warranted under NEPA. These species are those potentially located within and/or near the Pig's Puzzle Forest Management Project areas and/or potentially impacted by the projects and include ESA (Endangered Species Act of 1973, as amended) proposed or listed wildlife

species, Bureau Manual 6840 Special Status Species and Northwest Forest Plan Species, including Survey and Manage Species. Discussions of wildlife species of concern which are potentially located within or near the proposed action areas and potentially impacted by implementation of the Action Alternatives can be found below.

Wildlife Species proposed or listed under the Endangered Species Act:

The impacts resulting from the Pig’s Puzzle Forest Management Project upon three wildlife species proposed or listed under the Endangered Species Act were analyzed; these species include the northern spotted owl, marbled murrelet and bald eagle. The habitat definitions for these species used in this Biological Evaluation are contained in Figure 3.



Northern Spotted Owl - Federally Threatened (FT)

Designated Critical Habitat

Critical Habitat is designated by USFWS to provide for the conservation and eventual recovery of listed species. The proposed Pig’s Puzzle forest management project is not located within spotted owl Designated Critical Habitat (USDI 1992).

Proximity to Known Sites and RPAs

There are no historic or known occupied spotted owl sites, or 100-acre core areas as identified in the NWFP, within or near the proposed project areas. The nearest known historical owl sites are greater than three miles away; the nearest known occupied spotted owl site is believed to be at least 16 miles southwest of the project area. None of the proposed harvest units or haul routes are located within or near a spotted owl RPA (Reserve Pair Area) as delineated within the document entitled *Delineation and Management of Reserve Pair Areas within Oregon’s Northern Coast Range Adaptive Management Area* (dated June 1, 2000).

Spotted Owl Surveys

Under the Northwest Forest Plan and Salem ROD/RMP there are no requirements to survey for spotted owls in dispersal habitat on Matrix lands. There have been no known spotted owl protocol surveys conducted within or near the proposed project areas since approximately 1992 and 1993 when the BLM surveyed stands in the vicinity in support of the timber sale program. These surveys, which resulted in no spotted owl occupied sites being located, no longer fulfill protocol standards.

Spotted Owl Habitat

As previously outlined within the general discussion of the Affected Environment at the landscape or watershed scale, the majority of forest land in that portion of the state which includes the proposed project area is privately owned and managed for timber production in such a way as to preclude the development of larger blocks of late-seral stage habitat including suitable habitat for the spotted owl. The limited amount of Federal land within the area is distributed in a checkerboard fashion and is relatively isolated from larger blocks of public ownership; these factors do not facilitate the effective management of wide ranging species such as the spotted owl.

Dispersal Habitat

Currently, it is believed that the Analysis Area does not contain an adequate amount of dispersal habitat to facilitate spotted owl movements throughout the area. Based upon a GIS sort of the FOI database, approximately 94% (2,229 acres) of the BLM land within the Analysis Area is currently considered to be spotted owl dispersal habitat; an additional five acres is considered to be suitable owl habitat. Approximately 11% (250 acres) of these acres of Federal dispersal habitat have been “degraded”² as a result of recent commercial thinning projects (190 acres in 1998 via the McLafferty timber sale and 60 acres in 2004 via the Pisgah Progeny timber sale). Based upon photo interpretation of 2005 aerial photos, an estimated 19% (1,960 acres) of the private land is probable owl dispersal habitat. Considering all ownerships, approximately 33% of the Analysis Area (4,194 acres) is estimated to be currently in a condition to facilitate spotted owl dispersal (see Table 3).

Being stocked with approximately 71- to 75-year-old conifer and mixed conifer stands, with QMDs (Quadratic Mean Diameters) ranging from approximately 15.0 to 17.4 inches, the approximately 276 acres proposed for treatment are currently considered to be spotted owl dispersal habitat. This represents approximately 12.3% of the forested BLM stands within the Analysis Area which are currently in a condition to facilitate owl dispersal.

Some of the dispersal habitat within the Analysis Area, including portions of the proposed density management units, is currently considered poor quality dispersal habitat based upon the young stand age, small crown ratios and the extreme high density of trees which could inhibit an owl's ability to fly through the stand. Some of the conditions that keep these younger, more structurally simple stands from being considered suitable owl habitat include the lack of vital habitat characteristic including large trees and structural diversity, the lack of snags and suitable nesting substrates (e.g. large sheltered platforms or large cavities) and the relatively poor quality of habitat for a suitable prey base, which is primarily the northern flying squirrel in this area. The high degree of general forest fragmentation and relatively small patch sizes of forested stands within the area further limits the habitat quality of many of the existing stands.

Suitable Habitat

² “Degraded” spotted owl dispersal habitat continues to function as dispersal habitat (largely as a result of attention to maintaining a canopy closure greater than 40%) but the habitat quality has been temporarily reduced as a result of the commercial thinning. This degraded condition is expected to last approximately 10 to 20 years and gradually ameliorate over time as the stand continues to develop.

Based upon a GIS sort of BLM's FOI database, there are only five acres of forested stands greater than 80-years-old on BLM land within the Analysis Area and therefore considered to be potentially suitable as spotted owl habitat; this represents .002% of the BLM land. Based upon the small patch size and the young, fragmented nature of the surrounding landscape, the habitat suitability of these five acres for spotted owls is likely marginal. The amount of suitable habitat on non-Federal land within the Analysis Area is unknown but it is considered to be negligible.

In addition to the young and fragmented nature of forested stands within the Analysis Area, historic management practices in the area have often resulted in stands that are uniform in stand structure and composition, and densely stocked with trees exhibiting minimal crown development. A relatively high proportion of the stands in the project area have a lack of coarse woody debris, especially larger snags and CWD of the more recent decay classes.

Pig's Puzzle Treatment Units

Forested stands within the proposed treatment areas are considered to be spotted owl dispersal habitat; there is no suitable (nesting, foraging and roosting) habitat within 0.25 miles of the proposed action. There are a few small isolated patches of relatively larger trees, with an average DBH possibly greater than approximately 18 inches, within the treatment areas. These patches, generally just a few acres each, have been determined to be "non-suitable" based upon their small size and general characteristics as well as the general early-seral stage, fragmented character of the surrounding landscape.

Marbled Murrelet - (FT)

Designated Critical Habitat

Critical Habitat is designated by USFWS to provide for the conservation and eventual recovery of listed species. The proposed Pig's Puzzle project would not occur within or near Designated Critical Habitat for the marbled murrelet (USDI 1996).

Proximity to Known Sites

With the nearest known marbled murrelet site being more than 20 miles to the west, there are no known occupied murrelet sites within the vicinity of the proposed forest management units or non-paved haul routes.

Ranging from approximately 47 to 49 miles from the ocean, the Pig's Puzzle project areas are located within marbled murrelet Zone 2 (NWFP C-10). In Oregon, Zone 1 is located in a band of land extending up to 35 miles inland and Zone 2 is located 35 to 50 miles from the sea; Zone 1 holds a higher likelihood for murrelet occupancy than Zone 2.

Suitable Habitat and Surveys

There are approximately five acres of the BLM land within the Wildlife Analysis Area that is considered to be marbled murrelet suitable habitat³; these few acres of older trees, with an estimated birth date of 1840, are greater than one mile from the nearest proposed treatment unit. It is not known if this habitat is occupied by murrelets as the area has never been surveyed but there is believed to be a very low likelihood that murrelets are using the area. This is largely based upon distance from the ocean (46 miles) as well as the relatively few number of trees present containing potentially suitable nesting platforms. There is no known suitable marbled murrelet habitat on non-federal land within the Wildlife Analysis Area.

³ This is based on a GIS sort of the timber database to identify forest stands which contain a conifer component with at least a 1-bar stocking level that is greater than or equal to 80-years-old (1-bar stocking equates to roughly 10-39% of the canopy being derived from that component).

There is no suitable marbled murrelet habitat within the proposed treatment units or within 0.25 miles. Although there are a few small isolated patches of older trees with large moss covered limbs within the area (generally just a few acres containing one or two trees larger than approximately 48" dbh) these stands have been determined to be "non-suitable" murrelet habitat with a negligible likelihood of being used by murrelets based upon several factors. These factors include the following: the small size of the stand of larger trees, the general openness of the stands, the small number of trees with marginal platforms to serve as nest trees, the lack of overhanging cover associated with the large moss covered limbs which seemingly have potential to serve as suitable nesting substrates, distance from the ocean (47 to 49 miles), the general early-seral stage character of the surrounding landscape, and the high degree of fragmentation which would favor predators and offer little protection from weather.

Bald Eagle - (FT)

Bald eagles generally nest and/or roost within mature forest stands located within one mile of a large major river or lake, or within 0.5 mile of a major tributary. For the purposes of this analysis, a major river is considered to be 6th order or larger; there are no "major rivers" within or near the Pig's Puzzle Analysis Area. A major tributary is considered to be 5th order; the lower portions of both North and South Scappoose Creeks are considered to be 5th order streams and therefore "major tributaries" potentially influencing habitat suitability for bald eagles. According to BLM's FOI database there are no BLM forested stands within the Analysis Area greater than 75-years-old within 0.5 miles of the identified "major tributaries" (5th order streams); based upon this analysis as well as local knowledge of the area - there is no identified suitable bald eagle habitat on BLM land within the Analysis Area or within the Pig's Puzzle proposed treatment units. The nearest known bald eagle nest is more than five miles southeast of the proposed action.

Less information is available on habitat conditions on non-Federal lands however; the general trend on private land within the Analysis Area or across the larger landscape is one of decreasing quantities of mid- and late-seral habitat. The majority of the non-Federal forestland within the Analysis Area is owned by industrial timber companies and is managed for timber production on relatively short rotations. This effectively results in the private land base being maintained in a continual condition of earlier seral stage habitats and generally precludes the development and/or maintenance of mid- or late-seral habitats.

Dispersed eagle usage may occur throughout the Analysis Area wherever suitable eagle habitat is present. There have been no recent eagle sightings within the proposed treatment units and none would be expected based on the lack of suitable roosting, foraging or nesting habitat. There have been a number of eagle sightings in several areas near the Pig's Puzzle Wildlife Analysis Area. One of these areas is located approximately 1.75 miles from the nearest forest management treatment unit in an area identified as a communal winter eagle roost; this roost site is located on private timberland less than 0.25 miles from a portion of the Pig's Puzzle timber haul route.

Other Special Status Species and/or Survey and Manage Species:

Invertebrates:

Mollusks - BS (Bureau Sensitive) and/or Survey and Manage

There are currently seven species of mollusks identified as Bureau Sensitive on the Bureau's Manual 6840 Special Status Species List with the potential of being located within the proposed treatment units and/or in the general sale area (Wildlife Biological Evaluation, Pig's Puzzle Projects - Project Record document No. 5); two of these species are also Survey and Manage Species. In general, all of these species are associated with the organic duff layer on the forest floor as well as with habitat types containing sword ferns and a hardwood component, especially big-leafed maple. Additional habitat features utilized by some of these

species also include, uncompacted, cool, moist soils; hardwood leaf litter; abundant later-decay-class large and small woody debris; and mosses growing on the trunks of big-leaf maples. All of the proposed treatment units contain and/or are near potential habitat for Special Status Species and Survey and Manage mollusk species.

Mollusk Surveys All of the proposed Pig's Puzzle treatment units were surveyed for mollusks in the fall of 1999 and spring of 2000 (see Pig's Puzzle Timber Sale - Project Record Documents #5, 6 and 42). "Survey Protocol for Terrestrial Mollusk Species From the Northwest Forest Plan" (Draft Version 2.0 - October 29, 1997) was followed for all surveys. These surveys resulted in no mollusk species currently on the Bureau's Manual 6840 Special Status Species List and/or currently identified as Survey and Manage Species being located (Appendix 4).

Amphibians and Reptiles:

Cope's Giant Salamander - (BS)

Cope's giant salamander is one of the most recently described vertebrates in the Pacific Northwest. This salamander is most commonly known in the aquatic larval and neotenic forms; terrestrial adults are extremely rare. These salamanders most commonly inhabit fast flowing clear, cold creeks and streams and may also be found in seeps. Cope's giant salamanders are nocturnal and emerge from their diurnal hiding places and crawl about the rocky stream bottom or in the moist splash zone along the banks of streams. Its requirement for clear, cold water may make it sensitive to logging activities.

Relative to the forest management project, suitable habitat for this species is located entirely within the no-harvest buffers of the Riparian Reserves that are situated adjacent to the proposed treatment units. With very few exceptions, there would be no operational activities occurring within the no-harvest buffers. The most noteworthy exceptions are the limited potential for a few yarding corridors being created through the riparian area in Section 25 and a culvert replacement on a small perennial stream located on private land in Section 20.

Columbia Torrent Salamander - (BS)

The Columbia torrent salamander is strongly associated with the splash zone directly adjacent to permanently flowing streams and seeps. Like Cope's giant salamander, relative to the forest management project, suitable habitat for this species is located entirely within the no-harvest buffers of the Riparian Reserves that are situated adjacent to the proposed treatment units and at culvert replacement site on a small perennial stream located on private land in section 20.

Birds:

Peregrine Falcon - (BS)

The peregrine falcon was officially delisted from the ESA species list, effective 8/25/99; it is now treated as "Bureau Sensitive" under the Bureau's Special Status Species Policy. There have been no peregrine falcon sightings recorded in the area of the proposed action. The habitat within and around the proposed action is not suitable for falcon nesting. Impacts upon the Peregrine Falcon will receive no further analysis in conjunction with the Pig's Puzzle project.

Northern Goshawk - (BS)

Goshawks use a variety of forest types and structural stages as foraging areas but in the west, tend to nest in larger blocks of mature conifer habitats with a relatively dense canopy cover. They tend to build relatively large nests that can be used by the original pair or successors for many years.

With less than six recent records, breeding goshawks are quite rare in the Oregon Coast Range; goshawks

use Coast Range habitats more frequently in the winter and during migration.

Limited suitable goshawk nesting habitat exists within the Pig's Puzzle Wildlife Analysis Area including within the proposed forest management units; this habitat is considered to be marginal in quality. Although goshawks or goshawk nests have not been observed in the vicinity of the project area, migrating or dispersing birds could periodically use forested stands within and near the proposed treatment units as foraging areas.

Mammals:

NWFP Bats

The NWFP and Salem District RMP identify five species of bats that would benefit from additional habitat protection. Four of these five species have potential of being located within or near the proposed action areas. These species include the fringed myotis, long-eared myotis, long-legged myotis, and the silver-haired bat; they are also covered by the Bureau's Special Status Species Policy as either Bureau Tracking or Bureau Assessment (Wildlife Biological Evaluation, Pig's Puzzle Projects - Project Record Document No. 5). All of these bat species are known to inhabit mature and immature coniferous forest and may forage near riparian areas, open areas, and along forest edges while utilizing green trees or snags with habitat features such as hollow cavities or loose bark for roosting, hibernating, and/or maternity colonies.

There are no known bat roosting or hibernaculum sites within the project area. Snag habitat, especially higher quality large snags, is generally deficient within the area containing the proposed project. Surveys for these species are required under the NWFP and RMP if caves, mines, or abandoned wooded bridges and buildings are within or near the project area. There are none of these habitat types or structures within or near the project area therefore no bat surveys are required; no bat surveys are scheduled to be conducted within or near the Pig's Puzzle project area.

Townsend's Big-Eared Bat - (BS)

In addition to the bat species identified within the NWFP, one species of bat, Townsend's big-eared bat, is covered by the Bureau's Special Status Species Policy. Townsend's big-eared bats are seldom abundant but are known to occupy a variety of habitats. In western Oregon, these bats are associated with coniferous forests, but they are also considered characteristic dwellers of caves, abandoned mines, and buildings. No caves, abandoned mines or buildings are known to be located within the vicinity of the proposed action. Some of the more open forested and riparian habitats within and near the proposed treatment units could function as foraging habitat and it is possible although rather unlikely that this species of bat could be encountered within or near the proposed project area.

Red Tree Vole – (BS) and Survey and Manage

The red tree vole is generally associated with mature or old-growth conifer or mixed hardwood-conifer forests. The tall, multi-layered canopies of mature or old-growth forests retain humidity and intercept fog, which functions as a climatic buffer and a source of free water. Large branches of mature and old-growth trees provide stable support for nests, protection from storms and travel routes. Although red tree voles have been located within younger stands, especially if they contain a component of larger remnant trees, mature and old-growth stands are thought to be their optimal habitat.

A portion of the proposed Pig's Puzzle Project areas currently contains habitat for the red tree vole albeit marginally suitable habitat. There are only 5 acres of BLM forested stands within the Wildlife Analysis Area which are greater than 80-years-old; the amount of similar habitat on private land is considered to be negligible. Furthermore, the Analysis Area does not generally contain scattered components of larger remnant or old-growth trees as are often found in other areas.

All of the proposed Pig's Puzzle treatment areas were originally surveyed for red tree voles in October of 1999. These surveys resulted in no red tree voles or red tree vole nests being located. *Survey Protocol for the Red Tree Vole* (Version 1.0 – September 1996) was followed for these surveys. According to the red tree vole survey protocol, these surveys are valid for a period of about five years; therefore these original surveys have expired and are considered no longer valid in meeting S&M pre-project survey requirements. Consequently, the Pig's Puzzle treatment units were re-evaluated for their condition relative to red tree vole habitat according to the habitat triggers described in the *Survey Protocol for the Red Tree Vole* (Version 2.1, Revision, October 2002). As a result of this habitat evaluation, a total of 112 acres within units 29-2 and 29-3 were determined to have triggered the current protocol to the point that pre-project red tree vole surveys would be required. Surveys were conducted in March-April 2006 according to protocol (Version 2.1) resulting in no red tree voles or red tree vole nests being identified (Pig's Puzzle Projects - Project Record Document #2).

Other Species of Concern:

Roosevelt Elk and Black-Tailed Deer

Roosevelt elk and black-tailed deer use a wide range of habitat types. The use of the proposed project areas by these species is considered moderate and the quality of the habitat for these species in the project area is considered to be good. The habitat quality of the area is strongly influenced by the high degree of forest fragmentation in the area and the fact that generally, areas affording hiding cover are adjacent to, and interspersed with, areas containing adequate forage and/or browse.

Higher densities of roads that are open to vehicular traffic within an area can negatively influence habitat utilization and increase elk and deer vulnerability. The Final EIS to the Salem District RMP identifies a general target for roads open to motorized use as 1.5 miles of road per square mile. Looking at all system roads within BLM's GIS database, the current road density of the North Scappoose Creek 6th field subwatershed which includes the Pig's Puzzle Project is relatively high - approximately 6.7 miles/mi². However, roads located behind locked gates or earthen barriers, or overgrown with brush and hardwoods are less accessible and therefore commonly result in less potential for disturbance to wildlife. Due primarily to locked gates on private roads that restrict the general public's access to both private and Federal lands, a large but unquantified portion of the roads within the North Scappoose Creek 6th field subwatershed is not accessible by the public and/or drivable; this results in a reduced amount of general disturbance within the area and increases the quality of habitat for Roosevelt elk and black-tailed deer.

2.3.2.2 Environmental Effects on Wildlife – Alternative 1 (Proposed Action)

Species listed or proposed under the Endangered Species Act:

In accordance with regulations pursuant to Section 7 of the Endangered Species Act of 1973, as amended, informal and/or formal consultation with the USFWS concerning the potential impacts of implementing Alternative 1 of the Pig's Puzzle forest management project upon the spotted owl, marbled murrelet and bald eagle would be completed. The Pig's Puzzle project proposal would be included within the FY 2007-08 habitat modification biological assessment(s) prepared by the interagency Level 1 Team for projects within the North Coast Province which may modify the habitat of bald eagles, northern spotted owls and marbled murrelets under the categories of "light to moderate thinning" and regeneration harvest. Should the project not be implemented within FY 2007 or 2008 as currently planned but rather in a subsequent year, the project would likely be resubmitted for inclusion in the next appropriate programmatic consultation package.

Any ESA consultation required on the subsequent maintenance of trees planted as a part of this project would likely be accomplished by inclusion of the maintenance work within the appropriate programmatic

biological assessment(s) for activities in the North Coast Province which might disturb bald eagles, northern spotted owls or marbled murrelets which is prepared by the North Coast Province Interagency Level 1 Team.

Note: In order to obtain input from the terrestrial sub-group of the North Coast Province Interagency Level 1 Team and to facilitate the ESA section 7 streamlined consultation process, on April 11, 2006 elements of the Pig's Puzzle project and the associated analysis were discussed with the Level I team at a meeting held at the BLM Salem District Office in Salem Oregon.

Northern Spotted Owl - (FT)

Designated Critical Habitat

The proposed Pig's Puzzle project would not occur within or near spotted owl Designated Critical Habitat therefore, the proposed project would be of *NO EFFECT* upon spotted owl Designated Critical Habitat.

Disturbance

There are no known occupied spotted owl sites within or near the proposed project areas; although there have been no known spotted owl surveys conducted within the area of the proposed action since 1992 and 1993, no occupied spotted owl sites would be expected to be located within the area based upon the habitat quality within the area. All of the forested stands within the proposed treatment areas are considered to be spotted owl dispersal habitat; there is no suitable (nesting, foraging and roosting) habitat within 0.25 miles of the proposed action.

Based upon the lack of known occupied spotted owl sites within the vicinity and the fact that there is no suitable spotted owl habitat within 0.25 miles of the proposed action, the Pig's Puzzle Project would be of *NO EFFECT* upon the spotted owl as a result of disturbance.

Habitat Modification

Based upon stand age and conditions, all of the forested stands within the proposed Pig's Puzzle treatment areas totaling approximately 276 acres are considered to be spotted owl dispersal habitat.

