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Zigzag Road Decommissioning for Habitat Restoration, Increment 2

Environmental Assessment

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

For information contact: Michelle Lombardo
16400 Champion Way
Sandy, OR 97055
(503) 668-1796
mlombardo@fs.fed.us

The photos above depict a Forest Service road before and immediately after road decommissioning activities.

Table of Contents

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.

- What does the term "unneeded" mean?

  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. In this document, an unneeded road is one that is not currently vital to Forest Management operations and that does not access primary recreational destinations. It means that the limited potential uses do not warrant the cost of annual maintenance to keep a road on the transportation system.

This EA analyzes the environmental effects for decommissioning approximately 42 miles of road on the Zigzag Ranger District. Road decommissioning activities are proposed to improve hydrologic function and aquatic and terrestrial habitat in eight sixth-field subwatersheds: Cedar Creek – Sandy River, Clear Creek – Sandy River, Gordon Creek, Headwaters Sandy River, North Fork Eagle Creek, Tanner Creek – Columbia River, Wildcat Creek – Sandy River, and Zigzag Canyon (see maps in Appendix A). This EA analyzes three alternatives, including the Proposed Action and No Action alternatives; and the results of the analysis are captured in this document.

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 one other action alternative. This discussion also includes possible design criteria that were added as a result of environmental analysis.

- *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 other action alternative. 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 alternative.

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 Zigzag Ranger District – is just one of these planning efforts. This project is part of a larger aquatic restoration planning process which plans to review approximately 20 percent of the existing Forestwide road system each year to identify roads to decommission or close. To date, the Forest has completed two road decommissioning projects in the highest risk areas, such as the Bull Run Watershed, on the Zigzag Ranger District. The Forest is committed to examining all of its watersheds for restoration opportunities, and this project would complete the Forest's current road decommissioning efforts in the Sandy River Basin.

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). 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. With this trend of declining budgets expected to continue, 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)).

1.4 Desired Conditions

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

- The **transportation system** allows safe access through the Forest where appropriate, and it is carefully designed and maintained to minimize impacts to aquatic resources.

- **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.
- **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.

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. With the trend of declining budgets expected to continue, 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 42 miles of unneeded roads over several years, as implementation funding becomes available. A list of these roads is found in Chapter 2; also maps of roads proposed for decommissioning are found in Appendix A.

Road decommissioning in this document means:

- ✓ Stabilizing and restoring unneeded roads to a more natural state (36 CFR 212.1).
- ✓ Re-establishing vegetation and restoring hydrologic and ecological processes interrupted or adversely impacted by the unneeded road.
- ✓ Entrance management to block vehicles.
- ✓ Removing the road from the Forest Service transportation system database. Decommissioned roads would no longer be maintained.

Road decommissioning would be accomplished by both active (i.e., mechanical) and passive (i.e., inactive) methods. 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 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:

- 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).

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 Zigzag 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 Zigzag 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 Zigzag 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 another alternative;
- 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. 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. Goals, objectives, and desired future conditions of the management areas within the project area are discussed below in the description of land allocations. 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).

1.10 Public Involvement

The project was initially listed in the summer (July) 2009 Schedule of Proposed Actions, which the Forest publishes quarterly. This was mailed to over 200 interested individuals and parties, as well as posted on the Forest website. Then, in September, the Proposed Action along with maps was mailed to over 200 people. A legal advertisement notifying the public about the Proposed Action was published in *The Oregonian* newspaper on September 22, 2009. The 30-day comment period ended on October 21, 2009. By the end of the comment period, a total of 24 individuals and organizations had commented on the Proposed Action. The IDT and Responsible Official considered all comments received (as per 36 CFR Part 215). Appendix B provides specific "Responses to Comments"; and copies of the 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:

1) ***Potential effects to recreation***

Equestrian Riders

Closing Forest Road 3626-150 in the North Fork Eagle Creek subwatershed would close direct access to the Douglas Trail, which also provides access to the Eagle Creek Trail and Mcintyre Ridge Trail. Decommissioning Forest Road 1828-380 from Riley Horse Campground in the Headwaters Sandy River subwatershed would eliminate a popular equestrian riding loop.

Mountain Biking

Decommissioning Forest Road 1828-380 from Riley Horse Campground in the Headwaters Sandy River subwatershed would eliminate mountain biking experiences on the Forest. Also, decommissioning Forest Roads 2634-073 and 086 in the Zigzag Canyon subwatershed would eliminate mountain biking that is away from the traffic of Highway 26.

2) ***Potential effects to the management and access to private land***

Decommissioning a portion of Forest Road 2609 in the Cedar Creek subwatershed would restrict access to private lands owned by Longview Timber.

3) ***Potential effects to the management and access to a Portland General Electric (PGE) powerline***

Decommissioning Forest Roads 2634-073 and 086 in the Zigzag Canyon subwatershed would restrict access to maintaining a PGE powerline adjacent to Highway 26.

4) ***Potential effects to water quality in Alder Creek***

Not decommissioning roads immediately in the Wildcat Creek subwatershed could impact the watershed that provides drinking water to the City of Sandy.

5) ***Potential effects to water quality from "ghost" roads (i.e., non-system roads)***

Not decommissioning roads that still exist on the ground, but are no longer identified in the Forest's transportation system database could pose an aquatic risk if not properly restored.

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

Decommissioning the 3626-105 and establish a new trailhead for Mcintyre Ridge on Road 36

This alternative would decommission the entire 3626-105 (approximately 2.5 miles). A new trailhead for the Mcintyre Ridge Trail would be relocated to the 36 Road. A new trail, about one mile in length, would be constructed from this location to the trail's current access point towards the end of the 3626-105 spur. This alternative was considered, but eliminated from detailed study because new trail construction did not fit the Purpose and Need for this project. Additionally, the Interdisciplinary Team felt as though adding more trail miles to the existing trail system would be less feasible than improving the road to better access the trail. While this specific alternative was not considered in detail, an alternative (Alternative 3) was considered which included decommissioning a portion of the 105 (approximately 1.8 miles) and improving the trailhead at the 3626-150. Alternative 3 is analyzed in detail in Chapter 3.

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 127 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 decommissioning approximately 42 miles of road. Maps highlighting the roads proposed for decommissioning are in Appendix A. In the table below is a list of roads proposed for decommissioning by subwatershed.

Table 2.1. Roads proposed for decommissioning by subwatershed.

