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Forest Service

Pacific Northwest Region

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Clackamas Road Decommissioning for Habitat Restoration, Increment 2

Preliminary Assessment

Clackamas River Ranger District, Mt. Hood National Forest
Clackamas Country, Oregon

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The photo shows one example of a newly decommissioned Forest Service road on the Mt. Hood National Forest.

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1.0. Purpose of and Need for Action

1.1 Introduction

In an effort to aid the recovery of fish habitat, riparian habitat and water quality, the Mt. Hood National Forest (Forest) has accomplished numerous restoration projects over the past decade. The focus of several of these watershed restoration projects has included decommissioning over a hundred miles of road. As recognized by the Northwest Forest Plan, “the most important components of a watershed restoration program are control and prevention of road-related runoff and sediment production” (NWFP p. B-31). Also, the Forestwide *Roads Analysis* recommended decommissioning roads that have low access needs and considerable environmental risk (USDA Forest Service 2003). Therefore, in order to continue the Forest’s long-standing efforts to improve watershed health, this Environmental Assessment (EA) focuses on road decommissioning – the stabilization and restoration of unneeded roads to a more natural state.

- How are “unneeded” roads identified?

  The term **unneeded** in this document does not imply that there are no potential administrative uses for a road, or that no one uses it for recreation. An unneeded road is one that is not currently vital to forest management operations and that does not access primary recreational destinations. Thus, the Forest must review the road system within its jurisdiction and identify roads that are no longer needed to meet forest resource management objectives. Roads identified as unneeded should then be decommissioned or considered for other uses, such as for trails (36 CFR 212.5(b)(2)).

This EA analyzes the environmental effects for decommissioning approximately 255 miles of road on the Clackamas River Ranger District. All of the road decommissioning activities would improve hydrologic function and aquatic and terrestrial habitat in the following eight, sixth-field subwatersheds: Pot Creek – Clackamas River, Farm Creek – Collawash River, Lower Hot Springs Fork Collawash River, Nohorn Creek, Upper Hot Springs Fork Collawash River, Elk Lake Creek, Happy Creek – Collawash River, and East Fork Collawash River. The figures on the following pages show the project area; maps of each subwatershed and the respective transportation system can be found in Appendix A. This EA analyzes four alternatives, including the Proposed Action and No Action alternatives; and the results of the analysis are captured in this document.

Figure 1.1. Vicinity map of project area.

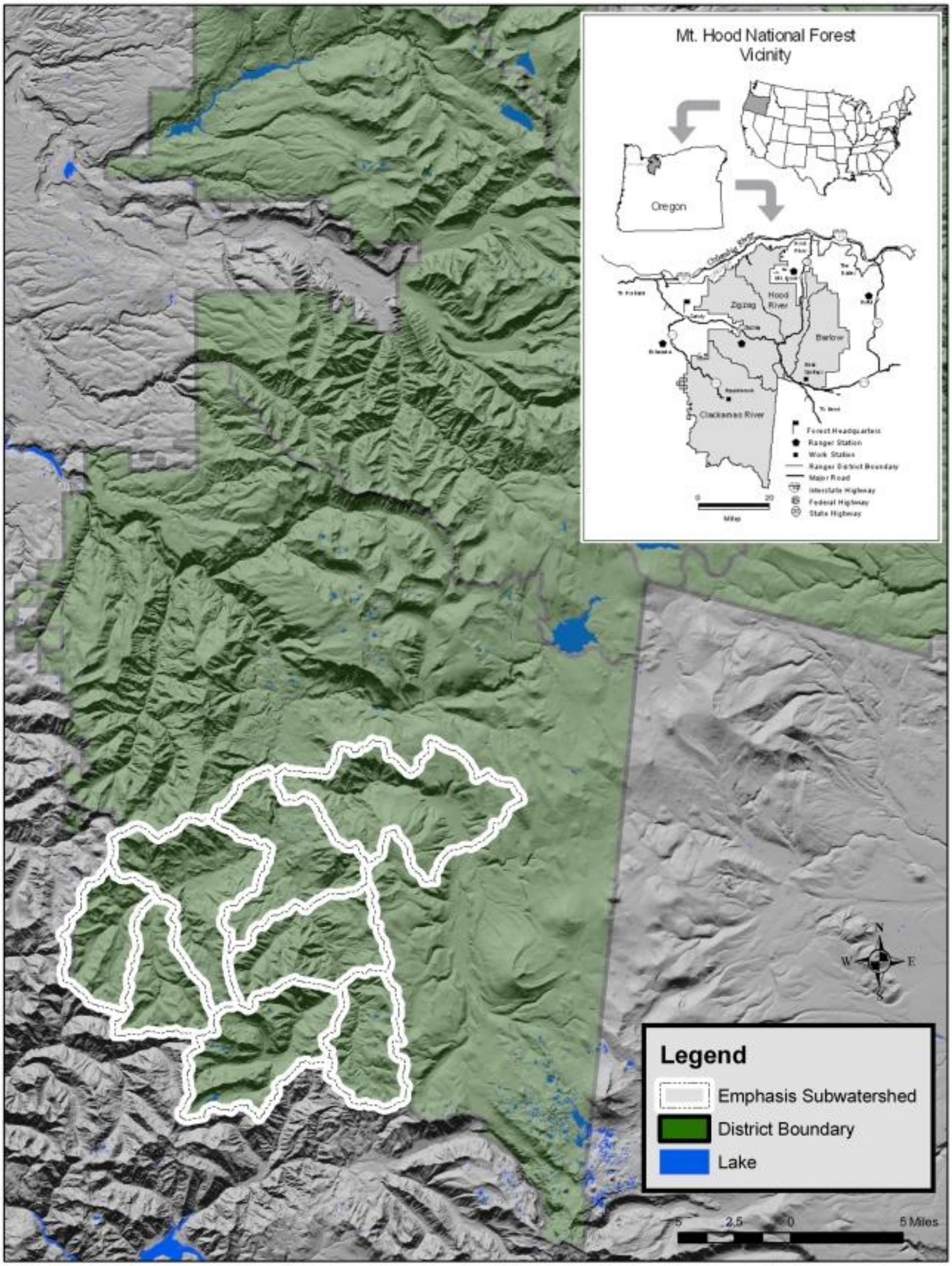
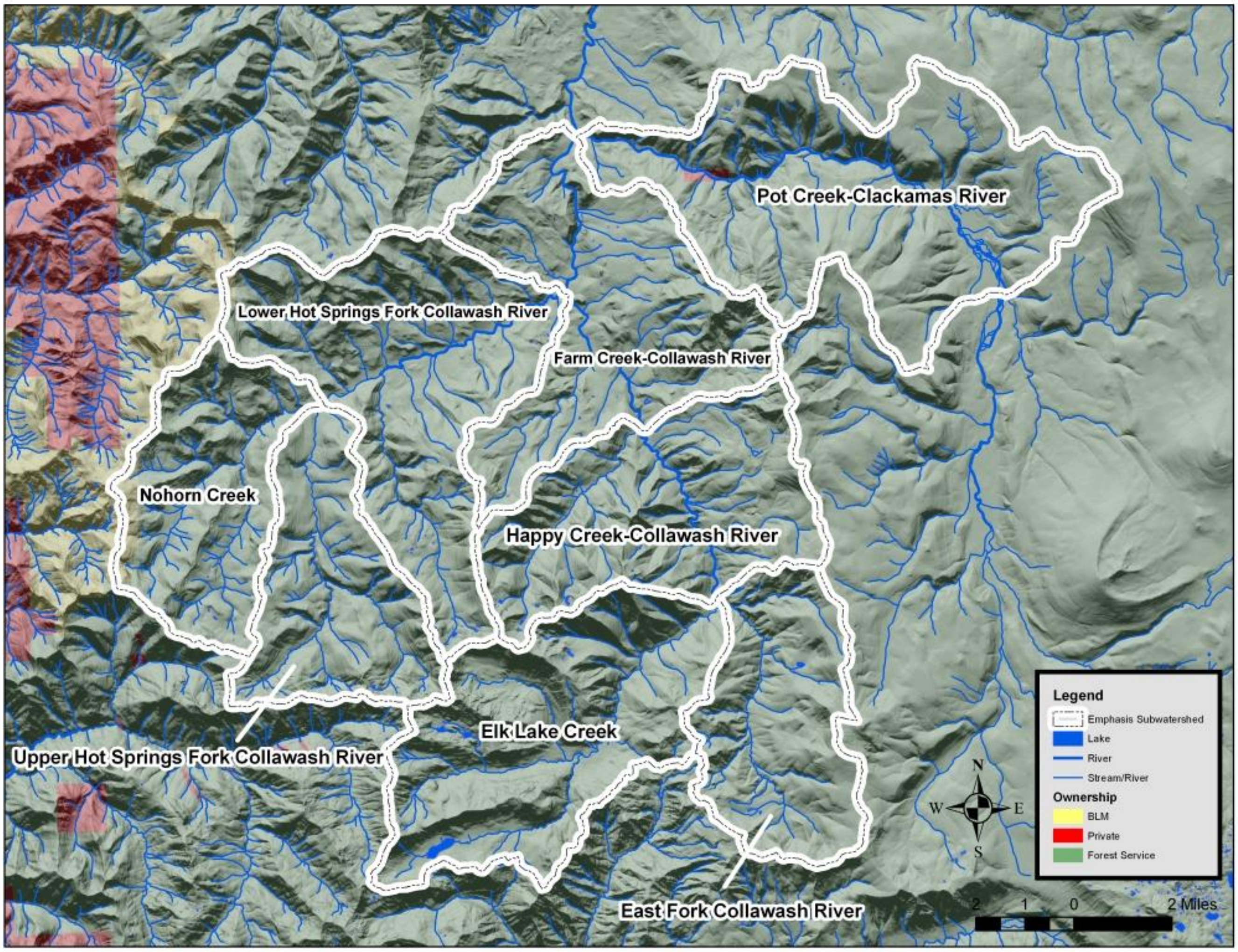


Figure 1.2. The eight emphasis subwatersheds within the project area.



1.2 Document Structure

This Environmental Assessment is written to fulfill the purposes and requirements of the National Environmental Policy Act (NEPA), as well as to meet policy and procedural requirements of the USDA Forest Service. The intent of NEPA, its implementing regulations, and Forest Service policy is to evaluate and disclose the effects of proposed actions on the quality of the human environment. The document is organized into three parts:

- *Purpose of and Need for Action:* The section includes information on the history of the project proposal, the purpose and need for action, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.

- *Alternatives, including the Proposed Action:* This section provides a more detailed description of the Proposed Action as well as the No Action Alternative and two other action alternatives. This discussion also includes design criteria and project development.

- *Environmental Consequences:* This section describes the environmental effects of no action as well as the trade-offs and effects of implementing the Proposed Action and the other action alternatives. This analysis is organized by resource area. Within each section, the existing environment is described first, followed by the estimated effects of no action that provides a baseline for evaluation, and finally the estimated effects of the Proposed Action and action alternatives.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Mt. Hood National Forest Supervisor's Office in Sandy, Oregon.

1.3 Background

In order to better manage the Forest's transportation system, the Forest has embarked on several planning processes that address travel and access management. This project – aimed specifically at managing roads posing an aquatic risk on the Clackamas River Ranger District – is just one of these planning efforts. This project is part of a larger aquatic restoration planning process[1] that plans to review approximately 15 percent of the existing Forestwide road system each year to identify roads to decommission, close, convert to trail, or improve. In 2009, the Forest completed its first planning effort on the District, as documented in the Clackamas Road Decommissioning for Habitat Restoration Environmental Assessment, which focused on decommissioning roads within the Upper Clackamas River drainage. The Forest is committed to examining all of its watersheds for restoration opportunities, and this project would complete the current road decommissioning efforts in both the Collawash and Clackamas River drainages.

The Forest's decision to examine the transportation system and the risk it poses to downstream aquatic habitat was reinforced with the information found in the Forestwide *Roads Analysis* (2003)[2]. The *Roads Analysis*, which addressed both the access benefits and ecological impacts of road-associated effects, highlighted the fact that Forest Service budgets have not kept pace with what it costs to maintain all roads so they are functioning properly. If the Forest is not able to adequately keep up with road maintenance needs, then the Forest's backlog of roads needing maintenance could impact hydrologic function. In response, the *Roads Analysis* recommends decommissioning road segments having environmental risk factors coupled with low access needs. In the end, these efforts, along with future efforts, will systematically lead us to achieving a minimum road system needed for safe and efficient travel and for managing the Forest lands (FSH 7709.55, Chpt 20 (January 8, 2009)).

[1] Appendix B includes a copy of the Forest's *Strategy for Road-related Activities to Restore Hydrologic Function*.
[2] For more information regarding the Forest's *Roads Analysis* see Section 3.10 Transportation of this document. Also, the *Roads Analysis* can be found on the Forest website at: http://www.fs.fed.us/r6/mthood/publications/.

1.4 Desired Conditions

The following statements represent desired conditions based on the Mt. Hood National Forest Land and Resources Management Plan, as amended.

- **Watersheds** have hydrologic and sediment regimes that function within their ranges of natural variability. They contain a network of healthy riparian areas and streams.
- **Streams** provide a diversity of aquatic habitat for fish and other stream-dwelling organisms. They offer sufficient quantities of large woody debris; they have clean and abundant spawning gravel; and they have stable banks that are well vegetated and have cool water.
- **Riparian areas** contain plant communities that are diverse in species composition and structure. They provide summer and winter thermal regulation; nutrient filtering; and have appropriate rates of surface erosion, bank erosion, and channel migration.
- **Habitats** provide for viable populations of existing native and desired non-native wildlife, fish, and plant species well distributed throughout their current geographic range within the National Forest System. Landscapes contain a diversity of habitats.
- The **transportation system** allows safe access through the Forest where appropriate, and it is carefully designed and maintained to minimize impacts to aquatic resources.

1.5 Purpose of and Need for Action

The need for this project is evident when the above desired conditions are compared to existing conditions site-specifically. The purposes are bolded below followed by the description of the needs.

Reduce impacts to water quality and aquatic habitats associated with unneeded roads
If unneeded roads are not maintained or decommissioned in the near future, there is an increased risk for surface erosion, gullying, and landslides. Such potential risks may result in increased sediment delivery to streams and reservoirs. Increased sedimentation can degrade water quality, aquatic habitats, and threatened, endangered, and sensitive aquatic species. The desired transportation system on the Forest is maintained to minimize environmental damage.

Reduce road density to improve wildlife habitat utilization
High open road density can result in habitat fragmentation, poaching and wildlife harassment. Lower open road densities promote healthier deer and elk populations. Decommissioned roads can increase forage as old roadways begin to grow native grasses and shrubs. Some wildlife species tend to utilize more contiguous habitats. Decommissioned roads would have fewer barriers to animals with limited dispersal ability. For wildlife, decommissioning roads would result in greater solitude, vigor, health, and reproductive success.

Reduce the spread of non-native invasive plants associated with unneeded roads
Roads serve as potential conduits for non-native invasive plants. Invasive plants displace native plants; reduce functionality of habitat and forage; increase potential for soil erosion; alter physical and biological properties of soil; reduce riparian area function; and degrade habitat for

culturally significant plants. Invasive plants may spread, displacing native plants on adjacent lands. These factors can affect desired healthy native ecosystems.

Reduce road maintenance costs

Current and anticipated road maintenance budgets are insufficient to properly maintain Forest Service system roads for safe and efficient access. There are miles of roads on the Forest that have not been maintained or properly repaired. Many such roads are no longer drivable due to brush encroachment. If the Forest is not able to adequately keep up with road maintenance needs, then the backlog of roads needing maintenance could affect hydrologic function and safety. Routine inspection of culverts and ditches on these roads is not always possible because of lack of access, personnel and funding.

1.6 Proposed Action

In response to the needs for action discussed above, this project would decommission approximately 255 miles of unneeded roads over several years, as implementation funding becomes available. Many of the roads would not be decommissioned until plantation thinning[3] has occurred. The Proposed Action would also convert one road (Forest Road 6340-140), about one half mile in length, into a non-motorized trail. All of the road decommissioning activities would occur in the following eight, sixth-field subwatersheds: Pot Creek – Clackamas River, Farm Creek – Collawash River, Lower Hot Springs Fork Collawash River, Nohorn Creek, Upper Hot Springs Fork Collawash River, Elk Lake Creek, Happy Creek – Collawash River, and East Fork Collawash River. Maps of each subwatershed and the respective transportation system can be found in Appendix A.

What does **road decommissioning** mean in this document?

- ✓ A decommissioned road is removed from the Forest's transportation system and no longer receives any maintenance.
- ✓ If hydrologic and ecological processes are interrupted or adversely impacted by the road, then the decommissioned road is stabilized and restored to a more natural state (36 CFR 212.5(b)(2)).
- ✓ Road decommissioning includes active (i.e., mechanical) and/or passive (i.e., inactive) methods.
- ✓ The beginning portion of a decommissioned road is treated in order to block vehicles from entering the decommissioned road.

All of the roads in the subwatersheds were considered for potential decommissioning using the "Transportation System Planning Tool" (Appendix B). This dichotomous key was developed to guide proposals for transportation system planning on the Forest. Specifically, the "Planning Tool" provides a framework for examining administrative and public access needs for a given road. Use of the "Planning Tool" results in five potential outcomes: 1) a road remains as it currently is on the Forest's transportation system; 2) a road needs repairs/improvements; 3) a road will be assessed in a future (within five years) planning effort; 4) a road is proposed for

[3] Plantation thinning includes stewardship/timber sales in the implementation and planning phases. Also, plantation thinning includes those units that would be ready to thin within approximately ten years. Appendix C includes a list of each road proposed for decommissioning and any plantation thinning access needs associated with a given road.

stormproofing; and 5) a road is proposed for potential decommissioning. All of the roads that were identified as needing repairs/improvements are included in Appendix C, but are *not* assessed in this NEPA document. All of the roads that were identified as potential decommissioning are included in this Proposed Action.

Road decommissioning would be accomplished by both active (i.e., mechanical) and passive (i.e., inactive) methods[4]. Decommissioned roads would no longer need maintenance of any kind, since the ground occupied by decommissioned roads would return to a more natural, forested landscape. All decommissioned roads identified in this project, including "actively" and "passively" decommissioned roads, would be removed from the Forest Service Infrastructure Database, which is the database system used for the storage and analysis of information in the transportation atlas for the agency.

Roads and road segments proposed for *active* decommissioning cross streams and require work, such as slope rehabilitation and culvert removal. Any drainage structures to be removed or treated, such as culverts, bridges, or fords, must be accomplished in such a way that restores natural drainage. This usually involves the excavation of road fill and removal of culverts for drainages and streams, thereby restoring natural contours of stream channels. For road surface drainage and intercepted shallow groundwater (springs and sheet wash), cross drains are excavated, culverts removed and flow from ditches routed to the cross drains. Cross drains are designed to be sufficiently large to capture all of the road related runoff and suitably spaced to limit the storm runoff to small discharges and slow velocities. Additionally, a barrier closure device or feature (e.g., berm, gate, or guardrail) may be constructed at the beginning of some actively decommissioned roads to deter vehicle access. In locations where a barrier closure device has been determined not to be an effective tool, the first portion (approximately 1/8 mile) of a road segment would made impassable by vehicles using mechanical methods (i.e., the road entrance would be obliterated so vehicles cannot travel beyond it).

Roads and road segments proposed for *passive* decommissioning would be decommissioned by allowing them to return to a natural condition as native vegetation grows. Most of the roads identified for passive decommissioning have not been maintained and natural vegetation has already made them inaccessible by vehicle. Also, most of these road segments are on relatively flat terrain where erosion and sedimentation are not a risk. Additionally, a barrier closure device or feature may be constructed at the beginning of some passively decommissioned roads to deter vehicle access. In locations where a barrier closure device has been determined not to be an effective tool, the first portion (approximately 1/8 mile) of a road segment would made impassable by vehicles using active mechanical methods (i.e., the road entrance would be obliterated so vehicles cannot travel beyond it).

The treatment needed for decommissioning each road segment would vary based on site-specific conditions: each road has a different history, lies on different terrain, and has different natural resource features. The techniques described above would be used where appropriate to achieve hydrologic stability and to block motorized access. The proposed treatment strategies for each road would consider the following factors:

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[4] For more information regarding road decommissioning methods, please refer to Section 3.10 Transportation in this document.

- Proximity to streams;
- Potential of sediment delivery to streams;
- Proximity to special wildlife habitats;
- Presence of erosion features;
- Slope of land;
- Cost;
- Likelihood of successfully eliminating illegal vehicle traffic; and,
- Amount of vegetation currently growing in roadway.

Prior to advertisement of a contract for decommissioning a road, the provisions of the contract and other implementation plans would be checked with this document to insure that required elements are properly accounted for. Monitoring would be conducted in conjunction with adaptive management to insure that treatments are effective. During implementation, Contract Administrators monitor compliance with the contract that contains provisions for resource protection. Monitoring of noxious weeds and invasive plants would be conducted where appropriate to track changes in populations over time and corrective action would be prescribed where needed. Effectiveness monitoring is also conducted at the Forest level (USDA Forest Service 1990, pp. 5-6 – 5-76).

All of the roads proposed for decommissioning were assessed for conversion to a *non-motorized* trail. Several factors were considered for trail conversion: if there was sufficient mileage to make the converted trail worthwhile (i.e, whether the trail would provide a meaningful recreational experience); if the converted trail could connect to an existing non-motorized trail; and if there was a request from the public to consider a specific road for trail conversion. Based on these factors, only Forest Road 6340-140 in the Happy Creek – Collawash River subwatershed is proposed to convert into a non-motorized trail (see map in Appendix A).

1.7 Adaptive Management

This project will utilize the concept of adaptive management. The treatment strategy that is currently considered appropriate for each road segment was based on initial field visits and analysis. However, after monitoring, the exact treatment details and the priority for a road may be adjusted at the time of implementation based on factors such as:

- Future weather events may cause road damage.
- Unauthorized uses by off-highway vehicles or other vehicles that were not observed during initial field visits may cause a need for more entrance work.
- A landslide or earth movement may occur.
- After implementation, monitoring may indicate that additional treatment is necessary to more effectively block vehicles or to more effectively control erosion.

Before changes are made, an interdisciplinary team would be assembled to review the change and make recommendations to the Clackamas River District Ranger. The review would consider whether the change meets the purpose and need, would consider its cost effectiveness and would determine whether the scope of the change and the anticipated effects fall generally within the range of effects and benefits described in the EA. It would consider effects and benefits to threatened, endangered, sensitive or rare species of plants and animals. If necessary, a supplemental heritage resource report would be prepared. Documentation of the change would be signed by the Clackamas River District Ranger and kept in the analysis file.

For example, if after installing the entrance management structures, the closure is breached by unauthorized vehicles, a site-specific treatment would be considered such as fortifying the barriers with large boulders to block further unauthorized vehicle access.

1.8 Decision Framework

The deciding official (i.e., Responsible Official) for this project is the District Ranger for the Clackamas River Ranger District, Mt. Hood National Forest. Based on the analysis in this document, and considering the public comments received, the Responsible Official will decide:

- Whether to decommission the roads as proposed, including all associated project design criteria;
- To select and modify an alternative; or,
- To take no action at this time.

The primary factor that will influence the District Ranger's decision is based on how well the purpose and need are addressed coupled with addressing the key issues. The Decision Notice will document and describe what activities will be implemented to address the purpose and need. The decision will be consistent with the Mt. Hood Forest Plan, as amended by the Northwest Forest Plan, and will incorporate the associated project design criteria.

1.9 Management Direction

This environmental assessment is tiered to the Final Environmental Impact Statement (FEIS) and Record of Decision (ROD) for the Mt. Hood National Forest Land and Resource Management Plan (hereafter referred to as the Forest Plan) (USDA Forest Service 1990), as amended. The Forest Plan guides all natural resource management activities and establishes management standards and guidelines for the Forest. It describes resource management practices, levels of resource production and management, and the availability and suitability of lands for resource management. Additional management direction for the area is also provided in the following Forest Plan amendments:

- The Northwest Forest Plan (NWFP) - *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl* (USDA & USDI 1994);

- Survey & Manage – *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines* (USDA Forest Service et al. 2001); and,

- Invasive Plants– *Pacific Northwest Invasive Plant Program Preventing and Managing Invasive Plants Record of Decision* (USDA Forest Service 2005); and *Site-Specific*

Invasive Plant Treatments for Mt. Hood National Forest and Columbia Gorge Scenic Area in Oregon (USDA Forest Service 2008).

Land Designations

The 1994 NWFP ROD land allocations amend those allocations described in the 1990 Forest Plan. There is considerable overlap among some allocations; therefore, more than one set of standards and guidelines may apply. Where the standards and guidelines of the 1990 Forest Plan are more restrictive or provide greater benefits to late-successional forest-related species than do those of the 1994 NWFP ROD, the existing standards and guidelines apply. The proposed road decommissioning would occur in the following Forest Plan Management Areas: Wilderness[5] (A2), Research Natural Area (A3), Special Interest Area (A4), Special Old Growth (A7), Key Site Riparian (A9), Developed Recreation (A10), Wild and Scenic River Corridor[6] (B1), Scenic Viewshed (B2), Special Emphasis Watershed (B6) (Blister Creek, Upper Collawash River, Hot Springs Fork Tributaries, and Pansy Creek), Earthflow Area (B8), Deer and Elk Summer Range (B11), Backcountry Lake Area (B12), Wood Product Emphasis (C1), Riparian Reserve, Matrix, and Late Successional Reserves (Collawash and Bagby). More information about the goals, objectives, and desired future conditions of the management areas within the project area can be found in the project file located at the Forest Supervisor's Office in Sandy, Oregon.

Other Relevant Laws and Direction

National Environmental Policy Act

This environmental assessment has been prepared in accordance with regulations established under the National Environmental Policy Act of 1969.

Endangered Species Act

Section 7(a)(2) of the Endangered Species Act of 1973, as amended, requires federal agencies to review actions authorized, funded, or carried out by them, to ensure such actions do not jeopardize the continued existence of federally listed species, or result in the destruction or adverse modification of listed critical habitat. For this project, road decommissioning activities would comply with the standards contained within the Programmatic Biological Assessment titled *Biological assessment of activities with potential to disturb northern spotted owls – FY 2010-2013*. Informal consultation for the northern spotted owl (disturbance only) has been completed and documented in a Letter of Concurrence written by U.S. Fish & Wildlife Service (August 20, 2009). Also, road decommissioning activities would be implemented consistent with the species and activity category-appropriate design criteria and conservation measures in Bureau of Land Management/Forest Service Fish Habitat Restoration Activities in Oregon and Washington CY2007-2012 Biological Assessment and associated Biological Opinions: NMFS BO (P/NWR/2006/06532 [BLM]), FWS BO (13420-2007-F-0055).

Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996, requires federal action agencies to consult with the Secretary

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[5] Roads that are wilderness as designated under the Omnibus Public Land Management Act of 2009 would not be decommissioned until a "Minimum Tools Analysis" has been completed.

[6] There are several roads within the Collawash and Clackamas River Wild and Scenic River corridors. A Section 7 Consistency Determination will be included as an appendix in the final EA.

of Commerce (NMFS) regarding certain actions. Consultation is required for any action or proposed action authorized, funded, or undertaken by the agency that *may adversely affect* essential fish habitat (EFH) for species identified by the Federal Fishery Management Plans. For this project, three salmonid species (Chinook, coho, and Puget Sound pink salmon) identified under the Act occur in the project area (Clackamas River watershed) (see Section 3.4 Fisheries); however, this project would not adversely affect EFH.

National Historic Preservation Act of 1966, Executive Order 11593, 36 CFR 800.9 (Protection of Historic Properties)

Section 106 requires documentation of a determination of whether each undertaking would affect historic properties. The Mt. Hood National Forest operates under a programmatic agreement between the Oregon State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation for consultation on project determination. Consultation with SHPO was completed for this project on June 24, 2010.

Wild and Scenic Rivers Act

Section 7(a) of the 1986 Wild and Scenic Rivers Act prohibits agencies of the United States from assisting in any water resources project that "…would have a direct and adverse effect on the values for which such a river was established…" Section 7 provides authority to the Secretary of Agriculture to evaluate and make a determination on water resources projects that affect wild and scenic rivers. The authority for that determination for projects on National Forest System lands is delegated to the Forest Supervisor (Forest Service Manual 2350). The final EA will include the Forest Supervisor's determination.

Clean Water Act

The Clean Water Act of 1977 (CWA) and subsequent amendments established the basic structure of regulating discharges of pollutants into waters of the United States. The Environmental Protection Agency (EPA) has the authority to implement pollution control programs and to set water quality standards for all contaminants in surface waters. The EPA delegated implementation of the CWA to the States; the State of Oregon recognizes the Forest Service as the Designated Management Agency for meeting CWA requirements on National Forest System lands.

1.10 Public Involvement

The project was initially listed in the summer (July) 2009 Schedule of Proposed Actions, which the Forest publishes quarterly. The Forest Service began collaborating on this project with the Clackamas Stewardship Partners over several meetings and a field trip in the summer of 2009. A scoping letter requesting public input for this project was mailed to over 200 individuals and parties in December 2009. This letter was also posted on the Forest website. Over 450 respondents submitted comments via mail, email, and phone. Copies of the scoping comments received are available in the project files at the Supervisor's Office in Sandy, Oregon.

1.11 Issues

Public comments were reviewed by the Interdisciplinary Team to identify public concerns and issues relative to the proposed action. The Responsible Official reviewed the public comments received during scoping to determine the significant issues to be addressed in this analysis.

> An **issue** is a point of debate, dispute, or disagreement regarding anticipated effects of implementing the proposed action. Issues may be significant or non-significant. Non-significant issues include those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. Significant issues are directly or indirectly caused by implementing the proposed action. Significant issues generally suggest a problem with the proposed action such that alternative actions need to be developed to solve that problem. Identifying the significant (or key) issues provides focus for the analysis. Significant issues are not only used to develop alternatives to the proposed action, but are also used to develop mitigation measures and track environmental effects.

The following are a description of the significant issues:

Potential effects to hunting

Decommissioning roads would eliminate access to popular hunting locations on the Forest. Specifically, decommissioning the following roads would remove access to important deer and elk hunting sites: 4640, 6311, 6320-120, 6321, 6330, 6341, 6350-160, 6370 (from its junction with the 6380), 7021, 7030, and 7040.

Potential effects to vegetation management

Decommissioning roads would eliminate access needs for managing plantations on the Forest. There is concern that removing roads from the Forest would impede vegetation management activities such as tree planting, survival exams, stand exams, precommercial thinning and restoration thinning during the course of their development.

Potential effects to the management and access to a Bonneville Power Administration (BPA) powerline

Decommissioning roads would eliminate access needs for managing BPA's John Day-Marion powerline. BPA would no longer have access to managing the transmission towers of this powerline if the following roads are decommissioned: 5732-029, 5732-143, 5732-013, 5732-012, 5731, 5731-116, 5720-024, 5720-020, 5720-018, 5720-016, 5720-183, 4650-140, 4650-135, 4650-130, 4650-115, 4650-114, 4650-118, 4650-150, 4650-025, 4650-120, 4650-011, 4650-012, 6310-031, 6310-200, 6310-203, 6310-033, 6310-190, 6310-021, 6310-182, 6310-025, 6310-180, 6310-019, 6310-160, 6310-018, 6321-119, 6321-022, 6321-014, 6322-012, 6322-011, 6322-130, 6322-120, 6320-120, 6322-120, 6320-130, 6320-016, 6320-018, 6320-160, 6320-119, 7010-114, 7010-012, 7010-013, 7010-015, 7010-120, 7015-130, 7015-120, 7010-019, 7010-020, 7010-018, 7010-152, 7010-150, 7010-024, 7015-016, 7015-017, and 7010-025.

2.0. Alternatives

2.1 Introduction

This chapter includes a description of the range of reasonable alternatives developed to respond to the need for actions described in Chapter 1. First, this chapter describes the alternatives considered but eliminated from further analysis. Next, two action alternatives and the no action are described and are presented in comparative form, so that the differences among them are clear to both the decision-maker and the public. Also described in this chapter are the design criteria that would be implemented to minimize or prevent adverse effects of road decommissioning.

2.2 Alternatives Considered but Eliminated from Detailed Study

Elk Lake Creek Trail (No. 559) – A public comment suggested that this project include improving the signs and safety considerations for passenger vehicles on Forest Road 6380 to the Elk Lake Creek Trail. It was also recommended that the road closure be extended and include trail conversion beginning at the east end of the Forest Road 6380 bridge over the Collawash River to create a self-enforcing motor vehicle barrier to wilderness entry, while retaining the bridge for non-motorized and emergency vehicle access. This would locate the trailhead at the bridge, and convert a portion of the 6380 road to a trail or rustic trail surface wide enough for emergency vehicles.

> **FS Response:** The Forest has not had a problem of vehicle trespass into the Bull of the Woods Wilderness on Elk Lake Trail. If necessary, the Forest can improve vehicle barriers at the existing trailhead. Relocation of the trailhead and conversion of the road and bridge to a "trail or a rustic trail wide enough for emergency vehicles" would put the entire road and bridge infrastructure in the trails arena of responsibility. Replacement of this large bridge would become a trails responsibility and would be very expensive to reconstruct. The number of large costly trails bridges on the Forest already stretches available funds when they need replacement. Maintenance of the trailhead at the existing location, with the road and bridge maintained for vehicle access allows wilderness users to access the trail and makes the most efficient use of limited trail funds on the Forest.

Dickey Creek Trail (No. 553) – A public comment suggested extending the Dickey Creek Trail approximately 0.6 miles north to a new trailhead located on Forest Road 6340; and then decommissioning the 140 road. They suggested that this would provide for additional road closures from the standpoint of Forest Service maintenance and environmental liability (including OHV trespass into the wilderness). Also, this would eliminate a dead-end trailhead that is difficult for recreationists to reach.

> **FS Response**: Alternative 2 proposes to convert the 6340-140 road into a trail. Alternatives 3 and 4 propose to relocate the trailhead to Forest Road 6340-150 in order to construct a short and relatively easier ½ mile connector to Trail #553. The trail suggested by public comment gains over 400 feet and is over 0.8 miles long on ground that is steep and difficult. Field reconnaissance done by the Forest Trails Engineer indicates the trailhead and trail relocation proposed in Alternatives 3 and 4 is preferable than what is being suggested. Also, the proposal in Alternatives 3 and 4 should achieve nearly the same objective for trail

access with little change in overall road mileage objectives. The relocated trailhead would be designed to eliminate potential OHV trespass into wilderness.

Pansy Lake Trail (No. 551) – A public comment recommended extending the closure of Road 6341 by one-tenth a mile to end the road at the existing Pansy Lake (No. 551) trailhead. This would eliminate the 6341 road from crossing Pansy Creek, just west of the trailhead; thereby providing environmental benefits and discouraging OHV encroachment.

FS Response: The road is proposed for decommissioning at the existing location because there is very limited parking where the trail starts and the adjacent roadside area is almost entirely wilderness. This location would provide additional trailhead parking. The decommissioning would be designed to deter any illegal vehicle access.

Bull of the Woods Trail (No. 550) – It was expressed by the public that the existing Bull of the Woods (No. 550) trailhead requires a long drive on a spur road that crosses very steep slopes, ending at a remote trailhead that is difficult to find and prone to unlawful activity. It was also stated that the Lily Pad Quarry, located along this access spur, is prone to unlawful activity. As an alternative, one public comment recommended relocating the Bull of the Woods trailhead to the present junction of Road 6341 and Road 6340, and converting the approximately two mile segment from the junction to the existing trailhead to trail. It was suggested that this would make it easier for the Forest Service to ensure that OHVs are not using the maze of spur roads near the current trailhead. Additionally, this proposal could include decommissioning of the Lily Pad Quarry, which would discourage unlawful activity. The added mileage and elevation gain (about 500 feet) from the trailhead would have the added benefit of discouraging unlawful activity at the historic Bull of the Woods Lookout by virtue of making access to the lookout more physically challenging for vandals.

FS Response: The Forest proposes to decommission the roads leading off the Quarry and Road 6340. There are funds available for these closures and the decommissioning can be done in a way to eliminate off-road vehicle use once the road is obliterated. Because of the remoteness of this area, there is not an issue with OHV use or unlawful activity. Also, the Forest has not had problems with unlawful activity or vandalism at the Bull of the Woods Lookout nor the trailhead that accesses it. Road signs providing direction to the trailhead are in the process of being replaced. While making access to the wilderness more remote may be seen as a benefit to wilderness values, the Bull of the Woods Wilderness has such low use that extending access to trailheads to decrease use is not necessary to maintain the wilderness character. In fact, the relatively few users on the Bull of the Woods trail enjoy accessing the wilderness and the lookout on a day hike of about six miles round trip. Adding four miles of hiking through fairly disturbed ground on a converted road would not enhance the wilderness experience for these day hikers. In fact, it would make it fairly difficult to complete as a ten mile day hike when one considers the travel time to this trailhead from Portland. No funds exist to close and rehabilitate the quarry at this time. The public comment describes issues and conditions that are not a problem for the Forest at this location, and converting two miles of road to trail has many additional trail maintenance and management issues (see Recreation section in this EA).