Alternative 1 of the Pig's Puzzle Project proposes forest management treatments through a combination of regeneration harvest and density management / commercial thinning. Approximately 147 acres would be treated with a regeneration harvest and 129 acres would be treated with a density management or commercial thinning treatment. The design features for the regeneration treatments call for the retention of up to 17 trees per acre. While a number of these trees are anticipated to die or blow over, those acres treated with a regeneration harvest are expected to have a post-treatment canopy closure of approximately 20%. The crowns of the retained trees are expected to rapidly expand but conservatively, it is estimated the treatment would effectively removed these acres from a condition to function as spotted owl dispersal habitat for a period of approximately 30 to 40 years. Post-harvest, those acres treated with a density management or commercial thinning operation would be expected to continue to function as spotted owl dispersal habitat; this is based upon the fact that the average post-harvest canopy closure within the treated stands is expected to be greater than 40%; it is expected to range from 40% to approximately 60% (see Silvicultural Prescription, Pig's Puzzle Projects – Project Record Document #4).

While the 129 acres of density management or commercial thinned areas would not be removed from a condition to function as dispersal habitat, the habitat quality of these acres, or at least a large portion of these treated acres, would be degraded for a period of approximately 10 to 20 years. These short-term negative impacts would be expected to gradually ameliorate over time as the stand continues to develop.

Snags and the processes and factors impacting their development and persistence are important elements to consider based upon the fact that snags, especially larger snags, are considered to important spotted owl

habitat elements. It could be expected that many of the existing, especially smaller less-stable snags would be inadvertently knocked over during the harvest operations or purposefully felled for reasons of safety. In addition to this direct loss of many of the existing snags the commercial thinning or density management treatment would be expected to also have an indirect impact upon snag habitat by largely curtailing the natural development of snags for the next 20-30 years.

In addition to the identified short-term adverse impacts some beneficial impacts to those acres treated with a density management or commercial thinning operation would also be expected. Some of the dispersal habitat within the proposed density management or thinning units is currently considered poor quality dispersal habitat based upon the young stand age, small crown ratios and the extreme high density of trees which could inhibit an owl's ability to fly through the stand. Removing a portion of the trees from those stands or portions of the stands currently with a very high density of trees may actually have some immediate beneficial impacts to some elements of the current habitat quality. In the long-term, the proposed thinning is expected to result in increased or maintained growth rates of the trees retained within the overstory. Where present, understory conifer and/or shrub species would also benefit for decreased competition. This would result in the development of some features of spotted owl suitable habitat within these stands currently considered to be dispersal habitat earlier than would occur without treatment. These features include large trees within the overstory which would be potential sources of future snags and down logs, and generally a more diverse and/or complex vertical and horizontal stand structure.

Impacts of Habitat Modification

Alternative 1 of the Pig's Puzzle Project *MAY AFFECT* and is *NOT LIKELY TO ADVERSELY AFFECT* the spotted owl as a result of habitat modification. This is based upon all the identified beneficial and adverse impacts – including cumulative impacts, resulting from forest management treatments on a total of 276 acres through a combination of regeneration harvest and density management / commercial thinning. Approximately 147 acres would be treated with a regeneration harvest and 129 acres would be treated with a density management or commercial thinning treatment. Those acres treated with a regeneration harvest would be removed from a condition to function as spotted owl dispersal habitat. Post-harvest, those acres treated with a density management or commercial thinning operation would be expected to continue to function as spotted owl dispersal habitat in a “degraded condition”. The project would be implemented in an area where the affected BLM-administered lands are in relative geographic or biologic isolation creating a low likelihood that this habitat currently facilitates owl dispersal between blocks of suitable habitat.

Cumulative Effects

In general, based upon the current habitat conditions within the Analysis Area, the expected trends on non-Federal land, as well as the impacts of the Pig's Puzzle project - there is potential for adverse cumulative impacts resulting in a heightened concern for spotted owl dispersal within the vicinity of the Pig's Puzzle Project.

Currently, it is believed that the Analysis Area does not contain an adequate amount of dispersal habitat to facilitate spotted owl movements throughout the area. Based upon a GIS sort of the FOI database, approximately 94% (2,229 acres) of the BLM land within the Analysis Area is currently considered to be spotted owl dispersal habitat; an additional five acres is considered to be suitable owl habitat. Approximately 11% (250 acres) of these acres of Federal dispersal habitat have been “degraded”⁴ as a result of recent

⁴ “Degraded” spotted owl dispersal habitat continues to function as dispersal habitat (largely as a result of attention to maintaining a canopy closure greater than 40%) but the habitat quality has been temporarily reduced as a result of the commercial thinning or density management operation. This degraded condition is expected to last approximately 10 to 20 years and gradually ameliorate over time as the stand continues to develop.

commercial thinning projects (190 acres in 1998 via the McLafferty timber sale and 60 acres in 2004 via the Pisgah Progeny timber sale). Based upon photo interpretation of 2005 aerial photos, an estimated 19% (1,960 acres) of the private land within the Analysis Area is probable owl dispersal habitat. Considering all ownerships, approximately 33% of the Analysis Area (4,194 acres) is estimated to be currently in a condition to facilitate spotted owl dispersal (Table 3).

Table 3. Summary of the Estimated Current Spotted Owl Dispersal Habitat Conditions within the Pig's Puzzle Wildlife Analysis Area			
	Federal Acres	Non-Federal Acres	All Ownerships
Ownerships	2,380 (19%)	10,032 (81%)	12,412
Estimated Current Dispersal Habitat	2,234 (94%)	1,960 (19%)	4,194 (33%)

All of the proposed treatment units within the Pig's Puzzle project, totaling approximately 276 acres, are currently considered to be spotted owl dispersal habitat. This represents approximately 12.3% of the forested BLM stands within the Analysis Area which are currently in a condition to facilitate owl dispersal. Approximately 147 acres of this dispersal habitat would be removed from a condition to function as dispersal habitat through treatment with a regeneration harvest and 129 acres would be degraded through treatment with a density management or commercial thinning treatment although still expected to function as dispersal habitat post-treatment.

There appears to be a very reasonable likelihood that a minimum of approximately 500 acres of the existing private dispersal habitat within the Analysis Area will be removed in the very near future – most likely within the next year or two. Coupling this with BLM's Pig's Puzzle project proposal to remove an additional 147 acres thru regeneration harvest – 140 acres of this is in a single large regeneration unit, a total of 647 acres (15%) of the existing dispersal habitat can soon be expected to no longer facilitate spotted owl dispersal. This would result in a maximum amount of approximately 3,542 acres of dispersal habitat to be expected to be remaining within the Analysis Area – considering all ownerships this represents approximately 28% of the Analysis Area. Additionally, considering previous BLM thinnings as well as the proposed Pig's Puzzle thinning of 129 acres, approximately 379 acres or 11% of the total amount of dispersal habitat within the Analysis Area would function as spotted owl dispersal habitat in a “degraded” condition (Table 4). While the effects of the thinning operation may linger for decades, these effects would generally ameliorate over time as the stands continue to develop. Thinned stands would be expected to ultimately provide better habitat structure in the long term than would occur without treatment – these potential long-term beneficial impacts would be most realized within the Riparian Reserve Land Allocation.

Table 4. Summary of the Pig’s Puzzle Post-Harvest Spotted Owl Dispersal Habitat Conditions within the Pig’s Puzzle Wildlife Analysis Area considering all ownerships and the estimated near-term harvests on non-federal lands.			
Non-habitat	8870 (71% of the Analysis Area)		
Spotted Owl Dispersal Habitat	3,542 acres (28%)	Degraded in quality =	379 acres (3 %)
		Non-Degraded =	3,163 acres (25 %)

Cumulative impacts to dispersal habitat are expected as a result of the Pig’s Puzzle Project. These impacts however are not considered to be significant based upon the fact that the geographic isolation of the affected BLM-administered lands creates a low likelihood that this habitat currently facilitates owl dispersal between blocks of suitable habitat.

The Pig’s Puzzle project is set in a context of Federal lands being distributed in a scattered, non-contiguous or “checkerboard” fashion with parcels of Federal lands commonly being less than a full section in size and relatively isolated from larger blocks of public ownership. These Federal lands, managed by the BLM are surrounded by and intermingled with private forestland generally managed by industrial timber companies. Within that portion of the Tillamook Resource Area’s Columbia Planning Unit referred to as the “Scappoose Block”, BLM’s 18,020 acres of ownership are scattered into 72 different parcels. These parcels range in size from approximately 40 to 640 acres (averaging approximately 250 acres) and are contained within 60 different (odd-numbered) sections. The nearest larger block of public ownership is located within the Tillamook/Clatsop State Forests, managed by the Oregon Department of Forestry, approximately 18 miles west of the project area. The nearest larger block of Federal LSR within the coast range (the “Nestucca Block”) is approximately 40 miles south-west of the project area; it is similar distances to larger Federal LSR blocks in the Washington and Oregon Cascades. These conditions do not lend themselves to effective management of a wide ranging species such as the spotted owl.

Marbled Murrelet - (FT)

Designated Critical Habitat

The proposed Pig’s Puzzle Project would not occur within or near Designated Critical Habitat for the marbled murrelet and therefore would be of *NO EFFECT* upon murrelet Critical Habitat.

Disturbance

With the nearest known marbled murrelet site being more than 20 miles to the west, there are no known occupied murrelet sites within the vicinity of the proposed forest management units or non-paved haul routes. Additionally, there is no suitable marbled murrelet habitat within the proposed treatment units, along the haul routes or within 0.25 miles.

The proposed Pig’s Puzzle Project would be of *NO EFFECT* upon the marbled murrelet as a result for the potential for disturbance.

Impacts of Habitat Modification

There is no marbled murrelet potential or suitable habitat in the proposed treatment areas or within 0.25 miles. No trees with potential murrelet nesting structures would be impacted.

The proposed thinning would have *NO EFFECT* on the marbled murrelet as a result of habitat modification.

Cumulative Effects

There would no direct or indirect effects to marbled murrelets under this alternative, and so there would be no cumulative effects.

Bald Eagle - (FT)

Disturbance

No recent eagle sightings have been recorded within or near the proposed treatment units and none would be expected based on the lack of suitable roosting, foraging or nesting habitat. There is no identified suitable bald eagle habitat within the Analysis Area (within approximately one mile of the treatment units) or within the Pig's Puzzle proposed treatment units. The nearest known bald eagle nest is more than five miles southeast of the proposed action.

It is currently expected that the majority of the harvested timber resulting from the implementation of the Pig's Puzzle forest management project would be hauled down Pisgah Home Rd., Siercks Rd., and finally along the Scappoose-Vernonia Highway. A portion of this haul route would pass to within an estimated 0.25 miles of a bald eagle communal winter roost site. However, based upon the project design features, the haul of timber harvested from the Pig's Puzzle Project is restricted to the "dry season" - generally June through mid-October. Bald eagles would generally not be expected to be using the winter roost site during this time frame. In the unlikely event that eagles would be using the roost during the hauling of logs, it would not be expected that hauling in this particular area would flush roosting birds, impact their behavior or the usefulness of the general area as a communal roost. This is primarily due to the existing relatively loud ambient noise level and high degree of traffic and general activity within the vicinity.

The proposed Pig's Puzzle project would be of *NO EFFECT* on the bald eagle as a result of the potential for disturbance.

Habitat Modification

Bald eagles generally nest and/or roost within mature forest stands located within one mile of a large major river or lake, or within 0.5 mile of a major tributary. For the purposes of this analysis, a major river is considered to be 6th order or larger; there are no "major rivers" within or near the Pig's Puzzle Analysis Area. A major tributary is considered to be 5th order; the lower portions of both North and South Scappoose Creeks are considered to be 5th order streams and therefore "major tributaries" potentially influencing habitat suitability for bald eagles. According to BLM's FOI database there are no BLM forested stands within the Analysis Area greater than 75-years-old within 0.5 miles of the identified "major tributaries" (5th order streams); based upon this analysis as well as local knowledge of the area - there is no identified suitable bald eagle habitat on BLM land within the Analysis Area or within the Pig's Puzzle proposed treatment units.

The proposed Pig's Puzzle project would be of *NO EFFECT* on the bald eagle as a result of habitat modification.

Cumulative Effects

There would no direct or indirect effects to bald eagles under this alternative, and so there would be no cumulative effects.

Other Special Status Species and/or Survey and Manage Species:

Summary: Primarily as a result of the nature and scope of the proposed project (including incorporated design features to minimize the potential for adverse impacts), the nature of the habitats affected and the expected impacts, implementation of Alternative 1 of the Pig's Puzzle Project would not be expected to result in the loss of population viability for any Special Status Species that may occur in the project area, or result in the need to elevate their status to any higher level of concern including the need to list under the ESA. There are no identified cumulative effects associated with the Proposed Action expected to affect any Bureau 6840 Special Status and/or Survey and Manage wildlife species.

Mollusks- (BS) and/or Survey and Manage

There are currently seven species of mollusks identified as Bureau Sensitive on the Bureau's Manual 6840 Special Status Species List with the potential of being located within the proposed treatment units and/or in the general sale area (see Pig's Puzzle Wildlife Biological Evaluation, Pig's Puzzle Projects – Document Record #5); two of these species are also identified as Survey and Manage species. All of the Pig's Puzzle treatment units were surveyed for mollusks during the fall of 1999 and spring of 2000 (see Pig's Puzzle Timber Sale - Project Record Documents #5, 6 and 42). These surveys resulted in no target species (either those of on the Bureau's Manual 6840 Special Status Species List and/or identified as Survey and Manage species) being located (Appendix 4).

There are several project design features which would help reduce the potential for short and longer term adverse impacts to mollusks in general and/or their habitats. These design features include but are not limited to maintaining a hardwoods component within all the treated stands; where appropriate, incorporating red alder and/or bigleaf maple into reforestation plantings which may include landings, cable corridors, created gaps and/or areas infected by *Phellinus weirii*; protecting and reserving existing CWD; minimizing disturbance to the existing organic duff layer by designating skid trails, limiting road construction and minimizing the use of fire; and maintaining a post-harvest canopy closure which averages approximately 40 to 60% within commercial thinning or density management treatment units.

The proposed action is expected to result in an increased amount of alder growing within portions of the treatment units which would be expected to result in some benefit to the quality of future mollusk habitat within the commercial thinning or density management treatment units. Even though measures are incorporated into the proposed action to minimize soil disturbance and resultant potential adverse impacts to the forest floor and mollusk habitat, it would not be totally eliminated. Soil disturbance often results in scattered red alder naturally seeding into areas with disturbed soil if a seed source is available.

The regeneration harvest of 147 acres would have adverse impacts upon mollusk habitat which would be expected to last for decades. Again, these acres have been surveyed to protocol resulting in no known sites for the various species of concern being identified. However from a habitat perspective, removal of the majority of the forest canopy would alter the optimal cool, moist habitat conditions favored by these species. As with the commercial thinning or density management treatments, there are several design features incorporated into the regeneration harvest operations which would serve to minimize the potential for adverse impacts and/or the time involved for the affected habitats to recover. The most noteworthy design feature specific to the regeneration harvest operations includes up to 18 trees per acre being retained within the regeneration harvest units - a portion of these trees would be hardwoods including a big-leaf maples. As with the thinning operations, regeneration treatments also include protecting and reserving existing CWD; minimizing disturbance to the existing organic duff layer by designating skid trails, limiting

road construction and minimizing the use of fire.

Alternative 1 of the Pig's Puzzle Project would not result in the need to elevate any mollusk species' status to any higher level of concern including the need to list under the ESA.

Amphibians and Reptiles:

Cope's Giant Salamander and the Columbia Torrent Salamander - (BS)

The Pig's Puzzle Project design features would provide adequate protection for these species and their potential breeding habitats. These design features include "no cut" riparian buffers (at least 100 feet wide along fish-bearing streams and 50 feet wide along non-fish-bearing streams), prohibition of falling trees into the reserves, one-end suspension during yarding activities within the reserves and full suspension in those few instances where yarding over a stream may take place in Section 25. All trees needing to be cut within these buffers would be retained on site as CWD.

There is a slight potential that the culvert replacement on the small perennial stream on private land in Section 20 could impact a few individual animals and very localized stretches of suitable salamander habitat. Project design features have scheduled in-stream work to occur during the ODFW in-stream work window (July 15-August 31) to help minimize the potential for adverse impacts. It would be expected that should there be any adverse impacts upon these salamanders and/or their habitat, they would be localized, very minor and short-term as the impacted areas would rapidly recover.

As a result of the nature and scope of the proposed project and expected impacts, implementation of Alternative 1 of the Pig's Puzzle Project would not be expected to result in the loss of population viability for Cope's Giant or Columbia Torrent Salamanders or result in the need to elevate their status to any higher level of concern including the need to list under the ESA.

Birds:

Northern Goshawk - (BS)

The proposed action is expected to have minor adverse and beneficial impacts upon goshawk habitat although overall these impacts are considered to be negligible. This is based upon the low likelihood of goshawks currently utilizing the area, the nature of the forested stands to be impacted and various project design features.

Goshawks use a variety of forest types and structural stages as foraging areas but in the west, tend to nest in larger blocks of mature conifer habitat with a relatively dense canopy cover. Some stands within and near the Pig's Puzzle Project area could function as foraging areas to migrating or dispersing goshawks. Due to the habitat conditions within the vicinity of the proposed project and goshawks rarity within the coast range of northern Oregon, it is not expected that goshawks would be nesting within or near the project area. Very limited suitable goshawk nesting habitat exists within the Pig's Puzzle Wildlife Analysis Area including within the proposed forest management units and this habitat is considered to be very marginal in quality. Goshawks tend to build relatively large nests that can be used by the original pair or successors for many years; goshawks or goshawk nests have not been observed in the vicinity of the project area. In the unlikely event that nesting goshawks should be located within the area, timber sale contract stipulations protect any newly discovered nesting raptors including goshawks.

Project design features such as the maintenance of the "no-harvest buffers" within the Riparian Reserves, the light nature of most of the proposed thinning prescriptions, and the dispersed nature of the treatment units across 3 sections which are often intermingled with other areas not proposed for treatment would all serve to minimize or mitigate adverse impacts upon goshawks and goshawk habitat. The commercial

thinning or density management treatments would be expected to result in some long-term beneficial impacts to goshawk habitat by maintaining or increasing the growth rates of reserve trees thereby favoring the development of some mature conifer habitat features. The regeneration harvest units, with up to 18 trees per acre be retained, are not expected to be a barrier to migrating or dispersing birds and would likely still function as foraging habitat for dispersing and migrating goshawks.

Alternative 1 of the Pig's Puzzle Project would not be expected to result in the loss of population viability for Northern Goshawks or result in the need to elevate their status to any higher level of concern including the need to list under the ESA.

Mammals:

Red Tree Vole – (BS) and Survey and Manage

The red tree vole is generally associated with mature or old-growth conifer or mixed hardwood-conifer forests. Although red tree voles have been located within younger stands, especially if they contain a component of larger remnant trees, mature and old-growth stands are thought to be their optimal habitat. A portion of the proposed Pig's Puzzle Project areas currently contains habitat for the red tree vole albeit marginally suitable habitat. There are only 5 acres of BLM forested stands within the Wildlife Analysis Area which are greater than 80-years-old; the amount of similar habitat on private land is considered to be negligible. Furthermore, the Analysis Area does not generally contain scattered components of larger remnant or old-growth trees as are often found in other areas.

Surveys All of the proposed Pig's Puzzle treatment areas were originally surveyed for red tree voles in October of 1999. These surveys resulted in no red tree voles or red tree vole nests being located. *Survey Protocol for the Red Tree Vole* (Version 1.0 – September 1996) was followed for these surveys. According to the red tree vole survey protocol, these surveys are valid for a period of about five years; therefore these original surveys have expired and are considered no longer valid in meeting S&M pre-project survey requirements. Consequently, the Pig's Puzzle treatment units were re-evaluated for their condition relative to red tree vole habitat according to the habitat triggers described in the *Survey Protocol for the Red Tree Vole* (Version 2.1, Revision, October 2002). As a result of this habitat evaluation, a total of 112 acres within units 29-2 and 29-3 were determined to have triggered the current protocol to the point that pre-project red tree vole surveys would be required. Surveys were conducted in March-April 2006 according to protocol (Version 2.1) resulting in no red tree voles or red tree vole nests being identified within those acres surveyed (Pig's Puzzle Projects - Project Record Document #2).

Impacts to Habitat Portions of the proposed Pig's Puzzle Project areas currently contain habitat for the red tree vole albeit marginally suitable habitat. Density management or commercial thinning harvest is likely to degrade the suitability of some of the treated stands in the short-term (less than 20 years) by temporarily removing adjoining tree crowns, but suitability is expected to be enhanced in the long-term (20 years or more). The reserve trees are expected to begin to respond to the thinning with an accelerated growth rate and increased crown development within a few years after the harvest. This would result in the long-term expected impacts of a higher quality of vole habitat within the treatment units sooner than would be expected to develop without treatment. Mitigation measures are included to reduce the potential for adverse impacts. Treatments are expected to maintain a post-harvest average canopy closure of 40% to 60%. Trees generally favored for retention would be the largest within the stand.

Regeneration harvest would remove the treated stand from a condition of suitability for the red tree vole.

There are no expected immediate impacts to red tree voles resulting from the proposed Pig's Puzzle Project based upon the fact that all project areas containing suitable vole habitat have been surveyed to protocol resulting in no red tree vole sites being located.

Bats (including NWFP bats and the Townsend's Big-Eared Bat)

There are no known bat roosting or hibernaculum sites within or near the project areas. There are no known special habitats used by bats such as caves, mines or abandoned wooden bridges or buildings within the vicinity of the proposed projects.