Watershed	Road Number	Proposed Action	Miles
Cedar Creek	2609136	Decommission with delay	1.72
	2609140	Decommission with delay	0.16
	2609150	Decommission with delay	0.03
	2609130	Decommission	0.06
	2609155	Decommission	0.02
	2609160	Decommission	0.29
	3626113	Decommission	0.33
	2609000	Decommission a portion	0.65
	Total miles proposed for decommissioning: 3.3		

Watershed	Road Number	Proposed Action	Miles
Clear Creek	1825380	Decom beyond Cast Creek trailhead	1.70
	1800017	Decommission	0.16
	1800025	Decommission	0.05
	1825386	Decommission	0.30
	1825388	Decommission	0.49
	Total miles proposed for decommissioning: 2.7		

Watershed	Road Number	Proposed Action	Miles
Eagle Creek	3626150	Close with barrier device (i.e., boulders)	0.20
	3626155	Decommission end portion	0.45
	3636355	Decommission with delay	0.41
	3626015	Decommission with delay	0.10
	2609000	Decommission	0.89
	2609104	Decommission	0.14
	2609106	Decommission	0.02
	Total miles proposed for decommissioning: 2.2		

Watershed	Road Number	Proposed Action	Miles
Gordon Creek	1500166	Decommission	0.19
	1509017	Decommission	0.18
	1509019	Decommission	0.76
	1509040	Decommission	0.25
	1509041	Decommission	0.19
	1509180	Decommission	0.66
	1509190	Decommission	0.24
	2000000	Decommission	1.89
	2000011	Decommission	0.69
	Total miles proposed for decommissioning: 5.1		

Watershed	Road Number	Proposed Action	Miles
Tanner Creek	2030050	Decommission	1.31
	Total miles proposed for decommissioning: 1.3		

Watershed	Road Number	Proposed Action	Miles
Sandy River	1828118	Decommission end portion with delay	1.35
	1825111	Decommission past junction of 109	1.49
	1825380	Decommission past Riley Horse Camp	1.62
	1828024	Decommission with delay	0.16
	1828125	Decommission with delay	2.55
	1800017	Decommission	0.21
	1800025	Decommission	0.09
	1800036	Decommission	0.17
	1800048	Decommission	0.13
	1800051	Decommission	0.16
	1800120	Decommission	0.58
	1800140	Decommission	0.48
	1825050	Decommission	0.53
	1800120	Decommission	0.58
	1800140	Decommission	0.48
	1825050	Decommission	0.53
	1825053	Decommission	0.21
	1825055	Decommission	0.47
	1825071	Decommission	0.14
	1825101	Decommission	0.22
	1825386	Decommission	0.89
	1825388	Decommission	0.49
	1828020	Decommission	0.14
	1828021	Decommission	0.34
	1828022	Decommission	0.27
	1828023	Decommission	0.17
	1828110	Decommission	0.23
	1828180	Decommission	1.61
	Total miles proposed for decommissioning: 16.3		

Watershed	Road Number	Proposed Action	Miles
Wildcat	1400500	Decommission beyond BLM land	0.65
	3626109	Decommission end portion	0.31
	2609140	Decommission with delay	0.29
	2609150	Decommission with delay	0.39
	3626107	Decommission with delay	2.00
	3626111	Decommission with delay	0.18
	3626114	Decommission with delay	0.30
	1400570	Decommission	0.14
	2609155	Decommission	0.32
	3626113	Decommission	0.16
	3626115	Decommission	0.30
	3626038	Decommission	0.18
	Total miles proposed for decommissioning: 5.2		

Watershed	Road Number	Proposed Action	Miles
Zigzag Canyon	2627000	Decommission end portion	1.56
	2600440	Decommission past pit	0.65
	1819018	Decommission	0.13
	2600070	Decommission	0.17
	2600072	Decommission	0.19
	2600073	Decommission	0.17
	2600086	Decommission	0.67
	2600088	Decommission	0.13
	2600092	Decommission	0.20
	2627014	Decommission	0.16
	2627015	Decommission	0.21
	2627016	Decommission	0.14
	2627017	Decommission	0.07
	2639025	Decommission	0.29
	2600522	Decommission end portion	0.64
	Total miles proposed for decommissioning: 5.4		

Active decommissioning methods would include ripping pavement, constructing crossdrains, removing fill at stream crossings, constructing boulder weirs in perennial stream channels, removing bridges and culverts, seeding or mulching disturbed areas, and planting at stream crossings. These methods are discussed in more detail below:

Pavement Ripping: The purpose of pavement ripping is to: 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 on Forest Roads is 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. At 15' intervals, a soil crater would be created to speed the establishment of plants. A hiking tread would be left intact on the edge of the roadbed.

For paved and gravel roads, cracking by various means is accomplished as heavy equipment operates. Removal of pavement pieces about 3 'x 3' on wheel treads spaced about every 15' and replacement with nearby vegetation is planned. Areas would be de-compacted down to mineral soil and existing vegetation would be planted when available. Pavement does not need to be removed to stop its function as an impervious surface to runoff. In many areas where paved roads have not been maintained in the watersheds, numerous tree species have become reestablished naturally. Inboard ditchlines would not be filled with broken asphalt.

Crossdrains: Crossdrains would be constructed as appropriate with a maximum distance of 200 feet between crossdrains. Suitable construction equipment includes, excavators, backhoes, and track mounted loaders.

Decommissioned Stream Crossing: Removal of the fill 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 cutslopes 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 1.1x bankfull as measured above the stream crossing. Stream banks would 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 must 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 be one layer thick and spaced to allow foot travel along roads.

Cross Vane or Upstream U: Boulder 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 Deck 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 earthwork, 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.

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

Alternative 3

Alternative 3 responds to the key issues described above and would decommission about 45 miles of road. The roads proposed for decommissioning remain the same as Alternative 2 – Proposed Action, ***except*** the following:

- Forest Road 1825-380 (Headwaters Sandy River): This road would be converted to a non-motorized trail in order to maintain an equestrian loop ride from the Riley Horse Campground (Key Issue #1). Also, converting this road to a non-motorized trail would allow for continued mountain bike use (Key Issue #1). The trail crossings over Cast and Lost creeks would be constructed so there would be minimal impacts on water quality and aquatic species (see Project Design Criteria in Section 2.4).

- Forest Road 3626-108 (Wildcat Creek): This road would be improved and a trailhead to access the Mcintyre Ridge would be established towards the end of this road (Key Issue #1). The trailhead location would allow for horse-trailers to park and turn-around.

- Forest Roads 3626-255, 3626-155, 3626-355, 3626-150, and 3626-105 (Eagle Creek): The 255 road would be decommissioned since it is currently inaccessible due to the burnt down bridge on the North Fork Eagle Creek and a trailhead to access the Douglas Trail would be better established at the end of the 3626-150 (Key Issue #1). Because trailhead access would be at the 150 road, then the remaining portion of the 105 would be decommissioned as well as the 155 road. The 155 to the junction with the 355 would be decommissioned once vegetation management activities have occurred.

- Forest Road 2609 (Cedar Creek): This road would remain open and maintained as needed to provide access to private lands owned by Longview Timber (Key Issue #2).

- Forest Roads 2600-073 and 2600-086 (Zigzag Canyon): These roads would remain open and maintained as need to provide access to a powerline maintained by Portland General Electric (Key Issue #3). Also, keeping this road open would allow for continued mountain bike use (Key Issue #1).

- Forest Roads 3626-038, 3626-107, 3626-111, 3626-114, 2609-140, and 2609-150 (Wildcat Creek): These roads would be decommissioned as soon as possible, rather than wait until vegetation management activities have occurred (Key Issue #4).

- Forest Roads N20100A and 3626-253 (Eagle Creek): While these roads have already been decommissioned and are no longer included on the Forest's transportation database, they continue remain on the landscape; therefore, these roads would be restored to a natural hydrologic condition (Key Issue #5).