Mount Lowe & the Granite Peaks – A public comment stated that decommissioning the 6310 road from the Linerunner Quarry on the west to Road 6340 on the east, near Mount Lowe, would help restore one of the more rugged, scenic areas of the Forest. This segment of Road 6310 covers about ten miles, crosses at least eight streams has many steep grades across vulnerable, high-elevation slopes. The presence of the road on the upper slopes of the Granite Peaks has a significant impact on the unique botanical diversity here, introducing OHVs and other unlawful activity due to the easy access. The rugged scenic character of the area and proximity to Mount Lowe and the historic Rhododendron Ridge Trail (No. 564) creates a unique opportunity for this heavily impacted area to be restored. By converting Road 6340 to trail, and adding other trails over time, this area could emerge as an important recreation destination in the future. Additionally, the public commented that this is one of the few examples of rugged high country in the Clackamas District that was not added to the wilderness system in 2009, and thus offers the potential to plan for road conversion to a bike trial. Road 6340 could be also be redeveloped as a dual-track rustic facility that allows for shared hike, bike and horseback use.

> **FS Response**: We cannot clearly identify the intent of the comment because Road 6310 ends at Road 4670 and not 6340. Also, the comment refers to closing Road 6340 when it is not in close proximity to any of the landmarks mentioned. Assuming the comment is referring to closing Road 6310, with a suggestion to convert ten miles of this major Forest connector road to trail, we would provide the following response. The nearby Rho Ridge Trail is already over ten miles long, open to hikers, mountain bikers and equestrians. It receives very little use. Maintaining this trail represent a very large investment in time and effort by Forest staff and volunteers for relatively few users. The Forest is not looking to expand trail mileage on the Forest unless there is a compelling need, an outstanding destination, and available and reliable volunteers able to help share in the trail maintenance for the project. Converting this major access road to another ten mile trail in the same general area as the Rho Ridge Trail does not meet a compelling need, does not access a major destination, and will stretch available volunteers, trail crew time and funds even thinner on the Clackamas District.

Big Bottom Unit of the Clackamas Wilderness – A public comment recommended the decommissioning of Road 4651 in the vicinity of the new Clackamas Wilderness. While this facility is already gated, it presents a risk to the newly created wilderness area from OHVs bypassing the gates, and should be fully decommissioned or considered for conversion to a hike or hike/bike trail. Other logging spurs into Big Bottom (some are unmapped) should also be considered for decommissioning due to the potential for introducing OHVs to the new wilderness, though they seem to be omitted from this phase of the road closure process due to proximity to the watershed boundary. These include Roads 120, 130 and 140.

FS Response: Forest Roads 4651-120, 130 and 140 were analyzed in previous Environmental Assessments (i.e., 2007 Restoration EA and Upper Clackamas Road Decommissioning EA). Forest Roads 130 and 140 are already planned for decommissioning and Forest Road 4651-120 is planned for decommissioning past the 140 junction. The Forest identified a need to keep Road 4651 and plans to install a seasonal gate.

2.3 Alternatives Considered in Detail

Alternative 1 – No Action

Under the No Action Alternative, no road decommissioning would be implemented in the project area. Approximately 440 miles of roads would remain as they currently are on the landscape. Portions of the transportation system would continue to receive little or no maintenance.

Alternative 2 – Proposed Action

Alternative 2 is the Proposed Action, as described in Chapter 1. Implementing this alternative would include removing approximately 58% of the roads from the Forest's transportation system within the analysis area (see maps in Appendix A). This alternative would include decommissioning 255 miles of roads as soon as funding is available and until plantation thinning has occurred[7]. The Proposed Action would also convert one road (Forest Road 6340-140), about one half mile in length, into a non-motorized trail. This trail would connect to an existing trail (Trail #553) in the Happy Creek subwatershed.

In general, road decommissioning methods are considered either "passive" or "active". For this project, a combination of both passive and active methods would be included. The decision to decommission a road by either method is dependent on several factors including: the existing physical condition of the road; the risk posed by the road to terrestrial wildlife; and the risk the road presents to aquatic resources. For consistency with the *Roads Analysis*, risks to both terrestrial and aquatic resources are ranked on a 2 through 10 point scale with 10 being a high risk and 2 being a low risk. Generally, roads identified as having lower risks are considered for passive methods and roads identified as having higher risks are considered for active methods.

Passive decommissioning methods generally consist of doing minimal work to eliminate entrance opportunities by vehicles to an inactive road. These methods are typically appropriate for roads that have not been actively used for some time, vegetation has naturally overgrown the roadbed, and natural drainage patterns are functioning at a high level.

Active decommissioning methods generally include actions utilizing mechanized construction equipment to physically de-compact, stabilize, restore and allow for revegetation of the roadbed. In order to re-establish roadbeds for vegetation establishment, decompaction techniques would be deployed. These decompaction efforts range from complete disturbance of the entire width of the roadway for up to 12" depth (pavement and gravel surface ripping) to the construction of localized, relatively small (approximately 3' x 3' wide) patterned decompacted zones (known as "craters") in the roadbed to give vegetation opportunities to begin re-establishment.

Entrance management techniques are common to both passive and active decommissioning. One technique that is used to eliminate/minimize the temptation of drivers to drive on the closed road and provide the optimum conditions for the rapid re-establishment of vegetation is to completely decompact the entire width of the roadway for up to 12" depth by mechanical construction

[7] Plantation thinning includes stewardship/timber sales in the implementation and planning phases. Also, plantation thinning includes those units that would be ready to thin within approximately ten years. Appendix C includes a list of each road proposed for decommissioning and any plantation thinning access needs associated with a given road.

equipment. This decompaction is generally completed on the initial 1/8 mile (660 ft.) of road from where it abuts to an open connecting road.

In order to simplify the description of decommissioning techniques for discussion purposes, active and passive techniques have been summarized in Table 3.32 and a more complete discussion of the methods are contained in Section 3.10 Transportation.

All design criteria listed Section 2.4 would be included in the implementation of Alternative 2.

Alternative 3

Alternative 3 was developed in response to the key issues discussed in Section 1.11 (maps are included in Appendix D). One of the primary focuses of the development of this alternative was an assessment of plantations and when they would be ready for thinning. In terms of vegetation management, the process used for developing the Proposed Action neglects to consider longer roads that have multiple plantations with a wide range of ages and management needs. While, the "Transportation System Planning Tool" provides a reasonable foundation for initial planning, it fails to include the complexities of specific roads. For example, if a road has twenty plantations of varying ages and growth rates, a thinning could be needed in multiple plantations every five years for the next 30 years. It would be difficult to assess when that road is no longer needed or when it would be prudent to decommission it.

The following is a specific example that captures the intricacies involved with access for vegetation management. The 2007 Plantation Thinning Environmental Assessment identified several stands along road 6330, which were included in the Hot Thin stewardship contract. This project is under contract, but thinning has not yet begun. It would conduct restoration thinning on 279 acres by removing trees averaging nine inches in diameter. The Hot Thin project generated $21,925 for restoration projects, $92,323 for road maintenance and repairs, plus $100,672 in potential retained receipts[8] to fund other important restoration projects. Also, along 6330, 43 acres of the 2007 Plantation Thinning EA remain to be offered as a helicopter operation; however, these units have been delayed due to the high cost of helicopter fuel. Currently, the Forest is planning the Jazz Thin which includes 169 acres of restoration thinning in plantations along 6330. Along this road there are also plantations that are not ready yet, but will be ready for thinning in the second decade as well as younger plantations that will be ready in the third decade. Each of these thinning contacts would contribute toward maintaining the road and providing funds through stewardship contracting to complete restoration work.

It is the premise of Alternative 3 that there would be sufficient funding generated by repeated harvest activities on certain roads to maintain the road as a system road in perpetuity and to repair or improve the road to deal with hydrologic concerns. The Forest's *Roads Analysis* (page 40) recommended some roads would be better treated by stormproofing. This recommendation was included in the development of Alternative 3 because it would retain access for future management while dramatically reducing maintenance costs and hydrologic concerns.

[8] This retained receipt dollar amount reflects today's market value; however, it could change with market adjustments.

With these concepts and concerns in mind, Alternative 3 was developed. It would decommission shorter roads (similar to those in the Proposed Action), but would not decommission longer roads that have multiple plantations with a wide range of ages and management needs. An analysis was conducted for the longer roads that were proposed for decommissioning with the Proposed Action. The following assumptions were used in this analysis and were based on previous experience:

- Plantations would be ready for thinning at age 35 in the western hemlock zone, at age 45 in the Pacific silver fir zone, and age 55 in the mountain hemlock zone.
- Plantations were grouped in ten year increments.
- 25% of each plantation would not be thinned.
- Late Successional Reserves would be thinned once.
- 50% of plantations outside of LSRs would be thinned a second time.
- Thinning volume would be approximately 10 MBF per acre.
- Timber value available for road maintenance, repair and other stewardship projects would be approximately $100 per MBF (with conventional logging systems).

Alternative 3 also addresses the concerns raised by the Bonneville Power Administration. This alternative would close the roads listed in Section 1.11. The roads would be closed for public access, but would remain on the Forest's transportation system for administrative use. In order to deter access to these roads, an entrance barrier device (e.g., gate) may be installed. These roads would be maintained by BPA in accordance with a maintenance agreement between BPA and the Forest Service.

In regards to hunting access, Alternative 3 proposes to keep all of the roads discussed in Section 1.11 as part of the Forest's transportation system. These roads include: 4640, 6311, 6320-120, 6321, 6330, 6341, 6350-160, 6370, 7021, 7030, and 7040. However, a portion of the 7021 would also be decommissioned. The segment from Whetstone Creek to the end that is now in newly designated wilderness would be decommissioned under this alternative (see Appendix D – Maps of Alternative 3).

Implementing this alternative would include removing approximately 30% of the roads from the Forest's transportation system. This alternative would decommission about 129 miles of road. Also, this alternative would close about 17 miles of road. These roads would be maintained by BPA, and potentially gated. In the Happy Creek subwatershed, the trailhead for Trail #553 would be relocated off of the 6340-160 or 150 road, which would require approximately ½ mile of new trail construction to reconnect with the existing trail.

Active decommissioning methods would include ripping pavement, constructing crossdrains, removing fill at stream crossings, constructing boulder weirs in perennial channels, removing bridges and culverts, seeding or mulching disturbed areas, and planting at stream crossings (for more information on each of these methods see the Proposed Action above).

All design criteria listed Section 2.4 would be included in the implementation of Alternative 3.

Alternative 4

Similar to Alternative 3, Alternative 4 was developed based on the key issues outline in Section 1.11 (maps are included in Appendix E). This alternative was also based on the same assumptions outlined in Alternative 3. However, there was a greater emphasis in decommissioning roads with higher aquatic and landslide risks as well as roads within the Late Successional Reserves.

Alternative 3 also addresses the concerns raised by the Bonneville Power Administration. This alternative would close the roads listed in the Key Issues Section 1.11. The roads would be closed for public access, but would remain on the Forest's transportation system for administrative use. In order to deter access to these roads, an entrance barrier device (e.g., gate) may be installed. These roads would be maintained by BPA in accordance with a maintenance agreement between BPA and the Forest Service.

Three of the roads proposed to be closed to public access (Forest Roads 4651, 6310-130, and 6321-120) would be treated in such a way that they are stabilized to resist forces causing movement/erosion that could impede hydrologic function. This treatment is often referred to as "storm damage risk reduction."

In regards to hunting access, Alternative 4 proposes to keep segments of the roads discussed in Section 1.11 as part of the Forest's transportation system. These roads include: 4640, 6311, 6320-120, 6321, 6330, 6341, 6350-160, 6370, 7021, 7030, and 7040. However, several segments of these roads would also be decommissioned (see Appendix E – Maps of Alternative 4).

Implementing this alternative would include removing approximately 39% of the roads from the Forest's transportation system. This alternative would decommission about 170 miles of road. Also, this alternative would close about 17 miles of road. These roads would be maintained by BPA, and potentially gated. In the Happy Creek subwatershed, the trailhead for Trail #553 would be relocated off of the 6340-160 or 150 road, which would require approximately ½ mile of new trail construction to reconnect with the existing trail.

Active decommissioning methods would include ripping pavement, constructing crossdrains, removing fill at stream crossings, constructing boulder weirs in perennial channels, removing bridges and culverts, seeding or mulching disturbed areas, and planting at stream crossings (for more information on each of these methods see the Proposed Action above).

All design criteria listed in the section below would be included in the implementation of Alternative 4.

2.4 Project Design Criteria

The following design criteria and standard management practices and requirements for the protection of resources are an integral part of the action alternatives, and are considered in the effects analysis in Chapter 3.

Botany Design Criteria

B-1: In order to prevent the spread of invasive plants, all equipment would be cleaned of dirt and weeds before entering National Forest System lands. This practice would not apply to service vehicles traveling frequently in and out of the project area that would remain on the roadway.

B-2: Existing roadways would be used to minimize the impacts to riparian vegetation and function. Native vegetation in and around project activity would be retained to the maximum extent possible consistent with project objectives.

B-3: Soil disturbance that promotes invasive plant germination and establishment would be minimized to the extent practical (consistent with project objectives).

B-4: The contractor would be educated in simple techniques to avoid spreading weeds (e.g., provide the contractor with the flyer, *Simple Things You Can Do to Help Stop the Spread of Weeds*).

B-5: If a road is part of a proposed noxious weed treatment site or provides access to a site, then complete treatment before making the road unavailable. If the road and the land it accesses are not listed in the Invasive Plant EIS, then check with the district noxious weed coordinator and consider a review or site visit to be sure there are no weed sites that would need to be treated. If a weed site is found that needs treatment, then complete treatment of the site prior to closing the road. Prior to initiating any decommissioning activities, a treated site should be monitored by a botanist in order to determine the effectiveness of treatment.

Fisheries Design Criteria

F-1: An experienced fisheries biologist, hydrologist, and/or technician would participate in the design and implementation of the project.

F-2: Slide and waste material would be disposed of in stable, non-floodplain sites. However, disposal of slide and waste material within existing road prism or adjacent hillslopes would be acceptable if restoring natural or near-natural contours. For road removal projects within riparian areas, recontour the affected area to mimic natural floodplain contours and gradient to the greatest degree possible. If natural contours are greater than 2 to 1 ratio, then slopes will be shaped to a 2 to 1 ratio or less.

F-3: Disturbance of existing vegetation in ditches and at stream crossings would be minimized to the extent necessary to restore the hydrologic function of the subject road.

F-4: Soil disturbance and displacement caused by project activities would be minimized, but where sediment risks warrant, soil movement off-site into water bodies would be prevented through the use of filter materials (such as weed-free straw bales or silt fencing) if vegetation strips were not available.

F-5: Project activities would be implemented during dry-field conditions (also see WQ-1).

F-6: The Oregon Department of Fish and Wildlife (ODFW) Guidelines for Timing of In-Water Work would be followed. Exceptions to ODFW guidelines for timing of in-water work would be requested and granted from appropriate regulatory agencies.

F-7: Power equipment would be refueled at least 150 feet from water bodies to prevent direct delivery of contaminants into a water body. If local site conditions do not allow for a 150-foot setback, then refueling would be as far away as possible from the water body. For all immobile equipment, absorbent pads would be used (also see WQ-13).

F-8: An approved Spill Prevention Control and Containment Plan (SPCCP) would be created, which describes measures to prevent or reduce impacts from potential spills. The SPCCP would include a description of the hazardous materials that would be used; and a spill containment kit would be located on-site. Refer to WQ-16 for specific criteria when an SPCCP would be required.

F-9: Hazard trees within riparian areas needing to be felled for safety purposes would be directionally felled, if possible, towards the stream.

F-10: For culvert removal, natural drainage patterns would be restored and promote passage of all fish species and life stages present in the area. Channel incision risk would be evaluated and in-channel grade control structures would be constructed when necessary.

F-11: Drainage features should be spaced to hydrologically disconnect road surface runoff from stream channels (also see WQ-11).

F-12: When removing a culvert from a first or second order, non-fishing bearing stream, project specialists should determine if culvert removal should follow the conservation measures under activity #5 in the programmatic biological and conference (Opinion) by the National Marine Fisheries Service (April 28, 2007) and by U.S. Fish and Wildlife Service (June 14, 2007). Culvert removal on fish bearing streams should adhere to the conservation measures activity #5 in the programmatic biological and conference (Opinion) by the National Marine Fisheries Service (April 28, 2007) and by U.S. Fish and Wildlife Service (June 14, 2007).

F-14: If other aquatic restoration activities are used as complementary actions, follow the associated design criteria and conservation measures.

Heritage Design Criteria

H-1: In the event that archaeological properties are located during implementation, all work in the vicinity of the find would cease and a District or Forest archaeologist would be contacted.

Any other protection measures would be developed in consultation with the Oregon State Historic Preservation Officer (SHPO), appropriate Tribes, and, if necessary, the Advisory Council on Historic Preservation.

H-2: No heavy equipment or ground disturbing activities would be allowed on Forest Roads 4600-043 and 6310-022 until site testing has been completed.

H-3: For Forest Roads 4620-340 and 4620-360, a District or Forest archaeologist would monitor the site during implementation of road decommissioning activities, or the roads should only include entrance management.

H-4: Only entrance management would occur on Forest Roads 4650-111 and 6380-125.

H-5: No heavy equipment or ground disturbing activities would be permitted beyond the lower bench area of Forest Road 6300-120.

H-6: No heavy equipment or ground disturbing activities would be permitted on the first ¼ miles of Forest Road 7020-170. Only entrance management would be permitted on this road. Also, a District or Forest archaeologist would monitor the site during implementation of road decommissioning activities.

Recreation Design Criteria

R-1: As much as possible, post signs on roads proposed to be closed for a summer season prior to project implementation. This would allow those users to at least become aware of the proposal if they were not already. Signs should say:

> *This Road Proposed for Closure in 2010 (or 2011). For More Information, Call (Ranger's Name or Project Lead Contact and Phone Number).*

R-2: Trailhead access and parking would be maintained or closure would be minimized during implementation. If any existing trailheads become inaccessible by decommissioning a road (none have been identified to date), then the affected trailheads and trails would be relocated prior to initiating any decommissioning activities.

R-3: If the distance added for accessing the trail is longer than ½ mile, then an alternate trail should be located rather than converting the road to a trail for aesthetic reasons. For short sections less than ½ mile, then converting the road to a may be considered.

R-4: Roads converted to trails should meet Forest Service standards for trail construction as contained in the Forest Service Manual and Handbook. A qualified trails engineer should perform trail layout and design. Drainage structures, fill and cut slopes, and future brushing needs should be within trail budgets to maintain. All trails created from decommissioned roads should meet the Forestwide Standards and Guidelines on page Four-115 and 116 for visual quality within five to ten years of conversion activities. Any relocated trails not on road beds should meet standards within one year of construction.

R-5: Conversion of a road to a trail, or relocation of the affected trail and trailhead including any additional surveys, analysis, documentation, design, and construction costs should be funded as part of the road decommissioning project. If funding is not available for this mitigation, the road decommissioning should be dropped until other benefitting function funding is available.

Water Quality Design Criteria

WQ-1: Road decommissioning activities would be suspended if there is more than 2 inches of rainfall in a 24 hour period in the project area. Activities may be resumed after consultation with appropriate Forest Service personnel.

WQ-2: Project operations would be suspended if soil moisture is recharged and streamflows rise above baseflow levels.

WQ-3: Removal of the fill at stream crossings would attempt to restore the stream channel and banks to original pre-road (natural) contours as much as possible (also see F-2).

WQ-4: The removed material would be carefully placed at cutslopes or on the road surface beyond the natural channel slope at a less than 2 to 1 slope angle.

WQ-5: Stream channel width would be at least 1.1x bankfull as measured above the stream crossing. Stream banks would be constructed at a maximum of 2 to 1 slope angle (50% slope).

WQ-6: 50-75% of the road surface where decompaction is prescribed would be de-compacted through the sub-grade and native vegetation could be placed on road surface no more than one layer deep.

WQ-7: All perennial streams would be evaluated to determine if "Upstream U's" are necessary to prevent streambed and bank erosion. The ends of structures would be keyed into the stream bank for at least ¼ of the diameter of the boulder to minimize the stream cutting into the stream bank at high flows. Structures would be installed as outlined in the following table:

Table 2.1. Pool to pool spacing.

Wetted Stream Width (feet)	Minimum Boulder Size Needed (inches)	Stream Gradient (percent) 0-2% 2-6% 6-15% 15-30%			
0 to 5	18	42 feet	15 feet	8 feet	4 feet
5 to 10	24	63 feet	21 feet	12 feet	6 feet
10 to 15	24	105 feet	36 feet	20 feet	10 feet
15 to 25	30	167 feet	57 feet	32 feet	16 feet

WQ-8: Activities associated with culvert or bridge removal in streams with active streamflow would be suspended if there is an increase of 10 NTU's (Nephlometric Turbidity Units) below the project area. Also, activities could be suspended if turbidity criteria are exceeded as determined by appropriate Forest Service personnel.

WQ-9: Removal-Fill Permits would be obtained for project activities when appropriate.

WQ-10: A site-specific water quality control plan would be submitted and approved for each stream diversion prior to the start of excavation. Live streams would be diverted during excavation to prevent mobilization of fill material.

WQ-11: Where roads are actively decommissioned drainage structures would be installed at a maximum of every 200’ or closer dependent upon road grade and associated geology, unless determined unneeded by appropriate Forest Service personnel.

WQ-12: All vehicles and machinery would be free of petroleum leaks. Any leaks that occur would be immediately repaired and the appropriate personnel would be notified.

WQ-13: Absorbent pads would be required under all stationary equipment and fuel storage containers during all servicing and refueling operations (also see F-6).

WQ-14: All trucks used for refueling should carry a hazardous material recovery kit (also see F-7). Any contaminated soil, vegetation or debris must be removed from National Forest System lands and disposed of in accordance with state laws.

WQ-15: All petroleum products being transported or stored would be in approved containers meeting Occupational Safety and Health Administration standards and Oregon Department of Transportation.

WQ-16: All vehicles hauling more than 300 gallons of fuel would have an approved communication system with which to report accidental spills. If any fuel or fluid storage container exceeds a capacity of 660 gallons, the contractor would prepare a spill prevention control countermeasures plan. Such plan would meet applicable Environmental Protection Agency requirements (40 CFR 112) including certification by a registered professional engineer.

WQ-17: The contractor would be liable for cleanup of any hazardous material or fuel spill occurring as a result of his/her work on this contract.

WQ-18: The contractor would, on a daily basis, remove all trash and refuse from the project work area.

WQ-19: In order to preclude erosion into or contamination of the stream or floodplain, staging areas (used for construction equipment storage, vehicle storage, fueling, servicing, hazardous material storage, etc.) would be located beyond the 100-year floodplain (also see F-7).

WQ-20: Following earthwork, especially near stream banks, the disturbed area would be seeded with a native seed mix if available and mulched with a weed-free straw, at approximately 2000 pounds per acres or so that there is completed coverage of the disturbed and the mulch is 4 inches deep. Attempts would be made to seed disturbed areas during conditions favorable for germination. Other materials may be used for mulching if they provide equivalent or better stabilization from erosion and protection from introducing non-native species.

WQ-21: The non-motorized trail crossings over Cast and Lost creeks (in Alternative 3) would be constructed so there would be minimal impacts on water quality and aquatic species.

Wildlife Design Criteria

W-1: Hazard trees outside of the riparian areas that pose a safety risk would be directionally felled, where feasible, away from the road prism and into the surrounding forestland.

W-2: No snow plowing, road decommissioning, use of motorized equipment or blasting would be permitted in severe winter range as determined by the Forest Service, or within any B10 land allocation (i.e., Deer and Elk Winter Range areas) between December 1 to March 31. No road decommissioning, use of motorized equipment or blasting would be permitted within key summer range areas as determined by the Forest Service, or within in any B11 land allocation (i.e., Deer and Elk Summer Range areas) from April 1 – July 31.

W-3: No activity shall take place within the disruption distance of a known or predicted activity center during the March 1 to July 15 critical nesting period, unless the habitat is known to be unoccupied or there is not nesting activity, as determined by survey to protocol. The distance and timing may be modified by a Forest Service wildlife biologist according to site-specific information. In the event that any new Northern Spotted owl activity center(s) is/are located, then seasonal operating restrictions would be implemented for the road affected.

W-4: Woody debris, which must be removed to access the area, would be saved and scattered on the disturbed areas. During placement they would be laid parallel to the slope to serve as contour barriers to surface soil movement. The material would serve as a source of large woody debris to help reestablish vegetation, and the scattering of material would act as a means to reduce fuel hazards.

W-5: If a wooden bridge is identified to be removed, then the bridge would first be assessed by a wildlife biologist to see if bats are using it for habitat. If so, then additional bat roosting habitat (e.g., bat boxes or snags) would be provided in the vicinity of the bridge.

2.5 Comparison of Alternatives

The following table displays the four alternatives by mileage proposed for decommissioning, conversion to trail, and closure. Appendix F includes a list of road numbers by alternative.

Table 2.2. Comparison of alternatives.

Proposed Treatment	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 3	Alternative 4
Decommission	0 miles	254.6 miles	129.0 miles	169.5 miles
Convert road to trail	0 miles	0.55 miles	0 miles	0 miles
Close	0 miles	0 miles	16.8 miles	16.8 miles
Total miles of removed from transportation system	0 miles	255.2 miles	129.0 miles	169.5 miles
Total miles remaining on the transportation system	439.9 miles	184.8 miles	310.9 miles	270.4 miles

3.0. Affected Environment and Environmental Consequences

3.1 Introduction

This chapter includes a summary of the physical, biological, social, and economic environments of the affected project area (the baseline or existing condition) and the expected effects or changes to those environments, if any of the alternatives were to be implemented. This chapter provides the scientific and analytical basis for the comparison of alternatives, presented on the previous page. Specialist Reports (available in the project files) are incorporated by reference, and all specialists have contributed directly to the preparation of this final document.

The chapter is arranged by resource, with the affected environment discussion presented first, followed by the estimated project effects (direct and indirect), and then estimated cumulative effects. Cumulative effects are those effects on the environment resulting from the incremental effect of the proposed road decommissioning activities when added to the effects of other past projects (that still have residual or on-going effects); the estimated effects of other current projects; and the effects of reasonably foreseeable future activities (federal or non-federal) (40 CFR Parts 1500-1508). The analysis was guided by the June 24, 2005 memo Guidance on the Consideration of Past Actions in Cumulative Effects Analysis, Executive Office of the President, Council on Environmental Quality.

3.2 Geology

Existing Condition

The area covered by this project contains some of the most geologically unstable terrain on the Mt. Hood National Forest. This unstable terrain is largely a result of the type of rock units present, the age of the rock units, and the weathering history of the rock units. Most of the rock units in this area are of volcanic origin and can be divided into two groups: lava rock and pyroclastic rock. The lava rock is typically andesite that is resistant to weathering and forms steep hillslopes. The original minerals present in the pyroclastic rock have typically been altered into clay minerals, resulting in a very weak material that is unable to support even moderately steep hillslopes. Extensive glaciation in the distant past oversteepened the valley walls. Once the glaciers melted and removed lateral support from the valley walls, large portions of those valley walls collapsed as giant landslides composed mostly of the highly altered, clay-rich, pyroclastic material.

The ancient landslide deposits developed during a much wetter climate than our present climate. The wetter climate occurred thousands of years ago. During that time unstable hillslopes collapsed and formed earthflows and large debris slides that became large coalescing deposits of landslide material. These landslide deposits can be several square miles in area and may be several hundred feet deep. Slope angles are usually gentle. These landslide deposits are more stable now than they were in the past but there are still portions of them that are adjusting to their “new” slope position. These adjustments are typically expressed as small landslides (slumps or debris slides) that occur at locally steep areas of the ancient landslide deposits, for example, along creek banks. These adjustments usually occur during or immediately after major storm events, when the ground water table is high. Most of the ancient landslide deposits are dormant and would require a major change in their hydrology or slope geometry to become active again. These dormant landslide deposits have been mapped as landform type ALD.

Other ancient landslide deposits have been recognized as being recently active. Evidence for recent movement includes fresh scarps, cracks, very tilted trees, and similar clues. These recently active landslide deposits have been mapped as landform type ALA. Landform type ALA can have a variety of types of landslides, but they are usually earthflows, debris slides, or slumps.

The large, ancient, mostly-dormant, landslide deposits in this area have been classified as high risk earthflows, moderate risk earthflows, and low risk earthflows. The high-moderate-low adjectives describe the relative susceptibility of the terrain to reactivation of ground movement from any cause.

Landslides can also occur on landform types other than ancient landslide deposits. Usually these are debris slides and debris flows that originate on steep slopes. Debris slides typically occur on slopes that are greater than 60%. Debris flows typically originate in channels that have a gradient that is steeper than about 35%. In this area many of the larger creeks originate on the upper valley walls where the creek gradients are steep, and the channels are incised enough that debris flows are common. These creeks are referred to here as debris-flow-prone creeks.

Poorly located, poorly constructed, or poorly maintained roads can result in slope stability problems and can result in resource damage. Well located, well constructed, and well maintained roads will have a minimal effect on slope stability.

Most of this area was heavily roaded beginning in the late 1950’s and continuing through the 1980’s. Road construction practices gradually improved though the decades but there remain many roads that were poorly located and/or poorly constructed in the past. Without proper maintenance these roads can be a threat to water quality and fish habitat.

Debris flows are a natural process in this area and have the beneficial effect of delivering boulders and large woody debris to lower elevation stream segments which enhances fish habitat. Debris flows can have detrimental effects also, such as delivering excess fine sediments to fish habitat, or blocking road crossings and diverting drainages. Poorly designed or poorly located road/creek crossings can impede this natural process and have an adverse effect on fish habitat. When debris flows reach a road, they can pass through the crossing unimpeded, they can be stopped completely, or they can block the culvert, divert the water flow, and cause extensive erosion of the road fill. In a worst case scenario, a debris flow can be temporarily stopped at the crossing and allow more water and sediment to accumulate behind the crossing, until the entire crossing structure fails catastrophically. The debris flow then continues down channel, much larger and more destructive then it would have been without the interference from the road crossing.

The Forest’s *Roads Analysis* (2003) collected data regarding the roads in this area. As part of that effort, road/creek crossings were categorized as high risk crossings, moderate risk crossings, and low risk crossings. A fourth category, crossings that are below (downstream) from high risk crossings was also used. The “risk” at these crossings pertains to the likelihood of the road crossing interfering with the natural passage of sediment and large woody debris to creeks and fish habitat. High risk crossings are those that are subject to frequent debris flows from debris-flow-prone creeks and are likely to interfere with that process. Moderate risk crossings experience fewer debris flows, and low risk crossings fewer still. Crossings that are located downstream from a high risk crossing have the additional potential to be destroyed if the higher crossing fails.

Direct and Indirect Effects

Properly decommissioned roads reduce the potential for road-related landslides and the resulting adverse effects on water quality and fish habitat. In general, the more miles of road that are properly decommissioned, the greater the beneficial effects to water quality and fish habitat. Roads that are properly decommissioned require no maintenance and therefore allow the limited forest road maintenance funds to be applied more effectively to a smaller road system. Better maintained roads have less environmental impact than poorly maintained roads.

Alternative 1 – No Action

The No Action Alternative keeps the 440 miles of road that currently exist on the transportation system in the analysis area. Road maintenance would continue to be inadequate to meet the needs for this many miles of road. Poorly maintained roads would continue to develop stability problems and continue to deliver unwanted sediment to creeks. Road repair costs would increase since more untreated problem sites would likely develop into larger and more expensive problems.

Alternative 2 – Proposed Action

This alternative removes the most miles of road of any of the four alternatives. By decommissioning the most miles of road, this alternative would result in the largest reduction in road-related stability issues and result in the most improved road maintenance for the remaining miles, thereby reducing the resource impact of those roads.

Alternative 3

Fewer road miles of road decommissioning would reduce the number and extent of road-related stability issues and reduce the overall impact of the road system on other resources, although not as much as compared to Alternatives 2 or 4. Also, road maintenance would improve over current conditions for the remaining roads, although not as much as compared to Alternatives 2 or 4. The improved maintenance would allow existing and developing road-related stability problems to be better addressed than they are at present, although not as much as compared to Alternatives 2 or 4.

For closed roads, existing drainage structures would be left in place. Sections of these roads with stability or drainage problems would be repaired. Gates could allow regular inspection of the closed roads by resource specialists. Timely recognition of developing problems and rapid response of road maintenance equipment is important during storm events or other landslide inducing conditions in order to minimize damage to roads and other resources. Gates would allow regular inspection and emergency access, if necessary.

Alternative 4

Fewer road miles would reduce the number and extent of road-related stability issues and reduce the overall impact of the road system on other resources, more than Alternative 3, but not as much as Alternative 2. Road maintenance would improve over current conditions for the remaining roads, more than Alternative 3, but not as much as Alternative 2. The improved maintenance would allow existing and developing road-related stability problems to be better addressed than they are at present, more than Alternative 3, but not as much as Alternative 2.

For closed roads, existing drainage structures would be left in place. Sections of these roads with stability or drainage problems would be repaired. Gates could allow regular inspection of the closed roads by resource specialists. Timely recognition of developing problems and rapid response of road maintenance equipment is important during storm events or other landslide inducing conditions in order to minimize damage to roads and other resources. Gates would allow regular inspection and emergency access, if necessary.

Comparison of Alternatives

With the data generated by the Forest's *Roads Analysis* (2003), it is possible to more closely compare the relative effects of the four alternatives on road-related slope stability. For this analysis, six factors were selected that are related to the incidence of road-related stability problems:

1. Road segments located on active landslides.
2. Road segments located on high risk earthflows.
3. Road segments located on moderate risk earthflows.
4. Road crossings of high risk crossings.
5. Road crossings of crossings below high risk crossings.
6. Road crossings of moderate risk crossings.

In Table 3.1 the alternatives are compared using the units (miles or number) for each factor. The table displays the data for the roads that are to be ultimately decommissioned under each alternative. (Note: In the next three tables, the following abbreviations are used: "Decom" = decommissioned road, "Blw" = below, "Wght" = weight.)

Table 3.1. Comparison of alternatives using landslide-related risk factors.

Factor	Alt 1	Alt 2	Alt 3	Alt 4
Decom on Active Landslides (miles)	0.0	4.5	1.4	3.3
Decom on High Risk Earthflow (miles)	0.0	17.5	5.7	13.2
Decom on Moderate Risk Earthflow (miles)	0.0	26.1	7.8	14.8
Decom at High Risk Creek Crossings (number)	0	204	51	115
Decom at Below High Risk Creek Crossings (number)	0	5	3	3
Decom at Moderate Risk Creek Crossings (number)	0	148	47	78

A slope stability specialist assigned a relative weight to each of the factors, reflecting the relative importance of each factor. Table 3.2 displays the weighted "scores" based on the landslide-related risk factors and totals the scores for each of the four alternatives. Since the data is for the roads to be decommissioned, the higher the score, the greater the benefit to the watershed.

Table 3.2. Comparison of alternatives using weighted scores based on landslide-related risk factors.

Factor	Weight	Alt 1	Alt 2	Alt 3	Alt 4
Decom on Active Landslides	10	0	45	14	33
Decom on High Risk Earthflow	3	0	53	17	40
Decom on Moderate Risk Earthflow	2	0	52	15	30
Decom at High Risk Creek Crossings	5	0	1020	255	575
Decom at Below High Risk Creek Crossings	4	0	20	12	12
Decom at Moderate Risk Creek Crossings	3	0	444	141	234
Total Weighted Score by Alternative =		**0**	**1634**	**454**	**924**

Not surprisingly, the alternatives that decommission the most miles of road score the best in this analysis. The scores suggest that Alternative 2 has the greatest reduction of adverse effects of road-related landslides, followed by Alternative 4 (which is about 57% as effective), and then Alternative 3 (which is about 28% as effective).

Table 3.3 compares the alternatives after normalizing the scores to a "per mile of decommissioned road" basis. This removes the "advantage" afforded the alternative that decommissions the most miles.

Table 3.3. Comparison of alternatives using normalized weighted scores based on landslide-related risk factors.

Factor	Alt 1	Alt 2	Alt 3	Alt 4
Total road miles decommissioned	0	255	146	188
Total Landslide-Related Risk Factor Score	0	1634	454	924
Landslide-Related Risk Factor Score/road mile decom	**0**	**6.4**	**3.1**	**4.9**

Even the normalized scores suggest that, for reduction of adverse effects of road-related landslides, Alternative 2 has the greatest reduction of adverse effects of road-related landslides. In this analysis, Alternative 4 is about 77% as effective, and Alternative 3 is about 48% as effective. The normalized scores suggest that, on average, Alternative 2 better targets roads for decommissioning that present a greater threat to water quality and fish habitat, followed by Alternative 4, and then Alternative 3.

Cumulative Effects

Other projects in the analysis area include thinning of second growth trees, and road repair projects. The thinning projects would result in a temporary reduction in the tree canopy, which would slightly increase peak stream flows in the project area. Stream channels would be protected with buffers that would mitigate against increases in channel bank instability. The longer-term effect would be an increase in slope stability and water quality. The road repair projects would have a beneficial effect on slope stability and water quality. This project would remove a large number of creek crossings and some road segments on potentially unstable ground and allow more road maintenance to occur on the roads that remain. These projects combined would have a net beneficial effect on slope stability and water quality regardless of the impacts of other nearby past, present, or reasonably foreseeable future actions.

3.3 Hydrology

In this section, the effects to water resources are addressed by three key elements:

1) Flow regime;
2) Soils and geology; and,
3) Sediment yield.

Affected Environment – General

The road network analyzed is on National Forest System lands within the Mt. Hood National Forest in eight emphasis subwatersheds on the Clackamas River Ranger District, which are listed in the table below. Figures 1.1 and 1.2 in Chapter 1 show the location of the subwatersheds.

Table 3.4. Emphasis subwatersheds.