Bats are known to forage near riparian areas, open areas, and along forest edges. The Pig's Puzzle Project would be expected to immediately improve the quality of bat foraging habitat within some portions of the density management or commercial thinning treatment units by opening up the canopy and creating small fragmented gaps in an otherwise closed canopy. The project's design features for CWD, snag and green tree protection and retention, including those trees with features desirable to species such as bats, should provide adequate structure for roosting or resting bats and greatly reduce any short- and/or long-term adverse impacts to bats which may result from the proposed project. Within the units proposed for thinning, including portions of the Riparian Reserves, there is potential for long-term benefits to bats based upon the fact that the treatment would favor the development of some older forest characteristics favored by these species; growth rates of reserve trees would be increased or maintained resulting in larger trees, and eventual CWD developing sooner than with no treatment. Thinning and regeneration treatments greatly increase sunlight to the floor of the stand which increases herbaceous growth for bats' insect prey. Regeneration harvest units result in the creation of forest edge which can be beneficial as bat foraging areas. Design features for the regeneration harvest units include the retention of up to 18 trees per acre for immediate and future use by a wide range of wildlife species including bats. This greatly increases the potential habitat value of the treatment areas for most bat species and is especially noteworthy given the character of the surrounding landscape including a general lack of quality snags and/or scattered large trees within the majority of the landscape's clearcut harvest units.

Alternative 1 of the Pig's Puzzle Project would not be expected to result in the loss of population viability for any of the bat species analyzed or result in the need to elevate their status to any higher level of concern including the need to list under the ESA.

Other Species of Concern

Roosevelt Elk and Black-tailed Deer

It is expected that the Pig's Puzzle project would temporarily displace individual deer and elk as they react to the disturbance created by project implementation and the increased human presence within the vicinity of the treatment units. This would not impact the health of the populations based upon the expected limited length of time of the disturbance and the fact that other, relatively undisturbed suitable habitat is present within the vicinity of the proposed action.

From a habitat perspective, the Pig's Puzzle Project would likely result in a combination of relatively minor beneficial and adverse impacts. The basic configurations of the treatment units, which are interspersed with denser areas of cover not proposed for treatment, would be expected to result in an overall improvement in the general habitat quality available for elk and deer. Although the proposed action would have a negative impact upon cover for big game, most notably within unit 29-2 which is approximately 140 acres in size and receiving the regeneration harvest, other suitable thermal and/or escape cover exists within the general area. These areas are located within Riparian Reserve no-harvest buffers as well as in other intermingled areas not proposed for treatment. In addition to the reserve areas, the acres receiving a thinning treatment should continue to function, in some regard as cover for big game (escape and/or thermal cover). Although thermal cover is probably less important or limiting within the Coast Range of northern Oregon than in other portions of the species' range, due to both the mild winters and summers within the region, forested stands which would be commercially thinned would still be expected in some regard to moderate temperature and wind extremes, and serve as a visual buffer. In response to the

thinning operation, the crowns of the retained trees would be expected expand at a relatively rapid rate. The project would not be expected to result in a reduction of available cover to the point where it would be become a limiting factor, negatively impacting the population health of these species.

In addition to the potential impacts to habitat discussed above, the proposed treatments would be expected to improve the vigor and abundance of the herb and shrub understory layers within both the regeneration and thinning units thereby improving the quality of available browse and forage. Partly due to the fact that BLM does not typically utilize herbicides in its management of young plantations, the areas treated with a regeneration harvest should provide high quality browsing and foraging areas for a period of at least 15 years.

Higher densities of roads that are open to vehicular traffic within an area can negatively influence habitat utilization and increase elk and deer vulnerability. The 0.6 miles of new road construction and 2.6 miles of reconstruction associated with the project would not result be expected to result in increased public access and resulting wildlife harassment based upon the fact that private landowner's gates are generally locked and therefore limiting the public's access into the project the area. Post harvest, approximately 0.4 miles of newly constructed road and 0.2 miles of reconstructed road, would be decommissioned, for no net change of road density within the project area.

2.3.2.3 Environmental Effects on Wildlife – Alternative 2 (No Action)

Under the No Action Alternative the BLM would not implement the forest management project including the associated activities. No commercial thinning or density management treatment of approximately 129 acres of densely stocked forest within the Matrix/GFMA or Riparian Reserve LUAs or regeneration harvest of approximately 147 acres as proposed under the Alternative 1 would occur.

Under the No Action Alternative, the local plant and animal communities would be dependent upon and respond to ecological processes that would continue to occur based on the existing condition without management intervention. The identified impacts of the action alternative upon wildlife and wildlife habitat would not occur at this site at this time.

There are no identified cumulative impacts to wildlife associated with the No Action Alternative.

Selection of the “No Action” Alternative would be of *NO EFFECT* upon the marbled murrelet and spotted owl (and their critical habitat) as well as the bald eagle and all other species listed under the ESA.

Alternative 2 would not be expected to result in the loss of population viability for any Special Status Species that may occur in the project area, or result in the need to elevate their status to any higher level of concern including the need to list under the ESA.

2.3.3 Invasive, Non-Native Plants

2.3.3.1 Affected Environment

Unit 25-1 is surrounded on all sides by recent clearcut harvest units or young plantations. Topographically it contains a riparian area, ridge, and slopes; several aspects; and slopes from 5 to 30%. The overstory is predominantly 1930's Douglas-fir (*Pseudotsuga menzeisii*). It is a brushy unit with abundant vine maple (*Acer circinatum*). Salal (*Gaultheria shallon*) and dwarf oregon grape (*Berberis nervosa*) are the other

dominant shrubs and often make a dense layer. In areas where they are not as dense, sword fern (*Polystichum munitum*) becomes more abundant. A creek runs through the southwest corner of the unit. On the slopes above the creek sword fern becomes the almost exclusive ground cover and is very dense. Red alder also increases in abundance in the riparian area and becomes the dominant tree at the northern end of the creek. Salmonberry (*Rubus spectabilis*) and devil's club (*Oplopanax horridus*) become abundant in this area as well. The amount of coarse woody debris is generally low throughout the unit. Past disturbance is shown by stumps and evidence of burning.

Unit 29-1 has a mixed overstory of Douglas-fir, red alder, and big-leaf maple (*Acer macrophyllum*) and an understory of Douglas-fir, western hemlock, and red alder. On the northern side of the unit there is a patch of red cedar (*Thuja plicata*). The shrub layer is predominantly comprised of vine maple, which is dense in places, and some sword fern and oregon grape. There are occasional patches of bare ground with no duff layer and little vegetation except for scattered redwood sorrel (*Oxalis oregana*). Stumps are present. The elevation ranges from 1120 to 1200 feet, aspect is north-west, and the slope is about 20%.

Units 29-2 and 29-3 are large, contiguous stands that are similar in their characteristics. The western side of unit 29-3 is a steep, east facing slope. The overstory is comprised of Douglas-fir with some big-leaf maple and has a canopy closure of 85% or more. The Douglas-fir are mostly small trees, but there are scattered large (30 plus inch dbh) trees present. The dominant shrubs are California hazelnut (*Corylus cornuta*) and dwarf Oregon grape. Sword fern is the other major species of ground vegetation. Coverage is consistent but usually not extremely dense. Traveling west across the unit, the topography flattens out a bit and is dominated by a flat ridgeline. The Douglas-fir become more even aged (about 70 years), but the canopy closure is still high. Vine maple and salal become more prominent and hazelnut and sword fern less so. This area is contiguous with the gently sloping portion of 29-2 and they have generally the same characteristics. Plant cover varies from being very dense, to moderate, to almost none. There is a moderate amount of coarse woody debris, but the majority of it is not very rotten. There are a number of riparian areas along the northern and southern borders. These are characterized by abundant sword fern and an increase in the abundance of red alder and big-leaf maple. Along the western border, the canopy closure is less than 80%. There is a good mix of red cedar, big-leaf maple, red alder and Douglas-fir. Vine maple, sword fern, and dwarf Oregon grape are abundant. In the extreme south west corner of unit 29-2 red cedar becomes abundant with small pole sized Douglas-fir. Ground cover is very sparse with scattered sword fern and dwarf Oregon grape. These two units range from 860 to 1440 feet in elevation and contain a variety of aspects and slopes. Skid roads and stumps are present.

Unit 29-4 is a mixed conifer hardwood stand. It has predominantly 1930's Douglas-fir in the overstory, but also contains red alder and big-leaf maple and in the western portion of the unit, western red cedar. Understory trees are sparse to lacking. The aspects of the unit are primarily south and southeast and the slope ranges up to about 20%. Elevation is from 920 to 980 feet. The unit is comprised of a ridgeline along the northern border and slope to the south of that. Over much of the slope sword fern and dwarf Oregon grape are dense. Bracken fern (*Pteridium aquilinum*) and red huckleberry (*Vaccinium parvifolium*) are also present. Herbs are few due to thickness of the ground cover, but vanilla leaf (*Achlys triphyllum*) is abundant near the edge of the clearcut along the southern border. Within 200 feet of the southern border in the southeastern portion of the unit, there are a few English holly (*Ilex aquifolium*). Along the ridge sword fern becomes less abundant and salal more so, and the vegetation is not as thick as on the slopes. In the southwest portion forbs become more plentiful and are dominated by wall lettuce (*Lactuca muralis*). Western red cedar is also present in this area. Salal, red huckleberry and oceanspray (*Holodiscus discolor*) are the dominant shrubs here. Stumps and old skid roads are present in the unit.

Unit 31-5 is a small, triangular area that is bounded on two sides by clearcuts and/or roads. The unit has an overstory of small Douglas-fir (1930's) and few understory trees. Dwarf Oregon grape and salal are the dominant shrubs and are dense in spots. Vine maple, sword fern, and bracken fern are also present in

moderate abundances. Downed wood is present in small amounts, but there are a few large pieces. The slope is gentle at about 0-5%, and the elevation ranges from 1060-1120 ft. Stumps are present in the unit.

2.3.3.2 Environmental Effects on Invasive, Non-Native Plants– Alternative 1 (Proposed Action)

Existing vegetation consists of a 60-75 year-old conifer over-story, scattered pockets of hardwoods and an under-story of common shrubs. A comprehensive native plant species list is located at the Tillamook Resource Area field office. A variety of habitats are represented throughout the project area (substrates, rock, features, elevations, slopes, aspects, water, and topography). Any ground-disturbing activity that occurs within these habitats offers opportunity for the introduction of noxious weeds and/or invasive non-native plant species based on the existence of a seed source. Botanical surveys for Invasive, non-native plant species within the Pigs Puzzle project area were conducted in June and July of 2000. Where mature native plant communities were established populations of non-native species were non-existent or at low non-competitive levels. Species that were identified within the proposed project areas consisted of Bull thistle, (*Cirsium vulgare*), Canada thistle (*Cirsium arvense*), Scotch broom (*Cytisus scoparius*), Tansy ragwort (*Senecio jacobaea*), Himalayan blackberry (*Rubus discolor*), English Ivy (*Ilex aquifolium*) and St. Johnswort (*Hypericum perforatum*). All species with the exception of English ivy were located along road edges and exposed areas that tended to have soil disturbance. English ivy being more shade tolerant was observed as an understory plant within the existing stand or project area. These species are considered Priority III (established infestations) on the Oregon Department of Agriculture (ODA) Noxious weed list. These aggressive weed species are prevalent throughout Western Oregon and proliferate easily through vectors such as motor or foot traffic, birds, wind, and water. Several populations of meadow knapweed (*Centaurea pratensis*) were noted outside of the project area but within close proximity to T4N, R2W, Sect. 29. Meadow knapweed is considered a Priority I species (potential new invader). Ground disturbing activities such as new road construction, reconstruction and decommissioning, yarding corridors, tractor skid trail development, landing use, and haul road maintenance are the most likely activities that could produce conditions conducive to noxious weed establishment. Some degree of invasive non-native plant species introduction or spread is probable as management activities occur in the project areas. Recent monitoring of thinned stands with a 60% canopy closure retention with similar invasive species located within the area have shown a significant increase in populations for the first several years. Increases in non-native plant populations should decline as native vegetation regenerates and out-competes them for light. Because this overtopping process could take up to 10 years any increase in non-native plant populations will increase the amount of seed that is available or is dispersed increasing the potential for spreading. Design features such as “*Prior to entering the sale area each work season, or before returning to the watershed after leaving it, any heavy machinery (with the exception of log trucks and pick-up trucks used for daily personnel travel) would have all dirt and adhering vegetation removed by power-washing*”, and planting and maintaining conifers throughout the thinning and regeneration harvest area, planting native grasses on decommissioned roads, and monitoring the project area to evaluate for control treatments will be used to mitigate introduction and spread of invasive non-native species throughout the project area.

Cumulative Effects

The analysis area for cumulative effects to Invasive/non-native plant species is in the Northern Oregon Coast Range located 5 miles northwest of Scappoose, Oregon, in Columbia County, on land managed by the Tillamook Resource Area of the Salem District, Bureau of Land Management. The project area is approximately 35 miles northwest of Portland, Oregon in Township 4 North, Range 2 West, Section 29 and 31, and Township 4 North, Range 3 West, Section 25, Willamette Meridian. Access to the project is from the Scappoose-Vernonia Highway and the Pisgah Home Road. The project area is located within the Scappoose Creek watershed. The proposed treatment area is within the Fall Creek and Brush Creek drainages in the North Scappoose Creek sub watershed. Examples of forest management activities within

the affected area that will create soil disturbance and influence the spread of Invasive/non-native plant species are: commercial and pre-commercial density management thinning, young stand maintenance, new road construction, road decommissioning, road maintenance, culvert replacement, and off highway vehicle (OHV) use. Activities that do not necessarily create disturbance but influence the spread of invasive/non-native plant seeds are: recreational hiking, biking, horseback riding, fishing, and hunting. Other sources of seed dispersal are from wildlife that are either passing through or frequenting the area, water movement, natural dehiscence and wind. Many past and present management activities tend to open dense forest settings and disturb soils therefore providing opportunities for widespread weed infestations to occur. Many, if not all of the weed species identified as Priority I and III on the Oregon Department of Agriculture(ODA) noxious weed list are present throughout the area. Because they are present in the project area, a seed bank has been established and new seed is available for dispersal. Most Invasive/non-native species are not shade tolerant and will not persist in a forest setting as they compete for light when tree canopies close and light to the under-story is reduced.

2.3.3.3 Environmental Effects on Invasive, Non-Native Plants – Alternative 2 (No Action)

The existing plant communities within the project area would continue to be dependant on ecological processes currently in place if no action is taken. Because most Invasive/non-native plant species are not shade tolerant and no immediate change to the existing habitat is expected to occur, no appreciable increase in the Invasive/non-native plant populations identified during the field surveys can be expected as most invasive species tend to occupy disturbed areas with high amounts of light. The one species identified that is shade tolerant, English ivy, generally does not reproduce in shade like conditions so any increase in population would rely on seed that was introduced to the site from birds. In the future as patches of hardwoods, especially red-alder, reach their climax age and fall out of the stand, or plant community, this will allow under-story of shrub species to dominate until an over-story of trees can reestablish itself. When this natural condition occurs it could be expected that invasive weed species will compete as one of these under-story species.

2.3.4 Soils

2.3.4.1 Affected Environment

Setting: The project is located on the northeast side of the Oregon Coast Range Province. Elevations range from 800 to 1,580 feet. The surface bedrock geology is marine sedimentary and tuffaceous rocks with small, irregular intrusions of basalt. The topography is dominated by rolling hills and upland plateaus that are incised by narrow river valleys. The dominant mass wasting process in the watershed is debris slides and debris flows. Most slope failures are associated with roads and very steep (>80%) and shallow surface hillslopes that have been clearcut or regeneration harvested.

Project Soils: The dominant soils within the project area are the Bacona, Braun, and Scaponia silt loams and Tolany loam (USDA –SCS, 1968). They are moderately deep to very deep soils developed mainly from eolian deposits (material moved by air) mixed with colluvium (material rolled downhill) from local rocks. Soils are well drained except for small areas in riparian zones that are poorly drained. Soil textures are mainly silt loams and loams with few coarse fragments. Bacona soils, covering about three-quarters of the project area, have a silty clay loam or silty clay subsoil starting at a depth at about 33 inches.

All hillslopes in the analysis area appear to be stable. There is no poorly drained deep-seated slump/earthflow topography. About 85% of hillslopes within the proposed harvest units are on gentle to moderate slopes (<40%). Only about 3 acres have hillslopes ranging from 60% to 75%. All steep slopes in

the project area were traversed and checked for indicators of instability such as barren slumps, fresh deposits of rock at the base of slopes, and pistol butt trees. Fragile sites not suitable for commercial timber harvest were identified during pre-project planning and removed from the proposed timber sale.

There are two main management concerns for this resource: 1) Project soils are very susceptible to accelerated erosion on steep slopes when their surfaces are exposed and compacted or rutted; 2) Project soils are very susceptible to compaction especially from ground-based equipment and the natural recovery from severe compaction takes decades.

2.3.4.2 Environmental Effects on Soils – Alternative 1 (Proposed Action)

For purposes of analyzing the affected environment, the analysis area is defined as all timber harvest units in the Pigs Puzzle Timber Sale and all roads used to directly access the harvest units. Effects on soils have been analyzed broadly in the Salem RMP/EIS (Chapter 4, pp. 4-11 to 4-14). This analysis assumes that all of the relevant Best Management Practices outlined in Appendix C-1 in the Salem District ROD/RMP and the design features in Chapter 2 would be implemented and would be effective.

Direct and Indirect Effects

Soil Disturbance: Project activities that have the highest potential to result in severe soil disturbance that could reduce soil productivity are: ground-based yarding, cable yarding, new road construction, road reconstruction, and fuel treatment. A summary of expected severe disturbance from the projection is presented below in Table 5.

Ground-based Yarding

Approximately 29 acres would be logged by ground-based systems (about 2/3 commercial thin and 1/3 regeneration). Less than 10% of the ground-based harvest unit would be covered by designated skid roads (trails) and landings. Existing skid trails would be used to the degree practical and count toward the 10% affected area. The severity and amount of disturbance would vary with the operator, climate, and the kind of equipment. If mechanized harvest or cut-to-length system is utilized, trees will be felled manually or by single or double grip harvester and yarded with a grapple skidder or forwarder. Compared to a tractor/skidder system, mechanized systems typically result in about 20 to 30% ground disturbance at a lower intensity (e.g., minor mixing and compaction, and little topsoil removal). If a tractor/skidder is used, there would likely be less overall disturbance but slightly more severe disturbance (e.g., subsoil is compacted, topsoil removal).

Cable Yarding

Cable yarding systems would treat about 258 acres (about 1/2 commercial thin and 1/2 regeneration) and result in about 3.7% severe soil disturbance. Heavy soil disturbance would be confined to landings and thin (< 4 feet), discontinuous strips in skyline corridors. About half of the landings would be located in roadbeds.

New Road Construction

Constructing approximately 0.6 miles of road (0.2 miles rocked and 0.4 miles natural surfaced) to provide better access to harvest units would displace topsoil and severely compact the subsoil on approximately 1-acre. Construction would be on stable, mostly gently sloping, benches and ridgetops. There will be no full bench construction that will be required nor any drainage crossed. Approximately 700 feet of new road would be constructed on a ridgetop in a Riparian Reserve in Unit 25-1.

Road Reconstruction

Approximately 2.6 miles of road (2.4 miles rocked and 0.2 miles natural surfaced) would be reconstructed to provide better access to harvest units. Reconstruction activities could include grading and minor re-shaping, re-alignment, widening, ditching, and in one location, replacing a culvert. Most of the reconstructed roads are decades old and occur on stable, mostly gently sloping, benches and ridgetops. One private road would require reconstruction of a stream crossing. Road reconstruction would result in an additional 1-acre of severe soil disturbance (displacement and compaction). This estimate assumes that 75% of the existing road surface to be reconstructed has severe soil surface and reconstruction would result in an additional 25% of severe soil disturbance for each mile of road.

Road Decommissioning

Upon completion of the timber harvest, approximately 0.6 miles of new and reconstructed roads directly used in the project would be decommissioned by decompacting the road surface (subsoiling), water-barring where appropriate and blocking to traffic. Subsoiling would increase infiltration of water, decrease water runoff, facilitate revegetation, and reduce long-term erosion.

Fuel Treatment/Slash Disposal

The proposed fuel treatments/slash disposal (lopping and scattering of slash, hand piling and burning of hand piles in regeneration harvest units) would result in small (< 1 acre), scattered, localized areas of soil damage. To minimize damage, burning would be restricted to wet soil conditions when soil resources are less vulnerable to impacts.

Soil Productivity: The following table shows the amount of expected severe soil disturbance, location and type of disturbance, and predicted soil productivity loss based upon a review of literature, expected disturbance, and site conditions.

Table 5. Soil Disturbance

Project Activity	Amount of Severe Soil Disturbance	Type of Disturbance	Discussion
Ground-based Yarding	<2.9 ac (<10% of Ground-base yarding harvest area in skid trails)	Skid trails & landings: Mostly compaction; minor mixing and displacement	Slight short-term loss in productivity.
Cable Yarding	<8 ac (3% of cable yarding harvest area)	Corridors: <4 ft compaction & displacement	Minimal productivity loss with relatively small logs, adequate slash in corridors, and disturbance restricted to narrow, discontinuous strips. Quick recovery expected.
	<2 ac (<0.7% of cable yarding harvest area)	Landings: mainly compaction.	Soil productivity would mostly recover in the long-term (decades) following subsoiling.
New Road Construction	0.3 ac (rock surface)	Compaction and displacement	Area will remain as non-forestland
	0.6 ac (natural surface)	Compaction and displacement	Soil productivity would recover in the long-term (>10 yrs) following subsoiling of road.
Road Reconstruction	3.8 ac (rock surface)	Compaction and displacement	Area will remain as non-forestland

	0.3 ac (natural surface)	Compaction and displacement	Soil productivity would recover in the long-term (>10 yrs) following subsoiling of road.
Fuel Treatment	<1 ac (hand piling and burning)	Scattered, spotty topsoil damage	Minimal productivity loss. Quick recovery.