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 Alternative 2 above).

All design criteria listed in the section below would be included in the implementation of Alternative 3.

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. These PDCs apply to active decommissioning only.

Botany Design Features

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 Features

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 Features

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.

Recreation Design Features

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.

R-6: Any road converted to a snowmobile trail or route, needs to have a minimum width of 16 feet to provide passage for a groomer. Trails would need to be brushed regularly to prevent encroachment. Also, roads converted to a snowmobile trail or route, should provide for safe passage of snowmobiles and groomers. This requires that closure devices have less height than the prevailing snow depth when use begins. Gates that can hook skis would not be acceptable. Where a closure barrier is necessary, berms are preferred. However, berms must not present a hazard to snowmobiles with abrupt drop-offs not visible when approaching on a machine.

Water Quality Design Features

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 2.2. 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 Features

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. Restrictions on chainsaw, heavy equipment, and helicopter use would apply to decommissioning and associated activities on Forest Roads 3626-110, 1825-052, and 1825-053. 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 tables display the three alternatives. Alternatives are compared in such a way that the differences among them in terms of road decommissioning are highlighted for the public and the Responsible Official.

Table 2.3. Comparison of alternatives by miles of decommissioning. (Miles of roads proposed for decommissioning by alternative.)

Watershed	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 3
Cedar Creek – Sandy River	0	4.2	4.2
Clear Creek – Sandy River	0	2.8	2.5
Gordon Creek	0	5.1	5.1
Headwaters Sandy River	0	16.1	16.1
North Fork Eagle Creek	0	1.5	5.5
Tanner Creek – Columbia River	0	1.4	1.4
Wildcat Creek – Sandy River	0	6.7	6.7
Zigzag Canyon	0	4.6	3.8
Total miles of road remaining	0.0	42.4	45.3

Table 2.4. Comparison of alternatives by miles remaining on the Forest's transportation system. (Miles of roads remaining in subwatershed *after* decommissioning activities have occurred.)

Watershed	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 3
Cedar Creek – Sandy River	8.8	4.6	4.6
Clear Creek – Sandy River	9.2	6.4	6.7
Gordon Creek	12.4	7.3	7.3
Headwaters Sandy River	43.7	27.6	27.6
North Fork Eagle Creek	6.9	5.4	1.4
Tanner Creek – Columbia River	3.4	2.0	2.0
Wildcat Creek – Sandy River	15.3	8.6	8.6
Zigzag Canyon	27.2	22.6	23.4
Total miles of road remaining	126.9	84.5	81.6

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 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

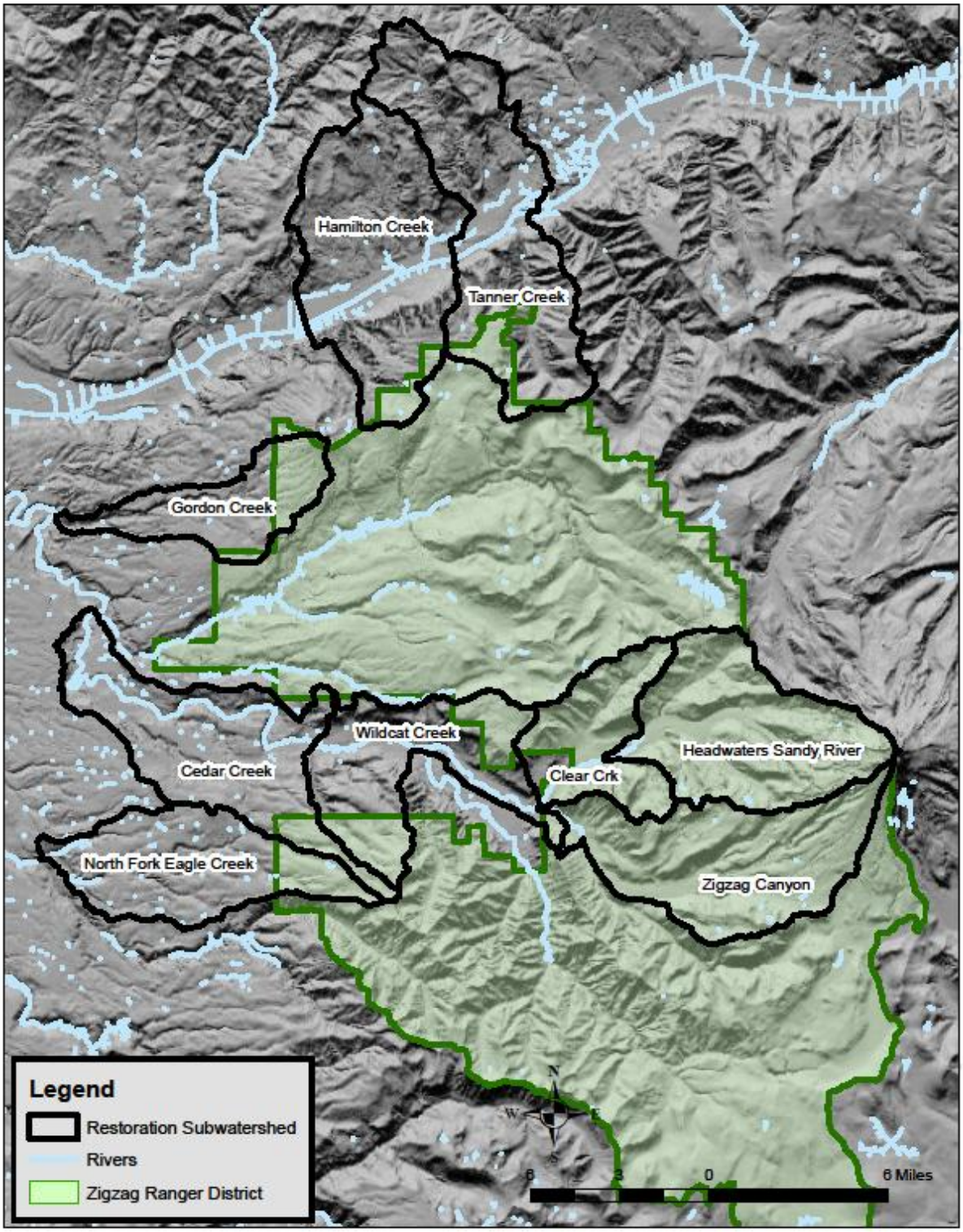
The road network analyzed is on National Forest System lands within the Mt. Hood National Forest in nine emphasis subwatersheds on the Zigzag Ranger District, which are listed in the table below. Figure 3.1 shows the location of the subwatershed.

Table 3.1. Emphasis subwatersheds.

Subwatershed	Total Acres	Acres on Mt. Hood National Forest and Columbia Gorge Scenic Area
Cedar Creek-Sandy River	22,604	2,237
Clear Creek-Sandy River	11,954	10,825
Gordon Creek	11,177	3,382
Hamilton Creek-Columbia River[1]	28,212	9,604
Headwaters Sandy River	22,213	22,213
North Fork Eagle Creek	17,842	2,767
Tanner Creek-Columbia River	29,472	14,040
Wildcat Creek-Sandy River	18,240	6,037
Zigzag Canyon	23,357	23,345

[1] Hamilton Creek subwatershed was assessed for potential road decommissioning; however, no roads are proposed for decommissioning in this analysis.