Subwatershed	Total Acres
East Fork Collawash River	10,395
Elk Lake Creek	17,181
Farm Creek-Collawash River	16,326
Happy Creek-Collawash River	14,533
Lower Hot Springs Fork Collawash River	18,272
Nohorn Creek	10,568
Pot Creek-Clackamas River	22,961
Upper Hot Springs Fork Collawash River	10,218
TOTAL	**120,455**

<u>Streamflow Regime (Peak Streamflows and Flood Events)</u>

Peak streamflows have important effects on stream channel morphology, sediment transport, and bed material size. Peak streamflows can affect channel morphology through bank erosion, channel migration, riparian vegetation alteration, bank building, and deposition of material on floodplains. The vast majority of sediment transport occurs during peakflows as sediment transport capacity increases logarithmically with discharge (Ritter 1978; Garde and Rangu Raju 1985).

The ability of the stream to transport incoming sediment will determine whether deposition or erosion occurs within the active stream channel. The relationship between sediment load and sediment transport capacity will affect the distribution of habitat types, channel morphology, and bed material size (MacDonald 1991). Increased size of peakflows due to urbanization have been shown to cause rapid channel incision and a severe decline in fish habitat quality (Booth 1990).

Another important consideration is the impact of bankfull flow, often described as the high flow during two out of three years, or as a stream discharge having a recurrence interval of 1.5 years (Dunne and Leopold 1978). The shape of the channel more closely reflects the bankfull width and height than it does the less frequent floods. If the bankfull flow is raised above the range of natural conditions, excess scouring can occur. If lower, the stream may not have the power to move its natural sediment load, causing sediment deposition within the watershed.

The Aquatic Conservation Strategy (ACS) gives clear direction that "the distribution of land use activities, such as timber harvest or roads, must minimize increases in peak streamflows" (ROD B-9) to create and sustain riparian, aquatic, and wetland habitats, and to retain patterns of sediment, nutrient, and wood routing.

Peak streamflows of large magnitude in the analysis area are generated by rain-on-snow events. The transient rain-on-snow zone is normally considered to be from 2400 to 4800 feet. Record floods occur predominantly during November through January, caused by accumulated snow at lower elevations followed by a rapid rise in temperature, unusually high-elevation freezing levels, and heavy rainfall. In some instances, the ground is frozen prior to snow accumulation, producing more favorable conditions for high runoff (SCS 1976).

There is a class of changes in hydrologic processes that consists of those that control infiltration and the flow of surface and subsurface water. This class is dominated by the effects of forest roads. The relatively impermeable surfaces of roads cause surface runoff that bypasses longer, slower subsurface flow routes. Where roads are insloped to a ditch, the ditch extends the drainage network, collects surface water from the road surface and subsurface water intercepted by roadcuts, and transports this water quickly to streams. The longevity of changes in hydrologic processes resulting from forest roads is as permanent as the road. Until a road is removed and natural drainage patterns are restored, the road will likely continue to affect the routing of water through watersheds (FEMAT V-20).

The Watershed Analysis for the Collawash/Hot Springs area concluded:

> The potential channel network expansion attributable to roads was calculated … Channel networks appear to have expanded 8 percent overall, with values ranging from 1.3 percent to 22.9 percent for various subwatersheds. Road densities for the Collawash River watershed and several subwatersheds (excluding Wilderness areas) are among the highest for the Mt. Hood National Forest. Roads may also encroach on stream channels, riparian areas, and floodplains, confining and straightening channels, generally accelerating velocities and increasing the magnitude and frequency of peakflows. As an example, Collawash peakflows associated with the February 1995 rain-on-snow event, having an estimated return interval of 5 to 10 years, came within one foot of flooding the main access road, Road 63, where the road encroaches on the river.
>
> The combination of channel network expansion due to road ditches, and created openings attributable to road surfaces and harvest areas is likely to have increased peakflows, though quantification of such changes is not possible with existing information.

Sediment Yield

Road networks are the most important sources of accelerated delivery of sediment to fish-bearing streams. Road-related landslides, surface erosion, and stream channel diversions often deliver large quantities of sediment to streams, both catastrophically during large storms and chronically during smaller runoff events. Older roads in poor locations and with inadequate drainage systems pose high risks of future sediment production. Road surfaces and ditches can also serve as extensions of the stream network, thereby increasing flood peaks and efficiently delivering road-derived sediments to streams (FEMAT II-40).

Accelerated rates of erosion and sediment yield are a consequence of most forest management activities. Road networks in many upland areas of the Pacific Northwest are the most important source of management-accelerated delivery of sediment to anadromous fish habitats. The sediment contribution to streams from roads is often much greater than that from all other land management activities combined, including log skidding and yarding. Road related landsliding, surface erosion and stream channel diversions frequently deliver large quantities of sediment to streams, both chronically and catastrophically during large storms. Roads may have unavoidable effects on streams, no matter how well they are located, designed or maintained. Many older roads with poor locations and inadequate drainage control and maintenance pose high risks of erosion and sedimentation of stream habitats (FEMAT V-16).

Increased levels of sedimentation often have adverse effects on fish habitats and riparian ecosystems. Fine sediment deposited in spawning gravels can reduce survival of eggs and developing alevins. Primary production, benthic invertebrate abundance, and thus, food availability for fish may be reduced as sediment levels increase. Social and feeding behavior can be disrupted by increased levels of suspended sediment. Pools, an important habitat type, may be lost due to increased levels of sediment (FEMAT V-19).

The Watershed Analysis for the Collawash/Hot Springs area notes:

> Existing management related sediment production and delivery in the watershed comes primarily from the road system. The dominant processes contributing to sediment production from roads are cut bank and fill slope related erosion, and erosion related to concentrated flows. Currently, there is a greater amount of sediment production and delivery sites than what existed under the reference sediment regime. Many upland forested sites that were not sediment sources in the past are now sites of chronic production; most can directly be attributed to roads. Pathways for sediment transport have been expanded by road related drainage (see hydrology section for related road effects analysis).
>
> Dry ravel, raindrop splash, and sheetwash, widespread sediment producing mechanisms not historically significant in the watershed now occur more frequently. The quantifiable difference between the existing range of sediment production and delivery as compared to the reference range is unknown. Considering increases in: 1) sediment production sources, 2) sediment delivery sites, and 3) the timing of annual production; it is believed that qualitatively the range of existing sediment production and delivery is greater than the background range.

Affected Environment – Flow Regime

The relatively impermeable surfaces of roads cause surface runoff of rain and snowmelt water to bypasses longer, slower subsurface flow routes in soils. Where roads are in-sloped to a ditch, as most of the roads in this project are, the ditch extends the drainage network, collects surface water from the road surface and subsurface water intercepted by road cuts and transports this water quickly to streams. This process increases flow routing efficiency and may result in increased magnitude of peak stream flows.

For this analysis peak flows are related to the increase in the channel lengths caused by road ditches connected to streams. Based on recent research on two basins in the Western Cascades of Oregon 57% of the road length is connected to the stream network by surface flowpaths including roadside ditches and gullies below road drainage culverts (Wemple 1996). It is assumed that all road ditches and culverts are properly maintained. Where roads are decommissioned, the length of expanded drainage network from roads decreases. In one recent study in the Olympic National Forest, road-stream connectivity was reduced by 70% associated with road decommissioning (Legacy Roads and Trails Monitoring Project, Road Decommissioning in the Skokomish River Watershed, Olympic National Forest). Decommissioned roads eliminate the road ditch to the first relief culvert upslope at drainage crossings, and intercepted subsurface flows from road cuts are dispersed and allowed to infiltrate. When the ditch relief culverts are removed and an earth bottomed cross drain remains with graded sideslopes, intercepted subsurface water from cut slopes and collected by ditches may infiltrate to reduce the diverted flows.

The increase in channel length due to the ditch length as just described is expressed as a percent of the stream drainage network. The Collawash/Hot Springs Watershed Analysis determined that the exact spacing of ditch relief culverts could not be determined for each road in each subwatershed, so a "best case" scenario (200 feet spacing) and a "worst case" scenario (500 feet spacing) were analyzed. The lower values appear to be realistic for most roads and watersheds, based on field observations and common construction practices. For this analysis a 350 culvert spacing was used. It was assumed that under the current condition ditchlines on all roads still have the potential to increase the stream drainage network. Likewise, all decommissioned roads would no longer have the potential to increase the stream drainage network.

Figure 3.1 and Table 3.5 show that roads currently in the project area increase the channel network length by 6.6%. Increases in stream drainage network enhancement vary from 0 to 11.5% based on analysis area.

Figure 3.1. Stream drainage network expansion.

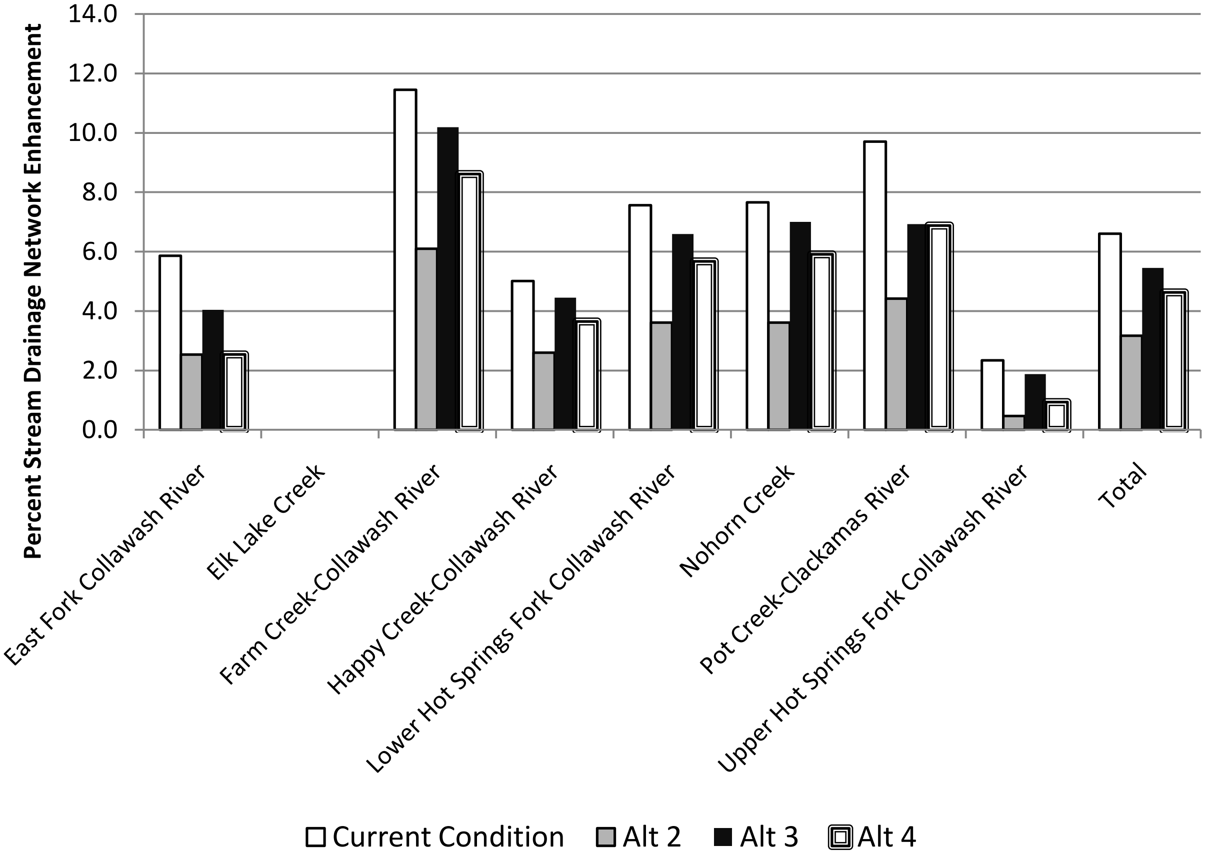


Table 3.5. Percent stream drainage network expansion.

Subwatershed	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 3	Alternative 4
East Fork Collawash River	5.9	2.5	4.0	2.5
Elk Lake Creek	0.0	0.0	0.0	0.0
Farm Creek-Collawash River	11.5	6.1	10.2	8.6
Happy Creek-Collawash River	5.0	2.6	4.5	3.6
Lower Hot Springs Fork Collawash River	7.6	3.6	6.6	5.7
Nohorn Creek	7.7	3.6	7.0	5.9
Pot Creek-Clackamas River	9.7	4.4	6.9	6.9
Upper Hot Springs Fork Collawash River	2.3	0.5	1.9	0.9
Total	**6.6**	**3.2**	**5.4**	**4.6**

Environmental Effects – Flow Regime

Alternative 2 would have the greatest reduction in the stream drainage network, followed by Alternative 4 and then Alternative 3 (see Table 3.6). The reductions associated with Alternative 2 are three times as large as those associated with Alternative 3. Reductions associated with Alternative 4 are between those associated with Alternatives 2 and 3.

Table 3.6. Project percent reduction in stream drainage network (as compared to the current condition) by alternative.

Current Condition	Alternative 2	Alternative 3	Alternative 4
0	52	17	30

There are no expected adverse effects for peak flow increases up to 10%, given the inherent error in peak flow prediction methods and the fact that changes in peak flows of up to 10% are usually below detection limits using standard stream gauging methods. Peak flow increases greater than 10% offer the possibility for adverse effects (DNR 1993). Therefore, a 10% increase in stream drainage network enhancement is used a threshold for the potential adverse effects. Farm Creek-Collawash River is the only subwatershed currently above the 10% threshold and with implementation of Alternatives 2 and 4 this subwatershed would be below the 10% threshold; implementation of Alternative 3 would be right at the 10% threshold. These modeled reductions associated with the alternatives would occur with the implementation of road decommissioning activities and would continue because the natural drainage patterns would be re-established.

Affected Environment – Soils and Geology

During the Roads Analysis for the Mt. Hood National Forest a Forestwide map of landslide risk was compiled from the geomorphic mapping completed during watershed analysis. Each watershed, and eventually the entire Forest, had been divided into geomorphic map units, primarily based on geologic unit and slope angle. Each geomorphic map unit had then been assigned a qualitative descriptor of its propensity for landslides (high, medium, or low). The assignment of this adjective was based on landslide inventories. The map lumps all landslide types together.

Road segments located in high landslide-risk polygons tend to have many more times the frequency of landslides than do road segments located in other landforms. In the adjacent Fish Creek Watershed a landslide study conducted after the 1996 storm event (*Factors Affecting Landslide Incidence after Large Storm Events during the Winter of 1995-1996 in the Upper Clackamas River Drainages, Oregon Casacades*) found that landslide incidence on roads in Upper Clackamas River Drainage was 0.5 landslides per road mile. Active landslides were mapped by the Forest Geologist using aerial photography and associated field validation (see Figure 3.2). The incidence of landslides per road mile is expected to be lower in the project area than the adjacent Fish Creek Watershed (see Section 3.3).

Figure 3.2. Landslide hazard and active landslides in the project area.

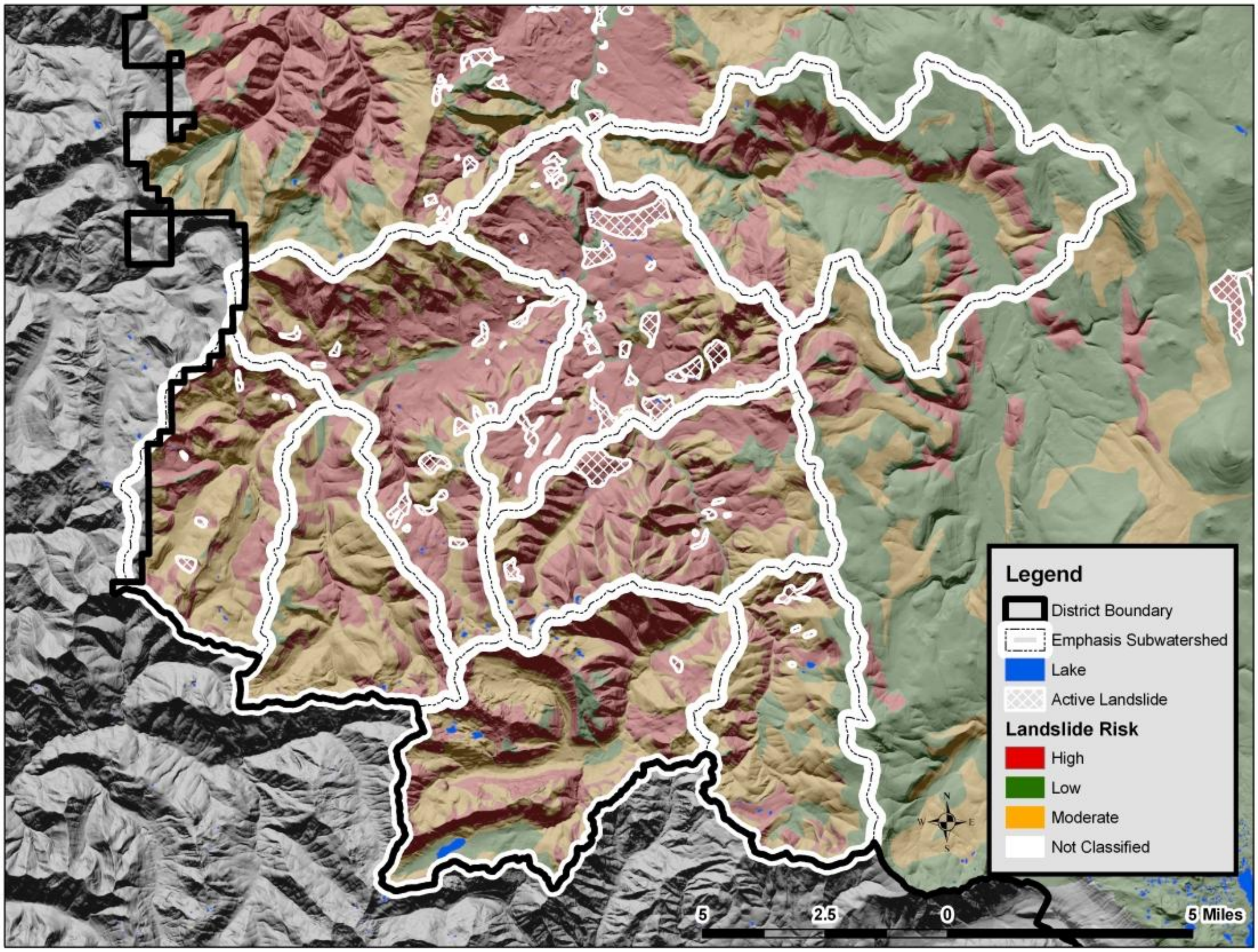


Figure 3.3 detail miles of road in high and moderate landslide hazard areas identified in the Forest's *Roads Analysis* (2003).

Figure 3.3. Miles of road in high and moderate landslide hazard areas identified in the Roads Analysis.

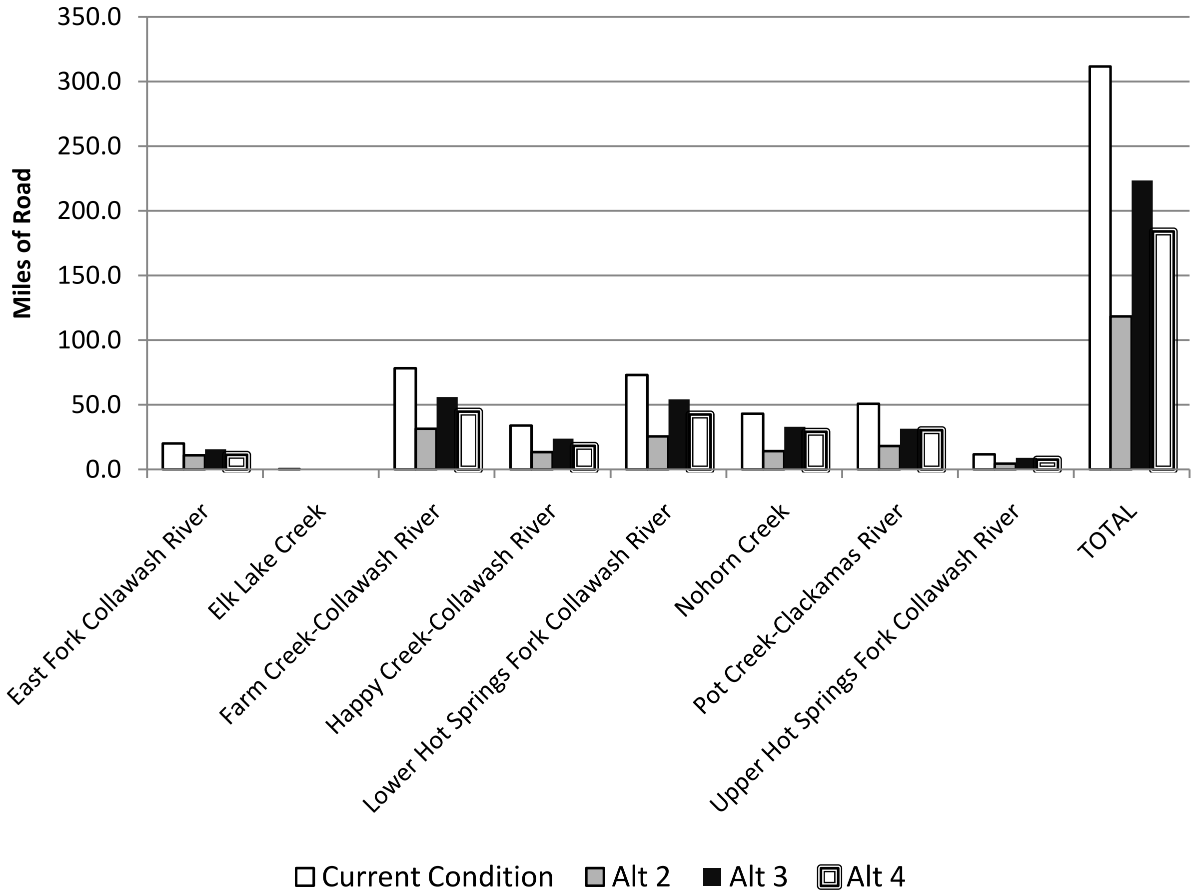


Table 3.7. Miles of road in high and moderate landslide hazard areas.

Subwatershed	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 3	Alternative 4
East Fork Collawash River	20.1	10.9	15.7	11.3
Elk Lake Creek	0.1	0.0	0.0	0.0
Farm Creek-Collawash River	78.4	31.7	56.1	44.7
Happy Creek-Collawash River	34.0	13.4	23.9	18.3
Lower Hot Springs Fork Collawash River	73.2	25.5	54.2	42.5
Nohorn Creek	43.2	14.3	33.1	29.1
North Fork Breitenbush River	0.1	0.0	0.0	0.0
Pot Creek-Clackamas River	50.9	18.1	31.6	30.5
Upper Hot Springs Fork Collawash River	11.7	4.6	9.0	7.7
TOTAL	**311.6**	**118.5**	**223.6**	**184.1**

Figure 3.4. Miles of road in active landslide areas.

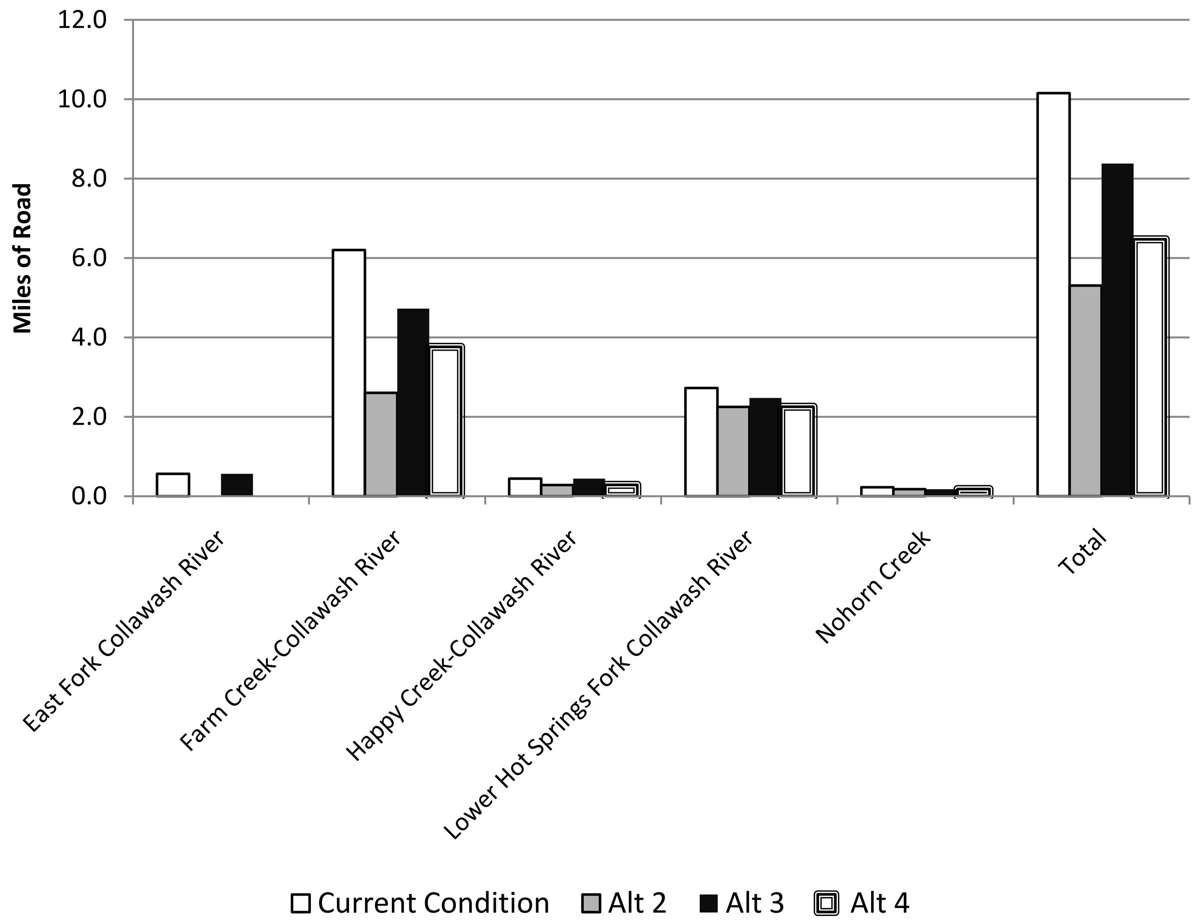


Table 3.8. Miles of road in active landslide areas.

Subwatershed	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 3	Alternative 4
East Fork Collawash River	0.6	0.0	0.6	0.0
Farm Creek-Collawash River	6.2	2.6	4.7	3.8
Happy Creek-Collawash River	0.4	0.3	0.4	0.3
Lower Hot Springs Fork Collawash River	2.7	2.2	2.5	2.2
Nohorn Creek	0.2	0.2	0.2	0.2
Total	**10.2**	**5.3**	**8.4**	**6.5**

Environmental Effects – Soils and Geology

All of the alternatives reduce the potential of landslides from existing roads. The greatest reductions in road mileage in the high and moderate landslide hazard classes is seen in Alternative 2 (62% reduction), followed by Alternative 4 (41% reduction), and then Alternative 3 (28% reduction). With the exception of East Fork Collawash River and Elk Lake Creek subwatersheds, reduction rates are very similar across the subwatersheds.

The reductions in miles of road in active landslide areas are greatest in Alternative 2 (48% reduction), followed by Alternative 4 (36% reduction), and then Alternative 3 (17% reduction). Only Farm Creek-Collawash River and Lower Hot Springs Fork Collawash River have noteworthy mileages if road in active landslide areas with the greatest reduction in roads under all alternatives seen in the Farm Creek-Collawash River subwatershed.

Affected Environment – Sediment Yield

Short-term sediment yield is assessed by examining a number of factors including total number of stream crossings, number of high and moderate risk stream crossings, sediment yield associated with a properly maintained road system, and sediment yield associated with removal of structures at road stream intersections.

Road crossings of stream channels create a potential for sedimentation due to the immediate proximity of the road to the stream being crossed. Where roads are insloped to a ditch, the ditch extends the drainage network, collects surface water from the road surface and subsurface water intercepted by road cuts and transports this water quickly to streams. This more rapidly flowing water is moving across a ditch which may not be vegetated and pick up sediment as it erodes. After road construction, this impact lessens, but still persists during storms due to the risk of overtopping of the crossing structure, most commonly culverts. Plugging of the structure by large woody debris or boulders in the streambed can reduce its capacity, and if severe, cause overtopping of the structure and damage to the fill on the downstream side of the road. Just as in the Flow Regime section, considering the number of drainage crossings is useful in assessing the risk of erosion and sedimentation from roads.

The erosive power of water increases at the sixth power of its velocity. Therefore, reducing the concentration of runoff and thereby its velocity is important to preventing erosion and the risk of sedimentation to streams.

In a study completed by the U.S. Geological Survey that assessed variations in stream turbidity within the Bull Run Watershed (LaHusen 1994), it was determined that the most visible sites of erosion are stream channels, streambanks, and roadside ditches.

Figure 3.5. Stream crossings by alternative.

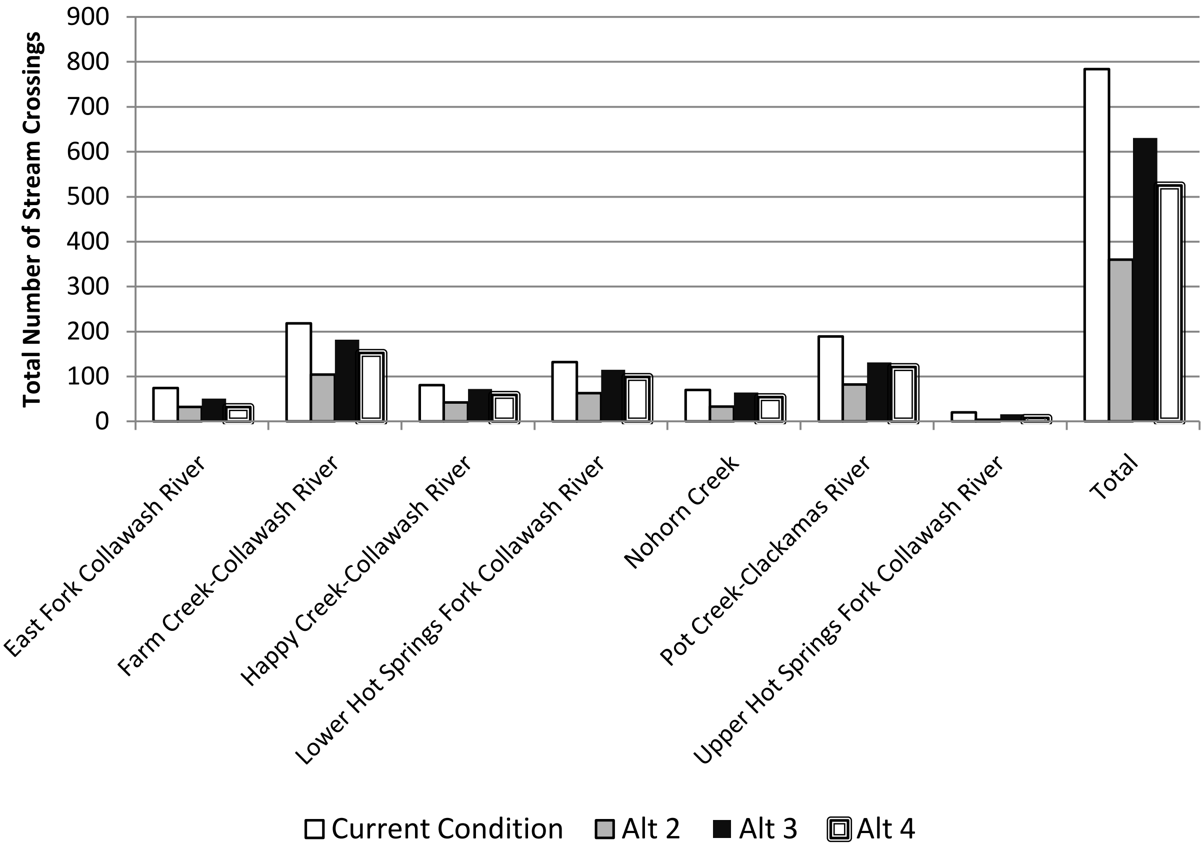


Table 3.9. Stream crossings by alternative.

Subwatershed	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 3	Alternative 4
East Fork Collawash River	74	32	51	32
Farm Creek-Collawash River	218	104	182	152
Happy Creek-Collawash River	81	42	72	59
Lower Hot Springs Fork Collawash River	132	63	115	99
Nohorn Creek	70	33	64	54
Pot Creek-Clackamas River	189	82	131	121
Upper Hot Springs Fork Collawash River	20	4	16	8
Total	**784**	**360**	**631**	**525**

High Risk Stream Crossings

There are several risk factors that could contribute to the failure of a road at a stream crossing. There is the potential for culvert blowouts, dam-break floods, debris flows, diversions and cascading failures. Contributing factors would include geologic hazards (landslides, debris flows, etc.) and hydrologic hazards (peak flow events). With the failure of a stream crossing there is the potential for large amounts of fine sediment to be directly deposited into the stream system (based on roads decommissioned under the 1999 Bull Run Road Decommissioning EA fills associated with perennial stream crossings varied from 300 to 3000 cubic yards).

To assess the risk, intermittent and perennial stream crossings located on high landslide-risk terrain were mapped using GIS. Since some impacts to both roads and aquatic systems can occur downstream, intermittent and perennial stream crossings located downstream of stream crossings on high landslide risk-terrain were mapped manually (Roads Analysis p. 26).

Figure 3.6. High and moderate risk stream crossings by alternative.

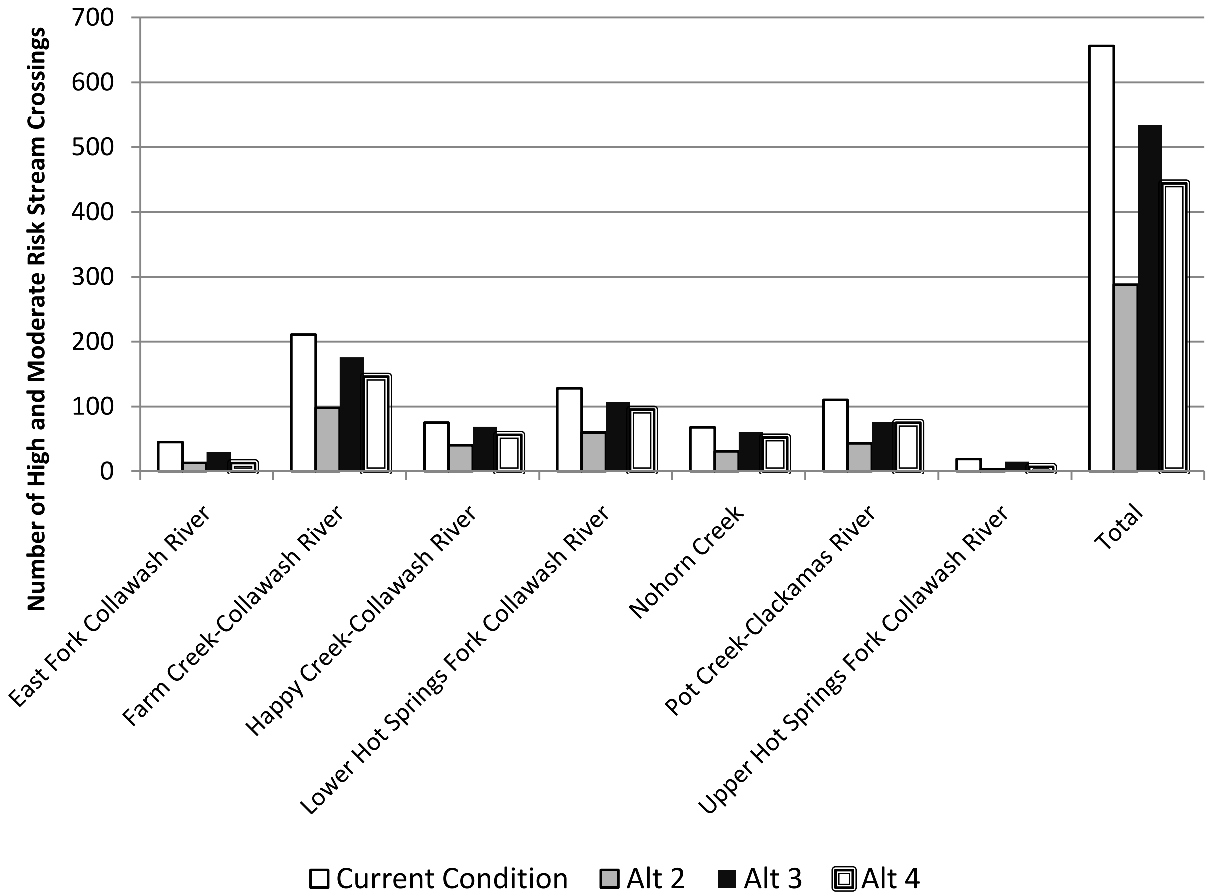


Table 3.10. High and moderate risk stream crossings by alternative.

Subwatershed	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 3	Alternative 4
East Fork Collawash River	45	13	30	13
Farm Creek-Collawash River	211	98	176	146
Happy Creek-Collawash River	75	40	69	56
Lower Hot Springs Fork Collawash River	128	60	107	95
Nohorn Creek	68	31	61	52
Pot Creek-Clackamas River	110	43	76	75

Subwatershed	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 3	Alternative 4
Upper Hot Springs Fork Collawash River	19	3	15	7
Total	**656**	**288**	**534**	**444**

<u>Modeled Sediment Yield from Road Network</u>

Sediment yield associated with a properly maintained road network was assessed using the Washington Department of Natural Resource's Standard Methodology for Watershed Assessment. While this method is based on the current scientific understanding of forest management and watershed processes, its predicted outputs should not be considered as exacting measures of potential sediment yield but instead provide a framework for comparing relative effects of sediment delivery between the two alternatives. It does not assess effects from unmaintained road ditches and culverts, but assumes they are functioning properly.