Currently, due to the lack of long-term data and complexity of the process, there is no agreed upon method to measure the long-terms effects of forest management activities on soil productivity. Forest management activities can impact soil productivity by the removal of vegetation and its nutrients, soil compaction and associated decrease in soil permeability to water and air, and soil displacement which removes most of the soil nutrient store. Recent soil disturbance studies in the Pacific Northwest (Miller, 1996; Heninger, 2002) and experience indicates that the potential impacts on soil productivity are best evaluated on site specific basis. The probability of adverse effects to soil productivity is generally the greatest with high silvicultural intensity conducted on sites with low inherent productivity and stressful climates (Beschta, 1995).

Project soils have moderately good physical and biological properties for growing forest vegetation. The climate is mild (mesic) and the soils are usually moist except for less than 45 days during the summer. The site index, the most common unit of measurement for potential forest productivity is on the lower side in the Coast Range but still considered quite productive, ranging from 119 to 133 on Douglas-fir, 50-year basis ((USDA –SCS, 1968).

The soil quality, its fitness to function within its surroundings, for the project area is generally high. The project area was logged about 50 to 70 years ago, most likely by tractor logging using logger’s choice skid trails. Former skid trails now have largely healed, little residual compaction is apparent. Access roads and landings, however, remain deeply compacted and in some places the subsoil exposed. These areas are covered mainly by a thick cover of brush, forbs and a few small trees. It is estimated, based upon field observations and aerial photos, that approximately 3 to 4% of the proposed harvest area has severely degraded physical conditions.

In conclusion, based upon the proceeding and with proper project implementation, soil disturbance from the proposed action would not impair overall stand growth and long-term productivity.

Cumulative Effects

The effects from the project action would be local, and there would be no other uses affecting this resource within the project area. The proposed logging and road work would add a small net increase in soil compaction and displacement over existing levels. Given the slow rate of natural recovery from compaction for these soils, if the ground-based harvest units are re-entered in less than 10 to 25 years, there is a strong likelihood that there would be a cumulative (additive) effect, especially if the routes of heavy equipment (e.g., roads and skid trails) are not reused.

2.3.4.3 Environmental Effects on Soils – Alternative 2 (No Action)

Direct and Indirect Effects

Under the no action alternative there would be no short-term effects on the soil resource over and above the existing condition. No additional logging, road construction, renovating and/or reconstructing, and burnings would disrupt the natural soil processes. Existing roads that were either surfaced by rock or lacking topsoil would remain as non-forest land for the foreseeable future. Areas impacted from past timber

management practices and natural disturbances would continue to recover at the current rate until another major disturbance (e.g. fire or a windstorm) occurs and the recovery process begins once again.

Cumulative Effects

The no action alternative would result in the continuation of current conditions and trends in the project area as described in the Affected Resource section of this report.

2.3.5 Hydrology

2.3.5.1 Affected Environment

Setting: The project area is located in the northeast side of the Scappoose Creek 5th field watershed (HUC #1709001202). This 5th field watershed is large, totaling about 334 square miles. There are no Key Watersheds within the watershed. Approximately two-thirds of the 5th field watershed is located in the Willamette Valley, an area consisting mainly of valley foothills, lowlands, wetlands, and scattered urban areas. The remaining third is located in the Oregon Coast Range, consisting mainly of forestlands. The Project Area is entirely within the North Scappoose Creek subwatershed. There is little non-forested land within subwatershed other than urban areas along major stream courses. Most streams on public land are located in the mid to upper reaches of the watershed.

For purposes of analyzing the affected environment, three spatial scales are used: site, subwatershed (North Scappoose Creek - 34.1 mi²) and planning watershed (Brush/Fall Creek drainage -8.5 mi²). The proposed project is not expected to have any measurable affect at the 5th field watershed scale. This is because the majority of the watershed is non-forestland and the proposed timber sale comprises only 0.1% of the 5th field watershed. The subwatershed is judged to be the most appropriate scale for analyzing cumulative effects. (See Cumulative Effects at the bottom of sections 2.3.5.2 and 2.3.5.3.) The following discussion is based upon the *1996 Scappoose Creek Watershed Analysis*, the *1999 Scappoose Bay Watershed Assessment*, BLM geospatial data, 2005 aerial photos, OWRD Water Right Information System data (<http://www.wrd.state.or.us/>), ODEQ water quality information (<http://www.deq.state.or.us/wq/>) and, knowledge gained while traversing the area.

The watershed has a maritime climate, characterized by cool, wet winters, and warm, dry summers. Rain is the primary hydrologic flow generating process, averaging about 60 to 70 inches annually. Approximately 80% of the precipitation falls in October through March. The analysis area is almost entirely below the transient snow zone (assuming 2,000 feet as the lower boundary). The underlying geology is marine sedimentary and Columbia River basalt. This material has limited water storage capacity. Infiltration rates are high. Stream flows are strongly linked to rain storm events. Most high stream flows occur during long-duration low-intensity events between November and April. Most stream channel forming occurs during large peak flows in the mid-winter when soil moisture is high. Extreme flows of record, such as the 1996-1997 flood, have often resulted from rare rain on snow events.

Beneficial Uses and Water Quality: The most sensitive beneficial uses of surface water draining the project area are cold water fisheries, fish rearing, and other aquatic life. There are no known domestic water users within 10 miles downstream of the project area. None of the surface and ground waters draining the project area is diverted for municipal use. The nearest municipal water use is for City of Scappoose and comes from three water diversions on South Scappoose Creek and two of its tributaries.

State water quality standards are designed to protect the most sensitive beneficial use within a waterbody. The key water quality parameters that are critical to these designated beneficial uses are: flow, water

temperature, sediment, turbidity, dissolved oxygen, large woody debris and structure, pH, and bacteria. The Oregon Department of Environmental Quality (ODEQ) has not identified any water quality limited streams, also known as the 303(d) list from Section 303(d) of the 1972 Federal Clean Water Act, in the project area or the Scappoose watershed. There is, however, very little known water quality data for the watershed. The *Scappoose Creek Watershed Analysis* (BLM, 1996) identified warm stream temperature, excessive sediment, low summer stream flows, and habitat modifications (lack structure and complexity) as likely water quality problems.

Water temperature data on streams downstream of the proposed timber sale collected by the Scappoose Watershed Council indicates that water temperatures are exceeding State of Oregon water quality standards. See Table 6 below.

Table 6. Stream Temperature Data

Site Name	7-Day Average Maximum	
	Date	Temperature
Brush Cr @ N. Scappoose Cr (2.2 miles downstream of nearest harvest unit)	08/02/2000	63.5 °F
N. Scappoose Cr @ Bonnie Falls (3.6 miles downstream of Brush Cr confluence)	08/02/2000	62.2 °F
Fall Cr @ N. Scappoose Cr (1.4 miles downstream of nearest harvest unit)	08/02/2000	62.2 °F
N. Scappoose Cr @ Hwy. 30 (4.0 miles downstream of Fall Cr confluence)	08/01/2000	75.4 °F

State temperature standards for these streams include the seven-day average maximum temperature for core cold water habitat at 60.8 °F and for salmon and steelhead spawning use during October 15 through May 15 at 55.4 °F. The existing condition of the Riparian Reserves in the near proposed harvest units appears to be providing adequate shade to maintain desirable water temperature.

Stream sediment levels are likely to above natural background levels due to the high amount of logging and associated road construction and use that has occurred in the past century. Road erosion, erosion below drainage culverts, and road failures at stream crossings are the most likely sources of fine sediment inputs.

Baseflow levels in the lower Scappoose Creek appear to have been reduced due to consumptive use for agriculture and domestic. The Watershed Analysis concluded that based upon calculated mean streamflows and allocated water rights for the watershed there is "...a potential for a serious shortage of streamflows during flow periods."

Project Area Streams: Most streams on BLM-administered lands in the project area are small, intermittent and perennial, non-fish bearing, with flows of less than 1 cubic feet per second (cfs) and bankfull widths up to 3 ft located in the upper reaches of drainage areas. They are moderately confined by hillslopes, have low to moderate sinuosity, and moderate to steep gradients. They are classified as Rosgen's A or B type streams. These streams are commonly underlain by soft, very erodible, sedimentary rock (siltstone and sandstone). The dominant substrates are commonly fine gravel, fine sands, and silts. Stream banks are moderately stable with a small amount of bank erosion. Small wetlands and beaver ponds are common along the flatter portions.

The largest streams in the project area are Brush Creek (west of Unit 25-1), an unnamed tributary of Brush Creek (bisecting Unit 25-1), Fall Creek (south of Unit 29-3), and an unnamed tributary of Fall Creek (north

of Unit 29-4). These streams are located in narrow, incised river valleys and canyons in the middle and lower drainage areas. They have flows of 1 to 2.5 cfs, bankfull widths of 3 to 6 ft with no floodplain or terrace development. They usually have fish. They are strongly constrained by steep hillslopes, have low sinuosity with moderate to very steep gradients (4 to 20%). They are classified as Rosgen's A+ or A type streams. They are mostly underlain by hard, resistant volcanic rock (Columbia River basalt). The dominant substrates are angular, large gravel, cobble, boulder, and bedrock. Stream banks are mostly stable with little bank erosion.

2.3.5.2 Environmental Effects on Hydrology – Alternative 1 (Proposed Action)

Direct and Indirect Effects

In summary, the proposed action is unlikely to result in changes in streamflows that would cause adverse impacts to the downstream beneficial uses of water. In the short-term (<3 years), it would increase local stream sediment and turbidity. However, any increases as the result of the proposed action are not expected to be distinguishable from background levels downstream where beneficial uses are present. It is unlikely to reduce effective shade over perennial streams and have any measurable effect on stream temperature. In the short-term, it would result in minor short-term channel adjustment to repair a stream crossing. In the long-term, it would stop the current erosion at the crossing, improve the current channel form and function, and reduce the risk of a mass road failure. And finally, the project action is unlikely to result in chemical or nutrient contamination.

Streamflows

Annual Water Yield

The proposed action is expected to have little effect on annual water yields for the following reasons: 1) only a small proportion of the affected watersheds would be regeneration harvested from this action (about 0.6% of the 6th field watershed and about 2.7% of the planning watershed); 2) there would be full retention of Riparian Reserves in regeneration units and minimum no harvest buffers of 50 ft. on non-fish-bearing streams and 100 ft. on fish-bearing streams; 3) and there would be an additional approximately 17 green trees per acre that would be retained in regeneration harvest units. Retained trees would take up and transpire water and moderate changes in stream flow.

Low Flows

The proposed action may result in fewer extreme low flows. Most studies in rain dominated catchments have reported less extreme flows for the first few years after timber harvest (Moore and Wondzell, 2005). Any increases in low summer flows would be beneficial to the aquatic system by lowering stream temperature and increasing more wetted area and volume.

Peak flows

The proposed action, based a review of literature, including papers cited below, the site conditions, and the proposed nature of the timber harvest and road work, may cause some increases in peak flows after small storm events, especially in the fall when the soils are dry. However, any changes in streamflow due to timber harvest or road activity are expected be minor and not likely to result in streambed scour and lateral erosion. Effects would not be distinguishable downstream where beneficial uses are present. Therefore, the proposed timber harvest is not expected to result in increases in peak flow large enough to adversely impact water quality.

The proposed timber sale (130 acres of commercial thinning harvest and 147 acres of regeneration harvest) is in a rain-dominated watershed. Flows in this watershed which modify stream channels and sediment transport tend to be from large storms that occur in the winter, commonly in December and January. The

regeneration harvest area is drained by eight small, well-distributed first-order streams. These streams appear to have adequate levels of LWD and stable banks. During the summer/fall period, most reaches in these streams are dry. The streams will have full retention of Riparian Reserves in regeneration units and minimum no harvest buffers of 50 ft. on non-fish bearing streams and 100 ft. on fish-bearing streams. In addition, about 17 green trees per acre would be retained in regeneration harvest units. Retained trees in harvest units and riparian buffer would take up and transpire water and moderate changes in stream flow. The closest stream reaches with sensitive beneficial uses to the proposed regeneration area range from 0.5 miles to >1.8 miles away. These streams have flows many magnitudes larger and their channels are relatively resistant to increases in flow (strongly constrained by steep hillslopes, low sinuosity, substrates dominated by large gravel, cobble, boulder, and bedrock, and stable banks).

There is considerable debate and uncertainty regarding how much influence timber harvest actions has on peak flows. A peak flow is defined as the maximum instantaneous discharge that is produced from an individual storm. The primary water resource concern for increased peak flows is that it can degrade stream habitat by scouring channel substrate, channel widening, stream incisement, and increasing sediment. Numerous watershed studies over the past 50+ years which have analyzed the effects of timber harvest on peak flows have often reported different results.

Most watershed studies which have reported increases in peak flows have been done on very small catchments that were extensively clearcut with no riparian buffers and where snow is an important contributor or precipitation. Most studies which have shown increases in peak flows and changes in timing of flow responses have been the result of either vegetation removal (e.g., timber harvest) by reducing interception and evapotranspiration losses or the result of constructing roads by increasing water runoff on compacted soils or the combination of the two. Peak flow increases tend to be greatest in the smallest drainages where greater proportion had been disturbed especially where clearcut timber harvest on snow accumulation and melt during rain-on-snow storm events occur (Harr 1981, 1986; Coffin and Harr 1992).

Relatively few studies have been conducted on rain-dominated coastal watersheds such as this one. In a recent literature review, Moore *et al.* (2005) compared nine paired watershed studies in rain-dominated coastal sites. Five showed increases ranging from 18% to 194%, three showed no significant change, and one showed a decrease (-22%) in peak flows (Moore *et al.*, 2005).

The only study area known that is similar in geology, elevation and climate to the project area is the Alsea Watershed Study (AWS). The AWS began in the 1960s, terminated, then restarted in the 1970s. Harr *et al.* (1975) correlated peak flow increases due to soil compaction (> 12% of the catchment) in road and skid roads in a study in coastal Oregon (Alsea watershed). After clearcutting a 175 acre watershed or patch cutting of an adjacent 750 acre watershed, no significant change was found. But when additional smaller early winter runoff events were included, the average peak flow increased 122%. In another study, a 750-acre watershed was clearcut into three areas averaging 62 acres each while leaving a stream buffer of 50-100 feet on each side of the stream along the main channel. No changes in peak flows were observed, even during fall and spring storms (Hall et al. 1987).

In a study in north coastal California (North Fork Casper Creek), Lewis *et al.* (2001) applied linear model analysis in 10 sub-catchments. They found no statistical effect related to roads at less than 7% of the watershed but did find that unit area peak flow varied linearly with the proportion logged, primarily by clearcutting. They also found that peak flow increases of up to 300%, but most increases were below 100% and occurred in the early season storms when soil moisture levels were low and declined with storm size. Recovery rates for peak flows were estimated to be 8% per year for the first 4-7 years.

Ziemer (1981, 1998) examined the peak flows after 65% of the South Fork Casper Creek watershed had been selection harvest and found no significant changes in the largest peak flows. The only increases were

in the smallest flow classes in the fall from small storm events.

In general, studies in rain dominated watershed have found considerable range of effects on streamflows from timber harvest. Peak flow increases tend to be greatest in the smallest drainages where a large proportion of the drainage had been clearcut. Retention of stream buffers appears to reduce the effects. Antecedent soil moisture has a strong influence on runoff response in rain-dominated watersheds. Ziemer (1998) has noted that in the Pacific Northwest, most of the increases in peak flows occur in the fall and are usually geomorphically unimportant. Channel forming events usually occur in the mid-winter when soils have recovered their moisture from the dry summer and early fall. Watershed studies in the H.J. Andrews, Alesa, and Caspar Creek have found that larger events are not significantly affected by logging.

Roads in the Pacific Northwest have been identified as a mechanism for increasing and altering the timing of peak flows. A review of literature indicates that the primary means by which roads can alter stream flows is by intercepting subsurface flow and routing the flow directly to the stream channel via road ditches and culverts. The most critical roads are those with deep road cuts, those built on mid-slopes, those built over shallow soils, and those that drain directly into stream channels (Coe, 2004).

Currently the road density for the N. Scappoose Creek 6th field/ Brush Creek & Fall Creek drainage is 7.7 mi/mi² and 7.4 mi/mi² or approximately 3.7% and 3.7% of the respective basins. Under this alternative, approximately 0.4 miles of road would be newly constructed and 0.6 miles of road would be reconstructed.

The proposed road construction is not expected to have a measurable effect on changes in peak flow for the following reasons. Before project completion, 0.4 miles of new road construction and 0.2 miles of reconstructed roads would be decommissioned. The end result is no net change in road mileage in the project area. Ziemer, 1981 found no changes to the hydrograph when roads occupied 5% of the basin. Harr et al., 1975 found that road effects on peak flows were detectable when 12% of the watershed was roaded. All new roads are located on ridgetops or benches with no hydrologic connections and are therefore unlikely to intercept subsurface storm flow and increase peak flows.

Extreme flows

The proposed action is unlikely to alter extreme flows. Extreme flows in the rain-dominated coastal watersheds are dependant on climatic patterns rather than vegetation manipulation. They occur in both logged and unlogged watersheds usually in December and January when soil moisture deficits have disappeared (Ziemer and Lisle, 1998).

Sediment and Turbidity

The primary ways by which the proposed action could contribute sediment and turbidity is timber yarding, road construction, decommissioning, reconstruction, and timber hauling and road maintenance.

Timber Yarding

Timber yarding is unlikely to increase sediment delivery in local streams. Any sediment that enters streams from yarding from the result of this action is expected to have an un-measurable and insignificant effect to beneficial uses.

All areas showing signs of potential instability were removed from timber harvest. Appropriate Best Management Practices (BMPs) and project design features would be used (Section 2.2.2) to minimize soil disturbance. Most soil disturbance would be relatively light as approximately 90% of the treatment area would be cable yarded and approximately 85% of the harvest units have slopes under 40%. Ground-base yarding would be restricted to the dry season. Harvest would occur on only 29 acres of Riparian Reserves. There would be no harvest buffers (min. 50 feet for non-fish bearing streams and min. 100 feet for fish

bearing streams) placed along both sides of streams. Most sediment produced from logging would travel a short distance before being trapped by duff, woody materials or other obstructions.

Road Construction and Decommissioning

Proposed work on approximately 0.6 miles of new road construction and decommissioning is not expected to result in sediment delivery to streams. The roads are on gentle slopes, stable ridgetops or benches far away from drainage channels, thereby limiting the potential for routing water and delivering sediment to project area streams. The only road construction in Riparian Reserves will be a short spur road located on a gentle ridgetop at least 250 feet uphill of an unnamed tributary of Brush Creek. All roadwork would be restricted to periods of low rainfall and runoff.

Road Reconstruction

Road reconstruction activities are expected to result in short-term increase in sediment input and a long-term decrease of sediment into streams.

Most of the of the approximate 2.6 miles of proposed road reconstruction would be on gentle ridgetops and benches far from streams where sediment transport to streams is unlikely. Part of the road reconstruction work would, however, include the replacement of a failing culvert in T4N R2W section 20. The culvert drains a shallow pond fed by a small perennial stream and is failing. The work would replace the existing 18 inch diameter culvert with a 36 or 48 inch diameter culvert. Sediment input would be minimized through the implementation of BMPs (e.g., restricting work to the ODFW's instream work window (July 15 to August 31), diverting the streamflow around the work site, stabilizing fill material at the stream crossing structures as soon as possible, and seeding and mulching exposed soils).

Some sediment delivery would occur with the replacement. Accurate estimates of sediment yield are not predictable. Depending on weather conditions and other various factors, sediment input is estimated to be between 0.5 and 1.5 cubic yards, based on professional experience. The first effect would be under 4 hours of increased sediment and turbidity during installation. With the small summer flow, these effects are not expected to be visible more 250 feet downstream. The nearest sensitive beneficial use is located approximately 1.2 miles downstream. The second effect would occur with the first sizeable rain, usually in late October or early November.

Over the past couple of winters it is estimated that 40 cubic yards of road material in the crossing has been eroded and transported downstream. In the near-term, the proposed action would reduce sediment input. In the long-term without reconstruction, the site will probably experience a torrent event within the next decade, releasing a possible 60 cubic yards of sediment from the road prism and possibly several hundred cubic yards of fine material from the pond.

Timber Hauling and Road Maintenance

Hauling timber from this project will likely deliver sediment to local streams. The effect would be of very limited magnitude and duration (<3 years). Most hauling would occur on year-round, well maintained, low gradient, gravel-surfaced forest roads, some of which cross small streams. With the implementation of design features and BMPs, hauling is not expected to exceed State of Oregon turbidity standards.

Most of this sediment is expected to come from hauling over a segment of private road in section 20 to remove timber from Units 29-2 and 29-3. This road segment crosses a small perennial stream at the bottom of a steep grade (8% to 22%) on the south and moderate grade (5 to 12%) on the north. A high volume of truck traffic (approximately 1,500 truckloads) is expected some of which will likely occur during the winter. (See stipulations for hauling under the project design features.) To help get an approximation, the Road component of the Water Erosion Prediction Project (WEPP) road erosion model was used. The module, in essence, calculates erosion from the road surface and the fill slope and then uses the buffer slope

characteristics to route the eroded material to the stream channel. Variables used in the prediction include the local climate, soil texture, soil rock content, road surface, traffic, design road gradient, width and length, fill gradient and length, and buffer gradient and length. The variables used for this project analysis are available in Appendix 3 - Sediment Assumptions and Calculations. Based on a 30-year mean annual average, the model predicts a total of sediment leaving buffer of 0.6 cubic yards. Note that this estimate includes significant uncertainties and should not be taken as definitive values. At best, the accuracy of the predicted sediment runoff is plus or minus 50 percent.

Stream Temperature

The primary means by which the proposed action could increase stream temperature is by the removal of trees adjacent to streams is via road reconstruction or commercial thinning activities. Regeneration harvest will not reduce stream shade because there would be no timber harvest within Riparian Reserves.