Figure 3.1. The nine emphasis subwatersheds on the Zigzag Ranger District.



Streamflow Regime (Peak Streamflows and Flood Events)

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 Upper Sandy Watershed (Cedar Creek, Clear Creek, Headwaters Sandy River, and Wildcat Creek subwatersheds) notes based on current stand conditions, the majority of subwatersheds are above the threshold associated with the possibility for adverse

effects from increased peakflows associated with rain on snow events; and, stream channel network expansion by roads is a concern in the majority of the subwatersheds (p. 4-152).

The Watershed Analysis for the Zigzag Watershed (Zigzag Canyon subwatershed) notes peak streamflows in the Zigzag Watershed appear to be on a decreasing trend. This is because the increased canopy closure and size of stands after fire events between 1900 and 1952 that resulted in less created openings (decreased effects from peakflows associated with rain on snow events). Stream drainage network expansion associated with roads is of concern in the watershed (Zigzag Watershed Analysis, p. 4-77).

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 Upper Sandy Watershed (Cedar Creek, Clear Creek, Headwaters Sandy River, and Wildcat Creek subwatersheds) notes 96% of the modeled sediment associated with management activities is associated with roads (p. 4-26).

Within the Alder Creek subwatershed there are predicted increases in peak flow magnitude (based on the DNR Hydrologic Change Module) associated with rain-on-snow events and increased stream drainage network expansion. These increases have the potential to increase suspended sediment and turbidity levels in Alder Creek due to in-channel processes. such as streambank and inner gorge failures. The stream survey of Alder Creek in 1993 noted erosion

and undercut streambanks throughout the entire surveyed area (Upper Sandy Watershed Analysis, p. 6-90).

The Watershed Analysis for the Zigzag Watershed (Zigzag Canyon subwatershed) details that 24% of the modeled sediment associated with management activities is associated with roads (70% is associated with highway sanding) (p. 4-87).

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 (Bull Run Watershed Analysis 1997, p. 4-160). 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. This process was analyzed for the portion of the subwatershed that is on National Forest System lands (because detailed road and stream data was not available for lands outside the National Forest boundary). For this section of the analysis 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 ditchlines with the potential to increase the stream drainage network.

Figure 3.2 and Table 3.2 show that roads currently in the project area increase the channel network length by 4%. Increases in stream drainage network enhancement vary from 0 to 11% based on analysis area.

Figure 3.2. Stream drainage network expansion.

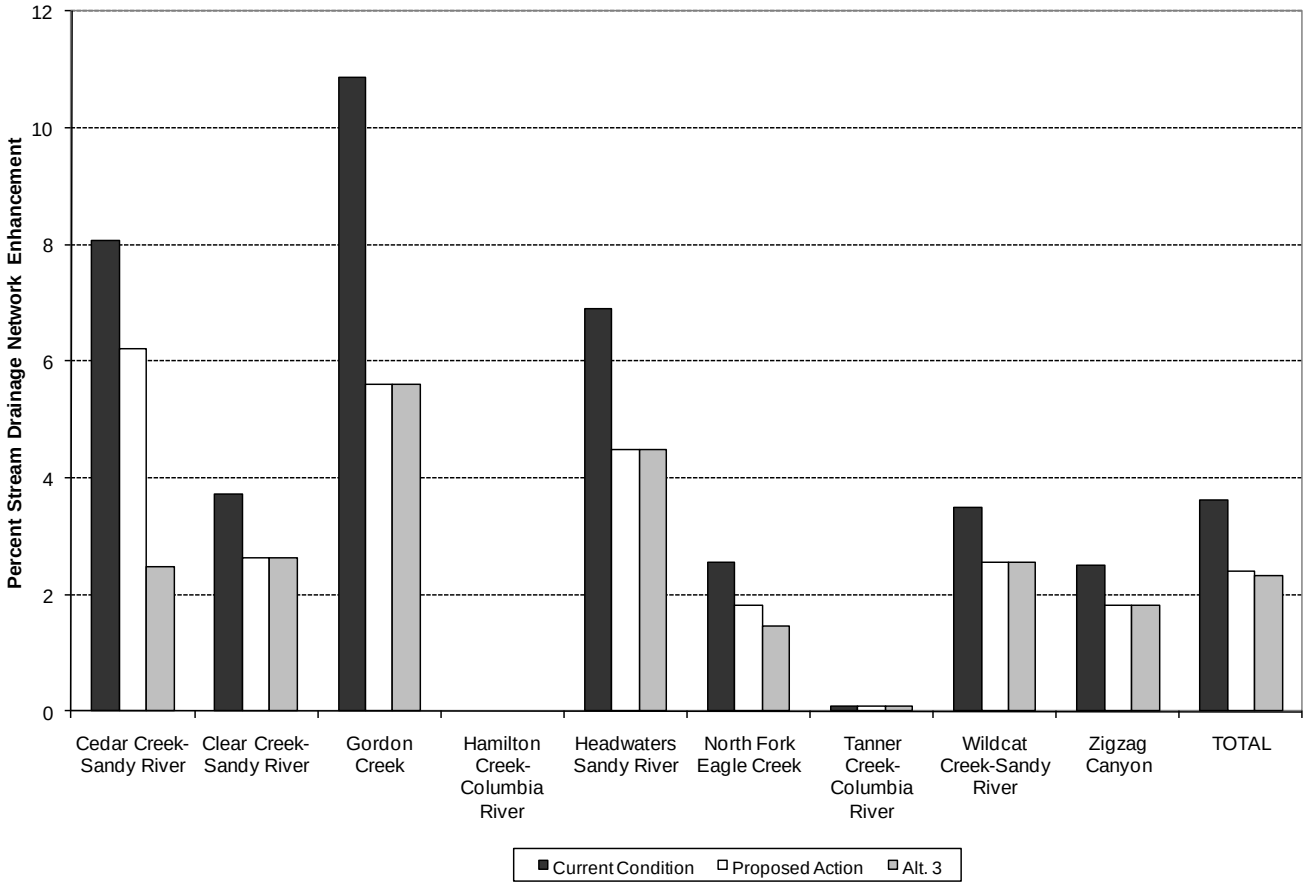


Table 3.2. Percent stream drainage network expansion.

Subwatershed	Alternative 1 – Current Condition	Alternative 2 – Proposed Action	Alternative 3
Cedar Creek-Sandy River	8	6	2
Clear Creek-Sandy River	4	3	3
Gordon Creek	11	6	6
Hamilton Creek-Columbia River	0	0	0
Headwaters Sandy River	7	4	4
North Fork Eagle Creek	3	2	1
Tanner Creek-Columbia River	0	0	0
Wildcat Creek-Sandy River	4	3	3
Zigzag Canyon	2	2	2
TOTAL	**4**	**2**	**2**

Environmental Effects – Flow Regime

Alternative 2 – Proposed Action

The Proposed Action alternative would reduce stream drainage network enhancement by 0 to 48% based on analysis area. 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. Gordon Creek is the only subwatershed currently above the 10% threshold. However, with implementation of the Proposed Action there would be at a 6% increase in the stream drainage network. These modeled reductions for the Proposed Action would occur with the implementation of road decommissioning activities and would continue because a critical part of the natural drainage patterns would be re-established.