Figure 3.7. Modeled road related sediment delivery (tons/year).

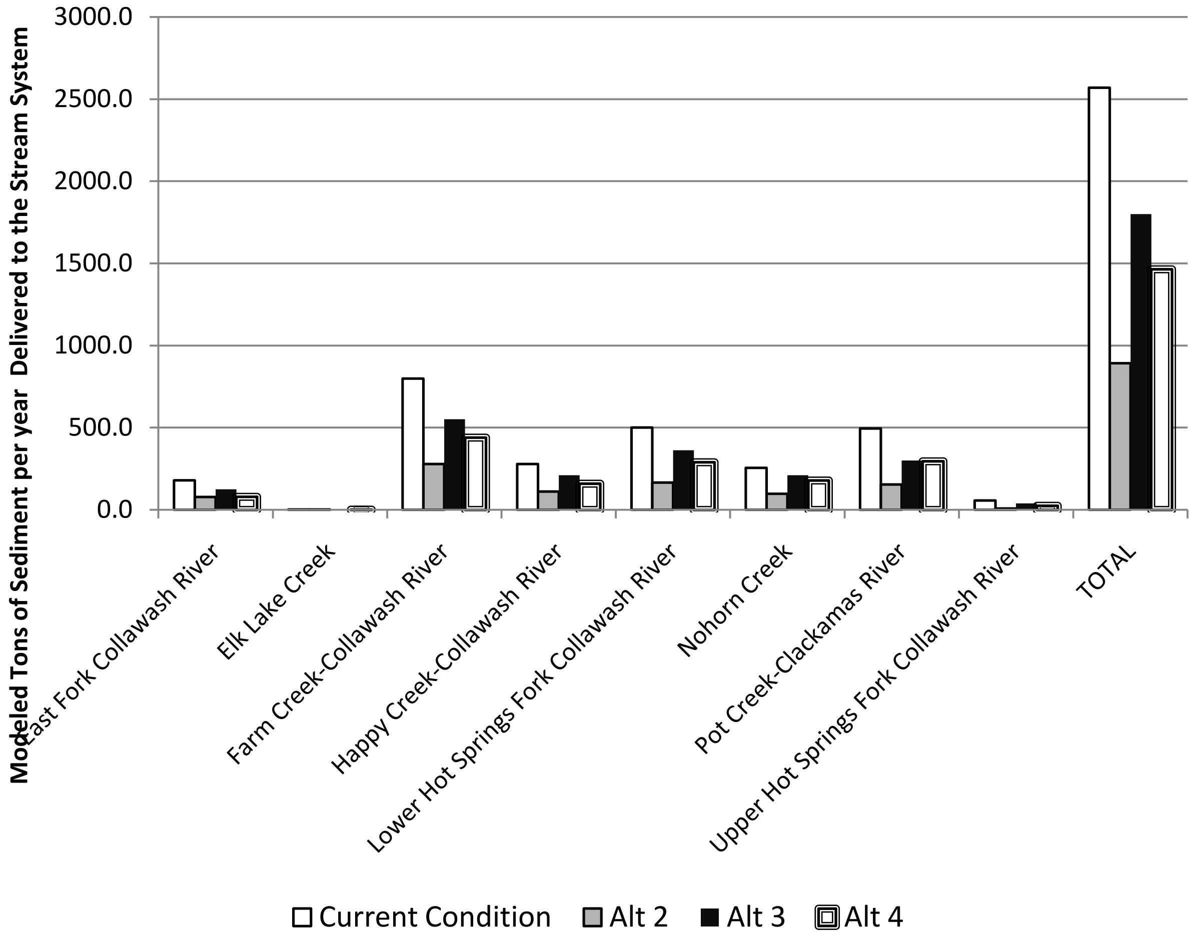


Table 3.11. Modeled road related sediment delivery (tons/year).

Subwatershed	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 3	Alternative 4
East Fork Collawash River	180.0	77.8	125.8	79.4
Elk Lake Creek	1.5	0.2	0.2	0.2
Farm Creek-Collawash River	799.8	278.6	550.8	439.0
Happy Creek-Collawash River	279.3	110.9	211.0	158.3
Lower Hot Springs Fork Collawash River	501.3	165.5	362.3	288.8
Nohorn Creek	255.7	97.2	209.8	178.6
Pot Creek-Clackamas River	495.1	154.3	300.7	295.1
Upper Hot Springs Fork Collawash River	57.1	8.0	38.5	24.6
Total	**2569.8**	**892.6**	**1799.2**	**1464.2**

Environmental Effects – Sediment Yield (Short-Term)

Under the No Action Alternative, there would continue to be chronic amounts of sediment generated associated with native surface and gravel roads and ditchlines of all roads as outlined in Figure 3.7 and Figure 3.7. There are also stream crossings and high risk stream crossings with the potential for catastrophic failure with the potential to deposit large amounts of sediment into the stream system.

Short-term measurable increases in sediment transport associated with the current condition related to plugged culverts and ditch lines may not occur for a number of years depending on the storm intensities that are encountered and the number of miles of roads that have plugged drainage structures.

Stream crossings would be reduced the most under Alternative 2 (54%), followed by Alternative 4 (33%), and then Alternative 3 (20%). With Alternative 2 having over twice the level of reductions of stream crossings as compared to Alternative 3 it would have much greater reductions in chronic sediment delivery to the stream system and this is detailed in the modeled road related sediment delivery figures where Alternative 2 has a 65% reduction (1677 tons per year) and Alternative 3 has a 30% reduction (771 tons per year). Impacts associated with Alternative 4 are between those of Alternative 2 and 3 (a reduction of 1106 tons per year).

High and moderate risk stream crossings, with the associated risk of catastrophic failure, would be reduced the most under Alternative 2 (56%), followed by Alternative 4 (32%) and then Alternative 3 (19%). Alternative 2 reduces high and moderate risk stream crossings about 3 times as much as alternative 3 (369 structures removed compared to 122 structures removed). Impacts associated with Alternative 4 are between those of Alternative by removing 212 structures.

The sediment contribution to streams from roads is often much greater than that from all other land management activities combined (FEMAT V-16) so these reductions are important in reducing management related sediment delivery to the stream system.

In the short term, decommissioning of roads would produce some sediment that would escape the mitigations designed to minimize soil loss at the new stream crossings and cross drains.

In order to quantify the potential short term sediment delivery to the stream system associated with road decommissioning the Water Erosion Prediction Project (WEPP) soil erosion model was used to quantify sediment deposition to streams.

The WEPP model (http://forest.moscowfsl.wsu.edu/fswepp/docs/distweppdoc.html) is a physically-based soil erosion model that can provide estimates of soil erosion and sediment yield considering the specific soil, climate, ground cover, and topographic conditions. It was developed by an interagency group of scientists including the U.S. Department of Agriculture's Agricultural Research Service (ARS), Forest Service, and Natural Resources Conservation Service; and the U.S. Department of Interior's Bureau of Land Management and Geological Survey.

WEPP simulates the conditions that impact erosion--such as the amount of vegetation canopy, the surface residue, and the soil water content for every day in a multiple-year run. For each day that has a precipitation event, WEPP determines whether the event is rain or snow, and calculates the infiltration and runoff. If there is runoff, WEPP routes the runoff over the surface, calculating erosion or deposition rates for at least 100 points on the hillslope. It then calculates the average sediment yield from the hillslope. WEPP has been shown to produce results useful for decision support, but as with all models, users are urged to test the models with locally available empirical data (Renschler, 2002).

For this project erosion and associated sedimentation were calculated for each stream crossing (actual decommissioned hillslopes where culverts were removed within the Bull Run watershed were used to estimate the area associated with crossings) and aggregated up for each analysis area. Sediment yield from the removal of stream crossings was spread over 10 years due to the amount of roads to decommission and the roads that will be decommissioned with delay. The WEPP analysis was completed for 50 years of climate data.

Table 3.12. Short-term sediment yield (tons/year) based on WEPP Analysis 2.5 year return interval storm.

Subwatershed	Alternative 1 – No Action	Alternative – Proposed 2	Alternative 3	Alternative 4
East Fork Collawash River	0	1.1	0.5	1.1
Farm Creek-Collawash River	0	2.6	0.6	1.4
Happy Creek-Collawash River	0	1.0	0.2	0.6
Lower Hot Springs Fork Collawash River	0	1.9	0.4	0.9
Nohorn Creek	0	1.1	0.2	0.5
Pot Creek-Clackamas River	0	2.3	1.2	1.2
Upper Hot Springs Fork Collawash River	0	0.4	0.1	0.3
Total	**0**	**10.5**	**3.2**	**6.1**

Table 3.13. Short-term sediment yield (tons/year) based on WEPP Analysis average storm for 50 years of modeling.

Subwatershed	Alternative 1 – No Action	Alternative – Proposed 2	Alternative 3	Alternative 4
East Fork Collawash River	0	1.1	0.5	1.1
Farm Creek-Collawash River	0	2.5	0.5	1.4
Happy Creek-Collawash River	0	1.0	0.2	0.6
Lower Hot Springs Fork Collawash River	0	1.8	0.4	0.9
Nohorn Creek	0	1.0	0.2	0.5
Pot Creek-Clackamas River	0	2.2	1.1	1.1
Upper Hot Springs Fork Collawash River	0	0.4	0.1	0.3
Total	**0**	**9.9**	**3.1**	**5.7**

Table 3.14. Short-term sediment yield (tons/year) based on WEPP Analysis 50 year return interval storm.

Subwatershed	Alternative 1 – No Action	Alternative – Proposed 2	Alternative 3	Alternative 4
East Fork Collawash River	0	4.6	2.2	4.6
Farm Creek-Collawash River	0	10.8	2.3	5.9
Happy Creek-Collawash River	0	4.3	0.9	2.5
Lower Hot Springs Fork Collawash River	0	7.7	1.8	3.8
Nohorn Creek	0	4.4	0.8	2.0
Pot Creek-Clackamas River	0	9.5	4.8	4.9
Upper Hot Springs Fork Collawash River	0	1.8	0.4	1.3
Total	**0**	**43.1**	**13.3**	**25.0**

Environmental Effects – Water Resources Sediment Yield (WEPP Analysis)

The current condition would not yield any sediment yield under this process because there will be no stream crossings removed. Examination of the 2.5 year recurrence interval storm (estimating a bankful streamflow event) details the most sediment yield under Alternative 2 (10.5 tons per year), followed by Alternative 4 (6.1 tons per year), and then Alternative 3 (3.2 tons per year). Impacts under Alternative 2 are over 3 times that of Alternative 4. The effects associated with the average storm for the 50 years of climate data are very similar to that of the 2.5 year recurrence interval storm.

The 50 year recurrence interval storm has approximately 4 times the sediment yield as that associated with the 2.5 year recurrence interval storm. Effects between alternatives are similar to that of the 2.5 year recurrence interval storm.

In the second winter following the drainage structure removal, erosion and delivered sediment should decrease further due to settlement of loose soils, re-vegetation, and armoring of the soil surface by an erosion pavement of gravel in the soils. Woody plants should become more significant in providing canopy cover and soil binding capability in three to five years depending on the favorability of the growing site and success in plant establishment, by planting, natural seeding, and re-sprouting.

Based on experience and monitoring results from activities associated with the 1999 Bull Run Road Decommissioning EA there are generally some short term pulses of sediment following the first large streamflow event after culvert removal activities and after that point the stream crossing is stabilized and turbidity levels (and is assumed suspended sediment levels) are the same upstream and downstream of the road crossing.

Environmental Effects – Sediment Yield (Long-Term)

To assess the long term potential risks of sediment production this assessment looked beyond the modeling of current sediment production which assumes that all roads are maintained, as the alternative analysis does. Currently, some roads have become sufficiently invaded by brush (red alder, willows, maple, scotch broom, and hemlock) that vehicle travel is no longer possible. This also means that the ditches and culvert inlets are fully occupied by woody vegetation and that these inlets likely have significantly reduced flow capacity. The potential for culvert plugging and flow overtopping the roadway is greatly increased. This directly increases the potential for fill erosion as the overflow spills down the road fill (Figure 3.8 and Figure 3.9Figure 3.). If flows are sufficiently large or continuous, a headcut scarp will develop at the toe of the fill and progress upslope. If not stopped, the entire road fill may be eroded by the new drainage location. The volume of lost fill would relate to the fill steepness, volume and duration of water discharge, and the size of the fill at the drainage structure.

Another possible scenario is the plugging of a ditch relief culvert causing increased flow to continue past the culvert inlet on the road and ditch to the next ditch relief culvert. The ditch in the second reach below the plugged culvert must now accommodate about twice its normal runoff. Since brush has reduced culvert inlet capacity and additional flow is probably eroding the ditch and moving sediment to the inlet, the likelihood of culvert plugging is increased greatly. Also, within the project area the larger storms create many, small drainages which enter the road ditches and add to ditch flow. Eventual overtopping of the culvert is possible and flow actively eroding across the road and fill occurs.

A third scenario applies to the present aging of the culverts in the project area. Most culverts are about 30 years old and are approaching their expected design life. As the bottom of culverts rust through, flow would continue underneath the culvert. This would allow erosion of the fine materials that were used to bed the culvert when it was installed. Settling would result and additional strain to the culvert structure would occur. Eventually, the culvert would collapse gradually and lose its capacity. Eventual overtopping of the culvert and road is probable and severe erosion of the fill would ensue.

To predict the potential volume of sediment produced from culvert plugging is not possible, but it is not extreme to think that it would be considerably more than the volumes predicted for a properly maintained road if considered over a ten year timeframe. Based on roads decommissioned under the 1999 Bull Run Road Decommissioning EA fills associated with perennial stream crossings varied from 300 to 3000 cubic yards of fill (based on local site conditions including stream size, road slope position and steepness of the area). In a large storm it would not be unreasonable for 5 to 10 culverts to fail resulting in 1,500 to 30,000 tons of sediment delivered to the stream system (for this analysis and based on soil composition 1 cubic yard of soil equated to 1 ton of sediment). In the current condition there is a risk of erosion, sedimentation, and downstream effects to turbidity and suspended sediment conditions associated with catastrophic failure of culverts and/or road fill slopes. Eventually, if not maintained, nearly all of the drainage crossings would plug, and fills would be eroded and transported as sediment.

Figure 3.8. Examples of catastrophic fill and culvert failure from the Mt. Hood National Forest Roads Analysis.

Figure 3.9. Example of gully erosion.

Table 3.15. Percent reduction of all stream crossings by alternative.

Current Condition	Alternative 2	Alternative 3	Alternative 4
0	54 (424 xings)	20 (153 xings)	33 (259 xings)

Table 3.16. Percent reduction of high and moderate risk stream crossings by alternative.

Current Condition	Alternative 2	Alternative 3	Alternative 4
0	56 (368 xings)	19 (122 xings)	32 (212 xings)

The alternatives reduce all stream crossings by 20 to 54% and high and moderate risk stream crossings by 19 to 56%. Alternative 2 has the greatest level of reductions followed by Alternative 4 and then Alternative 3. Reductions associated with Alternative 2 are near 3 times that of Alternative 3 and almost twice that of Alternative 4. Results for high and moderate risk stream crossings are very similar. It is assumed that the decommissioned roads are no longer producing sediment, because natural drainage patterns have been restored and impervious surfaces have been removed and re-vegetated. This comparison is applicable for the long-term evaluation of impacts after the short term effects of soil disturbance and stream channel re-establishment have passed.

Decommissioning roads would restore natural drainage patterns and thereby avoid large volumes of added sediment to the stream network that would be likely to eventually occur under the current condition. In addition limited road maintenance dollars could be focused on the remaining road systems resulting in more maintenance of culverts and ditchlines resulting in less potential for catastrophic failure.

In a recent study of road decommissioning activities on the Olympic National Forest values of a stream blocking index were reduced from an average of 1.7 before treatment to zero after treatment (n=15), indicating the risk of stream crossings becoming plugged was completely eliminated by excavation and removal of culverts and associated fills; and, diversion potential was eliminated at 89% (8 of 9) of stream crossing sites (Legacy Roads and Trails Monitoring Project, Road Decommissioning in the Skokomish River Watershed, Olympic National Forest).

Compliance with the Clean Water Act, Forest Plan, and Aquatic Conservation Strategy Objectives

Clean Water Act

It is the responsibility of the Forest Service as a Federal land management agency, through implementation of the Clean Water Act (CWA), to protect and restore the quality of public waters under their jurisdiction. Protecting water quality is addressed in several sections of the CWA including sections 303, 313, and 319. Best Management Practices (BMPs) are used to meet water quality standards (or water quality goals and objectives) under Section 319 (Forest Service and Bureau of Land Management Protocol for Addressing Clean Water Act Section 303(d) Listed Waters (http://www.fs.fed.us/r6/water/protocol.pdf).

Current statewide Water Quality Standards for the State of Oregon state: "Pursuant to Memoranda of Agreement with the U.S. Forest Service and the Bureau of Land Management, water quality standards are expected to be met through the development and implementation of water quality restoration plans, best management practices, and aquatic conservation strategies. Where a Federal Agency is a Designated Management Agency by the Department, implementation of these plans, practices and strategies is deemed compliance with this Division" (Forest Service and Bureau of Land Management Protocol for Addressing Clean Water Act Section 303(d) Listed Waters) (http://www.fs.fed.us/r6/water/protocol.pdf).

In addition, the Forest Plan contains the following Standards and Guidelines with respect to the implementation of BMPs.

- Compliance with State requirements shall be met through planning, application, and monitoring of Best Management Practices FEIS, Appendix H. Best Management Practices describe the process which shall be used to implement the State Water Quality Management Plan on lands administered by the Forest Service (FW-055 and FW-056).

- Individual, general Best Management Practices which may be implemented (i.e., on a project by project basis) are described in General Water Quality Best Management Practices, Pacific Northwest Region, 11/88. Evaluations of ability to implement and estimated effectiveness shall be made at the project level (FW-057 and FW-058).

- The sensitivity of the project shall determine whether the site-specific BMP prescriptions are included in the environmental analysis, the project plan or the analysis files (FW-059).

Water Quality Best Management Practices, with the express purpose of limiting non-point source water pollution, are incorporated into the proposed action and associated project design criteria.

<u>Section 303D</u>

Section 303(d) of the CWA requires that waterbodies violating State or tribal water quality standards be identified and placed on a 303(d) list. The Environmental Protection Agency regulations also allow States and tribes to include threatened waters (that is, waters that display a downward trend that suggests water quality standards will not be met in the near future).

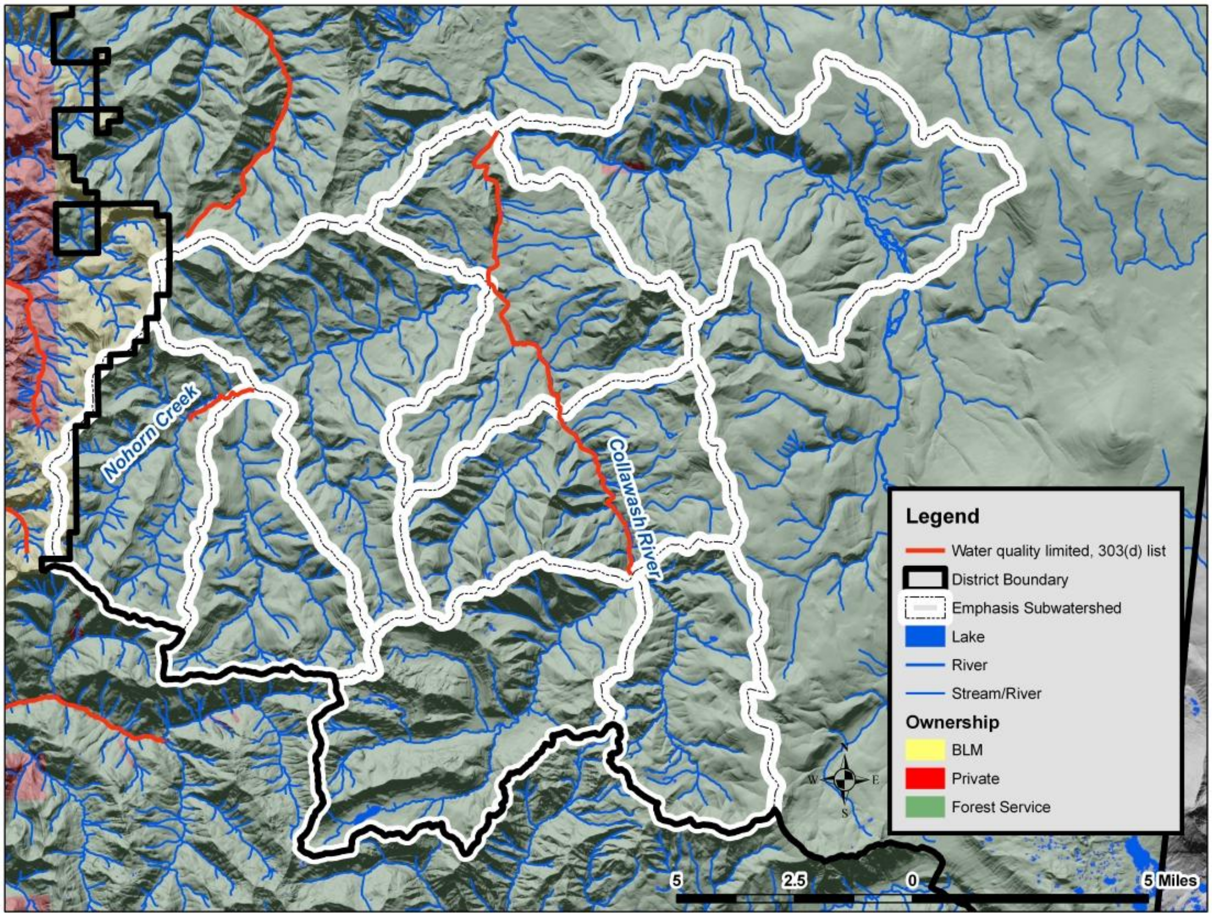
For each listed waterbody, the CWA requires States to establish a Total Maximum Daily Load (TMDL) for the parameter(s) causing beneficial use impairment. A TMDL is the sum of the waste load allocation for point sources of pollution (for example, outflow from a manufacturing plant) plus the load allocation for nonpoint sources of pollution, including "natural" background levels, plus a margin of safety to allow for uncertainty.

For water quality limited streams on National Forest System lands, the USDA Forest Service provides information, analysis, and site-specific planning efforts to support state processes to protect and restore water quality. Within the analysis area the Collawash River and Nohorm Creek are on the 2004/2006 State of Oregon 303(d) list. These streams are listed for stream temperature. Road decommissioning activities associated with Alternatives 2, 3 and 4 are predicted reduce stream temperatures by restoring natural drainage patterns (more subsurface and less exposed surface water flowpaths) and increasing stream shade (by removal and revegetation of stream crossings and road prisms paralleling streams).

Table 3.17. Water quality limited (303d) streams.

Water Body (Stream/Lake)	River Miles	Parameter	Season	Criteria	Beneficial Uses
Collawash River	0 to 7.7	Temperature	September 1 - June 15	Salmon and steelhead spawning: 13.0 degrees Celsius 7-day-average maximum	Salmon and steelhead spawning
Collawash River	0 to 12.2	Temperature	Year Around (Non-spawning)	Core cold water habitat: 16.0 degrees Celsius 7-day-average maximum	Core cold water habitat
Nohorn Creek	0 to 1.8	Temperature	September 1 - June 15	Salmon and steelhead spawning: 13.0 degrees Celsius 7-day-average maximum	Salmon and steelhead spawning

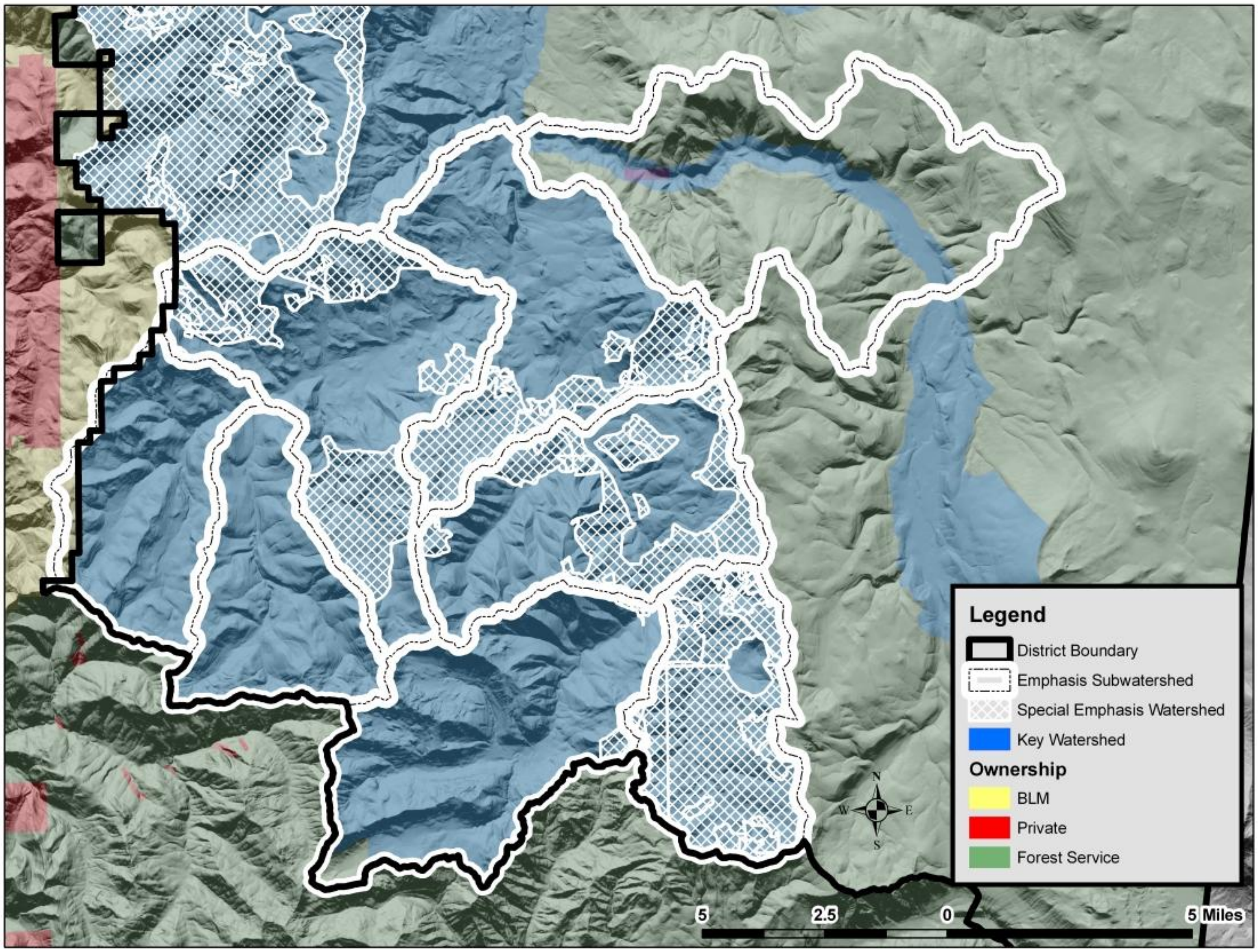
Figure 3.10. Water quality limited (303d) streams.



<u>Consistency with Mt Hood Land and Resource Management Plan Standards and Guidelines</u>

Key Mt. Hood Land and Resource Management Plan allocations, with respect to protection of the aquatic environment, include: Key Watersheds, Special Emphasis Watershed, Riparian Reserves and Riparian Area.

Figure 3.18. Key watersheds and special emphasis watersheds.



Key Watersheds

Key Watersheds are a system of large refugia comprising watersheds that are crucial to at-risk fish species and stocks and provide high quality water. The Aquatic Conservation Strategy includes two designations for Key Watersheds. Tier 1 (Aquatic Conservation Emphasis) Key Watersheds contribute directly to conservation of at-risk anadromous salmonids, bull trout, and resident fish species. They also have a high potential of being restored as part of a watershed restoration program. The network of 143 Tier 1 Key Watersheds ensures that refugia are widely distributed across the landscape. While 21 Tier 2 (other) Key Watersheds may not contain at-risk fish stocks, they are important sources of high quality water.

Standards and guidelines for Key Watersheds include:

- Reduce existing system and nonsystem road mileage. If funding is insufficient to implement reductions, there will be no net increase in the amount of roads in Key Watersheds.
- Key Watersheds are the highest priority for watershed restoration.

A large portion of the analysis area is in Key Watersheds either associated with the Collawash Watershed or the Clackamas River corridor. Project activities are consistent with Standards and Guidelines by reducing existing system road mileage.

Special Emphasis Watersheds
The goal of Special Emphasis Watersheds is: Maintain or improve watershed, riparian, and aquatic habitat conditions and water quality for municipal uses and/or long term fish production. Lower Hot Springs Fork Collawash River, Elk Lake Creek, East Fork Collawash River, Happy Creek-Collawash River, and Farm Creek-Collawash River subwatersheds have at least a portion of their area in this allocation. Major characteristics include that the transportation system design may be restricted to avoid sensitive watershed lands. Standards and guidelines include:

- Roads and associated facilities should be permitted, when consistent with the protection of watershed values

- Road crossings of fish-bearing streams shall be designed to provide for adult and juvenile fish passage.

- Drainage systems of roads or parking areas should incorporate practical features to minimize or eliminate sediment and/or other pollutants from discharging directly into water bodies.

The alternatives are designed to protect watershed values, provide for fish passage and minimize sediment delivery to streams from the road system so these alternatives are consistent with standards and guidelines for Special Emphasis Watersheds.

Riparian Reserves
Riparian Reserves are portions of watersheds where riparian-dependent resources receive primary emphasis and where special standards and guidelines apply. Standards and guidelines prohibit and regulate activities in Riparian Reserves that retard or prevent attainment of the Aquatic Conservation Strategy objectives. Riparian Reserves include those portions of a watershed directly coupled to streams and rivers, that is, the portions of a watershed required for maintaining hydrologic, geomorphic, and ecologic processes that directly affect standing and flowing waterbodies such as lakes and ponds, wetlands, streams, stream processes, and fish habitats. Riparian Reserves include areas designated in current plans and draft plan preferred alternatives as riparian management areas or streamside management zones and primary source areas for wood and sediment such as unstable and potentially unstable areas in headwater areas and along streams. Riparian Reserves occur at the margins of standing and flowing water, intermittent stream channels and ephemeral ponds, and wetlands. Riparian Reserves generally parallel the stream network but also include other areas necessary for maintaining hydrologic, geomorphic, and ecologic processes.

Consistency with Riparian Reserve Standards and Guidelines for roads within the Riparian Reserves is assessed by addressing consistency with the Aquatic Conservation Strategy objectives. However, there are Riparian Reserve Standards and Guidelines that address:

- Minimizing disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow.

- Closing and stabilizing, or obliterating and stabilizing roads based on the ongoing and potential effects to Aquatic Conservation Strategy objectives and considering short-term and long-term transportation needs.

- Minimizing sediment delivery to streams from roads.

- Providing and maintain fish passage at all road crossings of existing and potential fish-bearing streams.

An assessment of consistency with the Aquatic Conservation Strategy objectives is completed later in this section. The alternatives are designed to minimize disruption of natural, hydrologic flow paths, minimize sediment delivery and provide for fish passage.

General Riparian Area

The goal of General Riparian Area is to achieve and maintain riparian and aquatic habitat conditions for the sustained, long-term production of fish, selected wildlife and plant species, and high quality water for the full spectrum of the Forest's riparian and aquatic areas. Key Standards and Guidelines include:

- Road crossings of fish-bearing streams shall be designed to provide for adult and juvenile fish passage
- Drainage systems for roads should incorporate practical features to minimize or eliminate sediment and/or other pollutants from discharging directly into streams, lakes, wetlands, springs, or seeps.
- Existing roads causing impacts to riparian values should be mitigated or relocated.
- Unneeded and/or abandoned roads should be rehabilitated.

The alternatives are designed to meet objectives for General Riparian Area including providing for fish passage and minimizing sediment delivery to streams.

Aquatic Conservation Strategy Consistency Findings
The following is a summary of the projects consistency with the Aquatic Conservation Strategy objectives (ROD B-10).

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

The project is designed to restore natural drainage patterns (both surface and subsurface) which will restore natural travel paths for aquatic organisms by removing barriers. Removing roads has the potenial to restore floodplain connectivity, reduce aquatic habitat fragmentation, thus increasing the complexity of stream habitat. By restoring natural flowpaths for water, sediment and large woody debris channel components that contribute to channel complexity (pool quantity and quality, substrate, flows) would be enhanced.

Objective 2: Maintain and restore spatial and temporal connectivity in and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.

Restoring natural drainage patterns would restore spatial and temporal connectivity because riparian areas associated with stream crossings would become continuous, and surface and subsurface flows would follow natural patterns.

Objective 3: Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

Removal of roads including culverts restores streambanks and bottom configurations at stream crossings. By using stream simulation methods in designing stream crossings natural streambank and streambed configurations would be established above, though and below the existing stream crossings.

Objective 4: Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain in the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.

The project has the the objective of restoring or improving water quality by reducing existing chronic sediment sources and/or by reducing the risk of catastrophic failure of stream crossings. There may be short-term impacts to water quality (increased sedimentation) when the projects are implemented (during culvert removal). However, project design criteria were developed to minimize these impacts and keep them to an acceptable level.

Objective 5: Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.

Road decommissioning has the potential of maintaining or restoring the sediment regime, by removing obstructions or pinch points where sediment transport is impeded. In addition, chronic sediment sources associated with the road surface and ditchlines would be removed.

Objective 6: Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.

This project is designed to restore in-stream flows and provide for natural hydrologic and sediment regimes. By reducing stream drainage network enchancement and removing impervious surfaces associated with the road thus restoring natural flowpaths stream flow routing efficiency would approximate undisturbed levels and would not result in increased magnitude of peak stream flows. Improvement of stream crossings and restoration of areas where streams have been channelized or narrowed would reduce risks of increased peak flows, which can result in bank erosion and channel bed scour. Removal of stream crossings and restoration of the crossing using stream simulation techniques would provide for sediment, nutrient, and wood routing.

Objective 7: Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

Road decommissioning would restore natural hillslope flow processes, re-establishing natural drainage patterns, providing for restoration of floodplain inundation characteristics.

Objective 8: Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

Areas impacted by the implementation this project would be planted, seeded, and/or mulched. Seed may be native plants or non-persistent non-natives. These plants would rapidly provide ground cover, thereby reducing erosion. They would be replaced by native plants in a few years. Road decommissioning and associated culvert removal should reduce surface erosion, bank erosion, and allow for natural levels of channel migration.

Objective 9: Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.

> Road decommissioning activities restore vegetation, streamflow, and erosion patterns, enhancing terrestrial and aquatic plant and animal populations.

Cumulative Effects

A cumulative effects analysis was performed for watershed processes where adverse direct and/or indirect effects associated with the alternatives were identified. For this project these processes include short-term sediment delivery associated with streambanks and adjacent slopes where stream drainage structures, culverts, are removed

The cumulative watershed effects analysis area includes the watershed area upstream of the Clackamas River and Collawash River confluence.

Figure 3.12. Cumulative watershed effects analysis area.

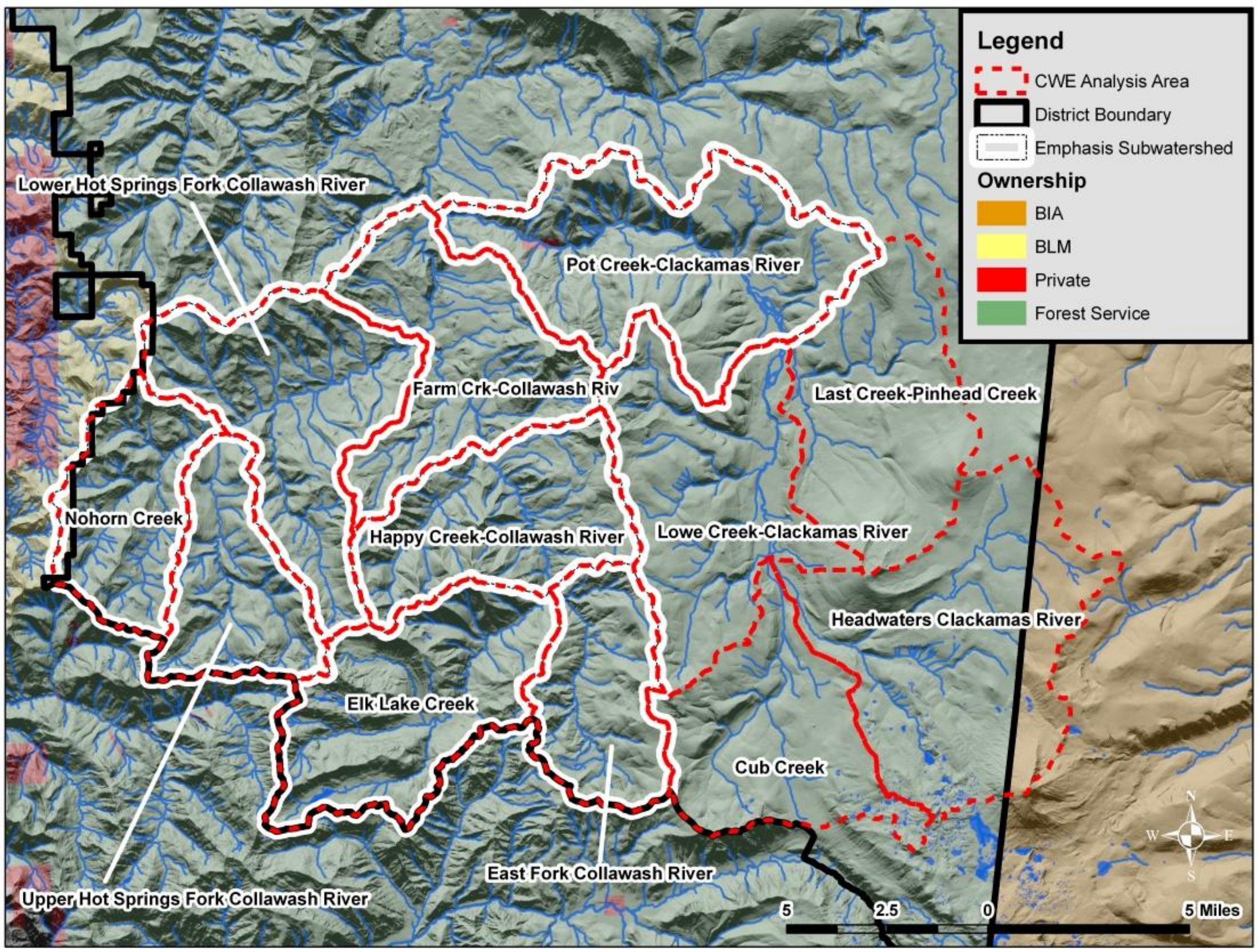


Table 3.18. Past, present, and reasonably foreseeable projects.