Nearly all roadwork would be located far away from streams. Approximately 8 small trees, primarily alders, would be removed to repair a stream crossing in Section 20 to allow access into Units 29-2 and 29-3. The removal of these trees is unlikely to have an appreciable affect to streamside shade and stream temperature because the small size (<3 ft width) and topographic location of the stream.

The proposed action would commercial thin a relatively small area near streams. (Approximately 28 acres of Riparian Reserve which is approximately 22% of commercial thinning units and approximately 10% of all harvest units). Most streams adjacent to proposed harvest units are intermittent and provide little or no surface flow during the summer time when elevated stream temperatures are of concern. No harvest buffers (minimum 50 ft on non-fish bearing and minimum 100 ft on fish bearing) would be placed on streams. Following thinning, the canopy closure is expected to average approximately 60%. No streamside vegetation, other than the possible cable corridors, of perennial streams is expected to be removed within the "primary shade zone" (PSZ, estimated to be no more than 60 feet from the active stream channel in all cases). No cable yarding corridors are anticipated to cross perennial streams. However, if for some reason it should become necessary, the yarding corridors would be too small to have any measurable effect on stream temperature. Yarding corridors would be narrow (maximum width of 12 ft) and perennial streams are small (<5 ft channel width) and confined by steep hillslopes.

Based upon the proceeding, the proposed action is consistent with recommendations in the "Sufficiency Analysis for Stream Temperature - Evaluation of the adequacy of the Northwest Forest Plan Riparian Reserves to achieve and maintain stream temperature water quality standards" (USDA Forest Service and USDI BLM, 2004). Stream temperatures would therefore be maintained.

Physical Integrity

With the exception of repairing a stream crossing in Section 20, the proposed action is not expected to alter the current condition of channels in the project area. Repairing the stream crossing would result in minor, short-term (<3 years) channel adjustment downstream of the crossing. In the long-term, this action would stop the current accelerated erosion at the crossing, improve the current channel form and function, and remove the risk of mass road failure.

Cumulative Effects

The proposed action is not expected to result in any measurable change to water quality indicators on the scale of the sixth field watershed, and would be unlikely to have any effect on any designated beneficial uses. Any effects to these attributes as a result of the Proposed Action would be within the range of effects disclosed in the RMP/FEIS (p. 4-14 to 4-19).

The following past management activities have occurred in the analysis area and are contributing to

cumulative effects: Most of the 34.1 mi² (21,819 acres) analysis area is private land and is covered by forests intensively managed for timber production. BLM administers approximately 20% of the lands in the subwatershed in an intermingled land pattern. In the past 30 years, BLM has harvested approximately 300 acres of timber within the analysis area; approximately 200 acres are 20 years old and approximately 100 acres less than 10 years old. Very few forest stands, on BLM or private lands, in the analysis area are older than 70 years. With exception of BLM lands, most riparian corridors are covered by thin strips of red alder, thick brush, and few scattered conifers, only on the largest streams has meaningful shade been retained.

The past century of logging has resulted in a vast network of roads. The BLM GIS coverage shows that there are 229 miles of roads in the subwatershed. Assuming that the actual amount of roads is understated by 15%, it estimated that the road density is 7.7 mi/mi². Assuming an average road width of 25 feet, the road network occupies about 3.7% of the subwatershed. The degree that local road networks effects stream and riparian networks is moderated by the fact that most of the subwatershed is composed of broad ridges with few short steep slopes and there are relatively few mid-sloped roads.

A majority of the forestlands within the in the subwatershed are not accessible to the public and/or drivable. They are located behind private gates usually locked, or earthen barriers, or overgrown with brush and hardwoods which. Consequently these forestlands are less disturbed by recreational activities (e.g., OHV use) than most forestlands. This is not expected to change in the future.

Some of the roads, primarily natural-surface spurs which were formerly used to support timber operations in the project area have been abandoned or have not been maintained. Some of these roads would be reconstructed to provide access to timber harvest units (Project 1). Most of these occur on stable, gently sloping, benches and ridgetops far away from streams.

For the reasonably foreseeable actions, no other BLM timber harvest projects or new road building are planned to occur over the next ten years. It is expected that BLM road maintenance would continue at the current level. This analysis assumes that the Pig's Puzzle Road Decommissioning Project (see Chapter 3 in this EA) would be implemented in the next 3 years. Logging on private land is expected to continue at the present rate, primarily clearcuts on a 40-50 year rotation. Road building on private lands would continue but at a slower rate and probably consist of mostly shorter access roads.

Streamflow

Low streamflows in Scappoose Creek during summer was identified as a concern in the Scappoose Watershed Analysis (1996). This is thought to be primarily from excessive water rights allocation.

Past private forest management activities in the subwatershed are probably affecting stream flows. Research data suggest that measurable increases in annual water yield or base flow begin to occur when about 25% of a catchments vegetation cover is removed in a rain dominated watershed (Stednick, 1996). Researchers found that annual water yields in coastal Oregon and British Columbia increased by up to ¼ inch for clear-cutting and patch-cutting, and up to 1/10 inch for selective cutting, for each percentage of the watershed harvested (Moore & Wondzell, 2005). Currently, of all the forest stands in the planning watershed, roughly 12% are under 10 years of age and 58% are 10 to 30 years of age and (based upon 2005 aerial photos interpretation and the BLM Forest Operations Inventory database). The proportion of land in the North Scappoose subwatershed appears to be similar.

After a review of the literature, it is reasonable to assume that in this rain-dominated, heavily-logged, coastal watershed, past timber harvests are probably having no more than modest effects on peak flows. The most likely affect is that peak flows are occurring somewhat earlier and may be of greater magnitude than it would be under a less disturbed condition. There is no direct evidence in the watershed that

channel-altering peak flows are contributing to the existing channel conditions, as the lack of large wood and structural elements seems to be the most limiting factor for channel and habitat conditions and is overshadowing other factors. In general, sensitive beneficial uses are located in streams with channels that are relatively resistant to increases in peak flows (strongly constrained by steep hillslopes, low sinuosity, substrates dominated by large gravel, cobble, boulder, and bedrock, and stable banks). Continued harvest on private lands would likely be offset by the continued hydrologic recovery of area harvested. The net result will be that this current streamflow will essentially remain unchanged.

Sediment

Past logging and road building activities in the sub-watershed and the project area have affected the sediment processes in the analysis area in several ways. Past logging removed anchoring trees that provided stability to hillslopes and stream banks. Logging has also reduced the amount of large woody debris that anchored stored sediments. Roads have contributed to torrent events in road crossings and to chronic erosion and sediment delivery to streams through erosion and transport of fine-grained surface soils. These activities on private forest lands have likely increased erosion and sediment delivery rates higher than under reference conditions. These higher rates are likely to continue in the future.

The proposed action would result in short-term (1 to 3 years), small increase in sediment (an estimated 2 cubic yards), mainly from repairing and hauling across a stream crossing in Section 20. The nearest sensitive beneficial use to the stream crossing is approximately 1.2 miles. No other future management is planned within the project area that would contribute incrementally to the cumulative effects from past and currently proposed activities. Cumulatively, the limited magnitude and duration of this effect would be unlikely to result in any measurable change for water quality on the scale of the sixth field watershed, and would be unlikely to have any effect on any beneficial uses. In the long-term, this action would stop the risk of a mass road failure in Section 20 which would likely measurably change water quality at the sixth field watershed scale at least for the short-term. This assumes that the culvert on a private road in Section 20 would not be repaired before a mass road failure occurred, as the landowner has indicated that they would not be repairing that road until it is needed for timber harvest in 20 to 30 years.

Temperature

Past management actions have had little affect on the current stream temperatures within the project area. The proposed action is not anticipated to have any measurable direct or indirect effects on stream temperatures in the project area and there is no other future management activities planned within the project area that would contribute incrementally to the cumulative effects from past management. Continued harvest on private lands would likely result in continued elevation of stream temperatures in the analysis area.

2.3.5.3 Environmental Effects on Hydrology – Alternative 2 (No Action)

Direct and Indirect Effects

Under the no action alternative, with the exception of a likely stream crossing failure, there would be no change in the current condition. There would be no timber harvest, no new temporary roads or landings built, nor additional ground disturbance from forest management activities. There would be no inputs of sediment from a culvert replacement in Section 20 and timber hauling. However, no action to repair a stream crossing in Section 20 would likely result in a massive road failure. Massive road failure would cause a torrent of water impacting the stream channel and water quality. It is estimated that approximately 60 cubic yards of sediment from the road prism and possibly several hundred cubic yards of fine material from the pond would be released into the small perennial stream which drains into North Scappoose Creek.

Cumulative Effects

With the exception of a likely catastrophic crossing failure in Section 20, under the no action alternative there would be no cumulative effects. If the crossing failure should occur (which appears to be likely), it likely measurably increase turbidity and sediment levels at the sixth field watershed scale (North Scappoose Creek) and impact beneficial uses, at least for the short-term.

2.3.6 Fisheries

2.3.6.1 Affected Environment

The analysis area specific to fisheries for the Pigs Puzzle timber sale is located in the North Scappoose Watershed from a point approximately 1 mile downstream of the confluence of Fall Creek upstream to the confluence of Brush Creek, inclusive of these two named tributaries and one unnamed tributary in-between. Within this analysis area BLM manages approximately 1145 acres.

There is limited historical data available on fish habitat and distribution in the watershed. It can be assumed that prior to extensive timber harvest, road construction, and settlement, fish habitat was most likely in better condition than it is today. A quote from “The History of Scappoose, Oregon between the Years 1852-1930,” by James Loring Watts states; “The Scappoose Creeks with their virgin timber watersheds and lack of diversions, were much larger in the earlier days. They contained many native trout, sea going trout, steelhead, and chub salmon in season. Also the uncontaminated bay had heavy runs of salmon both in spring and fall.” Better habitat was most likely associated with large woody material entering the stream channels creating complex habitat and pools desirable for fish production and survival. Fish passage was not affected by dams or water diversions and water quality was generally better except following major forest stand replacement events such as fire.

There are four species of anadromous fish; chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), steelhead (*O. mykiss*), Columbia SW Washington sea-run cutthroat trout, (*O. clarkii*), as well as resident coastal cutthroat trout and pacific lamprey inhabiting some of the waters above natural barriers in the Scappoose watershed and the analysis area. Steelhead distribution is mapped near units 25-1, 29-4 and 31-5. The precise distribution of adult coho or steelhead spawners or juvenile rearing areas is not known, but suspected (ODFW personal communication) in Fall Creek both historically and currently (ODFW distribution mapping). Coho, chinook and steelhead are federally listed as threatened under the Endangered Species Act. All populations of coho and chinook in the action area are covered under the Magnuson-Stevens Fisheries Conservation and Management Act (MSA). Columbia SW Washington sea-run cutthroat trout as well as coastal cutthroat trout are Bureau Sensitive species. Lower Columbia chinook has Designated Critical habitat located in North Scappoose Creek.

Fish Species distribution.

Mapped distribution of steelhead and coho is approximately one half of a mile below the proposed thinning in unit 25-1 in Brush Creek. A number of fish passage projects, culvert replacements or removals have occurred in the area including two culvert removals for fish passage in Brush Creek which has resulted in increased distribution of salmonids in the watershed.

In the Fall Creek drainage steelhead and coho are located approximately 0.40 miles below the harvest unit in section 29. There are several areas known to have the potential of greater salmonid distribution than is mapped within the streamnet web site (<http://www.streamnet.org/>). As there are no known barriers within Fall Creek the potential distribution for steelhead should not be cut off at the BLM property line in section 29; for analysis purposes steelhead and coho distribution in Fall Creek would extend to the East side of section 32. This is an extension of ~ 1.0 miles beyond the upper extent of ODFW mapped distribution in

this watershed.

No additional information is available to confirm or refute the mapped distribution of coho within the Scappoose drainage; as such the presence of coho will be assumed in this analysis to the mapped end by ODFW or further if the streams in the area could support them.

The historical distribution of anadromous salmonids may have changed dramatically after 1951. Bonnie falls, a 20 foot vertical waterfall located on North Scappoose Creek, 4.5 miles above it's confluence with Scappoose creek and approximately 0.4 miles above the Fall Creek confluence, was a barrier to all up-stream fish migration until 1951 with the construction of a fish ladder.

Existing Habitat Conditions

Habitat conditions in Fall Creek, Brush Creek and North Scappoose Creek vary greatly; the primary differences are stream slope and size. There are notable differences between the upper and lower portions of these stream channels due to the local geology. The headwaters of streams in this area start in sedimentary geology and as they move downhill the underlying geology is igneous. Stream morphology and potential habitat quality varies in part based on this geology; primary differences include substrate type, pool depths and the incidence of eroding stream banks. There appears to be distinct gradient breaks near the transition zone between these parent materials, in many cases these gradient breaks currently or in the past formed the barriers to fish distribution.

The lower reach in North Scappoose Creek (reach 1), associated with Lower Columbia chinook critical habitat, (beginning at the bridge crossing of the Scappoose-Vernonia Rd. near Siercks Rd and ending at Bonnie Falls) is constrained by terraces within a broad valley floor; the Rosgen stream type in this area resembles a B2 or G2. Average unit gradient is 1.6% with the habitat units being quite long. Stream habitat is dominated by riffles, rapids, and scour pools. The substrate in this reach is dominated by gravel, cobble and boulders. Pools make 25% of the habitat area.

Reaches 2-3 in North Scappoose Creek (from Bonnie Falls to bridge crossing the Scappoose-Vernonia road in the SE corner of section 17) have an average gradient of 2.9% and the dominant habitat units are made up of rapids, riffles and scour pools. Pools make up 34% of the habitat area.

Reach 4 in North Scappoose Creek (from end of reach 3 to confluence with Brush Creek) has an average gradient of 0.4 percent. The stream habitat unit is dominated by pools and riffles with the substrate dominated by silt, sand and gravels. Pools make up 56% of this reaches habitat area.

Brush Creek in its headwaters is narrow and steep, from a stream confluence in section 19 stream gradients drop and the stream takes on a higher sinuosity.

Fall Creek: the data available for this stream was collected in 1992; this stream has 22% of its area in pool type habitats with an average wetted width of 8 feet. Channel slope averaged 3% for this stream; however some segments have higher gradients. At the time of the survey extensive beaver activity with large dams were common and made up a large percentage of total pool area. Silt made up 19% of the primary substrates within this stream segment. Spawning size substrates make up 55% of the primary substrates within the surveyed portion of this stream.

Large Woody Debris

Due to past timber harvest, valley bottom roads, homesteading activity, fire and other management actions the larger streams within the action area are deficient in large woody debris (LWD). A 1998 ODFW survey

of North Scappoose Creek reported very low wood volume and almost a total lack of LWD. The BLM has been working to address the deficiency in LWD through the contribution of large wood to the watershed council for use in instream restoration. Planting in riparian areas has also been undertaken but not in the action area. Lack of LWD within the Scappoose Creek 6th field and the smaller action area has influenced the hydrologic processes of the watershed to the point that portions of the stream channels are not functioning properly for other indicators. Oregon Department of Fish and Wildlife Aquatic habitat surveys conducted in 1998 found 179 pieces of wood that matched the minimum size criteria for large wood ($\geq 3\text{m} \times 0.15$) in reach 1 but only one that matched the size criteria for a key piece ($\geq 10\text{m} \times 0.60\text{m}$ ODFW criteria). Key pieces are regarded as providing the most significant fish habitat. The baseline indicator for this habitat type is rated **Not Properly Functioning**.

Pool Quality and Frequency:

There is limited data for pool quality and frequency within the watershed as a whole. For the purposes of this analysis it is assumed that conditions existing in N. Scappoose Creek are representative of conditions in all of the streams in the proposed action area due to similar past management actions that have occurred in them.

North Scappoose Creek:

The number of channels widths between pools varies between 3.9 and 6.6 (5-8 ODFW desirable range). The percentage of pools varies between 25% and 76% ($>35\%$ ODFW desirable range) 4 of the reaches surveyed are in the desirable range. (**Functioning At Risk**)
Pool quality is considered to be **At Risk** due to the lack of cover within the available pool area.

Substrate

Substrate conditions vary widely depending on location within the action area. Streams in low gradient areas and the headwaters have habitat units that are dominated by fine sediments however, North Scappoose Creek from approximately the confluence of Alder Creek downstream to Siercks Creek is dominated by gravel, cobble and boulders and the incidence of bank erosion is low. Gravels make up roughly 15 to 17% of the substrate in surveyed habitat over 1.5% slope, while sand and silt combined make up 18 to 25% (**Not Properly Functioning**).

Floodplain Connectivity and Off Channel Habitat:

Floodplain connectivity and off channel habitat are rated as **Not Properly Functioning** due to the lack of large wood, large floods, and channel confinement (primarily from roads) has severely restricted access to the floodplain during high flows. Active restoration within the North Scappoose Watershed has added LWD and replaced many culverts, where these actions have occurred connections to floodplains and off channel habitat or the building blocks to achieve those habitat elements have been restored. It should be noted that due to the channel types (Rosgen B on the lower main channels and Rosgen A in headwater areas) large floodplains and habitat features such as oxbows and secondary channels are not an expected condition for these types of streams near the project area.

Refugia:

Within North Scappoose Creek and the entire Scappoose watershed adequate refuge habitat is lacking. Impingement of road systems and the withdrawal of water for municipal supply likely decrease available habitat during the warmer months of the year. This indicator would be considered **Not Properly Functioning**.

Width/Depth Ratio:

The width to depth ratio for the North Scappoose creek is 17.3 and as such is considered **Not Properly Functioning**.

Streambank Condition:

Based on ODFW Aquatic Inventory data, streambank condition in the analysis reaches is generally stable in the lower three reaches (bedrock channel) to actively eroding in the upper low gradient portions of North Scappoose Creek (three reaches as well). The current conditions of this subwatershed from a bank erosion standpoint appear to be functioning within a normal range, eroding in sediment rich portions and stable in hardened channel portions. For the North Scappoose subwatershed the current rates of bank erosion are considered **Properly Functioning**.

Critical Habitat within the action area: Critical Habitat for Federally Threatened (ESA) Fall chinook is located in North Scappoose Creek, mapped distribution ends near the Bonnie Falls and Fall Creek confluence with North Scappoose Creek. The critical habitat Streamnet web site (<http://www.nwr.noaa.gov/Salmon-Habitat/Critical-Habitat/>) illustrates the anticipated range of Lower Columbia chinook salmon.

The proximity of the proposed action to listed fish and Designated Critical Habitat is shown in Table 7.

Table 7. Distance from units to listed fish habitat and designated critical habitat

Unit	Stream	Proximity to Listed Fish / Habitat (miles)			
		LCR Steelhead	LCR coho	LCR chinook	Critical Habitat-LCR Chinook
25-1	Brush Creek	0.50	0.50	5.60	5.60
29-1	Unnamed Trib	1.70	1.70	2.50	2.50
29-2	Unnamed Tribs	.6	.6	1+	1+
	Unnamed Trib Fall Creek	0.50	0.50	1.50	1.50
29-3	Unnamed Trib Fall Creek	0.50	0.50	1.50	1.50
	Unnamed Trib Fall Creek	0.60	0.60	1+	1+
29-4	Unnamed Trib Fall Creek	0.14	0.14	1.3	1.3
31-5	Unnamed Trib Fall Creek	0.40	0.40	2.3	2.3

2.3.6.2 Environmental Effects on Fisheries – Alternative 1 (Proposed Action)

Timber Yarding

As discussed in the hydrology analysis (section 2.3.5.2), timber yarding is unlikely to increase sediment delivery to streams. Any sediment that enters streams from yarding from the result of this action is expected to have an un-measurable and insignificant effect to beneficial uses. Beneficial uses include fisheries resources and as such there is no causal mechanism to affect fisheries as a result of the proposed action.

Road Construction

As discussed in the Hydrology analysis (section 2.3.5.2), proposed work on approximately 0.6 miles of new road construction is not expected to deliver sediment to streams and as such has no causal mechanism to affect fish.

Road Reconstruction

As discussed in the Hydrology analysis (section 2.3.5.2), road reconstruction activities in section 20 are expected to result in short-term increase in sediment input and a long-term decrease of sediment into streams.

The replacement of a failing culvert located in T4N R2W section 20 is the only road reconstruction project that will result in short term sediment inputs. These inputs are unlikely to have impacts to fish. Fish presence has not been verified on this small 2nd order stream. GIS analysis and professional judgment suggests that the closest fish presence is located approximately 1.2 miles downstream of the proposed culvert replacement. This unnamed tributary averages 17% slope from it's confluence with N. Scappoose Creek for a distance upstream of approximately 0.4 miles, which constitutes a barrier for fish passage. The stream above this high gradient section flattens out and averages 2-3% slope for approximately 0.8 miles. Beaver activity is evident with well vegetated, stable stream banks. Any sediment that is input into the stream as a result of this culvert replacement will be minimized through the implementation of BMP's (e.g., restricting work to the ODFW instream work window, diverting the streamflow around the work site, stabilization of the fill material as soon as possible, and seeding and mulching exposed soils). Sediment that is released through the implementation of this action (approximately 2.0 cubic yards) is anticipated to be stored in this low gradient reach before reaching occupied fish habitat in North Scappoose Creek (1.2 miles below the culvert replacement). Other mitigation measures will be in place (see section 2.1) to reduce sediment inputs related to haul.

The removal of approximately 8 alders to facilitate the replacement of this culvert is discountable in its ability to effect stream temperature and therefore fish. These alders currently shade predominantly the road prism and provide minimal stream shading to the stream itself.

Road Decommissioning

As discussed in the Hydrology analysis (section 2.3.5.2), road decommissioning activities are not expected to result in sediment delivery to streams. There is no causal mechanism to affect fisheries as a result of the proposed action.