Alternative 3

Effects associated with implementation of Alternative 3 are very similar to the implementation of the Proposed Action. The overall reduction in stream drainage network across the project area is the same as the Proposed Action (2% reduction from the current condition). The Cedar Creek subwatershed would see a greater reduction in stream drainage network enhancement (6% compared to 2%) when compared to the Proposed Action associated with the decommissioning of the 3626-105 road in that subwatershed.

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.

The dataset associated with landslide does not include Gordon Creek, Tanner Creek or Hamilton Creek subwatersheds so those areas could not be assessed for this parameter.

Figure 3.3. Landslide hazard in the project area.

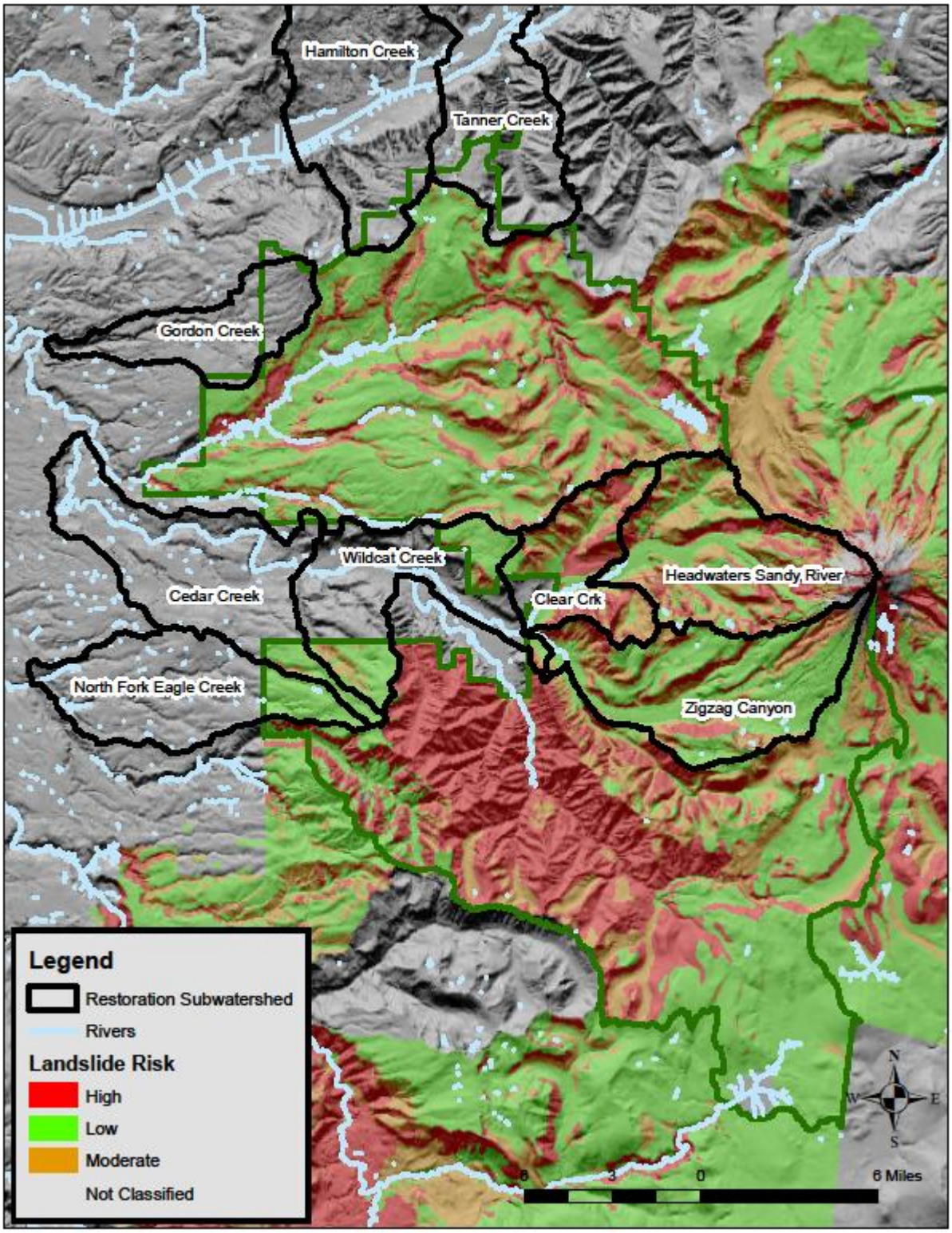


Figure 3.4. Miles of road in high and moderate landslide hazard areas identified in the Roads Analysis.