Project	Sediment yield tons per year
Modeled road related sediment (project area)	892.6 to 1799.2 tons per year (based on alternative implemented)
Modeled road related sediment (outside project area)	491.7 tons per year
Road decommissioning stream crossings (outside project area)	14.2 tons
Upper Clack Thinning Project	Short-term and undetectable at the watershed or subwatershed scale.
Rethin Project	Short-term and undetectable at the watershed or subwatershed scale.
2010 Clackamas Restoration Projects	Short-term and undetectable at the watershed or subwatershed scale
Cascade Crossing Transmission Project	Unknown
Planned road decommissioning activities within the project area covered under other NEPA documents	3.8 tons total yield[9]
Palomar Gasline Transmission Project	0.5 tons total yield[10]
BPA powerline and associated infrastructure maintenance	Sediment yield estimates are included in modeled road related sediment
Collawash Road Decommissioning Alternatives 2, 3 and 4	3.1 to 9.9 (tons of sediment delivered to the stream system per year based on alternative implemented, from analysis for road decommissioning project)

For this analysis the estimated sediment delivery in tons per year delivered to the stream system was used for comparison when possible. This was done in an attempt to normalize values and complete an "apples to apples" comparison.

Based on the alternative implemented the short term sediment delivery associated with project implementation is anywhere from 0.1% to 0.7% of the total short term sediment yield for the cumulative watershed effects analysis area. These results are consistent with the Collawash/Hot Springs Fork Watershed Analysis "*Existing management related sediment production and delivery in the watershed comes primarily from the road system*"; FEMAT *The sediment contribution to streams from roads is often much greater than that from all other land management activities combined (FEMAT V-16);* and, a recent assessment on assessing cumulative watershed effects (MacDonald, 2004) " *The median sediment production rate from roads was … nearly an order of magnitude higher than any of the other sources"*

This increase in sediment yield associated with project implementation is not anticipated to have any adverse impacts on the aquatic system.

[9] There are 15 stream crossings associated with this project so the same methodology used to calculate the sediment yield for the alternatives was used for this project.
[10] There are two stream crossings associated with this project so the same methodology used to calculate the sediment yield for the alternatives was used for this project.

Table 3.19. Comparison of alternatives.

Items of Comparison	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 3	Alternative 4
Flow Regime				
Miles of road[11]	476 miles	222 miles	348 miles	307 miles
Channel network expansion by roads	9.4%	4.5%	7.8%	6.6%
Soils and Geology				
Roads in high and moderate hazard areas for landslides	312 miles	118 miles	224 miles	184 miles
Roads in mapped active landslide areas	10.2 miles	5.3 miles	8.4 miles	6.5 miles
Sediment Yield				
Number of stream crossings	360	631	525	784
Number of high and moderate risk stream crossings	288	534	444	656
Road related sediment delivery (modeled tons/year) for properly maintained roads	893	1799	1464	2570
Short-term estimated road sediment production (modeled tons/year)	10.5	3.2	6.1	0
Long-term estimated road sediment production	56%	19%	32%	0%

3.4 Fisheries

Affected Environment

Past land management activities have had impacts on watersheds throughout the basin, but natural conditions and processes also dictate current conditions. Much of the landbase included in these eight subwatersheds occur within the Western Cascades geological zone, which is characterized by rainfall-runoff dominated streamflows and a wide range between winter high flows and summer low baseflow. These older volcanic rocks of the Western Cascades often exhibit intense weathering and are often more eroded than the younger High Cascade formations to the east. Stream networks are more abundant in the steeper, more eroded Western Cascades, the geology is much more water impermeable than that found in the High Cascades (USDA Forest Service and BLM 1996). The steep terrain combines with the parent geology to produce a landscape where landslides and large earthflows are more commonplace. The Collawash

[11] The miles of road used in this analysis are different than those stated in Chapters 1 and 2 because they reflect values calculated prior to updates made in INFRA. Also, these numbers include roads that have not yet been decommissioned on the landscape but were included in previous NEPA decisions.

watershed is the most unstable watershed on the Mt. Hood National Forest from a slope stability standpoint (USDA Forest Service 1995a).

Past management activities, have had negative impacts on fish and aquatic resources. These include extensive road building, timber harvest, stream channel cleanout and straightening for misguided flood control and salvage activities, water diversions, hydroelectric development, grazing, and recreation. These activities have resulted in some loss of connectivity, reduction of stream shading, alteration in riparian vegetation and function, increased sedimentation, reduced instream large woody debris, and loss of pools from historic reference conditions. Low level chronic sediment impacts to aquatic habitats from the road system are often exacerbated by larger climatic events like the 1996 Flood in the Pacific Northwest. Needed maintenance on the road system and the road drainage network far exceeds the appropriated funds that are available. Despite past impacts, most streams or stream segments within the Collawash and Upper Clackamas watersheds contain good quality habitat (USDA Forest Service 1995b).

Today the Clackamas River Basin supports regionally significant fish runs; however, fish populations in the basin and the lower Columbia River have declined from historic levels, with some stocks diminished to the point of being federally listed as threatened species (Oregon Department of Fish and Wildlife 1992). The Collawash and Upper Clackamas River watersheds currently provide habitat for the following Evolutionarily Significant Units (ESUs): Lower Columbia River (LCR) steelhead (*Oncorhynchus mykiss*), Upper Willamette River (UWR) chinook salmon (*Oncorhynchus tshawytscha*), and Lower Columbia River (LCR) coho salmon (*Oncorhynchus kisutch*). These species and their designated critical habitat are listed as Threatened and are protected under the federal Endangered Species Act (ESA). Other fish occupying these watersheds include mountain whitefish, large-scale suckers, sculpin species, longnose dace, and brook lamprey. All of the subwatersheds within the project area support populations of resident rainbow (*Oncorhynchus mykiss*) or cutthroat trout (*Oncorhynchus clarki*). Many of the high lakes have been stocked with trout via aircraft (Oregon Dept. of Fish and Wildlife 1992).

In sum, the affected environment lies within some of the most naturally unstable geologic areas on the Mt. Hood National Forest (USDA Forest Service 1995). While much of the eight subwatersheds in the project area are relatively stable from year to year, the extensive road system crosses many active earthflow and unstable areas that are characteristic of the parent geology. Very low levels of road maintenance are inadequate for the integrity of the road drainage system and protection of downstream fish habitat. Within this context of unstable geology and roads with minimal maintenance, are many miles of stream habitat supporting substantial numbers of rearing and spawning salmon and steelhead that are federally listed as Threatened (Oregon Dept. of Fish and Wildlife 1992).

Proposed, Endangered, Threatened, Sensitive, or Special Status (PETS) Fish and/or Aquatic Species located in (or downstream) of the Project Area

The Mt. Hood National Forest uses salmonids (salmon, trout and char) as management indicator species for aquatic habitats. Due to their sensitivity to habitat changes and water quality degradation, salmonids are used to monitor trends within Forest streams and lakes. Although other fish species may be present (e.g., sculpins, lamprey, and dace), population status and trends are unknown. Since more information exists on salmonids, this group serves as a more optimum choice for monitoring aquatic environments (USDA Forest Service 1991).

PETS species were federally listed or designated as sensitive for a number of factors. Although there are different reasons for their current status, common issues include impaired fish passage at dams and other obstructions, commercial and recreational fishing, loss of habitat, habitat modification, hatchery influences, and pollution. Hydroelectric dams have disrupted migrations and eliminated historically available habitat. Commercial and recreational fishing have reduced numbers of wild fish in some populations. Habitat has been degraded, simplified, and fragmented due to a variety of land management activities. Hatchery programs have strongly influenced populations, partly by masking declines in naturally spawning fish and dilution of native gene pools due to interbreeding.

Table 3.20. Special status (threatened, endangered, or R6 sensitive) aquatic species found in Clackamas River Basin streams.

Species	DPS/ESU	Status	Where species/Critical Habitat occurs within or downstream of Action Area
Bull Trout (*Salvelinus confluentus*)	Columbia River DPS	Threatened 5/98	Extirpated from Clackamas Basin
Steelhead Trout (*Oncorhynchus mykiss*)	Lower Columbia River ESU	Threatened 3/98	Upper Clackamas and Collawash Rivers and tribs., below barriers
Chinook Salmon (*O. tshawytscha*)	Lower Columbia River ESU	Threatened 3/99	Off Forest below Rivermill Dam
Chinook Salmon (*O. tshawytscha*)	Upper Willamette River ESU	Threatened 3/99	Upper Clackamas and Collawash Rivers
Coho Salmon (*O. kisutch*)	Lower Columbia River ESU	Threatened 6/05	Upper Clackamas and Collawash Rivers
Interior Redband Trout (*O. mykiss*)	Not Applicable (NA)	Sensitive - 7/04	Not found in Clackamas Basin
USDA Forest Service, Pacific Northwest Regional Foresters Special Status Species (Aquatic)			
Columbia duskysnail (*Colligyrus sp. nov.1*)	N/A	Sensitive - 7/04, and Special Status Species 1/08	Throughout Forest
Barren Juga (*Juga hemphilli hemphilli*)	N/A	Special Status Species 1/08	Throughout Forest
Purple-lipped Juga (*Juga hemphilli maupinensis*)	N/A	Special Status Species 1/08	Wasco County, Lower Deschutes, and Warm Springs Basins
Scott's Apatanian Caddisfly (*Allomyia scotti*)	N/A	Special Status Species 1/08	High timberline elevations of the White River and Salmon River watersheds

Surveys for the three special status aquatic mollusks were not conducted as part of this project, even though the Columbia duskysnail is known to occur in many streams on the Forest, including those in the proposed project area of the action alternatives. Instead of conducting surveys in all adjacent streams, species presence is presumed. Riparian reserve standards and guidelines and project design criteria are sufficient to provide for the habitat needs of this species. Anticipated effects of implementing the action alternatives would not significantly affect habitat or species persistence at each site.

Environmental Effects

Alternative 1 – No Action

Alternative 1 would not meet the purpose of this project to reduce adverse impacts to aquatics. There would be no direct effect or impact to any listed, proposed, or special status fish or mollusk species because no federal action would take place. The No Action Alternative could have negative impacts because the transportation system that has been deteriorating in recent years would continue to deteriorate until conditions become unsafe. Roads that have been damaged by storm events could become chronic sources of sediment, potentially impacting fisheries and aquatic resources. Many of the roads in the project area would continue to deteriorate potentially introducing sediment at some future point by slope failure or surface erosion.

In stream systems that currently have partial or full passage barriers due to inadequate stream crossings, connectivity for fish and other aquatic species would continue to be compromised. These barriers result in under utilization of spawning and rearing habitats and hinder the broad exchange of genetic material throughout populations of aquatic organisms. When culverts are too small to accommodate a 100-year flood event, there is the potential for them to become plugged, possibly resulting in washouts of the road system and damage to aquatic environments (Meehan 1991). Washouts would introduce a pulse of sediment into the stream system and potentially could cause degradation of downstream aquatic habitat.

Listed fish and their critical habitat, and special status species would continue to be negatively affected by sediment and continued loss of habitat connectivity.

Alternative 1 does not take any steps in the direction of moving toward improving watershed conditions or reducing road density. Long-term beneficial effects resulting from restoration of hydrologic functions, reduced risk of washouts and landslides, and reduction of sediment delivery to streams would not be achieved.

Alternative 2 – Proposed Action

This alternative includes the highest amount of road miles for decommissioning. All the action alternatives have the potential to cause short-term degradation of water quality by increasing sediment delivery to streams as roads are de-compacted by heavy equipment, culverts and cross drains are removed, and other restoration activities are implemented. This alternative because it does call for the greatest amount of roads to be decommissioned, may cause a greater amount of short-term degradation of water quality through sediment delivery to streams. Alternative 2, however, over the long term would provide the greatest benefit to watershed conditions. It improves habitat conditions over a larger watershed area for fish and other aquatic organisms because of the greater amount of roads decommissioned, which would restore more stream connectivity, improve hydrologic functions, and convert former road beds to a forested condition.

Alternative 3

With the exception of the No Action Alternative, Alternative 3 decommissions the fewest number of miles. Short-term impacts from sediment production entering waterways during road decommissioning from this alternative would be the least of the three action alternatives. At the same time, this alternative would provide the least amount of reduction in the long-term sediment entering stream systems from aging and deteriorating roads, roads crossing unstable landforms, and inadequate culverts. A greater number of road passage barriers would continue to block connectivity for fish and other aquatic organisms in contrast to the other action alternatives.

Alternative 4

Impacts, as well as benefits from this alternative are intermediate compared to Alternatives 2 and 3. Short-term sediment impacts from construction activities during road decommissioning would be very similar to alternative-3.

Direct Effects

Road decommissioning projects can involve work in the existing road prism and at times in an active stream channel. One of the most important aquatic components of watershed restoration is reducing habitat fragmentation by eliminating passage barriers to aquatic species (Meehan 1991). Whenever culvert removal is associated with road decommissioning, the potential exists to deliver sediment to streams and create turbidity. Some of these projects will involve work in or adjacent to an active fish-bearing stream channel. The use of heavy mechanized equipment, could disturb the stream influence zone, disturb fish, and cause incidental mortality. This activity could also deliver sediment, create turbidity, and cause stream bank erosion. There is also the potential of an accidental fuel/oil spill.

These projects may cause a short-term degradation of water quality due to sediment input and chemical contamination. Stream bank condition and habitat substrate may also be adversely affected in the short term. However with careful project design and mitigation, these affects are expected to be of a limited extent and duration.

Direct effects to fish and aquatic species resulting from project activities include reduced feeding efficiency during times of increased turbidity and the possibility of individual mortality during construction. Fish rely on sight to feed so feeding success could be hampered during those times turbidity is increased. This would be a short-term effect since turbid conditions would dissipate soon after the in-stream work phase was completed, generally in a few hours.

Any time there is digging or equipment being used in the live stream channel there is a possibility of fish being killed or seriously injured by being crushed or run over by equipment. Based on previous experience with in-stream restoration projects, most fish vacate the area when equipment disturbs the stream channel.

Road obliterations near streams will have short-term, construction-related effects. In the long term, the proposed road activities will decrease watershed drainage networks, eliminate stream-road crossings, and reduce areas of soil compaction. Direct long-term beneficial effects to both PETS fish species and their critical habitat and to special status species would occur from the road decommissioning projects. These projects would not only benefit seasonal fish migration, but they would decrease aquatic habitat fragmentation. Removal of culverts would allow wood, water, and sediment to move more naturally through these stream and river systems (Meehan 1991).

Indirect Effects

Indirect effects are possible from increased amounts of fine sediment degrading aquatic habitat after project implementation is completed. Fine sediment sources include material mobilized from the stream channel during culvert removal activities or erosion of exposed soil following the decompaction of road surfaces or culvert removals after project implementation. This sediment can also result from precipitation on disturbed ground prior to vegetation being re-established at project sites. Potential impacts from increased amount of fine sediments are degradation of spawning habitat and a reduction in rearing habitat caused by sediments filling in pools. Changes in channel geometry as a result of culvert removal activities could cause localized areas of erosion until the channel reaches equilibrium at those sites.

The amount of sediment generated from projects in Alternatives 2, 3, and 4 is expected to be low due to the time when the projects are implemented (seasonal low flow periods) and the use of best management practices. Once exposed soil areas are re-vegetated and stabilized, erosion would be negligible. Affected areas would be localized and probably extend no further than several hundred feet downstream from the project site. The effects would be relatively short-term; as flows in the winter increase, any sediment caused by project activity would be redistributed downstream and in effect diluted as material settles in different areas.

The probability of "take" of threatened or proposed species resulting from the implementation of these types of projects is low, but present regardless, as is any long-term adverse modification of habitat. Following ODFW in-stream work guidelines, project design criteria, using aggressive erosion control measures, and adherence to applicable Best Management Practices (BMP's) that are focused on reducing sediment production, would insure that any effects to aquatic species or their habitats would be negligible at the watershed scale (USDA Forest Service 1988).

Cumulative Effects

Generally, any cumulative effect on fishery and aquatic resources resulting from project implementation is focused around fine sediment input into streams. This sediment can result from construction activities, or occur at a later date, such as from precipitation on disturbed ground prior to vegetation being re-established. Fine sediment produced as a result of these restoration projects, both directly and indirectly, would contribute to the overall sediment load within the watersheds where activities will occur. Adherence to Best Management Practices (BMPs), mitigation measures and project design criteria would minimize any long-term adverse effects of project implementation.

The action alternatives (Alternatives 2, 3, and 4) consist of activities that reduce or eliminate negative effects from existing road systems on fish and aquatic resources. These activities are designed to restore in-stream, riparian, and upslope environments needed for the recovery of fish species and their habitat.

Road decommissioning where ground disturbance would occur will be implemented over multiple years in a number of different subwatersheds. The recovery from short-term effects from one project may be complete by the time another project in the same watershed is implemented. Cumulative effects from the proposed project are expected to be short-term and undetectable at the watershed scale.
Beneficial effects from implementation of the proposed projects include long-term improvements to fish habitat and riparian areas, restored fish passage for all life histories of threatened and proposed species, re-established connectivity of fish populations above and below man-made barriers, restoration of hydrologic function, more natural routing of wood and sediment through stream systems (Meehan 1991).

Effects Determination to ESA Listed Fish and Designated Critical Habitat

The implementation of road decommissioning and culvert removal projects in Alternatives-2, 3, and 4, which occur in a Riparian Reserve warrants a ***May Affect, Likely to Adversely Affect*** **(LAA)** determination for threatened LCR steelhead, UWR chinook, and LCR coho salmon found in or downstream of the project area due to the probability of take, in terms of short term, unintended harassment and the potential of short-term increases of sediment into the stream channel where these species reproduce, rear or feed. An effects determination of ***No Effect*** (**NE**) is warranted for LCR chinook since this species is found over thirty-five miles downstream from any project activity.

These projects would be implemented consistent with the species and activity category-appropriate design criteria and conservation measures in Bureau of Land Management/Forest Service Fish Habitat Restoration Activities in Oregon and Washington CY2007-2012 Biological Assessment and associated Biological Opinions: NMFS BO (P/NWR/2006/06532 [BLM]), FWS BO (13420-2007-F-0055).

Effects Determination to Designated Critical Habitat

Designated critical habitat for UWR chinook, and LCR chinook occurs within or downstream of the proposed project areas in the mainstem Clackamas River and a number of streams within the watersheds where project activity will occur. As of this time, critical habitat for LCR coho has yet to be designated but will likely correspond with the critical habitat designation for LCR steelhead and UWR chinook in the mainstem Clackamas and its tributaries.

Project design criteria was developed to minimize or eliminate any potential affect that project elements of the action alternatives might have on water quality, fisheries, and aquatic resources. The analysis of effects has determined that the probability of any potential effect to designated critical habitat would be of a short-term duration. There would be no measurable long-term effect to any habitat or baseline habitat indicator where ESA listed fish species occurs. The implementation of these projects would not have any long-term adverse effect to designated critical habitat. Therefore, an effects determination of ***May Affect, not Likely to Adversely Affect*** **(NLAA)** is warranted for designated critical habitat that occurs within or downstream of the project area.

Effects Determination to Essential Fish Habitat

Essential Fish Habitat (EFH) established under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) includes those waters and substrate necessary to ensure the production needed to support a long-term sustainable fishery (i.e., properly functioning habitat conditions necessary for the long-term survival of the species through the full range of environmental variation). EFH includes all streams, lakes, ponds, wetlands, and other water bodies currently, or historically, accessible to salmon in Washington, Oregon, Idaho, and California. Three salmonid species are identified under the MSA, Chinook salmon, coho salmon and Puget Sound pink salmon. Chinook and coho salmon occur throughout the Clackamas River watershed in the lower Clackamas River and within waters of Mt. Hood National Forest. Chinook and coho salmon utilize the mainstem Clackamas River for migration, rearing, and spawning habitat. The proposed project would not have any long term adverse effect on water or substrate essential to the life history of coho, chinook, or chum salmon that occur within any basin on the Mt. Hood National Forest.

Implementation of the projects proposed would have a short-term impact but would ***Not Adversely Affect*** (**NAA**) essential fish habitat for chinook or coho salmon. This activity would not jeopardize the existence of any of the species of concern or adversely modify critical habitat and would not adversely affect Essential Fish Habitat as designated under the 1996 Amendment to the Magnuson-Stevens Act.

Regional Forester's Special Status Species

The effects determination for special status species for both Alternatives 2, 3, and 4 on the Columbia Duskysnail, Barren Juga, Purple-lipped Juga and Scott's Apatanian Caddisfly would be ***May impact individuals or habitat but will not likely contribute to a trend towards federal listing*** **(MIIH)** for culvert removal and decommissioning of roads within a riparian reserve due to the potential of short-term, increases of sediment into stream channels which these species reproduce, rear or feed.. There would be no impact for road decommissioning activities outside of riparian reserves.

Redband trout do not occur within the Clackamas River basin therefore, the effects determination is ***No Effect*** **(NE)** for this species.

3.4 Wildlife

Northern Spotted Owl (Threatened) – Habitat Characteristics & Existing Condition

Old-growth coniferous forest is the preferred habitat of spotted owls in Oregon. Old-growth habitat components that are typical for spotted owls are: multilayered canopies, closed canopies, large diameter trees, abundance of dead or defective standing trees, and abundance of dead and down woody material. The owl's main food items are flying squirrels, red tree voles, western red-backed voles, and dusky-footed woodrats.

Habitat for the owl is further defined as either nesting/roosting/foraging (suitable) or dispersal habitat. Generally this habitat is 120 years of age or older, multi-storied and has sufficient snags and down wood to provide opportunities for nesting, roosting and foraging. Dispersal habitat for the owl generally consists of mid-seral stage stands between 40 and 120 years of age with a canopy closure of 40 percent or greater and an average diameter of 11 inches.

The Northwest Forest Plan strategy designated Late Successional Reserves (LSR) as an ecological approach on the landscape level to providing habitat for spotted owls and other late successional users. These LSRs provide connectivity of habitat across the western portions of the Pacific Northwest. Within the project area there are approximately 20 to 57 miles of roads within LSR. In addition, 100 acre Late Successional Reserves (LSR 100) were designated where there were known spotted owl nest sites and resident pairs. LSR 100s were established to maintain habitat for spotted owls where they were found. In the project area nine to 13 roads occur in the LSR 100s. In 1998, the US Fish and Wildlife Service established spotted owl Critical Habitat Units (CHU) to promote the recovery of the northern spotted owl. Most of these CHUs were in a different location than the LSRs. In 2008, the US Fish and Wildlife Service published a Recovery Plan for the northern spotted owl. The Recovery Plan revised the CHUs and created a new designation called Oregon Managed Owl Conservation Areas (OMOCA). These areas most often overlapped the late successional habitat on the westside of the Cascades. Part of this project area also occurs within an OMOCA.

Direct and Indirect Effects to Habitat for the Northern Spotted Owl

<u>Alternative 1 (No Action)</u>

No short-term effects to the spotted owl would be predicted with this alternative. The spotted owl habitat present in the project area would continue to function as spotted owl habitat. There would be no benefits gained for the spotted owl as is described in action alternatives.

Some parts of the project area and the surrounding area are in a high fire hazard situation and are currently prone to a wildfire outbreak. Maintaining these roads would allow the roads to be used to access areas for fire suppression activities. This alternative would maintain response time to fires that could serve to reduce the size and magnitude of future fires, potentially protecting spotted owl habitat.

<u>Alternative 2 (Proposed Action), Alternative 3, and Alternative 4</u>

The proposed road decommissioning would not modify any spotted owl habitat. Ground disturbance and vegetation alterations would be minimal and would not alter any of the habitat components important for spotted owls. There is an indirect effect of decommissioning roads. In the long term, the decommissioned roads would grow into forested stands and begin to provide a prey base for spotted owls. These roads would likely become dispersal or maybe even suitable habitat for the spotted owl in the future. Alternative 2 (Proposed Action) has a slightly greater area that could potentially become spotted owl habitat in the future because it decommissions more miles of roads than Alternatives 3 and 4.

The affects of road decommissioning for spotted owls is minor. There is a direct minor benefit to the owls in the short term. This benefit occurs as the road has vegetation rehabilitation. As the roads are replanted in grasses there would be a small increase in small mammal habitat (for mice and voles). However, the principal prey of spotted owl on the westside of the Forest is northern flying squirrels. Northern flying squirrels would not utilize the road prism to a great degree.

The long-term indirect benefit would occur if the road is not reutilized in the future, then trees may establish and become spotted owl habitat. This would take much longer in the road bed than in a more productive soil. The benefit of the reforestation is greatest in the areas of critical habitat and LSR. The following table summarizes the amount of road decommissioning in different spotted owl habitat designations.

Table 3.21. Roads proposed for decommissioning in LSR 100s, LSRs, and OMOCA/2008 CHU.

Alternative	Number of roads proposed for decommissioning in 100 acre LSRs	Miles of roads proposed for decommissioning in LSR	Miles of roads proposed for decommissioning in OMOCA or 2008 CHU	Total miles of roads proposed for decommissioning
Alternative 2	12	56.5	45.3	255
Alternative 3	9	19.7	13.5	129
Alternative 4	13	40.7	34.2	170

A high fire hazard situation exists in some parts of the project area. By decommissioning the proposed roads in the action alternatives, there would be a reduction of roads that could be used to access areas for fire suppression activities. The potential exists in all alternatives that a wildfire would burn an unknown amount of land within current habitat for spotted owls. A wildfire has the potential to remove the nest site by consumption of the nest tree, or by removing enough of the available suitable habitat near the nest to render the site un-usable by the spotted owl pair.

Alternative 2 (Proposed Action) could reduce the response time to fires by having less open roads and subsequently serve to increase the size and magnitude of a future fire. Alternative 2 has more roads proposed for decommissioning than Alternative 3 and therefore would have an increased potential for a greater loss of spotted owl habitat due to wildfire or at least response time for suppression efforts. There would be less road decommissioning in Alternative 4 than Alternative 2, so there would be more opportunity to reduce wildfire events in Alternative 4. The reduction in habitat for the spotted owl from wildfire could have negative effects to the spotted owl population residing in the area. However, the loss of habitat from a fire is speculative; thus, there would be no effects to spotted owl habitat from habitat alteration or removal.

Cumulative Effects to Habitat for the Northern Spotted Owl for All Action Alternatives

Cumulative effects to spotted owls and their habitat are very minor. There is no spotted owl habitat affected by the decommissioning of roads. Some reforestation would occur over a long period of time if the roads are allowed to remain dormant. There is a minor beneficial effect to changing road surfaces to vegetation where some small mammals may be found. However, since the primary prey of spotted owls in this part of Oregon is northern flying squirrels, and this habitat would benefit mice and voles not flying squirrels, the short-term effect is negligible. Cumulatively this increase in small mammal populations and increases in forest stands on these road beds in very minor.

Direct and Indirect Effects of Disturbance on the Northern Spotted Owl

Significant noise, smoke and human presence may potentially result in a disruption of breeding, feeding, or sheltering behavior of the spotted owl such that it creates the potential for injury to individuals. For a significant disruption of spotted owl behavior to occur as a result of disturbance caused by road decommissioning, the disturbance and owl(s) must be in close proximity to one another. A spotted owl that may be disturbed at a roost site is presumably capable of moving away from a disturbance without a substantial disruption of its behavior. Since spotted owl forage primarily at night, projects that occur during the day are not likely to disrupt its foraging behavior. The potential for disturbance is mainly associated with breeding behavior at active nest sites.

The proposed road decommissioning would occur in proximity to several spotted owl activity centers as well as un-surveyed suitable habitat; and has the potential to disturb the normal behavior patterns of individual owls or breeding pairs potentially at the site. In the Central Cascades, 86 percent of young owls fledge by June 30th. Therefore, the spotted owl critical period in this project area is considered to be March 1st through July 15th. After July 15th, it is presumed that most fledgling spotted owls are capable of sustained flight and can move away from harmful disturbances.

All project activities would comply with the standards contained within the Programmatic Biological Assessment titled *Biological assessment of activities with potential to disturb northern spotted owls – FY 2010-2013*. Informal consultation for the northern spotted owl (disturbance only) has been completed and documented in a Letter of Concurrence written by U.S. Fish & Wildlife Service (August 20, 2009). The standards and are as follows:

No activity would occur within the disruption distance of a known owl site or predicted owl site during the critical breeding period (March 1 – July 15). This standard equates to the following seasonal restrictions:

- Chainsaw use would be restricted during March 1 – July 15 if within 65 yards of a known or predicted owl site; and,
- Heavy equipment would be restricted during March 1 – July 15 if within 35 yards of a known or predicted owl site.

If the current location of the nest tree is not known, the disruption distance would be measured from the edge of a 300 meter buffer (nest patch) around the known or predicted owl site.

<u>Alternative 1 (No Action)</u>

There are some minor amounts of noise associated with a road (such as driving, chain saw use from cutting down hazard trees, and road maintenance) that can cause disturbance to the spotted owl. There is a tendency for spotted owls to nest at least 200 feet from a road. The reason for this is unknown (USFWS, Jim Thrailkill, Personal Communication). Thus, the disturbance effects of roads on spotted owls is minor.

<u>Alternative 2 (Proposed Action)</u>

For this alternative there are 21 known sites and one predicted site that would require a seasonal restriction due to the proximity of the heavy equipment work and the owl nest patch (see Table 3.22). Since the current location of the nest trees is not known, the 300 meter no treatment buffer would need to be used. If the location of the nest site is found prior to project implementation, the no treatment (disruption) buffers listed above may be used. The effect of Alternative 2 on disturbance to spotted owls would be *may affect but not likely to adversely* *affect* spotted owls since the seasonal restriction would ensure that no nest disruption would occur.

<u>Alternative 3</u>

For this alternative there are 13 known sites and one predicted site that would require a seasonal restriction due to the proximity of the heavy equipment work and the owl nest patch (see Table 3.22). Since the current location of the nest trees is not known, the 300 meter no treatment buffer would need to be used. If the location of the nest site is found prior to project implementation, the no treatment (disruption) buffers listed above may be used. The effect of Alternative 3 on disturbance to spotted owls would be *may affect but not likely to adversely affect* spotted owls since the seasonal restriction would ensure no nest disruption would occur.

<u>Alternative 4</u>

For this alternative there are 16 known sites and one predicted site that would require a seasonal restriction due to the proximity of the heavy equipment work and the owl nest patch (see Table 3.22). Since the current location of the nest trees is not known, the 300 meter no treatment buffer would need to be used. If the location of the nest site is found prior to project implementation, the no treatment (disruption) buffers listed above may be used. The effect of Alternative 4 on disturbance to spotted owls would be *may affect but not likely to adversely affect* spotted owls since the seasonal restriction would ensure no nest disruption would occur.

Summary of Effects to Northern Spotted Owl (Disturbance) for the Action Alternatives

The following table shows which roads would require seasonal restriction requirements by alternative.

Table 3.22. Seasonal restrictions by road number and alternative.

Road Number	Alternative 2	Alternative 3	Alternative 4
7010-120	X	X	
7010-270	X		X
7020-120	X		X
7020-017	X	X	
7021-120	X		X
7015-017	X		
7015-016	X		
6330-000	X		
6330-200	X	X	X
6330-170	X		X
6300-170	X		X
6300-175	X	X	X
6300-176	X	X	X
6310-240	X	X	X
6310-210	X		
6322-150	X	X	X
6380-012	X	X	
6350-250	X	X	X
5710-029	X	X	X
4650-120	X		X

4650-170	X	X	X
4670-150	X		
4670-160	X	X	X
4661-031	X		
4640-150	X	X	X
4661-164	X	X	X
4661-120	X	X	
4660-014	X		X
4661-031	X		X
4660-120	X	X	X

With these seasonal restrictions, adverse effects would be avoided. This project would have an effects determination of ***may effect, not likely to adversely affect (NLAA)***. The protection of known and predicted nest patches with the seasonal restrictions, and the low density of actively nesting spotted owls is the rationale for the effects determination. No additional restrictions are required in the 100 acre LSRs, LSR or OMOCAs.

Cumulative Effects for Disturbance to the Northern Spotted Owl for All Action Alternatives

Cumulative effects are minimal for disturbance to spotted owls. There is no evidence that roads or decommissioning of roads has any detrimental effect on the reproduction or well being of spotted owls. There are no anticipated effects from the cumulative effect of closing these roads or any new or existing road decommissioning project.

Effects to Regional Forester's Sensitive Species

The following table summarizes effects to Regional Forester's Sensitive Species from the Biological Evaluation, which is incorporated by reference and found within the analysis file.

Table 3.23. Summary of the effects to Special Status Species for all action alternatives.

Special Status Species	Suitable Habitat Presence	Impact of Action Alternatives 2, 3, and 4
Johnson's Hairstreak	No	No Impact
Mardon Skipper	No	No Impact
Oregon Slender Salamander	No	No Impact
Larch Mountain Salamander	No	No Impact
Cope's Giant Salamander	Yes	MII-NLFL*
Oregon Spotted Frog	No	No Impact
Lewis's Woodpecker	No	No Impact
White-Headed Woodpecker	No	No Impact
Bufflehead	No	No Impact
Harlequin Duck	Yes	MII-NLFL
Bald Eagle	No	No Impact
American Peregrine Falcon	Yes	MII-NLFL
Townsend's Big-eared Bat	No	No Impact
Fringed Myotis	No	No Impact
California Wolverine	Yes	No Impact
Malone's jumping slug	Yes	MII-NLFL
Oregon Megomphix	Yes	MII-NLFL
Puget Oregonian	No	No Impact

Special Status Species	Suitable Habitat Presence	Impact of Action Alternatives 2, 3, and 4
Columbia Oregonian	No	No Impact
Evening Fieldslug	No	No Impact
Dalles Sideband	No	No Impact
Crater Lake Tightcoil	Yes	MII-NLFL
Crowned Tightcoil	Yes	MII-NLFL

*"MII-NLFL" = May Impact Individuals, but not likely to Cause a Trend to Federal Listing or Loss of Viability to the Species.

Effects to the species listed above include changes to habitat as well as potential harm to individuals caused by physical impacts of mechanical equipment, and noise. Species that are may have some effect from this project are described below.

Effects to the Peregrine Falcon

There is a peregrine falcon nest on road 6321 at the 6321-150 section of road. Currently, there is a gate at the 6321 location and at the 6321-150 section. This road is utilized to monitor the nest success of the peregrine falcons. Surveyors are instructed to park at the gate at 6321-150 and walk into the site to do monitoring.

Any road decommissioning at the location would need to be timed to avoid disruption of nesting by the falcons. This would require work be done from October 31 to January 1 within one mile of the nest. There are no other nest sites or resources that would be impacted.

<u>Alternative 1 (No Action)</u>

If there were no road decommissioning there would be no disturbance to the peregrines nesting at the site by the deconstruction activities used to decommission the road. Currently the road is gated at two locations to reduce the potential for harassment of the birds. Peregrine falcons can be very easily disturbed and no action would eliminate any potential disruption of nesting or feeding of the young.

<u>Alternative 2 (Proposed Action)</u>

Alternative 2 would decommission the entire road. This would make it difficult to monitor the nest if the entire road was decommissioned. If only the portion of the road beyond the second gate just below the nest be decommissioned this would allow access to the site but still reduce the road density. This would protect the site from people driving down the portion of the road directly beneath the nest site.

The effect of decommissioning the road on the falcons would reduce harassment at the nest site in the long term. The use of heavy equipment and human presence during the road obliteration could cause the site to be abandoned and the nest to fail unless the work was timed properly. Reducing the time that people and equipment are in the area and only doing decommissioning work on the 6321 from October 31 to January 1 would reduce harassment at the site.

Alternative 3

This alternative would only decommission the 6321-150 section that is just below the cliff where the nest. This alternative maintains a way to monitor and do nest habitat improvement at the nest.