Timber Hauling and Road Maintenance

As discussed in the Hydrology analysis (section 2.3.5.2), hauling timber will likely deliver sediment to streams.

The road component of the Water Erosion Prediction Model that was used calculated 0.6 cubic yards of total sediment (+/- 50%) transported into streams via road crossings. The introduction of 0.6 cubic yards of total sediment into stream crossings located 1.2 miles from occupied or potentially occupied listed fish habitat has a discountable ability to affect fish due to its small magnitude and large distance.

Stream Temperature

As discussed in the hydrology analysis (section 2.3.5.2) actions associated with the proposed action will maintain the current stream temperatures and as such there is no causal mechanism to affect fish or their habitat.

Physical Integrity

The proposed action will alter the current condition of the stream channel at only one location, the culvert replacement in section 20. This action will result in a minor, short term (<3 years) channel adjustment downstream of the crossing. The closest occupied fish habitat is located approximately 1.2 miles downstream of this crossing replacement and due to the small nature of the channel readjustment there is no causal mechanism to affect fish.

LWD

The proposed project seeks to do thinning in approximately 28 acres of Riparian Reserves. Due to the small stream size adjacent to these areas, lack of transport potential of the streams in this area to deliver LWD to fish bearing streams, the use of large no harvest buffers (>80 feet), and distance to fish (no closer than 0.5 miles) there is a discountable probability of adversely affecting future LWD inputs that have benefits to fish.

Road Density

As described in the proposed action alternative (section 2.2) there will be no net increase in road density as a result of this project. New construction (0.6 miles total) will occur on stable, mostly gently sloping, benches and ridge tops. There will be no full bench construction that will be required nor any drainage crossed. Since there is no hydrological connection associated with new road construction there is no causal mechanism to affect fish.

Streamflow

Low Flows

As discussed in the hydrology section of this analysis (section 2.3.5.2) the net effect to low flows (summer flows) as a result of this action is a potential increase in low flows. Any increase to low flows will provide a beneficial action to aquatic resources, including fish.

Peak Flows

As discussed in the hydrology section of this analysis (section 2.3.5.2) there are no expected changes to peak flows as a result of the proposed action and as such there is no causal mechanism to affect fish.

Extreme Flows

As discussed in the hydrology section of this analysis (section 2.3.5.2) the proposed action is unlikely to alter extreme flows and as such there is no causal mechanism to affect fish.

Cumulative Effects

The proposed action is not expected to result in any measurable change to water quality or the fish habitat indicators on the scale of the sixth field watershed, and would be unlikely to have any effect on any designated beneficial uses, including fish. Any effects to these attributes as a result of the Proposed Action would be within the range of effects disclosed in the RMP/FEIS (p. 4-14 to 4-19).

2.3.6.3 Environmental Effects on Fisheries – Alternative 2 (No Action)

No forest management activities would occur within the proposed project areas at this time. Forested stands within the project area would continue to grow and develop without management intervention, although at a slower rate in areas heavily infected with *Phellinus weirii* root disease. The identified effects of the action alternatives would not occur at this site at this time. There would be no new roads or landings built, nor additional ground disturbance from forest management activities. There would be no short-term minor inputs of sediment from a culvert replacement in Section 20 and timber hauling. Assuming that the culvert on a private road in Section 20 is not repaired before a mass road failure occurred, there would be a torrent of water and sediment released (an estimated 60 cubic yards of sediment from the road prism and possibly several hundred cubic yards of fine material from the pond). This event would measurably increase turbidity and sediment levels at the sixth field watershed scale (North Scappoose Creek) and impact beneficial uses including fisheries, at least for the short-term.

Cumulative Effects

With the exception of a likely catastrophic crossing failure in Section 20, under the no action alternative there would be no cumulative effects. If the crossing failure should occur (which appears to be likely), it will likely measurably increase turbidity and sediment levels at the sixth field watershed scale (North Scappoose Creek) and impact beneficial uses including fisheries, at least for the short-term.

3.0 PROJECT 2 – ROAD DECOMMISSIONING

3.1 Purpose and Need for Action and Decision Factors

3.1.1 Purpose and Need for Action

The *Scappoose Creek Watershed* Analysis identified roads as a likely source of stream sediment and recommended decommissioning old natural-surfaced roads, especially those with inadequate or failing water crossing structures. The goal of the proposed project is to assist in restoring and improving ecological health of the watershed and aquatic systems within the watershed. The road proposed for decommissioning is an old natural-surfaced road (road no. 4N-2-28) that is no longer needed for management.

The objectives of the proposed action are to:

1) Implement the following management direction from the ROD/RMP pertaining to transportation management, specifically:

- Reduce road density by closing roads that are no longer needed for management activities and that are contributing to water quality degradation (RMP p.64);
- Meet Aquatic Conservation Strategy (ACS) requirements by “...closing and stabilizing, or obliterating and stabilizing roads based on the ongoing and potential effects to ACS objectives and considering short-term and long-term transportation needs” (RMP, p. 62).

3.1.2 Decision Factors

Factors to be considered when selecting among alternatives will include:

- The degree to which the objectives previously described would be met;
- The nature and intensity of environmental impacts that would result from implementation and the nature and effectiveness of measures to mitigate impacts to resources including, but not limited to wildlife and wildlife habitat, water quality, fisheries and fisheries habitat, and air quality;
- Compliance with: management direction from the ROD/RMP; terms of consultation on species listed and habitat designated under the Endangered Species Act; the Clean Water Act, Clean Air Act, Safe Drinking Water Act and O&C Act; and other programs such as Special Status and Survey & Manage Species; and
- Reduce the economic costs, both short-term and long-term, of managing the lands in the project area.

3.2 Alternatives

3.2.1 Alternative Development

The decision process for the Salem District RMP has resolved issues related to the land use allocations. No unresolved conflicts concerning alternative uses of available resources (section 102(2) (E) of NEPA) were identified. The BLM developed alternatives for this project 2 based on the identified purpose and need in Section 3.1. This EA will analyze the effects of the “Proposed Action” and the “No Action Alternative”. No additional alternatives were identified that would meet the purpose and need of the project.

3.2.2 Alternative 1 - Proposed Action

The Proposed Action is to decommission approximately 1.0 miles of an existing natural-surfaced road (4N-2-28) in T4N R2W section 29 (Figure 2). This is an old BLM-controlled road that has three stream-crossing culverts, two of which are in the process of failing and are chronic sources of sediment to Fall Creek. Decommissioning will be accomplished by removing the three culverts and restoring the stream channel to an appropriate width, removing as much trapped sediment as feasible above the culverts, subsoiling the road to reduce compaction and increase water infiltration, installing waterbars to control road surface runoff, planting native species such as red alder on the road surface, and blocking both ends of the road to all vehicle traffic, including off-highway vehicles (OHVs).

The following design features will be incorporated into the proposed action:

The following is a summary of the design features that reduce the risk of effects to the affected elements of the environment. The proposed action(s) would be implemented consistent with the Best Management Practices (BMPs) contained in Appendix C of the RMP.

- All road decommissioning activities would occur during the dry season. All work required in live streams (culvert removal) would be limited to the ODFW instream work window (July 15 to August 31).
- Live streams would be de-watered prior to culvert removal by blocking streamflow upstream from the disturbance area and pumping water around the site.
- Existing logs and rootwads in the road fills above the three culverts would be placed back into the stream channels after the culverts have been removed.
- Restricting OHV use on the decommissioned road may include the strategic placement of boulders or root wads, or other types of earthen barriers.
- Prior to entering the project area, or before returning to the watershed after leaving it, any heavy machinery (with the exception of pickup trucks used for daily personnel travel) would have all dirt and adhering vegetation removed by power-washing.

3.2.3 Alternative 2 - No Action

Under the no action alternative the culverts in road 4N-2-28 would not be removed and the road would not be subsoiled, waterbarred and blocked to vehicles at this time. These culverts would continue to fail, resulting in road fill over the culverts and sediment stored upstream from the culverts being transported downstream. Future decommissioning of this road would not be precluded and could be analyzed under a subsequent EA.

3.3 Affected Environment and Environmental Effects

3.3.1 Wildlife

3.3.1.1 Affected Environment

The road proposed for decommissioning is a 1.0 mile segment of old natural-surfaced road (BLM road no. 4N-2-28) located in T4N R2W section 29 (W.M.). Currently, except for about 100 feet along the eastern edge of section 29, the road is not accessible to vehicular traffic; post treatment it would be blocked to restrict future vehicular access.

Most of the road to be decommissioned is located on a bench with gently sloping or flat terrain; the eastern portion is located on slightly steeper terrain. It passes through forested stands which range in age from 45- to 75-years-old. Conifer dominates most adjacent stands along the eastern portion of the road and there is a considerable hardwood component along most other portions of the stands along the road; this includes a few scattered big leaf maple however red alder, either as scattered clumps or larger homogenous patches is the dominate hardwood. The road surface is relatively compacted; some portions of the road contain a very thin layer of duff, generally 0.25 to 0.5 inches thick. It is currently vegetated with various mosses, grasses, forbs, ferns, salal and scattered alder generally three to five inches DBH. There is little CWD, especially larger logs of the later decay classes on the road surface. For approximately half its length, the road serves as the southern boundary for one of the proposed Pig's Puzzle timber sale treatment units (unit 29-3). The three stream-crossing culverts that would be removed as a part of the decommissioning are located on 1st order streams.

There are no known special habitats (e.g., talus slopes, cliffs, caves, or mines or abandoned wooden bridges) within the vicinity of the road decommissioning project.

The Pig's Puzzle Projects Wildlife Biological Evaluation, (Pig's Puzzle Project - Project Record Document #5) identifies all "wildlife species of concern" that have such a status that the potential for impacts resulting from the Pig's Puzzle Projects is warranted under NEPA. These species are those potentially located within and/or near the road decommissioning project area and/or potentially impacted by the project and include ESA proposed or listed wildlife species, Bureau Manual 6840 Special Status Species and Northwest Forest Plan Species, including Survey and Manage Species. Discussions of wildlife species of concern which are potentially located within the proposed action areas and potentially impacted by implementation of the Road Decommissioning project can be found below.

Wildlife Species proposed or listed under the Endangered Species Act:

The Northern Spotted Owl, Marbled Murrelet and Bald Eagle - (FT)

The impacts resulting from the Road Decommissioning project upon three wildlife species proposed or listed under the Endangered Species Act were analyzed; these species include the northern spotted owl, marbled murrelet and bald eagle. As with the Pig's Puzzle Timber Sale Project, there is no suitable habitat for these three species within the vicinity of the Road Decommissioning Project and the project is not located within Designated Critical Habitat for the spotted owl or marbled murrelet. Portions of the road to be decommissioned are located directly adjacent to and/or pass through dispersal habitat for spotted owl.

Other Special Status Species and/or Survey and Manage Species:

Cope's Giant Salamander and Columbia Torrent Salamander - (BS)

Cope's giant salamander is one of the most recently described vertebrates in the Pacific Northwest. This

salamander is most commonly known in the aquatic larval and neotenic forms; terrestrial adults are extremely rare. These salamanders most commonly inhabit fast flowing clear, cold creeks and streams and may also be found in seeps. Cope's giant salamanders are nocturnal and emerge from their diurnal hiding places and crawl about the rocky stream bottom or in the moist splash zone along the banks of streams. Its requirement for clear, cold water may make it sensitive to logging activities.

The Columbia torrent salamander is strongly associated with the splash zone directly adjacent to permanently flowing streams and seeps.

Relative to the Road Decommissioning Project, suitable habitat for these species is located entirely within that portion of the project area involving the removal of three culverts on active 1st order stream reaches.

Roosevelt Elk and Black-Tailed Deer

Roosevelt elk and black-tailed deer use a wide range of habitat types. The use of the general vicinity containing the proposed Road decommissioning project by these species is considered moderate and the quality of the habitat for these species in the project area is considered to be good. The entire project area is behind locked gates. With the exception of about 100 feet along the eastern edge of section 29, the road to be decommissioned is not accessible to vehicular access and receives little traffic or general human activity. The road likely functions as a travel corridor for elk and deer.

As discussed within the general Landscape or Watershed Scale discussion, higher densities of roads that are open to vehicular traffic within an area can negatively influence habitat utilization and increase elk and deer vulnerability. The current road density of the North Scappoose Creek 6th field subwatershed which includes the road decommissioning project is relatively high - approximately 6.7 miles/mi². However, primarily due to the presence of locked gates on private roads that restrict the general public's access to both private and Federal lands, a large but unquantified portion of the roads within the North Scappoose Creek 6th field subwatershed is not accessible by the public and/or drivable; this results in a reduced amount of general disturbance within the area and increases the quality of habitat for Roosevelt elk and black-tailed deer.

3.3.1.2 Environmental Effects on Wildlife – Alternative 1 (Proposed Action)

Wildlife Species proposed or listed under the Endangered Species Act:

The Northern Spotted Owl, Marbled Murrelet and Bald Eagle - (FT)

As with the Pig's Puzzle Forest Management Project, there is no suitable habitat for the northern spotted owl, marbled murrelet or bald eagle within the vicinity of the Road Decommissioning Project and the project is not located within Designated Critical Habitat for the spotted owl or marbled murrelet. Portions of the road to be decommissioned are located directly adjacent to and/or pass through dispersal habitat for spotted owl; the project would not impact the adjacent spotted owl dispersal habitat.

There are no identified impacts, including cumulative impacts, resulting from the Road Decommissioning Project upon the northern spotted owl, marbled murrelet or bald eagle. Therefore, the project would be of *NO EFFECT* upon these species as a result of habitat modification or the potential for disturbance. The project would be of *NO EFFECT* upon Designated Critical Habitat for the spotted owl or marbled murrelet.

There are no direct or indirect effects on these species, so there are no cumulative effects on these species either.

Other Special Status Species and/or Survey and Manage Species:

Because there are no direct or indirect effects, there are also no cumulative impacts associated with the Action Alternative expected to affect any Bureau 6840 Special Status and/or Survey and Manage wildlife species.

Cope's Giant Salamander and the Columbia Torrent Salamander - (BS)

There is a slight potential that the removal of three culverts on active 1st order stream reaches could impact a few individual salamanders and very localized stretches of suitable salamander habitat. Project design features have scheduled in-stream work to occur during the ODFW in-stream work window (July 15-August 31) to help minimize the potential for adverse impacts. It would be expected that should there be any adverse impacts upon these salamanders and/or their habitat, they would be localized, very minor and short-term as the impacted areas would rapidly recover. The project would be expected to adversely affect a negligible percentage of available BLM habitat within the area. The project would have a long-term benefit to salamander habitat by relieving chronic sources of sediment to stream reaches below the culverts through alleviating the potential risk for continued culvert failure.

As a result of the nature and scope of the proposed project and expected impacts, implementation of Alternative 1 of the Road Decommissioning Project would not be expected to result in the loss of population viability for Cope's Giant or Columbia Torrent Salamanders or result in the need to elevate their status to any higher level of concern including the need to list under the ESA.

Roosevelt Elk and Black-Tailed Deer

Like the Pig's Puzzle Forest Management Project, it is expected that the road decommissioning project would temporarily displace individual deer and elk as they react to the disturbance created by project implementation and the increased human presence within the vicinity of the action area. These disturbance impacts, either individually or cumulatively would not impact the health of the local populations based upon the expected limited length of time of the disturbance and the fact that other, relatively undisturbed suitable habitat is present within the vicinity of the proposed action.

From a habitat perspective, the Road Decommissioning Project would likely result in relatively minor beneficial impacts to elk and deer habitat despite the fact that it would result in a reduction of 1.0 miles of road within the watershed. While the current road density of the North Scappoose Creek 6th field subwatershed which contains the proposed project is relatively high - approximately 6.7 miles/mi², roads located behind locked gates or earthen barriers, or overgrown with brush and hardwoods are less accessible and therefore commonly result in less potential for disturbance to wildlife. The road to be decommissioned is essentially blocked to vehicular access and well behind a locked gate; it currently receives little traffic or general human activity. Post treatment the road will be totally inaccessible to vehicles. This will benefit habitat quality however, given the small number of vehicles currently using such a small portion of this road, this benefit is considered to be negligible. Currently, the road likely functions as a travel corridor for elk and deer; post-treatment it would be expected to continue to function at that capacity.

3.3.1.3 Environmental Effects on Wildlife – Alternative 2 (No Action)

Under the No Action Alternative, no existing roads would be decommissioned; the three culverts, two of which have been identified to be at risk of failure, would not be removed. The local plant and animal communities would be dependent upon and respond to ecological processes that would continue to occur based on the existing condition without management intervention. The identified impacts of the action alternative upon wildlife and wildlife habitat would not occur at this site at this time.

Rather than the 1.0 mile decrease in road density as identified as a result of the Action Alternative, there would be no change in road density under the No Action Alternative.

There are no identified cumulative impacts to wildlife associated with the No Action Alternative.

Selection of the “No Action” Alternative would be of *NO EFFECT* upon the marbled murrelet and northern spotted owl (and their critical habitats) as well as the bald eagle and all other species listed under the ESA.

Selection of the “No Action” Alternative would result in the culverts along the road not being removed; two of these culverts have partially failed. It is expected that over time, these culverts would continue to fail, periodically sending pulses of sediment downstream which would have an adverse impact upon water quality; affects of this would likely be most prominent during the wet season especially during winter flood events. This reduction in water quality would have adverse impacts upon Cope’s Giant Salamander and the Columbia Torrent Salamander and/or their habitats. This potential for impact would likely be most notable for the Cope’s Giant Salamander as they seem to have stronger requirements for clear water.

Alternative 2 would not be expected to result in the loss of population viability for any Special Status Species that may occur in the project area, or result in the need to elevate their status to any higher level of concern including the need to list under the ESA.

3.3.2 Invasive, Non-Native Plants

3.3.2.1 Affected Environment

See section 3.3.1.1 (Affected Environment for Wildlife) for a general description of the affected environment for plants. There are no known special habitats within the vicinity of the road decommissioning project.

3.3.2.2 Environmental Effects on Invasive, Non-Native Plants – Alternative 1 (Proposed Action)

Botanical surveys for Invasive, non-native plant species within the Pigs Puzzle project area were conducted in June and July of 2000. A comprehensive native plant species list is located at the Tillamook Resource Area field office. Species that were identified within the proposed project areas consisted of Bull thistle, (*Cirsium vulgare*), Canada thistle (*Cirsium arvense*), Scotch broom (*Cytisus scoparius*), Tansy ragwort (*Senecio jacobaea*), Himalayan blackberry (*Rubus discolor*), English Ivy (*Ilex aquifolium*) and St. Johnswort (*Hypericum perforatum*). All species were located along road edges and exposed areas that tended to have soil disturbance. These species are considered Priority III (established infestations) on the Oregon Department of Agriculture (ODA) Noxious weed list. Any ground-disturbing activity or decrease in canopy cover offers opportunity for the introduction of noxious weeds and/or invasive non-native plant species based on the existence of a seed source. These aggressive weed species are prevalent throughout Western Oregon and proliferate easily through vectors such as motor or foot traffic, birds, wind, and water. Several populations of meadow knapweed (*Centaurea pratensis*) were noted outside of the project area but within close proximity to T4N, R2W, Sec. 29. Meadow knapweed is considered a Priority I species (potential new invader). Ground disturbing activities such as road decommissioning could produce conditions conducive to noxious weed establishment. Some degree of invasive non-native plant species introduction or spread is probable as management activities occur in the project area. Design features such as requiring washing of equipment before entering the site, planting native grasses and hardwoods on the decommissioned road, and monitoring the project area to evaluate for control treatments will be used to

mitigate introduction and spread of invasive non-native species throughout the project area.

Cumulative Effects

Examples of forest management activities within the subwatershed that will create soil disturbance and influence the spread of Invasive/non-native plant species are: commercial and pre-commercial density management thinning, young stand maintenance, new road construction, road decommissioning, road maintenance, culvert replacement, and off highway vehicle (OHV) use. Activities that do not necessarily create disturbance but influence the spread of invasive/non-native plant seeds are: recreational hiking, biking, horseback riding, fishing, and hunting. Other sources of seed dispersal are from wildlife that are either passing through or frequenting the area, water movement, natural dehiscence and wind. Many past and present management activities tend to open dense forest settings and disturb soils therefore providing opportunities for widespread weed infestations to occur. Many, if not all of the weed species identified as Priority I and III on the Oregon Department of Agriculture(ODA) noxious weed list are present throughout the area. Because they are present in the project area, a seed bank has been established and new seed is available for dispersal. Most Invasive/non-native species are not shade tolerant and will not persist in a forest setting as they compete for light when tree canopies close and light to the under-story is reduced.

3.3.2.3 Environmental Effects on Invasive, Non-Native Plants – Alternative 2 (No Action)

The existing plant communities within the project area would continue to be dependant on ecological processes currently in place if no action is taken. Because most Invasive/non-native plant species are not shade tolerant and no immediate change to the existing habitat is expected to occur, no appreciable increase in the Invasive/non-native plant populations identified during the field surveys can be expected as most invasive species tend to occupy disturbed areas with high amounts of light. The one species identified that is shade tolerant, English ivy, generally does not reproduce in shade like conditions so any increase in population would rely on seed that was introduced to the site from birds. In the future as succession takes place and species such as red-alder reach their climax age and fall out of the plant community, this will allow an under-story of shrub species to dominate until an over-story of trees can reestablish itself. When this natural condition occurs it could be expected that invasive weed species will compete as one of these under-story species. Due to the compaction of soils within the road grade, it can be expected that the reestablishment of conifer species may require more time than would be expected on non-compacted soil.

3.3.3 Soils

3.3.3.1 Affected Environment

The gently sloping, 1.0 mile road segment proposed for decommissioning is on a bench and crosses three small headwater streams. The road segment has not been maintained for many years and is not accessible to vehicle traffic. The road segment is natural surfaced composed of primarily of compacted Bacona silt loam and silty clay loam. Soil adjacent to the road consist predominantly of Bacona soil but includes a minor amount of an unnamed poorly drained, very deep soil. It is partially covered by grass, forbs, ferns, and a few scattered small trees, primarily red alders. Little surface erosion is apparent.