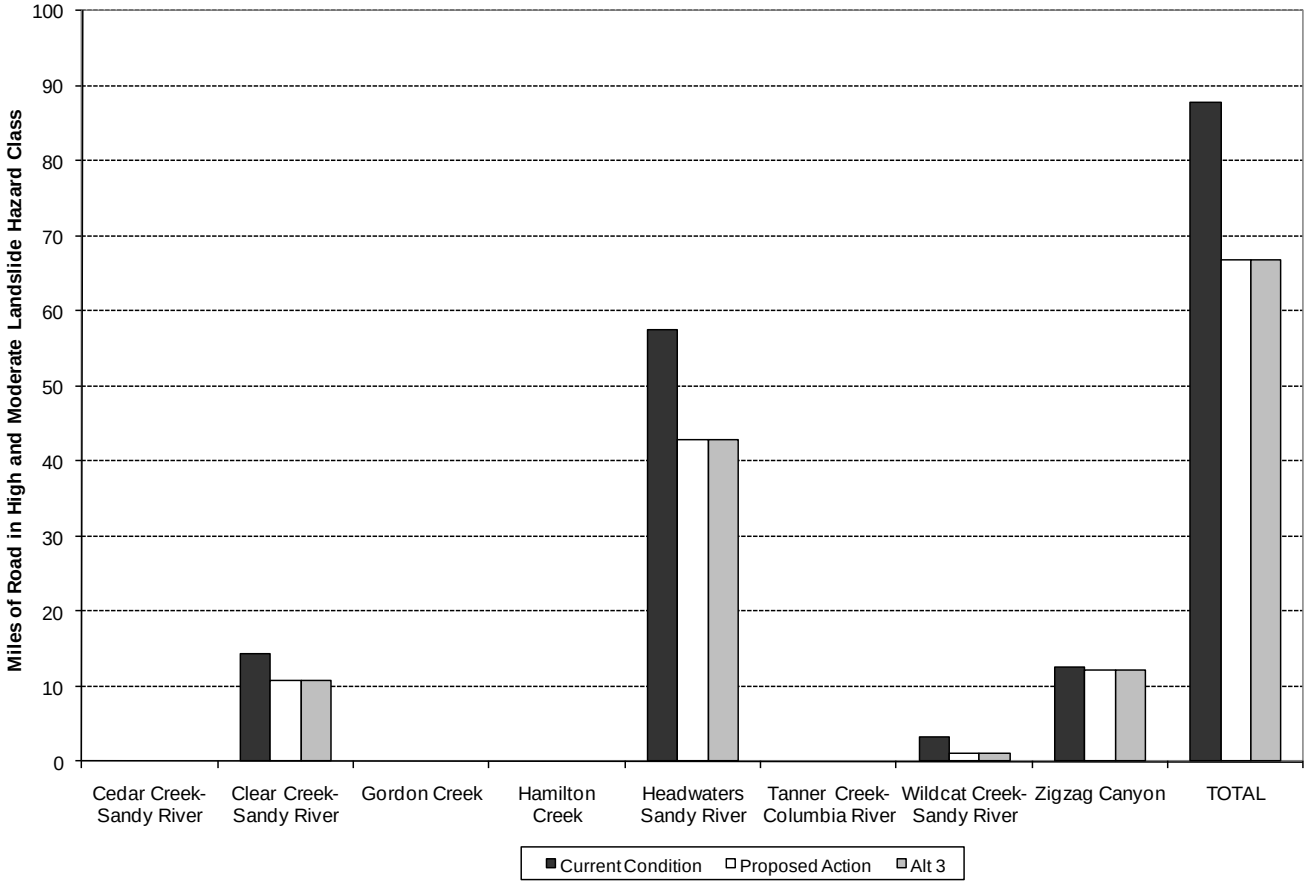


Table 3.3. Miles of road in high and moderate landslide hazard areas.

Subwatershed	Alternative 1 – Current Condition	Alternative 2 – Proposed Action	Alternative 3
Cedar Creek-Sandy River	0	0	0
Clear Creek-Sandy River	14.3	10.8	10.8
Gordon Creek	0.0	0.0	0.0
Hamilton Creek	0.0	0.0	0.0
Headwaters Sandy River	57.4	42.8	42.8
Tanner Creek-Columbia River	0.0	0.0	0.0
Wildcat Creek-Sandy River	3.3	1.0	1.0
Zigzag Canyon	12.7	12.2	12.2
TOTAL	**87.8**	**66.8**	**66.8**

Environmental Effects – Soils and Geology

Alternative 2 – Proposed Action

The Proposed Action alternative would reduce the potential of landslides from existing roads by reducing roads in the high and moderate landslide hazard areas especially in the Clear Creek, Headwaters Sandy River, and Wildcat Creek subwatersheds. In these subwatersheds reductions are at least 25% of the road mileage in the high and moderate landslide hazard classes. This may be especially important with the limited funding available for maintaining these roads.

Alternative 3

Effects associated with the implementation of Alternative 3 are the same as the Proposed Action for this process.

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.

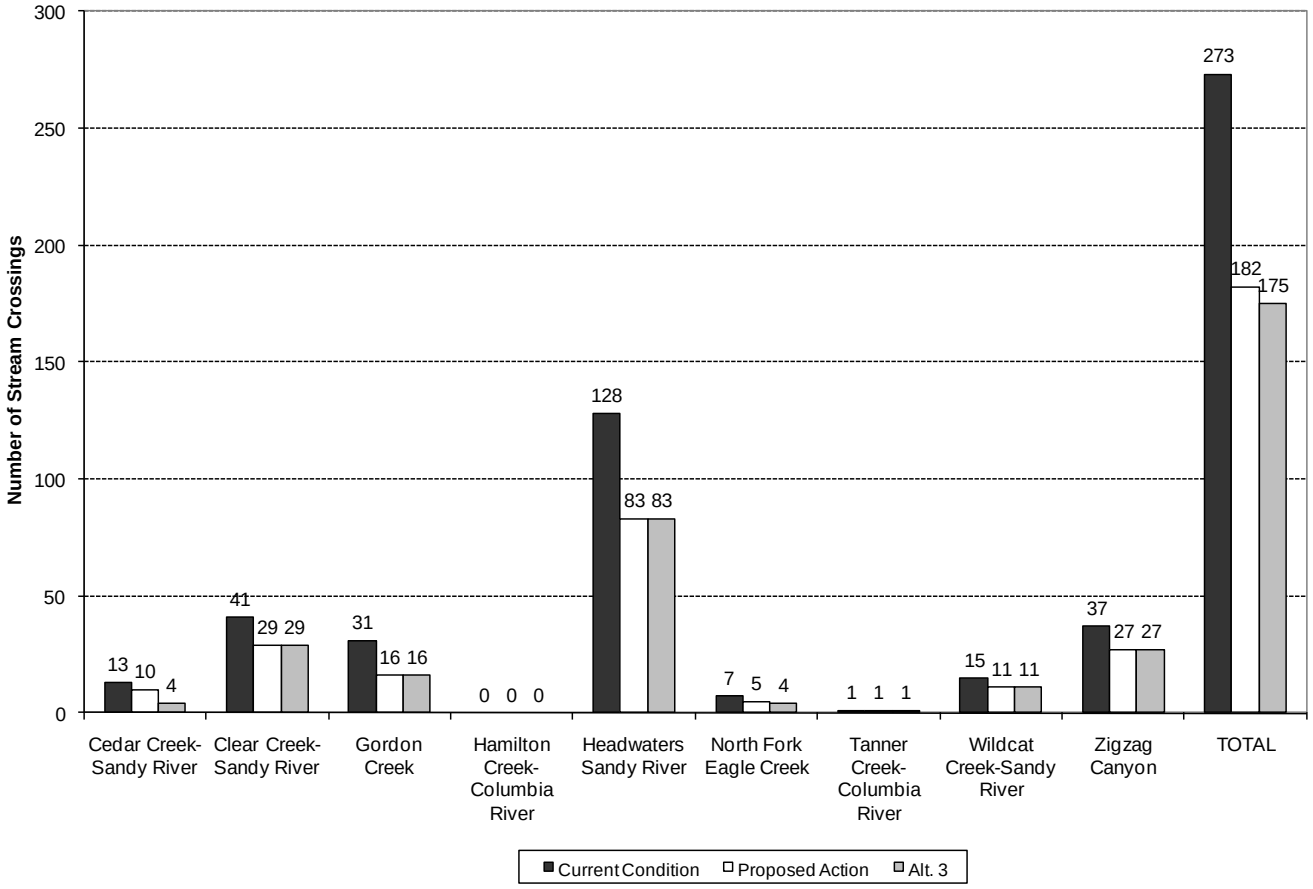


Table 3.4. Stream crossings by alternative.

Subwatershed	Alternative 1 – Current Condition	Alternative 2 – Proposed Action	Alternative 3
Cedar Creek-Sandy River	13	10	4
Clear Creek-Sandy River	41	29	29
Gordon Creek	31	16	16
Hamilton Creek-Columbia River	0	0	0
Headwaters Sandy River	128	83	83
North Fork Eagle Creek	7	5	4
Tanner Creek-Columbia River	1	1	1
Wildcat Creek-Sandy River	15	11	11
Zigzag Canyon	37	27	27
TOTAL	**273**	**182**	**175**

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).