The effect of decommissioning the road on the falcons would reduce harassment at the nest site in the long term. The use of heavy equipment and human presence during the road obliteration could cause the site to be abandoned and the nest to fail unless the work was timed properly. Reducing the time that people and equipment are in the area and only doing decommissioning work on the 6321 from October 31 to January 1 would reduce harassment at the site.

Alternative 4

Alternative 4 would decommission the entire road (which is the same as Alternative 2). This would make it difficult to monitor the nest if the entire road was decommissioned. If only the portion of the road beyond the second gate just below the nest be decommissioned this would allow access to the site but still reduce the road density. This would protect the site from people driving down the portion of the road directly beneath the nest site.

The effect of decommissioning the road on the falcons would reduce harassment at the nest site in the long term. The use of heavy equipment and human presence during the road obliteration could cause the site to be abandoned and the nest to fail unless the work was timed properly. Reducing the time that people and equipment are in the area and only doing decommissioning work on the 6321 from October 31-January 1 would reduce harassment at the site.

Harlequin Ducks

Harlequin Ducks nest along fast moving, permanent streams and spend the winter along the coast. Harlequins can be experience reproductive failures if harassed during the nesting season. There could be short term negative effects of decommissioning roads if the work is done near stream during the nesting season. But the removal of the road would have long term benefits by reducing future harassment. In either case the threat of disruption is low since the harlequin duck is very good at hiding its nest and does not flush easily.

Alternative 1 (No Action)

While no harassment would occur by the decommissioning of the roads near streams, there would be a long-term threat of people disrupting nest by accessing the stream from the road.

Alternatives 2, 3 and 4

The potential exists that when road decommissioning is occurring near a stream that harlequin ducks may experience nest disruption. This would only happen if the work occurred near a stream from March1 to July 1. The project design criteria would eliminate the threat of nest disruption by starting work after July 15.

Cope's Giant Salamander

The Cope's Giant salamander prefers streams and seepages in moist coniferous forests. They limit their occurrence to waters with temperatures in the 8 to 14 degrees Celsius range. They will also inhabit cold clear mountain lakes and ponds. They occur in suitable areas from sea level up to 1,350 meters elevation. The Cope's salamander breed and rear its young within the cracks and crevices of the rocky substrates within the stream course. They sometimes leave streams on wet rainy nights but remain on wet rocks and vegetation near the stream. This salamander is most frequently found on pieces of wood in streams, under logs, bark, rocks or other objects near streams.

The Cope’s Giant salamander has the potential to be negatively affected by increased sedimentation resulting from road decommissioning activities adjacent to or intersecting streams and water sources. Sediment deposition within the substrate could impair preferred habitat characteristics. Also, sedimentation of streams can lead to asphyxiation of embryos and larvae as well as a degradation of overwintering habitat that may result in local extinctions.

Due to the potential for ground disturbing activities associated with the road decommissioning to increase sediment into streams the project design criteria have been designed to minimize the risk of erosion. To reduce sedimentation the road decommissioning would be restricted to the dry season between July 15 and October 31. This restriction would reduce the risk of any surface erosion due to ground disturbance. The proposed road decommissioning would cross stream channels, and remove culverts and could potentially put some sediment into the stream channel. The scarification of the road bed and removal of culverts could cause sediment to be transported into stream channels by surface erosion or runoff. All decommissioned roads would be revegetated following scarification operations to help reduce compaction and increase infiltration rates. The project design criteria would help reduce the quantity of sediment generated and transported into the stream where it could impact the salamander’s habitat and lifecycle.

Impacts to the habitats for the Cope’s Giant Salamander caused by sedimentation from road decommissioning or obliteration, if any, would be short-term and minor. No measurable or meaningful degradation of habitat would occur with the obliteration and revegetation.

There is a low probability that implementation of the project would increase solar radiation. Current stream temperatures in all streams within the project area are expected to be maintained. Although there is the potential that very small micro-climate changes would occur with implementation of this project, the change is not predicted to be measurable or meaningful enough to affect habitation of the areas by Cope’s Giant Salamander

California Wolverine *(Gulo gulo)*

The wolverine is a rare carnivore that may occur rarely in the Oregon Cascades. It is primarily at high elevations with very little human activity. They avoid contact with humans. They feed on a variety of prey but depend on the scavenging from dead ungulates like elk. There have been no reliable sightings on the Forest since 1990. Continued efforts to find tracks or get a photograph with remote cameras have proven unsuccessful. The northern Cascade Range in Washington represents the southernmost extent of the current range of wolverines along the Pacific coast of North America (Aubry et al. 2007). The wolverine is considered a subarctic species and Aubry considers sightings of this species in Oregon to be rare wandering individuals.

Effects to Rare and Uncommon Species

Terrestrial Mollusks

The Malone's jumping slug, Oregon Megomphix, Puget Oregonian, Columbia Oregonian, evening fieldslug, Crater Lake tightcoil and crowned tightcoil are mollusk species with ranges that include the project area.

- The Malone's jumping slug and Oregon megomphix are found to be common on the Mt. Hood National Forest and adjacent forest and not necessarily tied to late or mature forest. Therefore, the likelihood of these species being present near the action area is high. There is no anticipated impact to these species from road decommissioning since no down wood or habitat would be modified that would harm the persistence at the site so no surveys are required per direction in the Survey and Manage 2001 ROD (Standards and Guidelines p. 22).

- The Puget Oregonian and Columbian Oregonian are found at low to mid-elevations, generally in damp mature forests with a component of down woody debris. None of the road decommissioning or associated activities would impact these mollusk species. Project implementation would have no effect to the habitat or individuals of these species. No surveys or further analysis is required for these species due to lack of impacts to habitat per the direction in the Survey and Manage 2001 ROD (Standards and Guidelines p. 22).

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- The evening fieldslug is found within meadow habitats. Project implementation would have no impact on evening fieldslug habitat or individuals of the species. No surveys were conducted for this species due to lack of impacts to habitat per the direction in the Survey and Manage 2001 ROD (Standards and Guidelines p. 22).

- The Crater Lake and crowned tightcoil are found at mid to high-elevations adjacent to perennial wet areas. Some of the culvert removal projects associated with the road decommissioning contain potential habitat for these species. Riparian reserve standards and guidelines as well as the design of the projects would prevent any adverse impacts to these habitats. No surveys were conducted for these species due to lack of measurable impacts to habitat per the direction in the Survey and Manage 2001 ROD (Standards and Guidelines p. 22).

Red Tree Vole

Habitat for the red tree vole is conifer forests containing Douglas-fir, grand fir, Sitka spruce, western hemlock, and white fir. Optimal habitat for the species occurs in old-growth Douglas-fir forests. Large, live old-growth trees appear to be the most important habitat component. Project implementation would not impact any potential habitat for the red-tree vole. No surveys were conducted for this species due to lack of impacts to habitat per the direction in the Survey and Manage 2001 ROD (Standards and Guidelines p. 22).

Northwest Forest Plan Wildlife Requirements

The white-headed woodpecker, black-backed woodpecker, pigmy nuthatch, flammulated and great gray owls, Canada lynx and bats are species with standards and guidelines within the Northwest Forest Plan. These species are discussed below:

- White-headed woodpecker, pigmy nuthatch, and flammulated owl: These three species are found generally in mature ponderosa pine habitat on the eastside of the Cascades. Project activities would not impact any ponderosa pine trees. There would be no habitat alteration in the project area for these species; therefore the standards and guidelines and management recommendations for these species do not apply.

- Black-backed woodpecker: Habitat for this species is found in mixed conifer and lodgepole pine stands in the higher elevations of the Cascade Range. Although the general project area does contain habitat for this species, project implementation would not have any impacts on individuals or the habitat for this woodpecker. Therefore, the standards and guidelines and management recommendations for this species does not apply.

- Great gray owl: There may be potential habitat for this species in the general project area. However, this project would not alter any potential habitat for the species. There is no road that crosses within 100 meters of a meadow or natural open area 10 acres or greater, thus no seasonal restriction would be required to avoid potential disturbance to this species during the breeding season and no surveys are required per the direction in the 2001 ROD (pg. 22, Standards and Guidelines)

- Canada lynx: This species is federally listed as threatened, but is not known or suspected to occur on the Mt. Hood National Forest. Because there is no suitable habitat for this species within the project area, the standards and guidelines do not apply.

- Bats: The Northwest Forest Plan provides additional protection for caves, mines, abandoned wooden bridges and buildings that are being used as roost sites for bats. Before a wooden bridge is removed, the bridge would need to be assessed for bat habitat. If bats are were found to be using the bridge, then additional bat roosting habitat (e.g., bat boxes or snags) would need to be provided in the vicinity of the bridge. There is only one bridge that is being proposed for removal, which is the 4650 bridge (see photo below). Because the flat understructure of this bridge does not allow for bats to roost, no mitigation or protection is required.

Photo of the 4650 bridge.

Rare and Uncommon Species

No surveys are required for rare and uncommon species covered under the *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection buffer, and other Mitigation Measures Standards and Guidelines* (2001) because road decommissioning is included in an exemption from Judge Pechman that allows removal of culverts if the road is to be decommissioned. The culvert removal is the only aspect of the project that could potentially be habitat disturbing for Survey and Manage species; therefore, no surveys are necessary.

Direct and Indirect Effects to Snags and Terrestrial Down Wood

<u>Alternative 1 (No Action)</u>

No effects to the snag and terrestrial down wood habitat components would occur with the No Action alternative.

<u>Alternative 2 (Proposed Action), Alternative 3, and Alternative 4</u>

Ground disturbance would occur primarily in the road prism. No down wood would be removed from the project sites. Some down wood might need to be moved during project implementation, but would remain in the area. No reduction in down wood would occur. Snags would only need to be removed if they posed a safety hazard to individuals at the site during project implementation. These trees would be felled and remain on site and add down wood to the area. The reduction of snags would be minimal and would have no measurable effect on the species dependent on this habitat substrate.

Cumulative Effects to Snags and Terrestrial Down Wood

Because there are no direct and indirect effects to snags and down wood, there are no anticipated cumulative effects.

Deer and Elk (Management Indicator Species) – Habitat Characteristics & Existing Situation

Roosevelt elk herds on the Clackamas River Ranger District likely exhibit a close association with riparian habitat in areas of gentle terrain and low road density. Elk tend to frequent streams or wetlands. Clearcuts in the shrub/seedling stage historically have been an important source of forage for elk. The area also contains black-tailed deer. Elk and deer on the District browse on a wide range of native shrubs, trees, forbs and grasses.

Deer and elk range throughout the District, although there are substantially fewer elk than deer. Elk herds were greater in the past due to forage being produced within mainly the shrub/seedling stage of timber harvest units. Since timber harvest does not occur as frequently on the District as it has in the past, few elk remain today due to a lack of forage. Deer have not been studied intensively within the watershed, but are generally considered to be wider ranging, more tolerant of human disturbance, and less dependent on riparian areas.

The Forest Plan Standards and Guidelines have minimum requirements for optimal and thermal cover habitat components, but no specific level for forage. During the 1980's and 1990's wildlife managers considered thermal cover to be important to elk survival and production. Over time wildlife managers have questioned if elk required thermal cover. Currently, there is not much support from the elk research community for the necessity of thermal cover for elk. John Cook indicated at the Elk Modeling Workshop (April 2010) that telemetry data indicated that elk were negatively associated with cover. Cook indicated that openings are far more valuable for elk than cover. With the reduction in timber harvest, the Forest now far exceeds the standards for optimal and thermal cover, but openings are becoming scarce. The reduction of openings is both intuitive and is evident to any observer on the Forest looking for openings to view elk. As the change in management from wide spread clear cutting has changed to using thinning to manage forest, the past harvest units have grown a thick stand of young trees that shade out the grasses and forbs used as forage for deer and elk.

In mountainous areas elk move seasonally. Winter snow accumulation and the reduction in forage availability makes movement to areas with less snow an important survival mechanism. These seasonal movements occur annually. When elk move down slope to the lower elevations, a biologist calls this *winter range*. In the spring when the elk move back up to higher elevations where new vegetation growth makes forage more palatable and with higher nutrition, a biologist considers this *summer range*. On the summer range calves are born in areas with flatter topographic relief. Migration away from the winter range allows for the maximum summer growth of plants that will provide for survival during the colder more snow influenced months. Management of elk during the winter has always been considered the most important time to reduce harassment when energy expenditure could exceed the ability of the elk intake enough nutrition to survive. But late summer foraging is also important to providing enough fat on cows and calves to go into the winter in sufficient condition to survive a harsh winter.

Presentations from the Elk Habitat Modeling Workshop (April 2010) indicated that elk were positively associated with openings and negatively associated with open roads. Telemetry data presented at this workshop indicated that elk avoided roads and used areas with lower road densities at a higher rate than areas with higher road densities. In other words, the lower the road density the greater the likelihood of elk use in that area.

High road densities lead to harassment of elk herds. Harassed elk move more often than elk left alone and use of habitat decreases as road density increases (Witmer and deCalesta 1985). The study mentioned above also reported that elk within or moving through areas of high open road densities moved longer distances; moving several miles per day was not uncommon.

The Forest Plan states that motorized vehicular traffic should be reduced to not exceed 2.0 miles per square mile within inventoried deer and elk winter range and 2.5 miles per square mile within deer and elk summer range. Table 3.25, below, shows the current condition of road density, its relationship to the Forest Plan standards and the density for each alternative.

Area analysis for road densities was conducted by fixed analysis areas, known collectively as Range X[12]. The Range X analysis looked at summer and winter range and classified the areas with the flattest topography and identified those areas as "key". The flatter or more gentle the topography the higher the value to elk both from an energy expenditure and nutrient capacity. The flatter topography captures and holds nutrients and fertile soils that deposit down slope. The flatter locations also hold more moisture making forage more palatable. There is both Key Winter Range and Key Summer Range. These areas are best suited for elk habitat for foraging and calving due to higher nutrition and less energy expenditure. The analysis areas differ from the watershed boundaries and were designed to analyze habitat components within the two ecological classifications deemed important to deer and elk – winter and summer range. Table 3.25 shows the road density analysis by elk habitat mapping unit identified in the Range X analysis.

Direct, Indirect and Cumulative Effects for Deer and Elk

The following table displays the amount of roads being decommissioned in summer and winter range.

Table 3.24. Proposed miles of road decommissioning in ungulate summer and winter range habitat by action alternative.

Range designation	Alternative 2	Alternative 3	Alternative 4
Summer range	51.6	18.6	29.5
Winter range	203.0	110.4	140.0

The greater the miles of road being decommissioned the greater the benefit to deer and elk by that alternative due to increased utilization of that area because of the reduction in harassment.

<u>Alternative 1 (No Action)</u>

Eighteen out of the 21 analysis areas currently meet or exceed road density Forest Plan standards. The remaining three analysis areas (Summer Range 19, Summer Range 27, and Winter Range 26) currently do not meet Forest Plan standards. Elk and deer populations would continue to decline as a result of fewer openings providing forage for the ungulates due to general trends in forest management in the Pacific Northwest. Following the Northwest Forest Plan there has been a tremendous reduction in clearcutting on Federal lands and this has resulted in annual reduction in openings in the Forest. This reduction in openings has produced a decrease in the amount of forage across the Cascades unless fire has created new openings and forage.

With the no action alternative, there would be no reduction in road density and the resultant improvement to habitat from reduced harassment. There would be no increased security provided to deer and elk as a result of the road decommissioning. However, there would be

[12] This analysis was conducted during the preparation for the Forest Plan in 1990. It utilized GIS to identify areas important to elk.

more opportunities for harvest in many areas that could have produced forage openings. Although the road densities would be greater, creating a situation where elk and deer might feel less secure, there would be more openings for them to use as forage so elk and deer numbers could be maintained from creation of forage openings until natural events such as fire created forage openings.

Alternative 2 (Proposed Action), Alternative 3, and Alternative 4

Ground disturbance would occur primarily in the road prism. There would be no impacts to optimal, thermal, and hiding cover, as well as forage habitat available to the ungulate population. Most of the roads that are decommissioned would eventually naturally revegetate and potentially provide additional forage and cover for the deer and elk residing in the area.

The action alternatives would prevent motorized traffic from traveling on the proposed decommissioned roads. The proposed road decommissioning would occur scattered throughout the subwatersheds and would reduce current open road densities of 1.8 miles per square mile (Alternative 1) to 1.17 miles per square mile in Alternative 2, 1.61 miles per square mile in Alternative 3, and 1.42 miles per square mile in Alternative 4, in both summer and winter range.

The Forest Plan states that motorized vehicular traffic should be reduced to not exceed 2.0 miles per square mile within inventoried deer and elk winter range and 2.5 miles per square mile within deer and elk summer range. The following table displays the reduction in road density per Range X Road Density Analysis Area that would occur with implementation of each alternative. The Range X analysis labels key habitats as either “KW” for Key Winter Range or “KS” for Key Summer Range. The label “WR” indicates Winter Range; the label “SR” indicates Summer Range.

Table 3.25. Road density analysis for Key Winter Range*, Winter Range, and Summer Range.

Analysis area units	Acres in analysis area	Current open road miles	Forest Plan Goal	Road density (Alt 1)	Alt 2 Miles of decom-missioning	Alt 2 Road density	Alt 3 Miles of decom-missioning	Alt 3 Road density	Alt 4 Miles of decom-missioning	Alt 4 Road density
KW8	3233	6.7	1.5	1.3	1.1	1.1	0.6	1.2	0.6	1.2
SR19	3656	15.7	2.5	2.7	10.2	1.0	2.0	2.4	2.0	2.4
SR20	6571	21.9	2.5	2.1	12.9	0.9	5.0	1.6	5.0	1.6
SR26	4872	14.1	2.5	1.9	3.8	1.4	3.8	1.4	3.8	1.4
SR27	5884	23.8	2.5	2.6	11.9	1.3	2.3	2.3	7.8	1.7
SR28	5043	15.0	2.5	1.9	2.8	1.6	0.9	1.8	2.8	1.6
SR39	3528	13.5	2.5	2.4	5.0	1.5	3.1	1.9	3.8	1.8
SR40	4943	15.7	2.5	2.0	5.4	1.3	1.3	1.9	1.3	1.9
SR41	6870	23.9	2.5	2.2	16.1	0.7	3.7	1.9	6.0	1.7
SR42	3128	5.7	2.5	1.2	4.8	0.2	2.3	0.7	3.7	0.4
SR43	6603	4.9	2.5	0.5	2.6	0.2	0.4	0.4	0.7	0.4
SR44	4939	13.3	2.5	1.7	8.8	0.6	3.5	1.3	6.9	0.8
SR45	5386	15.6	2.5	1.9	8.2	0.9	2.2	1.6	4.2	1.4
SR47	2718	1.9	2.5	0.4	1.9	0.0	0.0	0.4	1.9	0.0
SR6	5768	18.4	2.5	2.0	4.6	1.5	1.5	1.9	2.5	1.8
SR8	4707	16.3	2.5	2.2	3.5	1.7	2.0	1.9	2.0	1.9
WR24	1779	4.6	2.0	1.7	1.0	1.3	0.4	1.5	0.4	1.5

Analysis area units	Acres in analysis area	Current open road miles	Forest Plan Goal	Road density (Alt 1)	Alt 2 Miles of decom-missioning	Alt 2 Road density	Alt 3 Miles of decom-missioning	Alt 3 Road density	Alt 4 Miles of decom-missioning	Alt 4 Road density
WR25	4904	12.4	2.0	1.6	0.6	1.5	0.4	1.6	0.5	1.6
SR45	5386	15.6	2.5	1.9	8.2	0.9	2.2	1.6	4.2	1.4
WR26	3832	13.7	2.0	2.3	2.4	1.9	0.6	2.2	0.7	2.2
WR5	4197	12.6	2.0	1.9	0.1	1.9	0.1	1.9	0.1	1.9
WR9	5322	14.4	2.0	1.7	4.3	1.2	3.0	1.4	4.3	1.2
SR45	5386	15.6	2.5	1.9	8.2	0.9	2.2	1.6	4.2	1.4
WR26	3832	13.7	2.0	2.3	2.4	1.9	0.6	2.2	0.7	2.2
WR5	4197	12.6	2.0	1.9	0.1	1.9	0.1	1.9	0.1	1.9
WR9	5322	14.4	2.0	1.7	4.3	1.2	3.0	1.4	4.3	1.2

**Note: There is no key summer range located in the project area.*

The proposed decommissioning of roads would reduce the road density and improve utilization of deer and elk habitat due to the reduced harassment and increased security. Benefits to ungulates would be substantial in both summer and winter range in the project area. By reducing road densities in these areas, crucial winter habitat would be improved and summer habitat important for calf and fawn rearing would be more productive. Habitat utilization for ungulates would be slightly more improved in Alternative 2 than Alternatives 3 and 4 due to the increase in road decommissioning. However, the reverse is true of the opportunity to provide forage by created openings. The best scenarios occur when a harvest is scheduled prior to the decommissioning a road.

Deer and elk currently within the area during project implementation could be displaced for the short-term due to the noise levels and associated activity produced by the road decommissioning activities. Due to the abundance of similar low quality habitat in the surrounding area, individuals would be able to alter their foraging and dispersal patterns to another area with equally poor forage. Generally project implementation would not occur during the winter or spring (calving season) due to the wet soil conditions. These are the periods when deer and elk are most vulnerable to disturbance. Most roads would be decommissioned in the summer or fall, a time when disturbance to ungulates would not be highly disruptive to many animals.

Although the road decommissioning would slightly improve the habitat being provided for deer and elk, a lack of good quality forage would continue to be the main limiting factor for ungulate populations in the area. Since regeneration harvest is no longer occurring on the District, openings are not being created that was the ungulates source for forage during the period of heavy timber harvest in the recent past. This continuing lack of forage would continue to suppress ungulate numbers in the project area. Although the level of road decommissioning in the watersheds would improve security for the ungulates, it would not be able to off-set the negative effects of forage reduction from lack of timber harvest. Populations would continue to decline in the future due to the decrease in forage production.

There is a potential risk of large wildfire due to the decrease in the road network. The majority of fires caused by human sources are located in the main recreation areas where dispersed camping is taking place (Personal Communication with Mike Moore, Assistant Fire Management Officer, Clackamas River Ranger District, 9/22/2010). Lightning caused fires however, are the start of most of the Forest's larger fires. A decrease in the road network and the inability to easily reconstruct the road during a fire because the culverts have been removed could slow response times for crews and fire vehicles and could result in larger fires as a result of decommissioning. This could potentially increase habitat for ungulates by creating large amounts of forage.

American Marten & Pileated Woodpecker (Management Indicator Species) – Habitat Characteristics & Existing Condition

The status and condition of management indicator species (MIS) are presumed to represent the status and condition of many other species. This project focuses on certain key species and does not specifically address common species such as bear, bobcats or squirrels except to the extent that they are represented by management indicator species.

The pileated woodpecker was chosen as an MIS because of its need for large snags, large amounts of down woody material, and large defective trees for nesting, roosting and foraging. The pine marten is an indicator species to mature or older forests with dead and defective standing and down woody material. It has a feeding area that utilizes several stand conditions that range from poles to old growth (USDA 1990).

The pileated woodpecker is associated with forest habitats that have large trees, especially snags for nesting and foraging. It will use both coniferous and deciduous trees, but tends to be most common in old-growth Douglas-fir forests in western Oregon (Csuti et al. 1997)

American martens are associated with forested habitats at any elevation, but will wander through openings and even up into alpine areas. They prefer mature forests with closed canopies, but sometimes use openings in forests if there are sufficient downed logs to provide cover (Csuti et al. 1997).

Direct, Indirect and Cumulative Effects for American Marten & Pileated Woodpecker

<u>Alternative 1 (No Action)</u>

No direct effect to the pine marten and pileated woodpecker would occur with the no action alternative. Some parts of the project area and the surrounding area are in a high fire hazard situation and are currently prone to a wildfire outbreak. Maintaining these roads would allow the roads to be used to access areas for fire suppression activities. This alternative would maintain response time to fires that would serve to reduce the size and magnitude of future fires, potentially protecting pine marten and pileated woodpecker habitat.

<u>Alternative 2 (Proposed Action), Alternative 3, and Alternative 4</u>

Ground disturbance would occur primarily in the road prism. There would be no measurable impacts to pine marten and pileated woodpecker habitat. Although there is potential habitat for these species surrounding some of the proposed road decommissioning, it would not be impacted with project implementation. At the most a few snags would need to be felled for safety reasons, the amount of which would have no meaningful effects on these species or its habitat.

Many of these roads proposed for decommissioning are currently open. By blocking vehicular access to these roads, pine marten and pileated woodpecker habitat would be benefited by reducing the level of disturbance and habitat impacts that is associated with open roads (i.e., general road use, OHV use off the road prism, snag poaching, dispersed recreation, etc.)

By decommissioning these roads there would be a reduction of roads that could be used to access areas for fire suppression activities. This alternative could reduce the response time to fires by having less open roads and subsequently serve to increase the size and magnitude of a future fire. This could potentially remove pileated woodpecker and American marten habitat.

The only cumulative effects anticipated from this project would be an increase in snags and down wood that may have been taken out due to wood cutting or to reduce danger trees.

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Land Birds – Habitat Conditions and Existing Condition

Approximately 170 species of birds occur on the Forest. Less than 30 of these species are likely present within the project area during the breeding season. Some species favor habitat with late-successional characteristics while others favor early-successional habitat with large trees. Birds do not use roads as habitat in general, although some species will roost on roads or will gather gravel from the road surface. The gallinaceous birds from the dove family are known to utilize roads for this purpose.

Several migratory bird species occurring on the District have significantly declined over the last two decades, based on Breeding Bird Survey data (Sharp 1992). Of these species, approximately half are snag dependent and insectivorous or birds of prey feeding on forest birds.

Direct, Indirect, and Cumulative Effects for Land Birds

<u>Alternative 1 (No Action)</u>

There would be no change in the habitat for land birds if no roads were decommissioned. Roads are a minor effect to bird species in general. Roads act like gaps in the forest and provide some edge effect. Edge effect can be both beneficial and detrimental to birds. The edge effect can provide improved foraging opportunities and can increase species richness, but it can also introduce an increase in predation and nest parasitism.

<u>Alternative 2 (Proposed Action), Alternative 3, and Alternative 4</u>

Decommissioning of roads would not alter the habitat for migratory birds. There would be no negative effects to species that prefer late-seral habitats. There may be a reduction in areas for birds to gather grit from the road surface, but this is minor. This effect would mostly be to grouse, quail, doves, and pigeons. There are many places for these species to find grit so it is not a limiting factor for these species.

Decommissioning of roads would allow for this habitat to eventually fill in the gap and decrease the edge effect. This may decrease species richness and foraging opportunities for some species, but it would reduce nest parasitism and predation that comes with the edge effect.

The cumulative effects anticipated from this project and other road decommissioning projects would be a reduction in harassment of nesting birds from vehicles and people. For every road decommissioned there would be a potential increase in nest success of those birds utilizing that habitat.

3.6 Botany

Decommissioning roads benefits native vegetation and wildlife habitat by thwarting the spread of invasive nonnative plants. People and vehicles are major vectors for the spread of weeds. Blocking vehicle access to roads or closing roads aids in the prevention and control of invasive plants. The only drawback to road decommissioning is the potential transport and spread of weeds on heavy equipment used to actively decommission a road or the potential spread of weeds to disturbed ground resulting from the mechanical deconstruction of road surfaces (breaking up and removal of pavement), creating growing space for weeds to colonize. Aside from these concerns associated with active road decommissioning, decommissioning roads can be an effective invasive plant prevention and control measure.

Active decommissioning of roads can potentially introduce invasive plants either through transport on equipment or by disturbing ground within the road prism, creating growing space opportunities for invasive plant species. Passively decommissioning roads has less potential for introducing invasive plants, but a greater length of time will be needed for native vegetation to break down and recolonize pavement, gravel surfaces, or compacted ground within road prisms.

Common and Widespread Invasive Plant Species

Many to most of the roadsides on the westside of the Forest are colonized by invasive nonnative plant species. The following (in alphabetical order by common name) are the most common and widespread invasive plant species along roadsides on the westside of the Forest:

- bitter and curly dock (*Rumex obtusifolius, R. crispus*)
- Canada and bull thistle (*Cirsium arvense, C. vulgare*)
- common and English plantain (*Plantago major*, *P. lanceolata*)
- common tansy (*Tanacetum vulgare*)
- dandelion (*Taraxacum officinale*)
- foxglove (*Digitalis purpurea*)
- hairy cat's-ear (*Hypochaeris radicata*)
- oxeye daisy (*Leucanthemum vulgare*)
- Scotch broom (*Cytisus scoparius*)
- St. John's-wort (*Hypericum perforatum*)
- tansy ragwort (*Senecio jacobaea*)

Many ruderal species can quickly colonize disturbed ground and outcompete native species because of their ability to produce prolific seed and to reproduce asexually (vegetatively) from deep-seated root systems, rhizomes (underground stems), stolons (aboveground lateral stems), or root and stem fragments. Red and white clover (*Trifolium pretense* and *T. repens*) are nonnative plant species that are common and widespread along roads on the Forest. They were introduced intentionally in seed mixes in the past to revegetate roadsides. Some introduced species like Scotch broom are now so common, widespread, and abundant in western Washington and Oregon that they are considered *naturalized* (well-established in their introduced range but originating from a different area, region, or continent).

Uncommon Invasive Plant Species

Compared to the taxa listed above, the following invasive nonnative plant species are less common and scattered in distribution on the westside of the Forest:

Armenian (formerly Himalayan) blackberry (*Rubus armeniacus*)
diffuse and spotted knapweed (*Centaurea diffusa*, *C. biebersteinii*)
common hawkweed (*Hieracium lachenalii*)
English ivy (*Hedera helix*)
herb Robert (*Geranium robertianum*)
reed canary grass (*Phalaris arundinacea*)
rush skeletonweed (*Chondrilla juncea*)
shining crane's-bill (*Geranium lucidum*)

[*Note:* This short list is not at all comprehensive and includes only some of the more prominent invasive species occurring on the westside of the Forest. Additionally, it is expected that new invaders (new species) to the Forest will arrive over time and would be added to this list.] These invasive plants are of greater concern because, unlike the species in the first group, they are less common and widespread and, therefore, still controllable and should be treated to prevent their spread when decommissioning roads.

Spotted and diffuse knapweed tend to be confined to roadsides and disturbed sites and not spread into forests on the westside of the Forest, but they produce prolific seed (as much as 1,000 or more seeds per plant) and can infest disturbed areas quickly. For example, Highway 35 and roadsides along Lake Branch Creek on the Hood River RD are infested with spotted and diffuse knapweed. On the westside of the Forest, small populations of knapweed can be found scattered along Highway 26 (from Government Camp to Zigzag) and along Highway 224 (from Estacada south).

Herb Robert and shining crane's-bill not only spread quickly along roads but invade forest edges too. Both species were recently added to the Oregon Department of Agriculture's noxious weed list for the state of Oregon. In western Washington, herb Robert occupies the edges of most highways and roads at low elevations on the Mt. Baker-Snoqualmie National Forest and is out-of-control. At present, populations of herb Robert and shining crane's-bill can be found scattered at numerous locations on the westside of the Forest and are, therefore, reasonably controllable.

Reed canary grass is scattered across the district (along roadsides, rivers, streams, and wetlands) and is difficult to get rid of.

Only one population of *rush skeletonweed* is known on the west side of the Forest. Located along Highway 224 about a mile north of the Timber Lake Job Corps Center, the ¼-acre population was treated with herbicide by the Oregon Department of Agriculture in 2007.

Ecosystem-Altering Invasive Plant Species
The following are ecosystem-altering invasive plant species:

> false brome (*Brachypodium sylvaticum*)
> garlic mustard (*Alliaria petiolata*)
> Japanese, giant, Himalayan, and Bohemian knotweed (*Fallopia* spp.)
> orange, yellow, and common hawkweed (*Hieracium aurantiacum, H. caespitosum, H. lachenalii*)

No *ecosystem-altering* invasive plant species were found during surveys in the project area. These highly invasive species can displace entire native plant communities and alter ecosystem structure and functions, including plant-animal interactions, wildlife habitat, hydrology, nutrient dynamics, belowground processes (e.g., mycorrhizal associations), natural fire regimes, and many other goods and services provided by healthy functioning ecosystems.

False brome currently occupies thousands of acres (at last count some 2,500 acres) on the Willamette National Forest and is now in the Columbia River Gorge, including the National Scenic Area. It invades openings as well as forests and can spread rapidly forming monocultures on the forest floor.

Garlic mustard has spread from the town of Corbett, which appears to be its epicenter, into the Columbia River Gorge. Like false brome, it invades forest understories and, additionally, can disrupt mycorrhizal associations (fungal-plant symbioses) that benefit conifers and many other native plant species (Stinson et al. 2006). It too is capable of forming monocultures on the forest floor. Ample evidence of its ability to overwhelm forest understories exists in hardwood forests in the northeastern and midwestern United States.

For the last eight to nine years, The Nature Conservancy (TNC) has been treating hundreds of *Japanese knotweed* (*Fallopia japonica*) populations that occupy banks and gravel bars along the Sandy River. TNC has also been treating scattered knotweed populations in the Still Creek area in the summer home tracts near Zigzag-Rhododendron. The Oregon Department of Agriculture treated Japanese knotweed populations at and in the vicinity of Timber Lake Job Corps Center in 2008 and will return in 2010 to retreat these populations.

Populations of *orange and yellow hawkweed* are scattered across an estimated thousand acres along Lolo Pass Road and within the Bonneville Power Administration (BPA) powerline corridor on the Zigzag and Hood River RDs, originating from a one-acre population found in the early 1990s (T. Forney, Oregon Dept. of Agriculture, pers. communication). Populations have spread into the western end of the Bull Run watershed and there is a 3-4 acre population of orange hawkweed in the Mt. Hood Wilderness Area (Burnt Lake trail). Scattered populations of *common hawkweed* have recently been found along the 1828 road, which parallels Lolo Pass Road, and along roads in the western portion of the Bull Run watershed.

If any of these taxa are found during surveys of roads proposed for decommissioning in the Sandy and Salmon River watersheds, it is imperative to treat them during road decommissioning since they can spread from roads into upland forest, riparian areas, and meadows. Once established, they are difficult and costly to control, let along eradicate.

Treatment Considerations

Should common and widespread invasive plant species (e.g., Canada and bull thistle, oxeye daisy, Scotch broom, St. John's-wort, tansy ragwort, etc.) found along roads proposed for decommissioning be treated (manually, mechanically, or chemically) as part of the road decommissioning project?

The answer to this central question depends largely on the availability of funding. Funding for treating invasive plants on the Forest currently is limited given the challenge at hand of treating thousands of invaded acres. Title II Payco grants, applied for annually, provide the primary source for funding invasive plant treatments. There is no internal agency funding for westside invasive plant treatments except through challenge cost-share agreements with The Nature Conservancy and Clackamas River Basin Watershed Council. An additional challenge to treating common and widespread invasive plant populations is recruiting and coordinating a work force of contractors and volunteers to conduct treatments. Current treatments on the west side of the Forest target high-priority invasive plant species. Species targeted in 2008-2009 included Armenian (Himalayan) blackberry and English ivy along Highway 224; false brome along FS Road 70 (along the Hot Springs Fork of the Collawash River); Japanese knotweed at Timber Lake Job Corps Center and in the summer home tracts near Zigzag-Rhododendron; orange and yellow hawkweed along Lolo Pass Road and in the Mt. Hood Wilderness Area; rush skeletonweed along Highway 224; and spotted and diffuse knapweed along Highways 26 and 224. Treatments were carried out by partners such as the Oregon Department of Agriculture, The Nature Conservancy, the Oregon Department of Transportation, and the Clackamas River Basin Watershed Council. Major funding and coordination would be required to treat the many populations of common and widespread invasive plant species found across the west side of the Forest, including within the road decommissioning project area.

Manual treatment of common and widespread invasive plant species is complicated by not only limited funding and coordination challenges but the ability of many of these species to reproduce from seed stored in the soil, which can remain viable for many years (up to 75 years for Scotch broom), or to reproduce asexually (vegetatively) from rhizomes, stolons, and plant fragments. Unfortunately, herbicide treatment is often the most (or only) effective way to control these and other invasive plant species. Canada thistle, for example, can reproduce from deep and extensive root systems, including rhizomes, making effective manual treatment difficult. *Solarization* (covering plants with opaque plastic or a geotextile fabric) can be an effective treatment for Canada thistle, but there are thousands of populations of Canada thistle scattered across the Forest. Manual or mechanical removal (uprooting) of Scotch broom can be an effective treatment for this species, but it can also promote sprouting from seeds buried in the soil. Small populations of St. John's-wort and tansy ragwort can be handpulled, if done carefully, but both species are widespread along roadsides, produce abundant seeds that remain viable in the soil for many years (6-10 years for St. John's-wort and up to 15 years for tansy ragwort), and can reproduce from lateral roots (St. John's-wort) or root fragments (tansy ragwort). Therefore, manual control of many of the widespread invasive plant species can be ineffective and may require repeated treatment along hundreds of miles of road for extended years, a Herculean task even with a fully funded treatment program and a highly coordinated workforce of dedicated contractors, paid workers, and volunteers.

Given these daunting challenges, the best way to proceed at present is to target the most threatening invaders: i.e., the less common and widespread (and therefore controllable) species and those with the capacity to alter ecosystems. Once populations of these species are under control (which may take years of treatment), work can move on to other more common and widespread species based on criteria such as degree of invasiveness, number of populations, population size, location, and threat to other resources such as rare plants, wetlands, riparian vegetation, wildlife habitat, timber-production lands, etc.. Invasive plants increase in acreage at an estimated rate of roughly 10% per year on national forest system lands (USDA-Forest Service 1999). Control of invasive plants can be achieved gradually; however, it will require annual funding, a coordinated treatment plan and work force, and dogged persistence.