The analysis area consists of approximately 1.0 mile segment of the Road 4N-2-28 and a small area directly adjacent to it in T4N, R2W, Section 29.

3.3.3.2 Environmental Effects on Soils – Alternative 1 (Proposed Action)

Direct and Indirect Effects

Proposed action would reduce soil compaction, promote vegetation, and increase water infiltration on approximately 1.6 acres. Nearly all of the ground disturbing activities would occur on previously disturbed soil (the road prism). Waste material from culvert removal would most likely be placed on the existing roadbed adjacent to the crossings. It is expected that the erosion would be small and temporary. Over a period of several decades, soils would gradually recover much of their productivity.

Cumulative Effects

The effects on soils from the proposed action would be local, and there would be no other uses affecting this resource within the project area. The proposed action would result in a small net decrease in soil compaction over existing levels.

3.3.3.3 Environmental Effects on Soils – Alternative 2 (No Action)

Direct and Indirect Effects

No direct effects on soil resources from the proposed action would occur. The 1.0 mile of road would not be decommissioned and the three culverts, two of which have been identified to be at risk of failure, would not be removed. The local soil ecological processes that would continue to occur based on the existing condition, compacted and in a nonforest condition.

Cumulative Effects

Rather than the 1.0 mile decrease in road density in the watershed as identified as a result of the Action Alternative, there would be no change in road density under the No Action Alternative.

3.3.4 Hydrology

3.3.4.1 Affected Environment.

The general setting is similar to Project 1 (See Section 2.3.5.1). The approximately 1.0 miles of natural-surfaced road (4N-2-28) to be decommissioned is located 20 feet to 2,000 feet south of Harvest Units 29-2 and 29-3 of Project 1. The road segment crosses three small, 1st order, non-fish bearing streams. The road segment is not accessible to vehicle traffic and has not received any use or maintenance for many years, probably decades. Currently two of the three culverts are failing and are releasing sediment to streams. The culvert furthest to the west is currently in good condition but in time without appropriate maintenance will likely fail.

The headwater streams at the crossings are non-fish bearing and have gradients mainly 2 to 8%. They are either intermittent or have very low summer flows (<5gpm). They are typically slightly incised, have bankfull widths up to 3 feet, are moderately confined by hillslopes, and have channel types that are mostly riffles. Silt, sand, and small gravel sized material dominate the stream substrate. These small streams converge together just above their confluence of Fall Creek, approximately 2,000 to 3,000 feet downstream. Fall Creek is a 3rd order, fish-bearing stream.

For purposes of analyzing the affected environment, the analysis area extends from the origins of the three streams to Fall Creek (approximately 120 acres).

3.3.4.2 Environmental Effects on Hydrology – Alternative 1 (Proposed Action)

Direct and Indirect Effects

Proposed action of subsoiling 1.0 miles of natural surface road would reduce soil compaction and increase water infiltration on approximately 1.6 acres.

Culverts removal would result in short-term disturbance to the channels with an associated release of sediment to streams. No change in stream temperature, large woody debris, or chemical parameters is likely to occur as a result of the proposed action. Impacts would be minimized by only allowing work during low flows and adhering to BMPs. If there is flow at the time of removal it is estimated that between 0.1 to 0.5 cubic yards would be released per culvert. These short-term effects (<1/2 hour) and would unlikely be visible more than 200 feet downstream. Additional sediment from the roadbed and the accumulated material stored in the channel above the culverts would move downstream as pulses during high streamflow events.

In the long-term, removal of stream crossing culverts, fill material, and alluvial material accumulated in channel behind culverts would reduce the amount of sediment delivery in the project area and help restore the natural sediment transport regime. Channel morphology at the stream crossing location would recover, over a period of decades to approximately pre-disturbance condition.

Cumulative Effects

The proposed action would likely contribute a small additive, short-term increase in stream sediment as a result of road decommissioning (primarily culvert removal), which would likely contribute to a direct increase in turbidity levels directly below road/stream intersections. This additive sediment load is not expected to be of sufficient magnitude and duration (primarily in the first year following disturbance, limited to major storm events) that it would result in measurable change for water quality on the scale of the sixth field watershed, and would be unlikely to have any effect on any beneficial uses.

3.3.4.3 Environmental Effects on Hydrology - Alternative 2 (No Action)

Direct and Indirect Effects

Water quality and hydrologic processes would continue at current rates and levels. Effects to the watershed would continue to occur from the development of private lands (primarily timber harvesting and road building).

The 1.6 acres of road surface would continue to remain strongly compacted, continuing the human modification of local soil drainage and runoff conditions. Without culvert removals, the two stream crossings would continue to fail. Soil in the road fill and sediment stored upstream of the culvert would continue to be transported downstream. The channel morphology would continue to be modified. A fill failure could occur (judged to be of a low risk), potentially sending a large slug of sediment (>20 cubic yards) downstream

Cumulative Effects

Assuming that a large crossing failure would not occur, the cumulative effect is unlikely to result in any measurable change in water quality on the scale of the sixth or seventh-field watersheds, and would therefore be unlikely to have any effect on any designated beneficial uses. If a large crossing failure should occur, it would likely be during a high storm event. As a result, there could be a short-term (<three years)

change in in water quality on the scale of the sixth-field watershed (North Scappoose Creek), and therefore it could have an effect on designated beneficial uses.

3.3.5 Fisheries

3.3.5.1 Affected Environment

The general setting is similar to Project 1 (See Section 2.3.5.1). The approximately 1.0 miles of natural-surfaced road (4N-2-28) to be decommissioned is located 20 feet to 2,000 feet south of Harvest Units 29-2 and 29-3 of Project 1. The road segment crosses three small, 1st order, non-fish bearing streams. The road segment is not accessible to vehicle traffic and has not received any use or maintenance for many years, probably decades. Currently two of the three culverts are failing and are releasing sediment to streams. The culvert furthest to the west is currently in good condition but in time without appropriate maintenance will likely fail.

The headwater streams at the crossings are non-fish bearing and have gradients mainly 2 to 8%. They are either intermittent or have very low summer flows (<5gpm). They are typically slightly incised, have bankfull widths up to 3 feet, moderately confined by hillslopes, and have channel types that are mostly riffles. Silt, sand, and small gravel sized material dominate the stream substrate. These small streams converge together just above their confluence of Fall Creek, approximately 2,000 to 3,000 feet downstream. Fall Creek is a 3rd order, fish-bearing stream.

For purposes of analyzing the affected environment, the analysis area extends from the origins of the three streams to Fall Creek (approximately 120 acres).

3.3.5.2 Environmental Effects on Fisheries– Alternative 1 (Proposed Action)

Sediments generated as a result of the culvert removal associated with the decommissioning of the road in section 29 have the potential to impact fisheries. This activity may occur prior to, during, or after the timber sale activities as it is not part of the sale. The timing and magnitude of this sediment movement has the potential to affect adult chinook and their habitat as well as multiple life stages of both coho and steelhead. Adult coho and chinook arrive for spawning in November or December, Steelhead arrive in March through April. After the adults arrive, spawning generally occurs within 2-4 weeks, depending on the sites selected for spawning. The potential for impacts to redd's varies by location above or below the confluence of Fall Creek. Due to the different arrival times, adult coho and chinook have a greater potential of being affected by sediments moving down Fall Creek and North Scappoose Creek. With the later arrival of adult steelhead there is a high probability that the majority of the fine sediments from the culvert removals will have moved through leaving the larger particles to move in subsequent high flow events as bed load. It is anticipated that due to their later arrival adult steelhead will not be significantly affected by these sediments.

As juvenile coho and steelhead spend one to two or more years in the stream channels rearing they will be exposed to the movement of this sediment though Fall Creek and North Scappoose Creek. Due to their extended rearing time juvenile coho and steelhead in Fall Creek and North Scappoose Creek may well experience turbidities that cause a change in behavior i.e. avoidance, cessation of feeding etc. for a period of up to three years following implementation of the proposed project. These effects are pulse effects and coincide with higher rainfall events when background turbidity levels are normally higher. Impacts will be greatest the first year after implementation and decrease with each significant rainfall event as sediment is moved out of the system.

The proposed action is not anticipated to have any effects to Lower Columbia chinook critical habitat,

located in North Scappoose Creek. Due to the larger stream size of North Scappoose creek, larger water volume, high transport potential, and distance from the culvert removals to critical habitat, the removal of the culverts is not anticipated to adversely affect the current substrate condition in critical habitat areas. Mitigation measures will be employed to minimize the amount of sediments released upon culvert removal. These measures include removal of all fill material and re-contouring appropriate stream bank sloping, as well as removal of as much stored sediment that can be reached from the road prism (usually the maximum reach of an excavator ~25 feet). Any remaining stored sediment behind the culvert removals is likely to be transported varying distances downstream. The larger particles will most likely be stored in fall creek and transported over time (approximately 3 years) through critical habitat areas as part of the streams normal winter bedload. Suspended sediments, or fines, are anticipated to be transported through and out of areas of critical habitat due to stream size, slope, and water volume.

Cumulative Effects

The only action that is anticipated to be cumulative in nature as a result of the proposed action is a minor decrease in the road density indicator in this 6th field watershed. Upon completion of the proposed action a net decrease of approximately 1.0 miles of road density is anticipated as a result of the road decommissioning project in section 29.

3.3.5.3 Environmental Effects on Fisheries– Alternative 2 (No Action)

No direct effects on fisheries from the proposed action would occur. Water quality and hydrologic processes would continue at current rates and levels. There would be no short-term additions of sediment to streams from ground disturbing activities. Culvert removal activities designed to reduce the existing accelerated sediment delivery and future culvert failure, however, would not be completed. Without culvert removals, the two stream crossings currently failing would continue to fail and contribute sediment to streams. The other two crossings that are currently stable would eventually deteriorate to the point where they would start to fail and potentially contribute sediments that may adversely affect fish as far downstream as Fall Creek.

Cumulative Effects

Assuming that a large crossing failure would not occur, the cumulative effect is unlikely to result in any measurable change in either water quality or fish habitat on the scale of the sixth or seventh-field watersheds, and would therefore be unlikely to have any effect on any designated beneficial uses. If a large crossing failure should occur, it would likely be during a high storm event. As a result, there could be a short-term (<three years) change in water quality and minor impacts to fish habitat on the scale of the sixth-field watershed (North Scappoose Creek), and would therefore it could have an effect on designated beneficial uses.

4.0 LIST OF PREPARERS

The following individuals participated on the interdisciplinary team or were consulted in the preparation of this EA:

Bob McDonald	Interdisciplinary team lead; Writer/Editor; GIS Support
Darrin Neff	Fisheries Biologist
Kurt Heckerth	Botany
Doug Stout	Logging Systems
Steve Bahe	Wildlife Biology
Dennis Worrel	Soils and Hydrology
Debra Drake	Outdoor Recreation and Visual Quality
Kent Mortensen	Fuels
Walt Kastner	Silviculture

5.0 PUBLIC INVOLVEMENT AND CONSULTATION

5.1 Public Scoping and Notification

Scoping consisted of listing the proposed project in the June, September, and December 1997 editions of the quarterly Salem District Project Update which was mailed to over 1000 addresses; a field trip with representatives of the Scappoose Bay Watershed Council on September 27, 1997 (Pig's Puzzle Timber Sale - Project Record, Document 16); a letter mailed on October 3, 1997 to 124 individuals, groups, and agencies that were potentially affected and/or interested (Pig's Puzzle Timber Sale - Project Record, Document 17); a notice for public comment in The South County Spotlight on October 29, 1997 (Pig's Puzzle Timber Sale - Project Record, Document 46); and a copy of the Scoping Report mailed to Jay Worley and Tom Madison on November 3, 1997 (Pig's Puzzle Timber Sale - Project Record, Documents 47 and 48). A total of 8 letters and oral responses were received as a result of this scoping (Pig's Puzzle Timber Sale - Project Record, Documents 28, 30, 31, 34, 35, 37, 45, and 54). All public input was assigned a number and filed in the Project Record.

The following concerns were raised during the scoping, public comment, protest and appeal periods from the original Pig's Puzzle EA/Decision.

1) Increase or Decrease in Road Mileage

Comment or Concern: Whether the project would result in an actual decrease in road mileage as stated in the original EA.

Response: The Proposed Action for Project 1 would construct 0.6 miles of new road and reconstruct 2.6 miles of existing road. Roads to be reconstructed are considered to be existing roads. Upon completion of harvest activities 0.4 miles of new construction and 0.2 miles of reconstructed roads would be decommissioned. The end result is no net change in road mileage in the project area. See *EA Section 2.1*. Under the Proposed Action for Project 2, approximately 1.0 miles of existing natural-surfaced road would be decommissioned, resulting in a net decrease of 1.0 miles of road in the project area. See *EA Section 3.1*.

2) Sediment Impacts to Streams and Fisheries

Comment or Concern: Sediment from road building, log hauling and placement of logs in North Scappoose Creek would impact fisheries resources in the watershed.

Response: The placement of logs in North Scappoose Creek and road construction and logging of approximately 100 acres under the Pisgah Progeny Timber Sale have already been accomplished and are not included in the Pig's Puzzle project. The access route into section 29 has also been modified to avoid sediment input into a fish-bearing stream. See *EA Sections 2.3.5 and 2.3.6.*

3) Thinning in Riparian Reserves

Comment or Concern: Rationale for thinning in Riparian Reserves is questionable.

Response: See *EA Section 2.3.1.*

4) Survey and Manage and Red Tree Vole Surveys

Comment or Concern: Required surveys had not been done for Red Tree Voles or S&M Mollusks.

Response: All required S&M and Red Tree Vole surveys have been completed in accordance with the appropriate protocols. See *EA Section 2.3.2.*

5) 15% Retention Standard and Guide (S&G)

Comment or Concern: Timber harvest in these stands may affect attainment of the 15% S&G (maintain late-successional stands in watersheds with less than 15% of the federal forest lands in late-successional forest).

Response: The 15% S&G is addressed in *EA Section 2.3.1.*

5.1.1 30-day Public Comment Period

Public comment period: The EA will be made available for public review **July 26, 2006 to August 25, 2006**. The notice for public comment will be published in a legal notice in the *South County Spotlight* newspaper. Comments received by the Tillamook Resource Area of the Salem District Office, 4610 Third Street, Tillamook, Oregon, 97141, on or before **August 25, 2006** will be considered in making the final decisions for these projects.

6.0 Literature Cited and/or Selected References

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Assessment of habitat-modification projects proposed during Fiscal Years 2007 and 2008 in the North Coast Province, Oregon that would affect bald eagles, northern spotted owls or marbled murrelets or would modify the critical habitats of the northern spotted owl or the marbled murrelet. (Currently under development and in draft form)

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USDI - US Fish and Wildlife Service, Region 1. Portland Oregon. November 2004. Biological Opinion and Letter of Concurrence for the effects to Bald Eagles, Northern Spotted Owls and Marbled Murrelets from the US Department of the Interior, Bureau of Land Management, Eugene District and Salem District, and US Department of Agriculture, Siuslaw National Forest fiscal year 2005/2006 habitat modification activities within the North Coast Province (*USFWS Biological Opinion reference 1-7-05-F-0005*). 107 pages + appendices.

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APPENDIX 1 ENVIRONMENTAL ELEMENTS

In accordance with law, regulation, executive order and policy, the interdisciplinary team reviewed the elements of the human environment to determine if they would be affected by the alternatives described in Chapter 2 of the EA (environmental assessment). The following three tables summarize the results of that review. Those elements that are determined to be “affected” will define the scope of environmental concern, Chapter 3 of the EA.

Table 1. Critical Elements of the Environment. This table lists the critical elements of the human environment (BLM Handbook 1790-1) which are subject to requirements specified in statute, regulation, or executive order and the interdisciplinary teams predicted environmental impact per element if the alternatives described in Chapter 2 of the Environmental Assessment were implemented.			
<i>Critical Elements Of The Environment</i>	<i>Status: (i.e., Not Present, Not Affected, or Affected)</i>	<i>Does this project contribute to cumulative effects? Yes/No</i>	<i>Remarks</i>
Air Quality (Clean Air Act)	Not Affected	No	Project 1 -The proposed action (swamper burning, or burning of hand or landing piles, and dust created by logging activities including hauling) would have a minimal impact on air quality. Specifically, smoke would be kept out of Designated Areas through the application of a burn plan (fire activities would be conducted in accordance with the <i>Oregon State Implementation Plan</i> and the <i>Oregon Smoke Management Plan</i>). Hauling would not create dust above threshold levels. Project 2 – The proposed action would have no effect on air quality.
Areas of Critical Environmental Concern	Not Present		Projects 1 and 2 -There are no ACECs in the project area.
Cultural, Historic, Paleontological	Not Present		Projects 1 and 2 - Regarding pre-project surveys, the project area occurs in the Coast Range. Survey techniques for harvest actions are based on those described in Appendix D of the <i>Protocol for Managing Cultural Resources on Lands Administered by the Bureau of Land Management in Oregon</i> . The Coastal Range Inventory Plan only requires post-harvest surveys based on slope. As such, surveys will not be conducted until the harvest activity is completed. If during the implementation of the project cultural resources are found, ground disturbing work will be suspended until an archaeologist can assess the significance of the discovery. The project may be redesigned to protect the cultural resource values present, or evaluation and mitigation procedures would be implemented based on recommendations from the District Archaeologist
Energy (Executive Order 13212)	Not Affected	No	Projects 1 and 2 - There are no known energy resources located in the project area. The proposed action would have no effect on energy development, production, supply and/or distribution.

Table 1. Critical Elements of the Environment. This table lists the critical elements of the human environment (BLM Handbook 1790-1) which are subject to requirements specified in statute, regulation, or executive order and the interdisciplinary teams predicted environmental impact per element if the alternatives described in Chapter 2 of the Environmental Assessment were implemented.

<i>Critical Elements Of The Environment</i>	<i>Status: (i.e., Not Present, Not Affected, or Affected)</i>	<i>Does this project contribute to cumulative effects? Yes/No</i>	<i>Remarks</i>
Environmental Justice (Executive Order 12898)	Not Affected	No	Projects 1 and 2 - The proposed action is not anticipated to have disproportionately high and adverse human health or environmental effects on minority populations and low-income populations.
Prime or Unique Farm Lands	Not Present		Projects 1 and 2 - There are no prime or unique farm lands in the project area.
Flood Plains (Executive Order 11988)	Not Present		Projects 1 and 2 - The proposed action does not involve occupancy and modification of floodplains, and will not increase the risk of flood loss.
Hazardous or Solid Wastes	Not Affected	No	Projects 1 and 2 - There are no known existing hazardous or solid waste sites in the project area. The proposed action is not anticipated to lead to an increase in illegal dumping on the affected BLM lands.
Invasive, Nonnative Species (Executive Order 13112)	Affected	No	Projects 1 and 2 - Vascular plant surveys indicated existing populations of priority I and III noxious weeds within and adjacent to the project area. The proposed action will result in soil disturbance which provides an opportunity for the introduction and spread of noxious weeds and/or invasive non-native plant species. The unit of measure is a narrative. See sections 2.3.3 and 3.3.2 in the EA.
Native American Religious Concerns	Not Affected	No	Projects 1 and 2 - No Native American religious concerns were identified during the scoping phase of the project.
Threatened or Endangered (T/E) Species or Habitat	Fish	Affected	Projects 1 and 2 - See Sections 2.3.6 and 3.3.5 in the EA.
	Plants	Not Present	Botanical surveys were completed in 1999 and 2000. Surveys included any species listed under the Endangered Species Act and were conducted within required survey protocols. No listed species were found.
	Wildlife (including Designated Critical Habitat)	Affected	Projects 1 and 2 - See Sections 2.3.2 and 3.3.1 in the EA.
Water Quality (Surface and Ground)	Affected	No	Projects 1 and 2 - See Sections 2.3.5 and 3.3.4 in the EA.
Wetlands (Executive Order 11990)	Not Present		Projects 1 and 2 - There are no wetlands within the project area.
Wild and Scenic Rivers	Not Present		Projects 1 and 2 - There are no Wild or Scenic Rivers within the project area
Wilderness	Not Present		Projects 1 and 2 - There are no wilderness areas within the project area.

Table 2. Other Elements of the Environment. This table lists other elements of the environment which are subject to requirements specified in law, regulation, policy, or management direction and the interdisciplinary teams predicted environmental impact per element if the alternatives described in Chapter 2 of the Environmental Assessment were implemented.

<i>Other Elements Of The Environment</i>	<i>Status: (i.e., Not Present , Not Affected, or Affected)</i>	<i>Does this project contribute to cumulative effects? Yes/No</i>	<i>Remarks</i>
Coastal Zone (Oregon Coastal Management Program)	Not Present		Projects 1 and 2 - The proposed action is not with Oregon’s Coastal Management zone.
Essential Fish Habitat (Magnuson-Stevens Fisheries Cons. /Mgt. Act)	Affected	No	Projects 1 and 2 - See Sections 2.3.6 and 3.3.5 in the EA.
Fire Hazard/Risk	Not Affected	No	<p>Project 1 – Pigs Puzzle Unit No.’s 29-1 & 29-2 – Within the proposed Regeneration harvest areas the fuel load as measured in tons per/acre would increase in all fuels classifications, and will result in a higher risk of fire immediately following logging. Fire risk will greatly diminish following prescribed burning, (swamper burning, or hand piling and burning) and will continue to diminish as the fine (1 hour and 10 hour) fuels begin to break down. This process will occur over a period of three to five years.</p> <p>Pigs Puzzle Unit No.’s 29-3, 29-4, 31-5, & 25-1 – Within the proposed Commercial Thinning areas the fuel load as measured in tons per/acre would increase to a minor degree in the 1 hour, 10 hour, and 100 hour (fine) fuels classifications immediately following treatment but would quickly return to pre-treatment levels (in less than 5 years) in all Commercial Thinning units. Design features require accumulations of slash in landing areas, along roads, private property lines, and young plantations in the treatment areas to be assessed following treatment. Depending on the size of the landings or the accumulation of slash in these other potential high fire risk areas, burning, or slash pullback may be conducted to reduce the accumulation of slash. With the small increase in fuel loading across most of the treatment areas, and the fuel reduction projects designed for the high fire risk areas it would not be expected that an increase in fire hazard would affect the environment on the project level scale, and the change would not be measurable on the watershed scale.</p> <p>Project 2 – There would be no effect on fire hazard or risk from this project.</p>

Table 2. Other Elements of the Environment. This table lists other elements of the environment which are subject to requirements specified in law, regulation, policy, or management direction and the interdisciplinary teams predicted environmental impact per element if the alternatives described in Chapter 2 of the Environmental Assessment were implemented.