The dataset associated with high risk stream crossings did not include Gordon Creek, Tanner Creek or Hamilton Creek subwatersheds so those areas could not be assessed for this parameter.

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

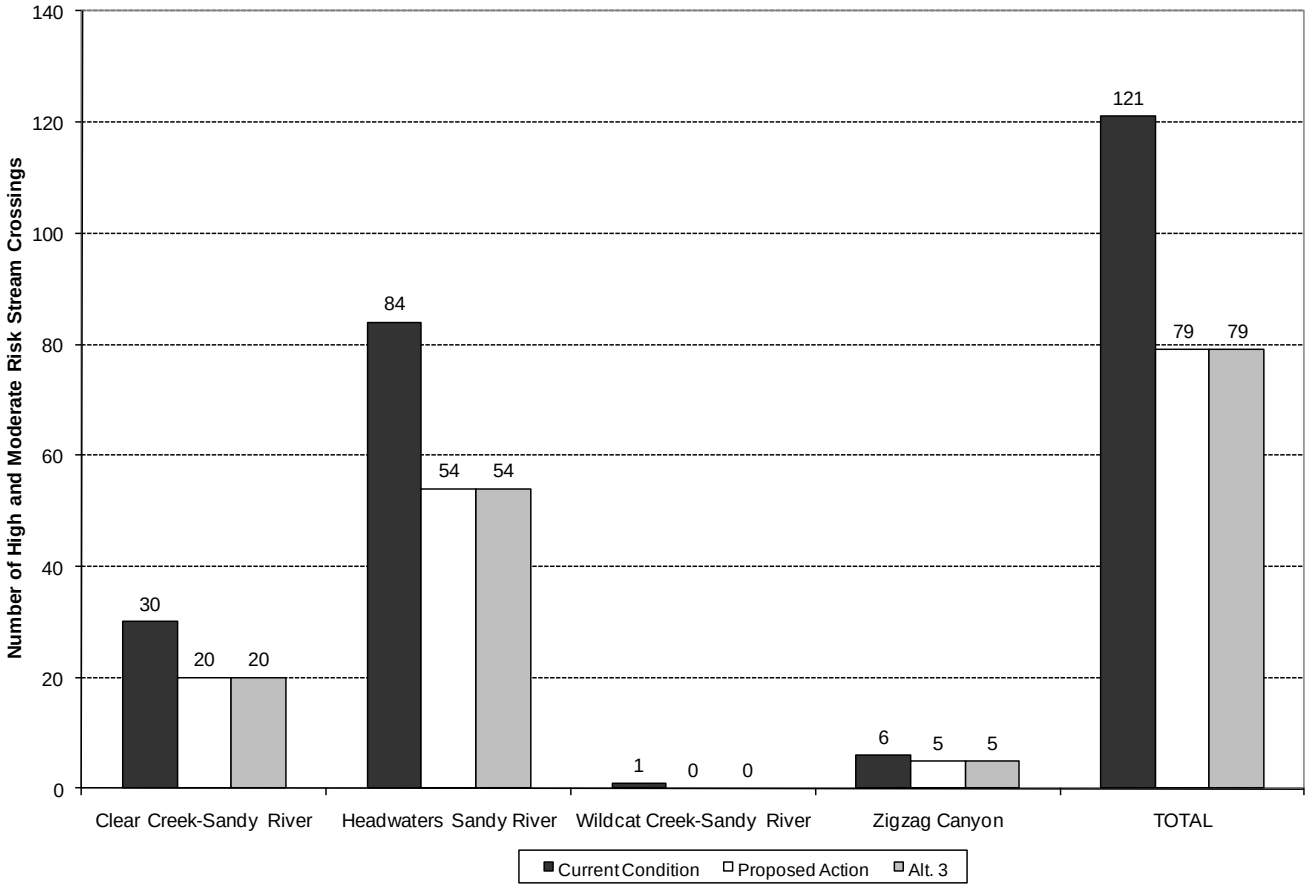


Table 3.5. High and moderate risk stream crossings by alternative.

Subwatershed	Alternative 1 – Current Condition	Alternative 2 – Proposed Action	Alternative 3
Clear Creek-Sandy River	30	20	20
Headwaters Sandy River	84	54	54
Wildcat Creek-Sandy River	1	0	0
Zigzag Canyon	6	5	5
TOTAL	**121**	**79**	**79**

Modeled Sediment Yield from Road Network

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).