Special-Status Plants (Region 6 Sensitive species)

Road prisms are disturbed areas and therefore not the most likely habitat for rare botanical species, although there are plenty of exceptions to this rule of thumb: e.g., *Cimicifuga elata* (shrub), *Bridgeoporus nobilissimus* (fungus), and rare epiphytic lichens such as *Usnea longissima*, *Hypogymnia duplicata*, and *Pseudocyphellaria rainierensis*. There are two *B. nobilissimus* sites within 10-15 ft. of paved roads on the Zigzag RD. *U. longissima* is relatively common on the Clackamas River RD and occurs along major roads, including Highway 224. *H. duplicata* has been found along decommissioned roads in the Bull Run watershed on the Zigzag RD. *P. rainierensis* has been found along trails and near decommissioned roads on the Clackamas River and Zigzag RDs. *P. rainierensis* was recently found on a tree along the Hot Springs Fork of the Collawash River adjacent to the false brome site along FS Road 70.

If active road decommissioning (i.e., tearing up the paved road surface) disturbs roadside banks, shoulders, or vegetation (particularly trees), there would be concerns if any special-status species happen to be in close vicinity. If road decommissioning will not disturb roadside banks, shoulders, or vegetation, then there is no concern. Of the species listed above, *U. longissima* is the most likely to occur along roads proposed for decommissioning. This lichen species is easy to identify and can only be confused with *Alectoria sarmentosa*. Neither *U. longissima* nor other special-status plant species were found during surveys conducted for the Upper Clackamas road decommissioning project during the summer of 2008 (W. Wong, pers. communication, 2009).

Summary

The net effect of road decommissioning is a reduction in the risk of invasive plant spread. Closing roads is a good thing for invasive plant management. The subsidiary negative side effects of active road decommissioning are the potential transport of weeds on road decommissioning equipment and the potential introduction or spread of weeds from the breaking up of paved road surfaces, releasing growing space for weeds to colonize.

Invasive (animal and plant) species management is one of the highest priorities for the U.S. Forest Service (FEIS 2005). So a reduction in invasive plant spread associated with road decommissioning is not only a benefit but an agency priority.

1. Closing/decommissioning roads benefits native plant communities and healthy ecosystems since human traffic on roads is the major vector for the spread of invasive plants, including noxious weeds. It makes sense to close/decommission roads from an invasive plant *prevention* standpoint.

2. Common and widespread invasive plant species (e.g., *Canada and bull thistle, oxeye daisy, Scotch broom, St. John's-wort, tansy ragwort,* etc.) may be treated in the future if more funding becomes available, but currently are not high-priority target species. A subset of populations of these species may be worth treating based on their size, vigor, proximity to resources we want to protect (e.g., rare plant sites, wetlands, water bodies, riparian habitat), or other considerations. *Note:* Tansy ragwort is controlled to some extent already by cinnabar moth larvae (an introduced biological control agent) that feed on the plant. But control is patchy. Manual or chemical treatment may be needed to supplement biological control.

3. *Uncommon* invasive plant species (e.g., *Armenian blackberry, herb Robert, spotted and diffuse knapweed,* etc.) should be treated. Early detection and rapid response (EDRR) is the most effective way to handle these species. A few populations of knapweed were found during surveys in the Upper Clackamas road decommissioning project (W. Wong, pers. communication) and have been included as new EDRR sites to be treated by the Oregon Department of Agriculture.

4. *Ecosystem-altering* invasive plant species (e.g., *false brome, garlic mustard, invasive hawkweeds,* and *invasive knotweeds*) should be treated to prevent/control their spread. None were found during road surveys in the Upper Clackamas road decommissioning project (W. Wong, pers. communication).

What other measures should we take to prevent the introduction or spread of invasive plant species during road decommissioning activities? (1) Educate contractors and other workers involved with road decommissioning about invasive plants and stipulate in their contracts that they must clean their vehicles and other equipment (using pressurized water) before entering the Mt. Hood National Forest in order to avoid the potential transport of weeds or weed seed. (2) Assess whether *active* or *passive* vegetation restoration is needed to prevent invasive plants from occupying released growing space resulting from active road decommissioning. Active restoration includes the planting of locally collected native grass seed, tree seedlings, shrubs, or forbs and, if needed, certified weed-free mulch. Mulch application is a good idea to prevent seed and seedlings from drying out and to prevent weed colonization. If locally collected native grass seed is not available, use non-native, non-invasive, non-persistent grasses (e.g., annual ryegrass [*Lolium multiflorum]*, Madsen sterile wheat) with certified weed-free mulch. In some cases, it may be advisable to plant annual ryegrass instead of a native grass species, such as blue wildrye, because the intent is for native plants already in the area to recolonize the disturbed ground. Annual ryegrass will occupy a disturbed site for only a few years whereas blue wildrye will occupy the site for a much longer time period, delaying passive restoration of native species. Additionally, the forest floor of closed-canopy forests tend to be occupied by shade-tolerant tree seedlings, shrubs, and forbs and less so by grasses. In many cases, invasive plants will return if disturbed ground is not *actively restored* (replanted with native species to occupy the released growing space).

Should decommissioned roads be monitored to check for weed growth following decommissioning? Yes, especially if highly invasive non-native plant species are suspected in the area or vicinity and if heavy equipment associated with active road decommissioning may have introduced invasive plants. Monitoring should continue for several years (at least 3-5 years) following road decommissioning since there may be a lag time between completion of road decommissioning activities and invasive plants appearing. Also, new plants can sprout from seed in the soil seed bank for many years, making long-term monitoring all the more important.

The recently completed *FEIS Site-Specific Invasive Plant Treatments for the Mt. Hood National Forest and Columbia River Gorge National Scenic Area* (2008) is a guide to invasive plant treatments for the entire Forest, including roads proposed for decommissioning in the Sandy and Salmon River watersheds. The FEIS is available at the following website: http://www.fs.fed.us/r6/invasiveplant-eis/site-specific/MTH/.

3.7 Vegetation

Most of the roads in the project area were built by timber sale operators to access harvest units. The resulting plantations need to be accessed for vegetation management activities such as tree planting, survival exams, stand exams, precommercial thinning and restoration thinning during the course of their development. Some of these actions can be accomplished by walking on closed or decommissioned roads at additional costs, but restoration thinning may or may not be feasible without reopening the roads. In addition to plantation access, roads are used today for other vegetation related activities such as gathering special forest products (firewood, mushrooms, etc.) and managing insect outbreaks. This section will focus primarily on plantation management.

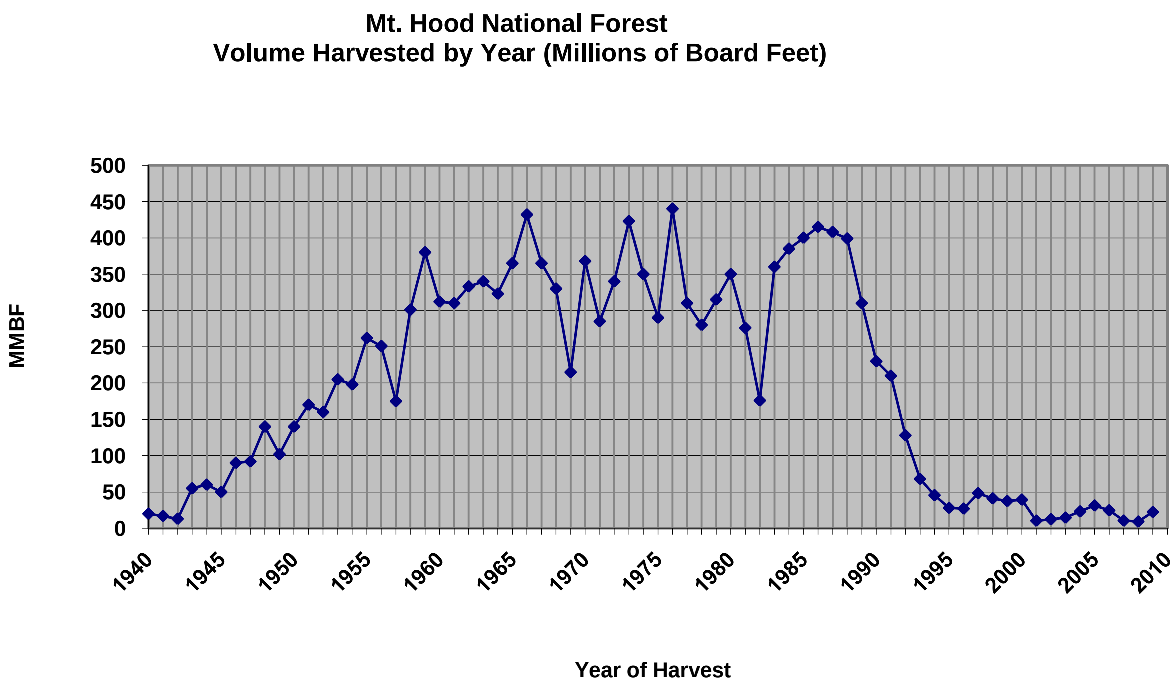
The reasons for thinning vary based on site-specific conditions and land allocations. Recent thinning Environmental Assessments such as Upper Clack Thinning have described in detail the rationale for thinning. In summary:

- Plantations display uniformity of species and dense tree spacing and do not grow well on their own without density management.
- Restoration thinning is needed in plantations in both riparian reserves and late-successional reserves to accelerate the development of mature and late-successional stand conditions.
- Diversity in plantations can be enhanced by variable density thinning that includes skips and gaps.
- The health, growth and wind-firmness are improved by thinning plantations at the appropriate stage of their development.
- Plantation management is a key component of the Forest’s strategy to meet the Northwest Forest Plan goal of maintaining the stability of local and regional economies. There is a need to keep forests healthy and productive to sustainably provide forest products now and in the future. Not only are forest products needed by society, but also the employment created is important to local and regional economies.
- Recent thinning projects have generated sufficient funds to cover the cost of road maintenance, road repairs and stewardship projects (fish and wildlife enhancements).

Public comments often suggest that helicopters can be used to accomplish restoration thinning and that roads are not needed. However, helicopter logging is very expensive given the high cost of jet fuel; costs become prohibitive for yarding distances greater than ½ mile. Helicopter projects may receive no bids and if they do they would not have sufficient value to cover the cost of road repairs/maintenance along haul routes or stewardship projects.

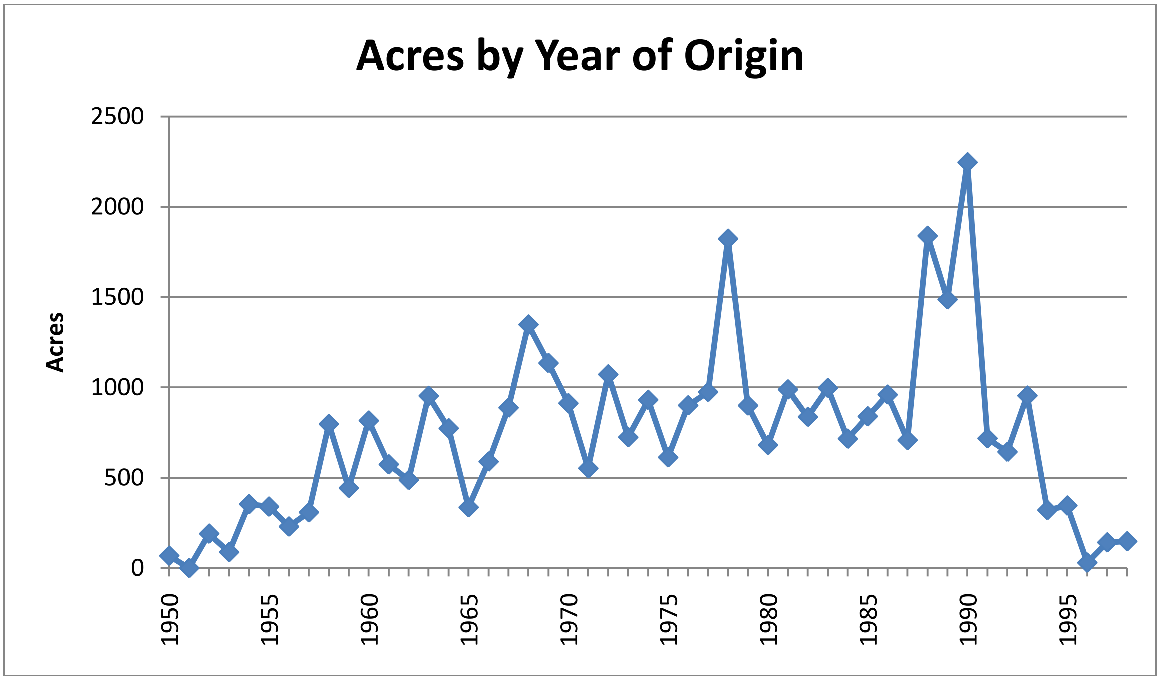
In order to facilitate access to future thinning, alternatives to helicopter use are the development of new roads and reopening of decommissioned roads. These would likely be feasible if the road is relatively short and does not require the installation of large stream-crossing culverts. Any new road construction or a future change to the status of decommissioned roads would require analysis through the NEPA process including public participation and evaluation of environmental effects.

One of the reasons often given for decommissioning roads is that there are insufficient funds available for road maintenance. In the project area, this situation is changing. Most of the roads in the project area were built by timber sale operators to access harvest units. Prior to the 1990s, timber harvest covered both the cost of constructing the current road system and regular maintenance. Since that time however, a major shift to plantation management has occurred. There has been a gap between when large scale old-growth harvesting ended and the time when large numbers of plantations grew old enough to be ready for thinning. The following analysis indicates that there is sufficient value in a sustainable restoration thinning program in the project area to cover the cost of maintaining roads to a standard that both provides safe access and protects resources. The chart below shows the volume harvested on the Mt. Hood National Forest each year (volume data separated by watershed is not available). This volume was generated primarily from clear cut harvest and the plantations that resulted are now ready for thinning or are growing steadily and will be ready for thinning in the next 10 to 30 years.



Existing Condition

The project area, excluding Wilderness, is 95,200 acres of which 35,325 acres are plantations (37% of the land base). The chart below shows plantations in the project area by their year-of-origin. The average quantity of plantations created between 1958 and 1993 is 920 acres for the project area. Recently planned restoration thinning projects covered the oldest plantations. In the future, each year, approximately 920 acres of plantations in the project area will be growing into conditions where thinning is viable. These plantations will require thinning in a timely manner to achieve the resource objectives summarized above. This will continue until at least 2040 or longer depending on the timing of a second thinning or other subsequent management.



This table is a summary of an analysis conducted to predict when plantations in the project area would be ready for thinning. These figures do not include plantations that may be thinned more than once.

Table 3.26. Timing of thinning and acres within the project area.

Timing of Thinning	Acres
First decade	7,722
Second decade	11,366
Third decade	9,581
Fourth decade	5,793
Fifth decade	825
Sixth decade	38
Total	**35,325**

The value of this restoration thinning would not only help maintain roads that access plantations, but would be used to maintain roads that access recreation features such as campgrounds and trailheads as well as roads that continue on to other portions of the Forest.

There are currently 85 miles of roads that have already been decommissioned in the project area within the past 20 years. Approximately 4,000 acres of plantation are no longer accessible by roads due to past decommissioning.

Virtually all of the plantations in the project area display uniformity of species and dense tree spacing and would not grow well on their own without density management. Plantations in riparian reserves and late-successional reserves would be slow to develop mature and late-successional stand conditions. Plantation health, growth and wind-firmness would gradually deteriorate.

The project area contains a mix of land allocations identified in the Forest Plan. With the exception of Wilderness, the land allocations allow and encourage the thinning of plantations. For example, it is encouraged in viewsheds (B2-034), special emphasis watersheds (B6-018), riparian areas (B7-028), earthflows (B8-028), and timber emphasis areas (C1-016). The standards and guidelines of the Northwest Forest Plan encourage the thinning of plantations in late-successional reserves and riparian reserves. Thinning in plantations is also a primary recommendation in the Collawash Watershed Analysis (page 4-5) and the Upper Clackamas Watershed Analysis (page 61).

Environmental Consequences

<u>Alternative 1 (No Action)</u>

Vegetation management activities would continue on 31,325 acres of plantations and other stands that remain accessible. The needs for plantation management would be achieved without having to reassess accessibility. Access for other activities such as sapling thinning and special forest product gathering would not be impeded.

<u>Alternative 2 (Proposed Action)</u>

Approximately 22,358 acres of plantations would lose access, or 62% of the total plantations in the project area. Cumulatively, 4,000 acres of plantations in the project area have already been made inaccessible by past decommissioning. Alternative 2 would result in a landscape where only 26% of the plantations would remain accessible.

It is difficult to predict what portion of this acreage could be feasibly managed by helicopter or by reconstructing roads when stands are ready for thinning. With this alternative, many plantations would be well beyond the feasible reach of helicopter systems.

Plantations that cannot be feasibly thinned would remain at maximum density for many decades until natural processes (mortality, disturbance) opens the canopy enough to allow expansion of crowns and understory response from increased light. Failure to maintain tree spacing while they are young can have consequences lasting the life of the stand (Oliver 1996). If stands are not treated, the overstocked condition would result in trees with reduced vigor, small size, increased mortality, and increased susceptibility to stressors such as insects, diseases and weather. Recent studies have indicated that dense, closed-canopy second growth without legacy trees can result in a period of low structural diversity that can last more than 100 years and can have profound effects on the capacity of the forest to develop biocomplexity in the future (Courtney 2004).

When plantations are not thinned there would be long-term implications for climate change. A detailed discussion of thinning and climate change can be found in recent thinning Environmental Assessments such as Upper Clack Thinning. In summary: no long-lived wood products would be created, no enhanced growth of the residual stand would occur to sequester carbon, and as health declines plantations would have reduced capacity to withstand stresses such as dry summer conditions (Spies 2010).
When plantations are not thinned there would be a reduction in the amount of forest products removed making it difficult to meet the Northwest Forest Plan goal of maintaining the stability of local and regional economies. The need to keep forests healthy and productive to sustainably provide forest products now and in the future would not be met on inaccessible acres. Forest products are needed by society, and the employment created is important to local and regional economies. Alternative 2 would forgo some of the opportunities to meet these needs. It would also reduce the Forest's ability to generate funds to cover the cost of road maintenance, road repairs and stewardship projects such as fish and wildlife enhancements. Alternative 2 would also reduce access for sapling thinning and special forest product gathering. There would be reduced local employment as these activities are curtailed.

These effects are cumulative across the Forest as each increment of decommissioning planning gradually removes access in other watersheds. For example, 106 miles of roads were decommissioned in the Fish Creek watershed and 113 miles have been planned for decommissioning in the Upper Clackamas watershed.

One example of the many roads proposed for decommissioning with this alternative is Road 6330. This road and its tributaries are 11.4 miles long and it accesses 45 plantations varying in age. A total of 1,246 acres of plantation are accessed with 571 acres ready to thin now, 430 acres ready in the second decade, and 245 acres ready in the third decade. Depending on the timing of the decommissioning, there could be many acres of plantations inaccessible for their first thin and all of them would be inaccessible for a second thin. Most of these plantations would not be feasible for helicopter logging due to the extreme distance to the nearest road available for helicopter landings.

<u>Alternative 3</u>

Approximately 9,777 acres of plantations would lose access or 27% of the total plantations in the project area. Approximately 61% of the plantations would remain accessible. Alternative 3 would result in some of the same effects described for Alternative 2 when inaccessible plantations are not thinned. However, Alternative 3 would retain access for a much greater portion of the landscape.

With Alternative 3, Road 6330 would remain open providing access to 1,246 acres of plantations. The plantation thinning along this road would provide approximately $400,000 per decade to maintain this and other roads.

Alternative 4

This alternative falls midway between Alternatives 2 and 3 in terms of access. Access would be lost to approximately 14,546 acres of plantations or 41% of the total plantations in the project area. Approximately 48% of the plantations would remain accessible.

Alternative 4 would result in some of the same effects described for Alternative 2 when inaccessible plantations are not thinned. However, Alternative 4 would retain access for a much greater portion of the landscape.

With Alternative 4, Road 6330 would be decommissioned at mile post 3.8 leaving access to a portion of the plantations (800 acres) along its length.

Comparison of Alternatives

This table shows the value of timber in restoration thinning available each year in the project area to pay for road maintenance and restoration projects.

Table 3.27. Value of timber in restoration thinning available each decade by alternative.

Alternative	First decade	Second decade	Third decade	Fourth decade
Alternative 2	$579,000/year	$422,000/year	$565,000/year	$521,000/year
Alternative 3	$579,000/year	$804,000/year	$1,072,000/year	$928,000/year
Alternative 4	$579,000/year	$753,000/year	$937,000/year	$850,000/year

3.8 Recreation

Introduction

Recreational driving is one of the primary uses of the Forest. Recreational driving can include driving for pleasure and driving to recreational destinations including trailheads, campgrounds, dispersed campsites (undeveloped campsites without facilities), fishing and hunting areas, and collection areas for mushrooms, firewood and other special forest products. There are about 3,107 total miles of roads on the Forest. The proposed decommissioning project primarily would affect smaller spur roads that do not access trailheads, campgrounds and other recreation destinations. Roads or portions of roads that access campgrounds, nearly all trailheads, and other major recreation destinations have not been proposed for closure. Short spur roads generally do not have a recreational use. Occasionally there may be a dispersed campsite along or at the end of one of these spur roads. Longer roads proposed for closure have the potential to affect the more dispersed recreational uses. They are used for accessing hunting and special forest product gathering areas. They may access also access dispersed campsites, stream fishing sites, target shooting areas and viewpoints.

Some of the roads being considered for closure are being used by off-highway vehicles (OHVs), including quads, motorcycles, and snowmobiles. In August 2010, the Forest issued a Record of Decision for the Off-Highway Vehicle Management Plan Final Environmental Impact Statement that designates OHV riding locations. This Record of Decision will restrict non-street legal OHV use on many of the gravel and native surface system and user-created roads and off-road areas that these users may currently access.

Spur roads are occasionally popular spots to dump trash, appliances and building debris, cook methamphetamine, strip cars, and target shoot at trees and dumped structures. These illegal and nefarious uses of some of the spur roads being considered are difficult to prosecute or catch suspects in the act.

Affected Environment

Several specific roads were identified by Forest users commenting on the Proposed Action. They indicated that these roads were important for keeping vehicle access to their hunting grounds. They include Forest Roads 4640, 6321, 6311, 6320-120, 6330, 6341, 6350-160, 7021, 7030, 7040, and 6370 (from its junction with the 6380 up to Ogre Creek). Some suggested that a seasonable closure would be preferable for any major roads that are important for hunting access. It was suggested that the 6320-120 be gated and open August 1 to November 15. They also indicated that the proposal would eliminate vehicle access to some popular hunting campsites including sites along Forest Road 4640 to where it ties in with Road 5710, and along Forest Roads 6330 and 6350-160. There was a comment expressing concern for closing dispersed campsites along Forest Road 6380-125. Lastly, there were comments from snowmobilers that closing Forest Road 4650 would eliminate snowmobilers' ability to get to Forest Road 4670 and access the Graham Pass area. They suggested that Forest Road 4651 be decommissioned instead.

General Effects to Recreation from Road Decommissioning for All Action Alternatives

<u>Trailhead and Trail Access</u>

Of particular concern to recreation users are roads that access trailheads. Roads to campgrounds are generally major roads not considered for closure. In some cases roads that provide more direct access are proposed for closure and Forest users will need to drive farther to access their recreation destination. Roads that access more remote trailheads may be considered for closure. Often these roads are proposed as a "road to trail" project. Roads converted to trails can have adverse affects on the ease of trail maintenance, visual aesthetics and trail length and use.

The Forest has many sections of trails that were once roads accessing a trail, mostly where a section of land was designated as wilderness, thereby closing the road. These roads were usually left to grow in and became a part of the trail. Most of these road/trail sections have trail maintenance issues. Roads are not located on the landscape the same way a trail would be located. Similarly, trails are not located in the same way a road would be placed on the terrain. Where trails would have short dips and climbs to deal with drainage, roads have long steeper climbs that make getting drainage off the trail more challenging. The road ditches can fill in or the flatness of the wider road bed can cause water to channel down the road causing trail erosion. Trail maintenance budgets are already stretched thin to maintain the over 1000 miles of existing trails on the Forest. Adding trail mileage with road conversions increases trail maintenance costs and backlogged trail maintenance needed.

On a "road to trail", most hikers can tell they are walking on a trail along an old road. The clearing is wider, the road bench is still present, and many times the old road surfacing or tire tracks are still visible. Converting roads to trails can lengthen the hike on the original trail making a particular destination longer. This can make it less likely to be used by day hikers when it is too long.

“Road to Trail” Proposals

“Road to trail” has become a popular option when roads are proposed for decommissioning on the Forest. Clarification and extensive site specific analysis is needed for any proposal of a “road to trail”. Just as the Forest is interested in reducing its road mileage, it should also avoid adding more trail mileage without a compelling demonstrated need. What would draw people to use the trail? How many people would use the trail? As stated above, in general roads make for poorly designed trails. When “road to trail” is proposed, most people assume that about ¾ of the “road” will be decommissioned, leaving ¼ of the road to serve as the “trail”. It is important to know what the extent of the road decommissioning will be to assess what type of trail may be left in a “road to trail” proposal. The different road decommissioning options all have different effects as future trails.

When a road is passively decommissioned and converted to a trail, it will resemble a road for a very long time, until vegetation becomes well established. Even then, most users are able to see that they are walking on an old road bed (e.g., Burnt Lake North, Burnt Lake South, and Eagle Creek Trails). If the “road to trail” decommissioning rips up the road bed and digs holes and leaves mounds, and brings in down logs and rocks to make it look more like the surrounding topography trail users will experience something that looks more like a trail over years as vegetation becomes established. The first several hundred feet of what was Forest Road 1825-100 that went between the existing Ramona Falls Trailhead and the upper Ramona Falls Trailhead demonstrates this approach. Trails converted from roads will generally have drainage issues and require more frequent and costly trail maintenance. They will have much wider clearing limits, evidence of the original road bench, long uphill or downhill stretches and much longer sight lines for decades after conversion.

Road decommissioning that restores the natural topography can in the long term make the trail look more inviting and less road like, however the large amount of earth disturbance in the short term is generally more impactful to trail scenery. Usually road decommissioning budgets are not able to pay for this large investment of re-contouring the terrain. Eliminating the road requires new trail tread construction in what is generally loose freshly dug terrain that may have restored steep sideslopes. It cannot really be considered a “road to trail” because the road is being completely eliminated. Constructing new trail tread can make it easier to install trail drainage dips, waterbars, and outsloping that helps with long-term trail maintenance. This benefit can be offset by the fact that the trail must be located within the original road clearing on newly moved earth limiting trail design options for drainage. A trail on a two mile long sustained straight hill climb will be more difficult to maintain than a trail that was designed to climb and drop and work with the natural topography.

Culvert removal associated with a road to trail project is one of the most challenging aspects of road decommissioning with the intent of having a trail after the project. Where culverts are shallow, infrequent, and not crossing a major creek, a trail crossing may be constructed as part of the project. Mid-slope roads on steep side slopes (that are often identified for decommissioning) can have culverts that are buried quite deep on the downhill side with 40 feet of fill or more over them. Digging out that much fill and restoring the stream side slope to 1:1 leaves a relatively large canyon for a trail to cross. The situation is even more problematic when there are multiple crossings in short distances as in the headwaters of a creek. The canyons can overlap each other.

Crossing the drainages in these newly established canyons can require a trail culvert or in many cases a trail bridge. In order to design and install a trail bridge, the exact crossing location must be known to define the span of the crossing. The subsurface conditions where the bridge sills are going must be known. Generally, trail engineers make great effort to locate trail bridges where spans are shortest and where ground is stable to avoid wash outs. In most cases, there are far better locations to put a trail crossing than where the road crossed. Being limited to the existing road prism on freshly re-contoured ground is problematic.

Trails usually approach a bridge headed up stream and going downhill to the crossing. The bridge approaches on a newly re-contoured canyon, must be constructed on the re-contoured side slopes in a limited area (the road prism). Generally it will be nearly impossible to design a trail crossing until after the culverts are pulled and the side slopes re-contoured to know what trail crossing conditions exist (span, etc.). It may also be advisable to wait one to two years before designing and constructing trail bridges to give the re-contoured slopes time to settle and stabilize to the "angle of repose". It also gives the new creek channel time to establish its fall line and location. Delaying trail construction impacts trail users in the short term. Building a trail bridge on freshly contoured side slopes on a creek that is still finding its meanders, may result in the creek washing out the new bridge. Trail bridges are costly structures to construct, maintain and replace and are susceptible to washouts, especially when installed in less than ideal locations. Given very limited trail maintenance budgets, trail managers are concerned about getting additional trail bridges to maintain and replace in the future.

It is therefore very important to analyze all these factors when road decommissioning and conversion to a "road to trail" is being considered as an option. Are parts of the road being completely eliminated? Will the decommissioned road make a satisfactory trail? It may be more desirable for the trail users and the trail managers who must maintain the trail in the long term to construct a new trailhead and build a new connecting trail to the original trailhead. In some cases, it is far better for long-term trail maintenance and trail design objectives to do the necessary planning and design to relocate the trail rather than stay within the original road prism, traversing large canyons, and requiring structures including bridges to cross drainages. The difficulty with this option is that generally road decommissioning will pay for "road to trail" options done as part of the project in the road prism. Finance managers have indicated that road decommissioning funds should not be used to construct alternative connecting trails that do not follow the original road prism. As stated, trail maintenance funds are limited and trail construction funds are usually funneled to trail reconstruction – not new construction of an alternative trail link. Securing those funds on the same timeline as the road decommissioning project can also be difficult.

Off-highway Vehicle Use

Some of the roads being considered for closure are gravel or native surface roads that may currently be used for recreational off-highway vehicle (OHV) driving by quads, motor-cycles and four wheel drive trucks. These vehicles occasionally make new "user trails" off of these roads and go cross-country. Currently, some of this off-road use is legal. The Forest policy in the past has been "open unless posted closed". In August 2010 the Forest issued a Record of Decision for the Off-Highway Vehicle Management Plan Final Environmental Impact Statement that designates OHV riding locations. This Record of Decision will restrict non-street legal

OHV use on many of the gravel and native surface system and user created roads and off-road areas that these users may currently access. None of the drainages being considered in this project are a designated OHV location in the OHV Management EIS. Therefore, roads considered for closure in this project would be closed by the OHV Management EIS.

Access to Hunting Grounds

Several of the roads considered for closures are used for accessing favorite hunting grounds. Many of the hunters scout along the roads, set up camps along or off the road, or access off-road hunting areas. Closing roads affect these users making it more challenging to access their hunting grounds and displacing them from dispersed hunter camps. Reducing the roads may improve wildlife habitat, but make it more difficult for hunters to locate and retrieve game. The use of some of these roads and adjacent areas by vehicles that are not street legal (for example game retrieval by quads) will already be restricted by the OHV Management EIS.

Target Shooting and Illegal Road Uses

Some of the roads considered in this project are roads or landings at the end of the roads that are used for illegal or more dangerous uses including dumping trash, construction materials, hazardous materials, illegal target shooting (where they shoot up old cars, appliances, etc.), car stripping and dumping, manufacturing illegal substances, and other nefarious uses. In these cases, closing these roads can help address some of these problems on a site specific basis. Unfortunately, in many cases, these inappropriate uses move or are just displaced to other open roads rather than being eliminated all together.

Dispersed Road Users

The Forest users that engage in more dispersed activities on these roads are generally not members of organized recreational user groups. That makes it more challenging to make these users aware of what roads are proposed for closure. In many cases, some of these roads may provide “favorite areas” for certain Forest users to fish, hunt wildlife, mushrooms, and other personal uses. It is unknown who uses what areas. The first indication of concern about these areas may well be when the road is decommissioned and these users go up to access the areas.

Effects to Recreation by Alternative

Alternative 1 – No Action

Because the No Action Alternative would not close or decommission any roads, there would be no adverse impacts to current Forest users accessing the Forest for dispersed recreation. Access to dispersed camping sites, fishing holes, wildlife hunting grounds, legitimate target shooting areas, and mushroom, firewood, and other special forest collection sites would not be affected. However, there would be continued adverse impacts in some problem areas that are prone to illegal and more nefarious uses. As mentioned in the Affected Environment section, some of these roads are magnet areas for illegal dumping, target shooting of adjacent trees, appliances and other dumped items, stripping cars, illegal OHV use, and other management problems. These uses would likely continue in the same locations under the No Action alternative.

The OHV Management EIS issued in August, 2010 establishes designated OHV locations. None of the areas identified as designated OHV use in the EIS are located in drainages considered in this project. The effects of implementing the EIS are disclosed in that document. The lack of road closures in the No Action alternative would make it more difficult to prevent illegal OHV use. This would make enforcement of the OHV Management EIS more difficult to implement under the No Action alternative.

Alternative 2 – Proposed Action

The Proposed Action would decommission over 250 miles of roads on the Clackamas River Ranger District. Most of these roads are relatively minor spur roads that were constructed for past timber sales. Some of the longer roads that have been in place for more than ten years have established recreational use areas accessed by these roads, especially where they follow streams and rivers popular for dispersed camping. Some of the roads being proposed for decommissioning access hunting grounds, fishing holes, and special forest product collection areas. Decommissioning these roads under Alternative 2 would require dispersed recreation users to either hike farther in to access these locations, or find other areas to pursue these uses. Alternative 2 would benefit recreation users seeking a larger unroaded setting adjacent to wilderness. In many drainages, nearly all the roads in a large tract would be decommissioned. While evidence of these roads would likely be visible on the landscape for decades, the lack of vehicles and fewer people would give these areas a more primitive setting over time.

Alternative 2 would help address some of the management problems on these roads, although those problems would likely be displaced to other adjacent areas. To the extent that Alternative 2 obliterates roads, it would also help restore larger areas of unroaded areas for hikers wanting larger unroaded areas. Most of the roads would have less than full obliteration due to costs. For that reason, these areas would continue to have evidence of the decommissioned road and look less than “unroaded”. Several areas with proposed road decommissioning have specific issues associated with them including adverse impacts to recreation users or ongoing management issues. Following are some more site specific known recreation use patterns and management issues by area:

- **East Fork Collawash River:** Access to Round Lake, the Round Lake Trail (#656) and the Rhododendron Ridge Trail #564 would be maintained. Road 6370 would be kept open to the Round Lake Trail and closed beyond that. Road 6370 up to Ogre Creek, accesses areas used by hunters and also goes to duck boxes maintained by the Oregon Hunters Association. The closure of Road 6355-120 limits a road that provides mid-trail access to the Rho Ridge Trail.

- **Elk Creek:** The Proposed Action would close Road 6380-125 that accesses a popular area of dispersed recreation sites in an area also known as “The Bridge to Nowhere” along the East Fork of the Collawash River near the Elk Lake Trail #559. Alternative 2 would not affect access to this trailhead.

- **Farm Creek Collawash River:** The 6340 provides access to the trailhead for Bull of the Woods Trail #550. Road 4620 provides access to the Sandstone Trail # 542. Alternative 2 would not change those trailhead accesses. It would close spur roads around the Bull of the Woods Trailhead. Alternative 2 would close nearly five miles of Road 6311 and over three miles of Road 6321 which would affect hunting access in these drainages. Alternative 2 would maintain the decision made in the past Kahuna Environmental Assessment and leave

Road 4620-260 road open to the 4620-180 junction and leave the 4620-280 road open for recreational hunting.

- **Happy Creek Collawash River:** The 6340-140 road provides access to the trailhead for Dickey Creek Trail #553. The last part of the road is now within expanded wilderness, so that section of road must be closed to vehicles. This alternative would convert this road to trail. See the above section on effects of converting the road to trail. The road decommissioning in wilderness would require mechanized equipment and a minimum tool analysis would need to be done to assess alternatives and effects to wilderness. Another short spur 6340-140-032 that is located within wilderness would also be decommissioned. Several other spur roads are adjacent to the expanded Bull of the Woods Wilderness and would also be decommissioned.

- **Lower Hot Springs Collawash:** Alternative 2 would decommission nearly six miles of Road 6330 and nearly nine miles of Road 6341. Closure of these 15 miles of roads would restrict access to a large area of dispersed recreation sites and hunting grounds. This alternative would decommission all the roads in a very large part of this drainage. It would leave access to the Pansy Creek Trailhead #551 along Road 6341. The trailhead for this trail is along the road which parallels the wilderness boundary. There is additional parking for the trailhead just beyond the culvert where the road crosses Pansy Creek. The road would be closed beyond this trailhead parking and turnaround area. This alternative would maintain access to Sandstone Trail # 543.

- **Nohorn Creek:** The Proposed Action would decommission nearly all roads in a ten square mile area around Nohorn Creek, Skin Creek and Hugh Creek including 5.5 miles of Road 7030 and nearly four miles of Road 7040 and 7040-120. These roads were identified by hunters and dispersed recreationists as important use areas.

- **Pot Creek:** Alternative 2 would close over two miles of Road 4640 as well as 4650 from its junction with Road 46 and Road 4650-120 north of the powerline. This part of the 4650 road parallels the south side of the Clackamas River and would affect access to dispersed sites and recreation uses along the river. Closure of Road 4650 in this section would also extend the access to the Burnt Granite Trail #595 Trailhead for those coming from Road 46 by over nine miles as they would now need to travel Road 46 to Road 4670 to Road 4650 from the south.