Other Elements Of The Environment	Status: (i.e., Not Present, Not Affected, or Affected)	Does this project contribute to cumulative effects? Yes/No	Remarks	
Forest Vegetation and Productivity	Project 1 - Affected Project 2 – Not Affected	No No	Project 1 – See Section 2.3.1 in the EA. Project 2 – No forest vegetation would be affected by the Proposed Action for this project.	
Land Uses (right-of-ways, permits, etc)	Not Affected	No	The proposed action would not affect land uses in the project area.	
Late successional / old growth	Not Present		Projects 1 and 2 – There are no late successional or old growth stands or trees within the project areas.	
Mineral Resources	Not Present		Projects 1 and 2 - There are no known mineral resources of commercial value in the project area.	
Recreation	Not Present	No	Projects 1 and 2 – The project areas are located behind locked gates and there is no public access for recreation purposes.	
Rural Interface Areas	Not Present		Projects 1 and 2 - There are no rural interface areas within the project area.	
Soils	Affected	No	Projects 1 and 2 - See Sections 2.3.4 and 3.3.3 in the EA.	
Special Areas outside ACECs (Within or Adjacent) (RMP pp. 33-35)	Not Present		Projects 1 and 2 - There are no Special Areas within the project area.	
Other Special Status Species/Habitat	Fish	Affected	No	Projects 1 and 2 - See Sections 2.3.5 and 3.3.5 in the EA.
	Plants	Not Affected	No	Projects 1 and 2 - Surveys were conducted throughout the proposed project area and no Special Status Species were found.
	Wildlife	Affected	No	Projects 1 and 2 - See Sections 2.3.2 and 3.3.1 in the EA.
Survey and Manage Species / Habitat	Not Affected	No	Projects 1 and 2 - Surveys were conducted for Survey and Manage Species throughout the proposed project area (See Appendix 4). Two populations of category D fungi (<i>Otidea leporina</i> and <i>Sparassis crispa</i>) were located and verified. The original project area boundaries were adjusted excluding their presence within the project area therefore mitigating disturbance to these known sites.	
Visual Resources	Not Affected	No	Projects 1 and 2 - The BLM lands are managed as VRM Class IV, which allows for management activities which require major modification of the existing landscape.	
Water Resources (except Water Quality)	Affected	No	Projects 1 and 2 - See Sections 2.3.5 and 3.3.4 in the EA.	

Table 2. Other Elements of the Environment. This table lists other elements of the environment which are subject to requirements specified in law, regulation, policy, or management direction and the interdisciplinary teams predicted environmental impact per element if the alternatives described in Chapter 2 of the Environmental Assessment were implemented.

<i>Other Elements Of The Environment</i>	<i>Status: (i.e., Not Present , Not Affected, or Affected)</i>	<i>Does this project contribute to cumulative effects? Yes/No</i>	<i>Remarks</i>
Other Wildlife Structural or Habitat Components (Snags /CWD / Special Habitats, road densities)	Affected	No	Projects 1 and 2 - See Sections 2.3.2 and 3.3.1 in the EA.

Table 3. Aquatic Conservation Strategy Summary. This table lists the four components of the Aquatic Conservation Strategy (RMP pp. 5-7), and the interdisciplinary teams predicted environmental impact per component if the alternatives described in Chapters 2 and 3 of the Environmental Assessment were implemented.

Components	Consistency with ACS	Remarks /References
Riparian Reserves	Consistent	The proposed actions are consistent for the following reasons: a watershed analysis has been completed; road and landing locations have been minimized in Riparian Reserves; wetlands have been avoided when constructing new roads, and sediment delivery has been minimized to streams from roads.
Key Watershed	Not Applicable	The project areas are not within a Key watershed.
Watershed Analysis	Consistent	The proposed actions are consistent for the following reasons: road density within the watershed would not be affected by Project 1 and would be reduced by Project 2; water quality and quantity impacts would be short-term and minimal; stream channel structure and stability and aquatic habitat would not be affected; and the abundance and distribution of noxious/exotic plants within the watershed would not be affected.
Watershed Restoration	Consistent	Project 1 - Although the proposed action is not a component of the resource area’s watershed restoration program, it will not have an adverse effect on restoration efforts. Project 2 – The proposed action to decommission 1.0 miles of existing road and remove three failing culverts is an important component of restoration efforts in this watershed.

APPENDIX 2

LIST OF PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS WHICH MAY BE CONSIDERED IN THE CUMULATIVE EFFECTS ANALYSIS OF THE PIG'S PUZZLE PROJECTS

List of Other Actions – This list contains a number of identified ongoing and/or past, present or reasonably foreseeable future projects, activities or programs of work; it serves as a source or pool of activities that various specialists may have considered while conducting cumulative effects analysis for the Pig's Puzzle Project. Depending upon the resource and/or temporal or spatial scale of the analysis, projects to be considered include those projects which may continue to impact or are expected to impact the same resource at the same time and place as the proposed action, and/or have contributed to the current condition in a manner that still has impacts upon the same resources. A more complete description of the history of the watershed is contained in the Scappoose Creek Watershed Analysis (BLM, 1996)

- There are two recently completed BLM timber management projects in the watershed, the Pisgah Progeny timber sale (92 acres) and McLafferty timber sale (176 acres). These sales had similar types of activities (road construction and reconstruction, commercial thinning and regeneration harvest) and impacts to what is expected for the Pig's Puzzle project.
- There are no future federal timber sale projects planned in the Scappoose Creek watershed at this time. Anticipated BLM activities include periodic road maintenance, fish habitat enhancement, and young stand management (pre-commercial thinning).
- Logging and associated road construction continue to occur on private land with the assumption that much of the merchantable-aged timber will be harvested in accordance with the Oregon Forest Practices Act within the next ten years and the resultant clearcuts will then be intensively managed (thinning, spraying herbicide, etc.). In the area within one mile of the sections containing the Pig's Puzzle Project, it is anticipated that at least 500 acres of private timberlands will be harvested within the next year or two. Similar levels of harvest activities are expected to occur on private lands throughout the watershed.
- Public access to most Federal and private forest lands is restricted by locked gates and various types of other road closures. Because of these access restrictions, there is a limited amount of OHV use on federal or private lands in most of the watershed.
- Road densities in the watershed are relatively high (approximately 6.5 miles/mi²) and are expected to increase with continued timber harvest activities and residential development.

Appendix 3. Sediment Assumptions and Calculations

The Water Erosion Prediction Project (WEPP) road soil erosion predictor model was used to predict sediment output from a road segment and to a small stream below a crossing in Section 20. The WEPP model is a physical based soil erosion model developed by a federal interagency group of scientists (USFS, BLM, ARS, USGS, and NRCS). The accuracy of the predicted runoff or erosion rate is, at best, plus or minus 50 percent. This range of variability is due to natural variability in the ecosystem, as much as errors in the modeling assumptions. While there has been no direct validation of the WEPP, there have been field observations on erosion rates from road surfaces and road prisms, and on lengths of sediment plumes. Documentation of the WEPP model is available at the web site: <http://forest.moscowfsl.wsu.edu/fswepp/>.

WEPP:Road log

Pigs Puzzle Stream Crossing in Sec 20

Mon May 22, 2006 8:16

Yrs	Climate	Soil	Rock	Surface, traffic	Design	Road grad	Road len	Road width	Fill grad	Fill len	Buff grad	Buff len	Precip	Rain runoff	Snow runoff	Sed road	Sed profile	Com-ment
30	N. Scappoose Cr OR +	clay loam	10 %	graveled high	outsloped rutted	10 %	50 ft	12 ft	10 %	20 ft	50 %	10 ft	61.00 in	5.40 in	0.59 in	400.95 lb / 0.18 cy	343.39 lb / 0.16 cy	North
30	N. Scappoose Cr OR +	clay loam	10 %	graveled high	outsloped rutted	18 %	75 ft	12 ft	10 %	15 ft	50 %	20 ft	61.00 in	5.41 in	0.50 in	1118.68 lb / 0.51 cy*	925.22 lb/ 0.42 cy*	South

../working/204_124_92_254.wrlog

* 1.1 tons of clay loam = 1 cy

Total sediment leaving buffer = .58 cy

Crossing Calcs

Original Crossing fill	15 ft wide x 23 ft long x 8 ft deep	=	approx 100 cy
Crossing fill removed	15 ft wide x 10 long x 7 ft deep	=	approx 40 cy
Crossing material remaining (as of 5/17/2006)		=	approx 60 cy
Shallow pond approx 25 ft x 100 ft		=	several hundred cy of fine material stored

APPENDIX 4 – SURVEY AND MANAGE COMPLIANCE REVIEWS

2001 ROD Compliance Review: Survey & Manage Wildlife Species (vers. 01-24-2006)

Environmental Analysis File
Salem District BLM – Tillamook Resource Area

Project Name: The Pig's Puzzle Projects - The Pig's Puzzle Forest Management Project and a project decommissioning 1.0 mile of existing natural-surfaced road. Environmental Assessment Number - OR-086-97-13 – (reissue)

Project Type: A forest management project including commercial thinning and regeneration harvests, and a road decommissioning project

Prepared By: Steve Bahe – Wildlife Biologist
Date: July 10, 2006

Location: T4N., R3W., section 25; T4N., R2W., sections 29 and 31, (W.M.) Willamette Meridian.

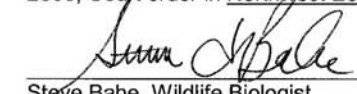
Table A. Survey & Manage Wildlife Species. Species listed below include those species whose known range includes the Tillamook Resource Area, Salem District BLM, according to the *Survey Protocol for the Red Tree Vole v2.1* (Oct. 2002) and the *Survey Protocol for S&M Terrestrial Mollusk Species v3.0* (Feb. 2003), which includes the results of the Annual Species Reviews through 2003. There are no other Survey and Manage wildlife species groups that occur within the Tillamook Resource Area.

Species ¹	S&M Category	Survey Triggers			Survey Results			Site Management?
		Within Range of the Species?	Project Contains Suitable habitat?	Project may negatively affect the species or its habitat?	Surveys Required?	Survey Date	Sites Known or Found?	
Vertebrates								
Oregon Red Tree Vole (<i>Arborimus longicaudus</i>)	C	Yes	Forest Management Project – Yes	Yes	Yes	March-April 2006	No	N/A
			Road Decommissioning Project – No	No	No	N/A	N/A	N/A
Mollusks								
Puget Oregonian (<i>Cryptomasix devia</i>)	A	Yes	Forest Management Project – Yes	Yes	Yes	Fall of 1999 and spring of 2000	NO	N/A
			Road Decommissioning Project – No	No	No	N/A	N/A	N/A
Evening Fieldslug (<i>Deroceras hesperium</i>)	B	Yes	Forest Management Project – Yes	Yes	Yes	Fall of 1999 and spring of 2000	NO	N/A
			Road Decommissioning Project – No	No	No	N/A	N/A	N/A

N/A = Not Applicable

¹ S&M species also located within the BLM Salem District although their range does not encompass Tillamook Resource Area include Larch Mountain Salamander (*Plethodon larselli*), Great Gray Owl (*Strix nebulosa*), Crater Lake Tightcoil (*Pristiloma arcticum crateris*), Columbia Dusksnail (*Lyogyrus n. sp. 1*) and Basalt Juga (*Oreobasis*) n. sp. 2).

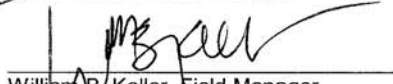
Statement of Compliance. Pre-disturbance surveys that are required by protocol standards to comply with the 2001 Record of Decision and Standard and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measure Standards and Guidelines (Jan. 2001), as amended through the 2001, 2002, and 2003 Annual Species Review(s), were completed for the Pig's Puzzle Forest Management Project. No pre-disturbance surveys were required for the Pig's Puzzle Road Decommissioning Project as suitable habitat is not present or not impacted. Management of known sites within or near the Pig's Puzzle Projects for Category A, B, C, D and E species as identified in the 2001 ROD (as modified) was not required as none are known to exist in the area and none were discovered during pre-project surveys. For the foregoing reasons, the decisions for which all of the Pigs Puzzle Projects rely are in compliance with the 2001 ROD as stated in Point (3) on page 14 of the January 9, 2006, Court order in Northwest Ecosystem Alliance et al. v. Rey et al..



Steve Bahe, Wildlife Biologist

7-13-06

Date



William B. Keller, Field Manager
Tillamook Resource Area

July 14, 06

Date

2001 ROD Compliance Review: Survey & Manage Botany Species

Environmental Analysis File
Salem District Bureau of Land Management

Project Name: Pigs Puzzle (EA# OR-086-97-13)

Project Type: Timber Sale and Road Decommissioning

Prepared By: Kurt Heckerth (Botanist)

Date: July 12, 2006

Location: T4N R2W sections 29 and 31, and T4N R3W section 25, Willamette

S&M List Date: December 2003

Table A. Survey & Manage Species Known and Suspected in the Salem District. Species listed below were compiled from the 2003 Annual Species Review (IM-OR-2004-034) and includes all species in which pre-disturbance surveys may be needed (Category A, C and non-fungi Category B species if the project occurs in old-growth as defined on page 79-80 of the 2001 ROD) and lists known sites of other survey and manage species that are known to occur within the project area. In addition, the table indicates whether or not a survey was required, survey results and site management.

The following survey protocols and literature were used in determining species known range, habitat and survey methodology. All field surveys were completed by intuitive controlled methods.

Fungi:

Survey Protocols for *Bridgeoporus* (= *Oxyporus*) *nobilissimus* (Version 2.0, May 1998)

Lichens:

Survey Protocols For Component 2 Lichens (Version 2.0, March 1998)

Survey Protocols for Survey and Manage Category A & C Lichens in the Northwest Forest Plan Area (Version 2.1 (2003)

2003 Amendment to the Survey Protocol for Survey and Manage Category A & C Lichens. (Version 2.1 Amendment, September 2003)

Bryophytes:

Survey Protocols for Protection Buffer Bryophytes (Version 2.0)

Vascular Plants:

Survey Protocols for Survey and Manage Strategy 2 Vascular Plants (Version 2.0, December 1998).

All species:

Rare, Threatened and Endangered Species of Oregon; Oregon Natural Heritage Information Center (May 2004).

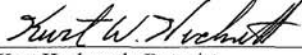
Species	S&M Category	Survey Triggers			Survey Results			Site Management
		Within Range of the Species?	Project Contains Suitable habitat?	Project may negatively affect species/habitat?	Surveys Required?	Survey Date (month/year)	Sites Known or Found?	
Fungi								
<i>Bridgeporus nobilissimus</i> ^{1a}	A	YES	NO	NO	NO ²	5/4/2006	None	N/A
Lichens								
<i>Bryoria pseudocapillaris</i> ^{1a}	A	NO	NO	NO	NO ³	5/4/2006	None	N/A
<i>Bryoria spiralis</i> ^{1a}	A	NO	NO	NO	NO ³	5/4/2006	None	N/A
<i>Dendroscopula intricatulum</i> ^{1c}	A	YES	NO	NO	NO ⁵	5/4/2006	None	N/A
<i>Hypogymnia duplicata</i> ^{1c}	C	YES	NO	NO	NO ⁵	5/4/2006	None	N/A
<i>Leptogium cyanescens</i> ^{1c}	A	YES	YES	NO	YES	5/4/2006	None	N/A
<i>Lobaria linita</i> var. <i>tenuoir</i> ^{1b}	A	YES	NO	NO	NO ⁵	5/4/2006	None	N/A
<i>Nephroma occulum</i> ^{1c}	C	YES	NO	NO	NO ⁵	5/4/2006	None	N/A
<i>Niebla cephalota</i> ^{1b}	A	NO	NO	NO	NO ³	5/4/2006	None	N/A
<i>Pseudocyphellaria perpetua</i> ^{1c}	A	NO	NO	NO	NO ⁴	5/4/2006	None	N/A
<i>Pseudocyphellaria rainierensis</i> ^{1c}	A	YES	NO	NO	NO ⁵	5/4/2006	None	N/A
<i>Teloschistes flavicans</i> ^{1a}	A	NO	NO	NO	NO ³	5/4/2006	None	N/A
Bryophytes								
<i>Schistostega pennata</i> ^{1b}	A	YES	NO	NO	NO ⁵	5/4/2006	None	N/A
<i>Tetraphis geniculata</i> ^{1b}	A	YES	YES	NO	YES	5/4/2006	None	N/A
Vascular Plants								
<i>Botrychium manganense</i> ^{1c}	A	NO	NO	NO	NO ⁶	5/4/2006	None	N/A
<i>Botrychium montanum</i> ^{1b}	A	NO	NO	NO	NO ⁶	5/4/2006	None	N/A
<i>Coptis asplenifolia</i>	A	NO	NO	NO	NO ⁸	5/4/2006	None	N/A
<i>Coptis trifolia</i> ^{1b}	A	NO	NO	NO	NO ⁶	5/4/2006	None	N/A
<i>Corydalis aquae-gelidae</i> ^{1a}	A	NO	NO	NO	NO ⁷	5/4/2006	None	N/A
<i>Cypripedium fasciculatum</i> ^{1a}	C	NO	NO	NO	NO ⁶	5/4/2006	None	N/A
<i>Cypripedium montanum</i> ^{1c}	C	NO	NO	NO	NO ⁶	5/4/2006	None	N/A
<i>Eucephalis vialis</i> ^{1a}	A	NO	NO	NO	NO ⁶	5/4/2006	None	N/A
<i>Galium kamschaticum</i>	A	NO	NO	NO	NO ⁸	5/4/2006	None	N/A
<i>Plantanthera orbiculata</i> var. <i>orbiculata</i>	C	NO	NO	NO	NO ⁸	5/4/2006	None	N/A
Category B Species (equivalent effort surveys needed if project area includes old-growth as defined in 2001 ROD glossary, p. 79-80)								
None. ⁹	B	-	NO	NO	NO ⁹	5/4/2006	None	
Additional Category B, D, E & F known sites located within the proposed project Area								

- 1 These species are former species of concern; (a) Bureau sensitive, (b) bureau assessment or (c) bureau tracking species.
- 2 This species is known from high elevations containing true fir and the only site in the Oregon Coast Range is at approximately 4000 feet on the top of Mary's Peak. There are no true firs within the proposed project area.
- 3 This species known range within the NW Forest Plan is along the immediate coast or within the coastal fog zone within sight or sound of the Pacific Ocean but often extending up to 15 miles inland.

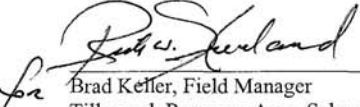
- 4 This species is only known from Oregon at Cape Perpetua adjacent the Pacific Ocean. There are no survey protocols available. Survey protocols were due to be completed on September 30, 2005, and fully effective September 30, 2006.
- 5 These species are known primarily from mature and old-growth, Doug-fir, Western Hemlock and Pacific silver-fir. Field surveys are not required if the species is not known to exist in the proposed project area or in the vicinity, and if it is determined that probable suitable habitat is unlikely to exist in the proposed project area.
- 6 These species are not known to occur on Bureau of Land Management lands within the Salem District. These species have no known sites in the Oregon Coast Range physiographic province.
- 7 This species is known to occur on Bureau of Land Management lands within the Salem District in the Cascades Resource Area. This species has known sites in the Western Cascades physiographic province but none in the Oregon Coast Range physiographic province.
- 8 This species is only known from western Washington. There are no known sites in Oregon.
- 9 Surveys are not required. The project area is less than 80 years of age and the project does not meet the definition on page 79-80 of the 2001 ROD.

STATEMENT OF COMPLIANCE: Pre-disturbance surveys and management of known sites required by protocol standards to comply with the 2001 Record of Decision and Standard and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measure Standards and Guidelines (as the 2001 ROD was amended or modified as of March 21, 2004) were completed for the Pigs Puzzle Project Area (EA # OR-086-97-13). There is no known Category A, B, C, D, E or F species within the project area.

SUMMARY OF SURVEY RESULTS: No Survey and Manage species were located within the Pigs Puzzle Project Area (EA # OR-086-97-13). Therefore, based on the preceding information (refer to Table A above) regarding the status of surveys and site management for Survey & Manage botanical species, it is my determination that the Pigs Puzzle Project (EA # OR-086-06-06) complies with the provisions of the 2001 Record of Decision and Standard and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measure Standards and Guidelines (as the 2001 ROD was amended or modified as of March 21, 2004). For the foregoing reasons, this project is in compliance with the 2001 ROD as stated in Point (3) on page 14 of the January 9, 2006, Court order in Northwest Ecosystem Alliance et al. v. Rey et al.


 Kurt Heckerth, Botanist
 Tillamook Resource Area, Salem District BLM

7/17/06
 Date


 Brad Kefler, Field Manager
 Tillamook Resource Area, Salem District BLM

7/18/06
 Date