Alternative 3

Alternative 3 would decommission about 130 miles of roads in on the Clackamas River Ranger District. Most of the long access roads would not be decommissioned under this alternative. Most of the short spur roads identified in the Proposed Action would also be decommissioned in Alternative 3. The effects to recreation resources of this alternative would be fewer closures of dispersed recreation campsites, hunting areas and other vehicle based recreation. Because far fewer roads would be decommissioned in this alternative, there would be fewer large tracts that would have more “unroaded” recreation opportunities. Where roads are proposed for decommissioning in both alternatives, effects of implementing Alternative 3 are captured in the effects described in Alternative 2. Differences in the effects in Alternative 3 are listed below by specific area:

- **East Fork Collawash River:** Alternative 3 would leave Road 6370 open including access to Ogre Creek that is used by hunters and to access duck boxes. Access to Round Lake, the Round Lake Trail (#656) and the Rhododendron Ridge Trail #564 would be maintained.

- **Elk Creek:** Similar to the Proposed Action, Alternative 3 would close Road 6380-125 that accesses a popular area of dispersed recreation sites in an area also known as "The Bridge to Nowhere" along the East Fork of the Collawash River near the Elk Lake Trail #559. Alternative 3 would not affect access to this trailhead.

- **Farm Creek Collawash River:** Alternative 3 would leave Roads 6311 and 6321 that were identified by hunters, open for recreational use.

- **Happy Creek Collawash River:** Alternative 3 would not close the 6350-160 and 6380-130 roads, which are two of the longer roads closed in the Proposed Action. The 6340-140 road provides access to the trailhead for Dickey Creek Trail #553. The last part of the road is now within expanded wilderness, so that section of road must be closed to vehicles. Alternative 3 would construct an alternative access trail off of the 6340-150/160 spur road. This trail would provide more of a wilderness setting for the Dickey Creek Trail.

- **Lower Hot Springs Collawash:** Alternative 3 would leave nearly six miles of Road 6330 and nearly nine miles of Road 6341 open to the public for dispersed recreation. Alternative 3 would leave access to trails unchanged.

- **Nohorn Creek:** Alternative 3 would leave the nearly 10 miles of road around Nohorn, Skin and Hugh Creeks accessible to hunters and dispersed recreationists.

- **Pot Creek:** Most of the roads closures in Alternative 3 are the same as the Proposed Action including the closure of Road 4650 that would add another nine miles of road travel for hikers accessing the Burnt Granite Trail #595.

<u>Alternative 4</u>

Alternative 4 would decommission about 170 miles of road on the Clackamas River Ranger District. Most of the effects of implementing Alternative 4 are captured in the effects described in Alternatives 2 and 3 above. Alternative 4 would decommission fewer roads than Alternative 2, and decommission more roads than Alternative 3. Differences in the effects in Alternative 4 are listed below by specific area. Alternative 4 would have the same effects as Alternative 3 as far as access to the Dickey Creek Trail #553.

- **East Fork Collawash River and Elk Lake Creek:** The effects of Alternative 4 in the East Fork of the Collawash and Elk Lake Creek drainages are nearly identical to Alternative 2.

- **Farm Creek Collawash River:** Alternative 4 would decommission approximately the last third of Roads 6311 and 6321.

- **Happy Creek Collawash River:** One of the major differences between the Proposed Action is that Alternative 4 would not decommission 6350-160. Alternative 4 would construct the new trail to the Dickey Creek Trail and decommission the trailhead and access road similar to what is proposed in Alternative 3.

- **Lower Hot Springs Collawash:** Alternative 4 would decommission the last 2/3 of Road 6341 past the Pansy Creek Trailhead. It would decommission the last 1/3 of the 6330 road as well as both Roads 160 and 170 spurs off of that road. It would not decommission the 7010-160 spur.

- **Nohorn Creek:** Alternative 4 would decommission only the last section of the 7010 road and only the 7020-120 road along the east side of Hugh Creek. Most of the effects in Alternative are more similar to Alternative 3 than Alternative 2.

- **Pot Creek:** The effects of Alternative 4 in Pot Creek drainage are more similar to Alternative 2 than Alternative 3. Most of the same roads would be decommissioned.

3.9 Heritage Resources

The National Historic Preservation Act and the National Environmental Protection Act both require consideration be given to the potential effect of federal undertakings on historic resources, (including historic and prehistoric cultural resource sites). The guidelines for assessing effects and for consultation are provided in 36 CFR 800. To implement these guidelines, in 2004, Region 6 of the Forest Service entered a Programmatic Agreement (PA) with the Oregon State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation (ACHP). In accordance with this agreement, the proposed activities were considered on a case-by-case basis and separated into one of two categories: 1) Activities considered to have little or no potential to affect historic properties and are excluded from review; and 2) Activities requiring a survey or inspection.

Environmental Effects

Alternative 1 – No Action

All of the roads considered for analysis would remain in their existing condition under this alternative. Heritage resources would only be affected by decay and other natural forces that are already occurring. This alternative would have no effect on heritage resources.

Alternative 2 – Proposed Action

In accordance with the 2004 agreement between Region 6 of the Forest Service, Oregon State Historic Presentation and the Advisory Council on Historic Preservation, the projects have limited potential to affect archaeological properties (Stipulation III.b(5); *Road decommissioning including ripping, culvert removal, out sloping, water barring, stabilization (following analysis) potentially unstable fills, and seeding and planting native vegetation, and mulching, if needed.*) and is exempt from case-by-case review in accordance with the 2004 Programmatic Agreement. However, activities occurring within native surfaced roads or outside of previously disturbed ground have some potential to affect archaeological properties and require inspection surveys.

The proposed projects were separated into activities for which no survey is required, and activities requiring surveys. If previous surveys were determined to comply with the 2004 agreement, a resurvey of the area is not required.

Actions not requiring surveys include road decommissioning activities within areas defined as having a low potential for the presence of archaeological properties, passive decommissioning consisting of barricades and natural revegetation, and activities occurring within roads with thick aggregate surfaces. Actions requiring surveys include road decommissioning activities within native surfaced roads, road decommissioning activities within or near previously documented archaeological sites, and culvert removals where heavy machinery may enter undisturbed ground. All native surfaced roads situated in areas with a high likelihood for the presence of archaeological sites scheduled for passive decommissioning would have the first 300 feet actively disturbed and also require surveys.

Due to wilderness expansion and an active earthflow area approximately ½ mile of 6340140 was placed into wilderness status. It is proposed under Alternative 2 to construct approximately ½ mile of trail to connect 6340160 to the existing Dickey Creek Trailhead #553 at the end of the 6340140 road. A heritage survey must be completed on this new proposed section of trail before implementation.

For this particular project, it was determined that surveys or inspections were required for culvert locations situated in areas with a high likelihood for the presence of archaeological sites, and all native roads scheduled for active or passive decommissioning which are also situated in areas with a high likelihood for the presence of archaeological sites. These roads consist of Forest Roads 4600043,4600044, 4600045, 4600046, 4600300, 4620021, 4620026, 4620038, 4620260, 4620270, 4620280, 4620290, 4620340, 4620360, 4640021, 4640025, 4640150, 4640157, 4640163, 4640170, 4640173, 4650011, 4650012, 4650013, 4650014, 4650015, 4650018, 4650021, 4650022, 4650023, 4650024, 4650025, 4650026, 4650111, 4650120, 4650150, 4651011, 4660011, 4660013, 4660014, 4660016, 4660120, 4660130, 4661011, 4661012, 4661013, 4661019, 4661020, 4661031, 4661120, 4661164, 4670014, 4670150, 4670160, 4670165, 5710020, 5710029, 5710130, 5710148, 5710160, 5710161, 5710190, 5720015, 5720016, 5720018, 5720020, 5720021, 5720023, 5720024, 5720039, 5720185, 5720188, 5720190, 5720200, 5730120, 5731013, 5731014, 5731015, 5731016, 5731116, 5731120, 5732016, 6300016, 6300120, 6300130, 6300140, 6300150, 6300173, 6300175, 6300176, 6300180, 6300190, 6310016, 6310018, 6310019, 6310020, 6310021, 6310022, 6310025, 6310028, 6310029, 6310030, 6310031, 6310037, 6310120, 6310125, 6310140, 6310150, 6310165, 6310172, 6310173, 6310178, 6310180, 6310182, 6310190, 6310200, 6310202, 6310203, 6310204, 6310206, 6310210, 6310230, 6310240, 6310248, 6310256, 6310260, 6311011, 6311150, 6320014, 6320016, 6320018, 6320023, 6320024, 6320027, 6320029, 6320123, 6321014, 6321015, 6321017, 6321150, 6322011, 6322012, 6322013, 6322014, 6322122, 633011, 6330013, 6330014, 6330017, 6330019, 6330160, 6330170, 6330195, 6330200, 6330240, 6340015, 6340017, 6340019, 6340021, 6340024, 6340026, 6340030, 6340031, 6340032, 6340033, 6340140, 6340150, 6340160, 6340164, 6340300, 6340310, 6340320, 6340330, 6340340, 6341011, 6341012, 6350029, 6350230, 6350231, 6355018, 6355019, 6370215, 6380125, 7010013, 7010014, 7010017, 7010025, 7010127, 7010134, 7010210, 7015016, 7015017, 7015018, 7020017, 7020020, 7020024, 7020170, 7021012, and

7040121. A total of 86.82 miles were surveyed (160.18 acres). All surveyed roads proved negative for the presence of archaeological properties with the exception of the following: 6300120 (site 665NA242), and 6310022 (665SN243).

However, there are three new and 13 previously documented archaeological properties on or near roads 4600043, 4600046, 4620340, 4620360, 4640157, 4650111, 6310022, 6310120, 6300140, 6340320, 6380125, and 7020170 scheduled for decommissioning, which are discussed below:

- Archaeological site 35CL210 (663NA210) was found to lie within the road prism of 4600043. This site area and road are now within the boundary of the new Wilderness and the site be affected by the decommissioning of the road. Mitigation measures are 1) Road entrance closure only, or 2) complete site testing to determine site boundary, depth and eligibility so decommissioning can be implemented on the road south of the site boundary with an entrance closure. No heavy equipment will be allowed to utilize the road until site testing is completed.

- Archaeological isolate 663SN286 was found to lie outside of any area of potential effect on 4600046. No additional measures are required concerning this archaeological property.

- Archaeological site 665NA08 was found during the construction of 4620340. Testing of the site area in 1978 determined the site was a low density lithic scatter that was located within the road prism and within the existing clear cut to the west. Mitigation measures are 1) monitoring the project during implementation or 2) road entrance closure only.

- Archaeological site 35CL18 (665NA10) was found to be located within the clearcut harvest unit to the north and southeast of the 4620360 road. Mitigations are to 1) monitor the road decommissioning during project implementation or 2) road entrance closure only.

- Archaeological site 663NA225 was found to be located within a dispersed camping site of the east of 4640157. Decommission the road leading to the disperse camp site is outside the scope of this project and is not approved by heritage resources for any type of ground disturbance. No additional protective measures are required concerning this site.

- Archaeological site 663NA60 was found to be located near the end of the 4650111 road. Road entrance closure is recommended for this road and no additional protective measures are required concerning this site.

- Archaeological site 663EA133 was found to be located along the 6300120 road and was found to lie outside of any area of potential effect. No additional measures are required concerning this archaeological property.

- New archaeological site 665NA242 was found to lie within and near the end of road 6300120. Mitigation measures are to decommission road 6300120 to the lower bench dispersed site approximately 300 feet to the west. No ground disturbing activity is allowed beyond the lower bench area.

- Archaeological site 35CL105 (663NA74) was found to lie outside any area of potential effect on the 6300140. No additional measures are required concerning this archaeological property.

- New archaeological isolate was found to lie within the road prism of 6310022. Testing within the isolate site area must be completed to determine if it is a true isolate of a site. If testing finds the road to be a true isolate than no additional protective measures are required concerning this isolate. If testing determines the area to be a pre-contact site then additional measure will be required.

- Archaeological site 665EA07 was found to lie outside any area of potential effect on the 6340300. No additional measures are required concerning this archaeological property.

- Archaeological site 35CL21 (665NA04) was found to lie outside any area of potential effect on the 6340320. No additional measures are required concerning this archaeological property.

- Archaeological site 35CL22 (665NA11) was found to lie outside any area of potential effect on the 6340320. No additional measures are required concerning this archaeological property.

- Archaeological site 35CL263 (663NA326) was found to lie within and near road 6380125. The mitigation measure for this site area is to close the road at the entrance. No ground disturbing activities are approved for this site area.

- Archaeological site 665NA142 was found to lie within and near road 7020170. Mitigation measures consist of 1) begin road decommissioning ¼ mile east of the 7020, 2) entrance closure only, and 3) monitoring during project implementation. No ground disturbing activities are approved for the first ¼ mile of the 7020170 road.

- New archaeological site 665NA244 was found to lie outside any area of potential effect on the 7020. No additional measures are required concerning this archaeological property.

In the event that archaeological properties are located during decommissioning activities, all work in the vicinity of the find will cease and a District or Forest archaeologist will be contacted.

Therefore, the proposed project may proceed as planned with no effect to heritage resources.

<u>Alternatives 3</u>

The anticipated impacts to heritage resources would remain the same under this alternative as they do for Alternative 2. With the recommended mitigation measures (as stated above and in the *Project Design Criteria* section), Alternatives 3 would have no effect to heritage resources.

<u>Alternatives 4</u>

The anticipated impacts to heritage resources would remain the same under this alternative as they do for Alternative 2. With the recommended mitigation measures (as stated above and in the *Project Design Criteria* section of the Heritage Report), Alternatives 4 would have no effect to heritage resources.

3.10 Transportation

The road system on the Forest has been developed since before the establishment of the Forest. The system steadily grew from approximately 1,000 miles in the 1950's to its peak of approximately 3,850 miles in early 1990's. Currently, there are approximately 3,107 miles of roads on the Forest. This project analyzes approximately 440 miles of roads, which represents 14 percent of the total road system on the Forest.

A majority of the Forest's roads were constructed to support decades of timber harvesting and were paid for largely through timber sale receipts. Road maintenance was funded largely by timber sales and congressional appropriations. However, as timber harvesting has been reduced from 370 million board feet in 1990 to about 25 million board feet today, road maintenance funding has been reduced as well. While reduced timber traffic has reduced maintenance needs, the maintenance needs associated with recreation and weather have not decreased. With the continued deterioration of the Forest's transportation system coupled with diminished finances, we have been forced to make tough administrative decisions to reduce maintenance activities.

In January 2001, the Forest Service issued interim administrative directives requiring that all road management activities, including construction, reconstruction, or obliteration, must be preceded by a roads analysis that identifies the need for a road and emphasizes a minimum road system. The Mt. Hood National Forest *Roads Analysis* (2003) addresses both the access benefits and ecological costs of road-associated effects, gives priority to reconstructing and maintaining needed roads and decommissioning unneeded roads, or, where appropriate, converting them to less costly and more environmentally beneficial other uses. This process is outlined in Forest Service Manual 7700. Responsible Officials are directed to use a Roads Analysis process to ensure that road management decisions are based on identification and consideration of social and ecological effects. The objective is to manage the Forest transportation system to provide user safety, convenience, and efficiency of operations in an environmentally responsible manner and to achieve road related ecosystem restoration within the limits of current or likely funding levels. This analysis incorporates by reference the information found in the Forest's *Roads Analysis*.

The Forest Plan Access and Travel Management Guide (Appendix C of Forest Plan) provides broad direction for travel management of the transportation system and provides general Forest guidelines for preparation and implementation of travel management plans.

Road Maintenance Methods

Road maintenance is defined as the upkeep of the entire Forest transportation facility including surface and shoulders parking and side areas, structures, and such traffic control devises as are necessary for its safe and efficient utilization. Road maintenance excludes activities that would increase its capacity or upgrading it to serve a different purpose from originally intended. Maintenance includes work needed to meet laws, regulations, codes and other legal policies as long as the original intent or purpose of the road is not changed. A road is considered to be fully maintained when the maintenance activities are completed that leaves the road in a condition that meets the criteria as stated by its Road Management Objectives (RMO).

All Forest system roads are assigned maintenance levels, which describe in general terms the type of traffic that uses each road and the level of maintenance intended for the road. Maintenance levels 1 through 5 are defined in the Forest Service Handbook 7709.59, Chapter 62 (Transportation System Maintenance) and included below.

Maintenance Levels

- Level 1: Assigned to roads of intermittent service during the period that they are closed to vehicular traffic. Roads receiving level 1 maintenance may be of any type, class, or construction standard, and may be managed at any other maintenance level during the time they are open for traffic. However, while being maintained at level 1, they are closed to vehicular traffic, but may be open and suitable for non-motorized uses.
- Level 2: Assigned to roads open for use by high-clearance vehicles. Passenger car traffic is not considered.
- Level 3: Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities.
- Level 4: Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double lane and dust abated or paved.
- Level 5: Assigned to roads that provide a high degree of user comfort and convenience. These roads are normally double lane, paved facilities.

A summary of the existing road system by maintenance level for both the current Forest road system and roads within the project are is shown below:

Table 3.28. Maintenance levels for the Forest and project area.

Maintenance Level	Surfacing Type	Total Miles on the Forest	Total Miles within this Project Area
1	All surface types (native, aggregate, or pavement)	446	84.9
2	All surface types (native, aggregate, or pavement)	2,296	276.8
3	All surface types (native, aggregate, or pavement)	220	16.25
4	All surface types (native, aggregate, or pavement)	82	0.00
5	All surface types (native, aggregate, or pavement)	63	23.8
TOTAL		**3,107**	**439.9**

Road Maintenance Costs

Costs associated with road maintenance are generally grouped into four cost categories:

1. Surfacing costs, which includes the costs associated with repairing the road surface;
2. Road prism costs, which includes the costs associated with repairing road damage caused by such things as minor earthen slides and earthen slumps within the roadbed;
3. Safety costs, which includes costs related to items such as sign repair/replacement, brushing, improving turnouts and road widening; and,
4. Drainage costs, which includes items such as repairing or adding culverts, cleaning plugged or partially culverts and cleaning plugged or partially plugged roadside ditches.

These four cost categories help managers identify and classify the type of maintenance needed for a specific road identified for maintenance. Depending on the particular condition of each road the required annual maintenance costs may include items in one or more categories. For annual road maintenance planning and budgeting purposes, roads are inspected and the required maintenance items identified. Annual maintenance costs can then be calculated, priority roads identified and maintenance work programmed for completion.

The Forest's *Roads Analysis* contains a discussion of average maintenance costs for maintenance and decommissioning on pages 18-19 and 40-42. In order to be consistent with the *Roads Analysis* and previous EAs that used these costs, the average unit costs used in the *Roads Analysis* are used in this analysis. A summary of the average maintenance costs per mile and surfacing type is given in the table below. The maintenance cost can be calculated by multiplying the number of miles by the average annual maintenance cost per mile of road. For the purposes of this analysis it is assumed that the average annual maintenance costs include the costs required to meet all four cost categories as described above to meet the roads annual maintenance needs.

Table 3.29. Average maintenance costs per mile based on maintenance level.

Maintenance Level	Surfacing Type	Average annual maintenance cost per mile
1	All surface types (native, aggregate or pavement)	$50
2	All surface types (native, aggregate or pavement)	$410
3	All surface types (native, aggregate or pavement)	$2,100
4	Native or Aggregate	$3,980
5	Asphalt or other Pavement	$3,980

With the number of road miles known by surfacing type and maintenance level, along with average annual maintenance costs, the total cost for each type of road can be estimated. A summary of these costs are contained below in the table below.

Table 3.30. Estimated annual maintenance costs by maintenance level.

Maintenance Level	Surfacing Type	Total Miles on the Forest	Average Annual Maintenance Cost per Mile	Estimated Annual Maintenance Cost
1	All surface types (Native, Aggregate or Pavement)	446	$50	$22,300
2	All surface types (Native, Aggregate or Pavement)	2,296	$410	$941,360
3	All surface types (Native, Aggregate or Pavement)	220	$2,100	$462,000
4	All surface types (Native, Aggregate or Pavement)	82	$3,980	$326,360
5	All surface types (Native, Aggregate or Pavement)	63	$3,980	$250,740
TOTAL		**3,107**	**n/a**	**$2,002,760**

Road Maintenance Budgets

As stated earlier, the funds received and used to perform annual maintenance activities are lower than the need to fully fund the annual maintenance needs of the Forest's road system. The table below shows a summary of the appropriated funds received to support the road management program on the Forest.

Table 3.31. Summary of appropriated funds for road management.

Fiscal Year	Annual CMRD Budget
1995	$1,783,000
1996	$2,350,000
1997	$4,600,000
1998	$2,045,000
1999	$1,806,000
2000	$1,891,000
2001	$2,266,000
2002	$1,749,000
2003	$3,169,000
2004	$1,456,000
2005	$1,938,000
2006	$613,574
2007	$1,449,500
2008	$1,332,036
2009	$1,153,000
2010*	$3,507,000

*This amount also includes one-time funding of $2,381,000 from American Recovery and Restoration Act Funds and $65,000 in Legacy Roads Funds in addition to CMRD Funds.

As shown in the table above, road funding generally varies from year to year. The budget is inadequate for both routine and deferred road maintenance. The result of current funding levels and the inability to perform routine annual maintenance is the slow deterioration of the road system due to the effects of deferred maintenance.

The Forest Service does, however, have cooperative road maintenance agreements with various counties and local road agencies, including the City of Portland, which has maintenance responsibility for approximately 128.7 miles of roads within the Bull Run Watershed. Under these agreements, the Forest can do maintenance on cooperating agencies' roads and the cooperating agencies may perform maintenance on the Forest Service road system. These collaborative efforts allow the agencies to more efficiently complete their work, but they do not add miles of maintenance the way in which the volunteer trail maintenance organizations do.

Road Decommissioning Methods

In general, road decommissioning methods are considered either passive or active. The decision to decommission a road by either method is dependent on several factors including: the existing physical condition of the road, the risk posed by the road to terrestrial wildlife, and the risk the road presents to aquatic resources. For consistency with the *Roads Analysis*, risks to both terrestrial and aquatic resources are ranked on a 2 through 10 point scale with 10 being a high risk and 2 being a low risk. Generally, roads identified as having lower risks are considered for passive methods and roads identified as having higher risks are considered for active methods.

Passive decommissioning methods generally consist of doing minimal work to eliminate entrance opportunities by vehicles to an inactive road. These methods are typically appropriate for roads that have not been actively used for some time, vegetation has naturally overgrown the roadbed, and natural drainage patterns are functioning at a high level. Active decommissioning efforts on this type of roads are not economically justifiable and the environmental effects of the active decommissioning efforts would likely cause more impact than the long-term impacts from leaving the road as is. An example of a passively closed road where natural vegetation has re-established itself is shown in the photo below. In this case, a naturally fallen tree helps serve as a barrier to vehicles, but a more substantial vehicle barrier exists at the connection with a connector road to provide a more effective deterrence to vehicles entry. Also, in this case the road database has been updated to remove this road from our active system.

Photo of a passively decommissioned road on the Forest.

Active decommissioning methods generally include actions utilizing mechanized construction equipment to physically stabilize, restore and allow for revegetation of the roadbed. Mechanized construction equipment might include excavators, backhoes and truck mounted loaders. In order to re-establish roadbeds for vegetation establishment, decompaction techniques would be implemented. These decompaction efforts might include the complete disturbance of the entire width of the roadway (Full Width Decompaction) for up to 12" depth. This includes "pavement ripping" on roads where asphalt pavements exist. The purpose of pavement ripping and other decompaction efforts are: 1) to break-up of the impervious surface by physical disturbance and root action; and 2) to revegetate with native species, contributing litter, and seed to improve the site for vegetation establishment. The asphalt layer (or gravel surfacing) on Forest Roads is typically 4-6" in depth on average. The asphalt would be broken up with an excavator and spread out evenly over the road surface, being careful to keep the broken asphalt on the road surface and out of ditches, waterbars, and streams. Another type of decompaction method is partial area decompaction. This method involves removal of pavement pieces about 3'x 3' on wheel treads spaced about every 15' and replacement with nearby vegetation. Areas would be decompacted down to mineral soil and existing vegetation would be planted when available.

These active efforts also strive to re-establish natural (pre-road construction) drainage patterns by removal of culverts and other drainage devices including bridges where necessary, removal of deep fills originally needed for installation of deep-fill culverts and stabilization of resultant slopes. In some cases these efforts also include removing unstable fills and pulling back road shoulders in hill-side construction areas where cut/fill techniques were used to balance cuts and fills in the immediate area during construction. The intent in this case is not to fully restore natural (pre-road construction) contours and slopes, but rather to stabilize unstable fills. The most intensive (and expensive) active method to decommission a road is by complete elimination of the roadbed and re-establishing natural (pre-road construction) contours and slopes. This method is typically called "re-contouring" and is employed on hill-side construction areas where cut/fill techniques were used to balance cuts and fills in the immediate area during construction. But unlike efforts that just pull-back fills to stabilize unstable fills, the intent is to fully remove the entire presence of the roadbed.

Decommissioned Stream Crossing: Removal of culverts and bridges at stream crossings is meant to restore the stream channel and banks to original pre-road (natural) contours as much as possible. The removed material would be carefully placed at cut-slopes or on the road surface beyond the natural channel slope at a less than 2 to 1 slope angle. Stream channel width would be at least 110% of “bankfull” width as measured above the stream crossing. Stream banks would be constructed at a maximum of 1.5 to 1 slope angle (66% slope). All fill materials would be tamped by the bucket of the excavator to reduce settling. Woody debris (which might be removed to access the area) would be saved and scattered on the disturbed areas parallel to the slope in order to serve as: contour barriers to surface soil movement; as a source of large woody debris to help reestablish vegetation; and as a means to reduce fuels hazards. The debris would generally be one layer thick and spaced to allow foot travel along roads. *Additionally, b*oulder weirs (upstream U’s) would be constructed in most perennial stream channels. The purpose of the weirs is to decrease stream bed and bank erosion by keeping the flow of the stream in the center of the channel.

Bridge Removal: Log stringer bridges on log crib abutments with wooden plank deck overtopped with asphalt pavement would be removed as part of the decommissioning associated with the proposed action. Prior to removal of the bridge, a sheet plastic cover or similar covering would be placed underneath the bridge to prevent falling debris from entering the water and streambed. Turbidity monitoring would occur before, during, and after the project at locations above and below the project. An increase of 10 NTU's (Nephlometric Turbidity Units) below the project area would cause work to stop and the operator would need to take remedial measures to clean the stream and prevent entry of soils into the stream. Also, in the event that chemically treated wood materials are found within the bridge structure, then those materials would be removed and disposed of in accordance with state standards.

The pavement would be removed by a loader and bucket or similar equipment and end hauled to a local disposal site outside of the Riparian Reserve. The decking would be removed to a disposal site for later burning during the rainy season. The log stringers would be cut into two pieces and yarded from the each end of the bridge. The log cribs would be removed and the accompanying fills pulled back and end hauled to a disposal location where the spoils would be spread and revegetated. The exposed stream banks would be mulched with weed-free ryegrass or wheat straw, seeded with a native grass seed mix, and replanted with a diversity of woody species present in the immediate vicinity.

Erosion Control with Seed and Mulch: Following soil disturbing activities, the disturbed areas would be seeded with a native seed mix or annual ryegrass and mulched with a weed-free annual ryegrass or wheat straw. Other materials may be used for mulching if they provide equivalent or better stabilization from erosion and protection from introducing non-native species. Attempts would be made to seed disturbed areas during conditions favorable for germination. When possible, plant materials would be saved and stockpiled from the areas of excavation and replanted on the disturbed areas. Native plants may also be transplanted to openings created in the wheel tread portion of the pavement.

In summary, active decommissioning methods include ten primary forms as summarized in Table 3.32.

Table 3.32. Road decommissioning techniques.

Decommissioning Method		Descriptor	Treatment Name and Description
Passive	Active		
X		P1	Road has not been used in the recent past, vegetation has naturally overgrown the roadbed and natural drainage patterns are functioning at a high level.
	X	A1	Active Entrance Treatment – complete disturbance (de-compaction) of the entire width of the roadway for up to 12” depth by mechanical construction equipment. (This includes commonly describe techniques such as “Pavement Ripping” where asphalt pavement exists.) This de-compaction effort is generally completed on the initial 1/8 mile (660 ft.) of road from where it abuts to an open connecting road. This method would also include the removal of minor culverts within the initial 1/8 mile if they exist. See Photo below for example of de-compaction effort.
	X	A2	Full Width Decompaction – complete disturbance (de-compaction) of the entire width of the roadway for up to 12” depth by mechanical construction equipment. (This includes commonly describe techniques such as “Pavement Ripping” where asphalt pavement exists.)
	X	A3	Partial Area Decompaction (Craters) – localized, relatively small (approx 3’ x 3’ wide) patterned de-compacted zones (known as “craters”) established by mechanical construction equipment in the roadbed.
	X	A4	Minor Drainage Improvements – generally include the construction of water-bars, swales and other water conveyance techniques to minimize localized erosion potential.
	X	A5	Minor Fill Removal/Stabilization – generally involves localized removal of unstable fills and pulling back road shoulders in hill-side construction areas where cut/fill techniques were used to balance cuts and fills. The intent in this case is not to fully restore natural (pre-road construction) contours.

	X	A6	Minor Culvert Removal – for both cross-drains and stream crossings generally involves removal of smaller diameter pipes (less than 36") and shallow fills (less than 10 ft), stabilization of adjacent slopes, re-establishment of natural drainage patterns.
	X	A7	Major Culvert Removal – for both cross-drains and stream crossings generally involves removal of large diameter pipes (greater than 36") and deep fills (greater than 10 ft), stabilization of adjacent slopes, re-establishment of natural drainage patterns.
	X	A8	Re-Contouring – generally involves complete elimination of the roadbed and re-establishing natural (pre-road construction) contours and slopes. This method is employed on hill-side construction areas where cut/fill techniques were used to balance cuts and fills during construction. The intent is to fully remove the entire presence of the roadbed.
	X	A9	Bridge Removal – generally includes removal of all portions of a bridge structure incluiding decking, asphalt paving, abutments and other appurtenances.
	X	A10	Other methods – generally includes other techniques than described to meet unique field conditions.

* Note that for all decommissioning techniques, after prescribed techniques have been implemented, the road would be removed from the Forest's database.
** Note that for all decommissioning techniques that result in disturbed soil, seeding and mulching would be applied where necessary.

Entrance management techniques are common to both passive and active decommission methods. One technique that is used in order to eliminate/minimize the temptation of drivers to drive on the closed road and provide the optimum conditions for the rapid re-establishment of vegetation, is to completely decompact the entire width of the roadway for up to 12" depth by mechanical construction equipment. This decompaction is generally completed on the initial 1/8 mile (660 ft.) of road from where it abuts to an open connecting road. An example of this technique is shown in the photo below. In addition to showing the full-width decompaction efforts, the photo also shows straw mulch placed over the previously seeded areas to minimize erosion potential and provide for rapid seed germination results. Other entrance management techniques will include placement of boulders, large logs, and or gates to ensure complete closure of the road to vehicle access.

Photo of an example of “entrance treatment” method.

Road Decommissioning Costs

Estimating costs for decommissioning roads is difficult to do because of the site specific nature of techniques employed. However, in order to gauge the magnitude of the economic impacts to the Forest’s Transportation Management Program a general methodology is required. The Forest’s *Roads Analysis* contains a detailed discussion and subsequent methodology to estimate these costs. For consistency with this analysis and other environmental documents prepared that used this methodology, the average costs of road decommissioning techniques developed in the *Roads Analysis* will be used in this report. The average costs are shown in the table below.

As can be seen in the table below, the cost of full obliteration with slope recontouring is very expensive and in many cases the cost is not warranted unless the resource risks involved are very high. Within this project area, the risks associated with roads proposed for decommissioning are relatively low. Based on the composite risk factor from the *Roads Analysis*, the project area has 8.2% of the roads are very low risk, 28.7% are low risk, 29.1% are moderate risk, 33.7% are high risk and less than 1% very high risk.

Table 3.33. Costs per mile by decommissioning type.

Treatment Method	Decommission Type	Cost per Mile
Passive	Entrance Treatment-Flat slope, no live stream culvert removal, no large fills (passive decommission method).	\$2,000 - \$5,000
Active	Stabilize-Removal of some small culverts, minor to moderate live stream channel restoration, some fill pullback (active decommission method).	\$5,000 - \$15,000

Treatment Method	Decommission Type	Cost per Mile
Active	Stabilize-Large fills, large culvert removal, sidecast pullback, major stream channel restoration (active decommission method).	$15,000 - $30,000

Roads Record Management

The management of electronic information related to the road system and other transportation system components is completed via a standard agency-wide database called "Infra Travel Routes". Within this database data on individual roads is maintained that includes such items as maintenance level, traffic data, traffic accident records, road logs, condition surveys, maintenance needs, and future management objectives.

Updating the database is an ongoing annual task that is performed by Forest Service personnel and if roads are decommissioned as a result of this study, they will be removed from the system and no longer tracked as a system road. Roads that are designated for decommissioning as a result of the decision by the Responsible Official will be indicated as such within the database and the database will serve as the official tracking tool for decisions made for each road.

Effects Analysis

Each road proposed for decommissioning under this project is site specific for its aquatic restoration issues and needs. The cost to decommission the proposed roads is estimated from previous road decommissioning projects from 2009.

The alternative chosen would affect the average annual maintenance costs for the roads system within the project area. The same road under each alternative may have a different treatment associated with it.

<u>Alternative 1 - No Action</u>

Selecting the No Action Alternative would mean no road decommissioning activities would be completed under this road decommission project. Approximately 440 miles of roads would remain as they currently are on the landscape. The same level of access would be provided in the future and the estimated annual maintenance costs would remain the same for the road system within the area. These roads would continue to receive limited funding and therefore, maintenance needs may not be adequately met.

<u>Alternative 2 - Proposed Action</u>

Implementation of Alternative 2 would reduce the total road system in the project area to 185 miles of roads. This represents a reduction of about 61% of the analyzed road system within the project area. Upon completion of the decommissioning efforts, it is estimated that the annual maintenance costs for the system within the project area would be $221,000. This represents a reduction in estimated annual maintenance costs of $255,000.

Implementation of Alternative 2 would decommission about 81.6 miles of level 1 roads; 188.2 miles of level 2 roads; and 0.18 miles of level 3 roads[13].

Alternative 3

Implementation of Alternative 3 would reduce the total road system in the project area to 311 miles of roads. This represents a reduction of 31% of the analyzed road system within the project area. Upon completion of the decommissioning efforts, it is estimated that the annual maintenance costs for the system within the project area would be $347,000. This represents a reduction in estimated annual maintenance costs of $129,000.

Implementation of Alternative 3 would decommission about 65.3 miles of level 1 roads and 72.4 miles of level 2 roads[13]. No level 3 roads would be decommissioned.

Alternative 4

Implementation of Alternative 4 would reduce the total road system in the project area to 270 mile of roads. This represents a reduction of 40% of the analyzed road system within the project area. Upon completion of the decommissioning efforts, it is estimated that the annual maintenance costs for the system within the project area would be $306,000. This represents a reduction in estimated annual maintenance costs of $170,000.

Implementation of Alternative 4 would decommission about 67.9 miles of level 1 roads and 110.3 miles of level 2 roads[13]. No level 3 roads would be decommissioned.

Table 3.34. Total annual costs to maintain roads by alternative

Alternatives	Miles of level 1 and 2 roads on the Forest	Current and predicted road maintenance costs per year (Based on $1000.0/mile).
Alternative 1 (No Action)	2,826	$2,826,380
Alternative 2 (Proposed Action)	2,572	$2,572,280
Alternative 3	2,698	$2,698,380
Alternative 4	2,657	$2,656,980

[13] Mileage is from the INFRA database. Most of the mileage from this project is from GIS data; therefore there are some differences in the mileage amounts because INFRA and GIS data reflect slight differences due to how the information is complied and utilized.

3.11 Other Required Disclosures

Floodplains and Wetlands

There would be no impacts to floodplains or wetlands from this project. The Oregon Department of Lands and the US Army Corps of Engineers would be notified and provided necessary information about this project related to dredging and filling at stream crossings (Section 404, Clean Water Act).

Air Quality

No burning is planned for this project, so there would be no impacts on visibility from smoke. Any dust from proposed decommissioning activities would be short-term in duration and very site-specific for each road. There would be no effects past the decommissioning phase. No cumulative effects would be expected.

Consumers, Civil Rights, Minority Groups, Women, and Environmental Justice

Executive Order No. 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, directs Federal agencies to address effects accruing in a disproportionate way to minority and low income populations. No disproportionate impacts to consumers, civil rights, minority groups, and women are expected from the action alternatives. Decommissioning work would be implemented by contracts with private businesses. Project contracting for the project's activities would use approved management direction to protect the rights of these private companies.

Treaty Resources and Reserved Indian Rights

No impacts on American Indian social, economic, or subsistence rights are anticipated. No impacts are anticipated related to the American Indian Religious Freedom Act. The Confederated Tribe of Warm Springs was contacted in reference to this Proposed Action.

Prime Farmlands, Rangelands, and Forestlands

None of the alternatives would have an adverse impact to the productivity of farmland, rangeland, or forestland.

Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that are forever lost and cannot be reversed. Irretrievable commitments of resources are considered to be those that are lost for a period of time and, in time, can be replaced. The alternatives would not result in any irreversible or irretrievable commitments of resources.