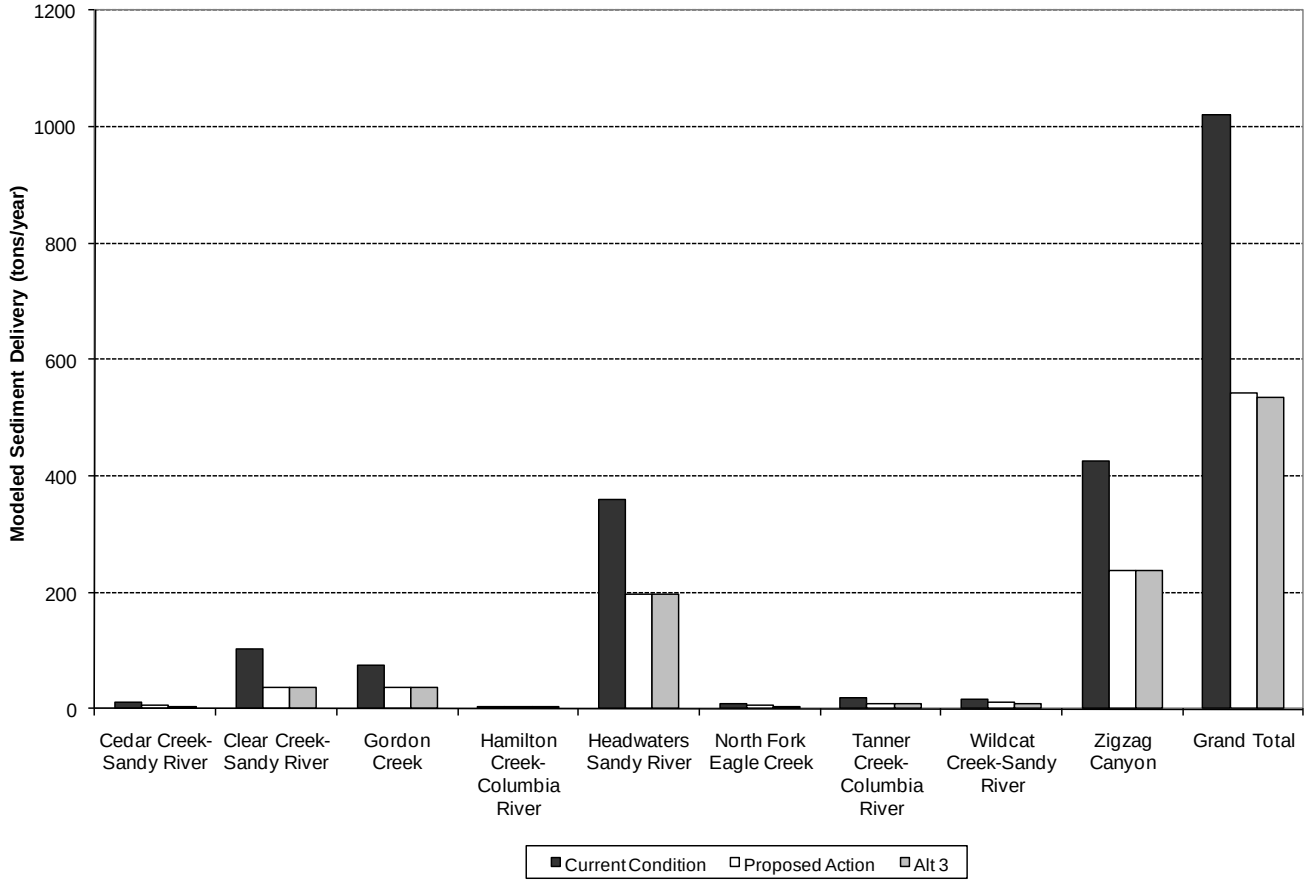


Table 3.6. Modeled road related sediment delivery (tons/year).

Subwatershed	Alternative 1 – Current Condition	Alternative 2 – Proposed Action	Alternative 3
Cedar Creek-Sandy River	11	6	3
Clear Creek-Sandy River	103	37	37
Gordon Creek	76	36	36
Hamilton Creek-Columbia River	2	2	2
Headwaters Sandy River	361	198	198
North Fork Eagle Creek	8	6	2
Tanner Creek-Columbia River	19	9	9

Subwatershed	Alternative 1 – Current Condition	Alternative 2 – Proposed Action	Alternative 3
Wildcat Creek-Sandy River	16	10	10
Zigzag Canyon	426	238	238
TOTAL	**1021**	**543**	**535**

Environmental Effects – Sediment Yield (Short-Term)

Under the current condition 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. and Table 3.66. 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.

Alternative 2 – Proposed Action

There is an overall reduction of 33% in the number of stream crossings (273 structures to 182 structures) with reduction of over 25% in Clear Creek, Gordon Creek, Headwaters Sandy River, North Fork Eagle Creek, Wildcat Creek, and Zigzag Canyon.

The number of high and moderate risk stream crossings is reduced from 121 to 79 crossings (a 35% reduction) with the most reductions found in Clear Creek and Headwaters Sandy River (Wildcat Creek and Zigzag Canyon reductions are associated with the removal of one stream crossing in each subwatershed).

The reduction in stream crossings and especially high and moderate risk stream crossings should result in less potential for culvert blowouts, dam-break floods, debris flows, stream diversions and cascading failures with an associated reduction in sediment delivery to the stream system.

Based on modeled road related sediment delivery there would be an overall 47% reduction in sediment delivery for the entire project area, which corresponds to a reduction of 478 tons of sediment delivery per year. Across the associated subwatersheds there would be reductions from 0 to 64% corresponding to 0 to 188 tons per year of sediment delivery to the stream system. The sediment contribution to streams from roads is often much greater than that from all other land management activities combined (FEMAT V-16); therefore, these reductions in the associated subwatersheds are important in reducing management related sediment delivery to the stream system.

Alternative 3

Effects associated with implementation of Alternative 3 are very similar to the implementation of the Proposed Action. The overall reduction in stream crossings is 36% compared to 33% for the Proposed Action. Cedar Creek subwatershed would see a greater reduction in stream crossings (69% compared to 23%) when compared to the Proposed Action associated with the

decommissioning of the 3626-105 road in that subwatershed. The number of high and moderate risk stream crossing is the same in Proposed Action and Alternative 3.

Modeled road related sediment delivery for the entire project is 543 tons per year for Alternative 3 compared to 543 tons per year under the Proposed Action, so the effects are assumed to be very similar. However, Cedar Creek and North Fork Eagle Creek have additional 32% and 57% (3 tons per year and 4 tons per year) reductions in sediment delivery associated with the implementation of Alternative 3.

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. The WEPP analysis was completed for 50 years of climate data.

Table 3.7. Short-term sediment yield (tons/year) based on WEPP analysis 2.5 year return interval storm.

Subwatershed	Alternative 2 – Proposed Action	Alternative 3
Cedar Creek-Sandy River	0	0
Clear Creek-Sandy River	0	0
Gordon Creek	0	0
Hamilton Creek-Columbia River	0	0
Headwaters Sandy River	0	0
North Fork Eagle Creek	0	0
Tanner Creek-Columbia River	0	0

Subwatershed	Alternative 2 – Proposed Action	Alternative 3
Wildcat Creek-Sandy River	0	0
Zigzag Canyon	0	0
TOTAL	**0**	**0**

Table 3.8. Short-term sediment yield (tons/year) based on WEPP analysis average storm for 50 years of modeling.

Subwatershed	Alternative 2 – Proposed Action	Alternative 3
Cedar Creek-Sandy River	0.0	0.1
Clear Creek-Sandy River	0.1	0.1
Gordon Creek	0.1	0.1
Hamilton Creek-Columbia River	0.0	0.0
Headwaters Sandy River	0.3	0.3
North Fork Eagle Creek	0.0	0.0
Tanner Creek-Columbia River	0.0	0.0
Wildcat Creek-Sandy River	0.0	0.0
Zigzag Canyon	0.1	0.1
TOTAL	**0.5**	**0.6**

Table 3.9. Short-term sediment yield (tons/year) based on WEPP analysis 50 year return interval storm.

Subwatershed	Alternative 2 – Proposed Action	Alternative 3
Cedar Creek-Sandy River	0.8	2.3
Clear Creek-Sandy River	3.0	3.0
Gordon Creek	3.8	3.8
Hamilton Creek-Columbia River	0.0	0.0
Headwaters Sandy River	11.3	11.3
North Fork Eagle Creek	0.5	0.8
Tanner Creek-Columbia River	0.0	0.0
Wildcat Creek-Sandy River	1.0	1.0
Zigzag Canyon	2.5	2.5
TOTAL	**22.8**	**24.6**

Alternative 2 – Proposed Action

WEPP analysis resulted in an average yield for the entire project area of 0.5 tons of sediment delivery per year. Based on the return period analyzed, the short-term sediment yield varies considerably. For the 2.5 year return period event, the annual yield is 0.0 tons per year for the project area. The 50 year return period event results in 22.8 tons per year for the project area. Compared to modeled road related sediment delivery of 1021 tons per year for the current condition and 543 tons per year for the Proposed Action, the 0.5 tons of sediment delivery per year is very small.

In the second winter following the drainage structure removal, erosion and delivered sediment should decrease further due to settlement of loose soils, re-vegetation, 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 stream flow event after culvert removal activities and after that point the stream crossing is stabilized and turbidity levels are the same upstream and downstream of the road crossing.

Alternative 3

WEPP analysis for Alternative 3 yields very similar results to the Proposed Action. There is no difference between the two alternatives for the 2.5 year interval storm, 0.1 tons per year of sediment delivery difference associated with the average storm, and 1.8 tons per year of sediment delivery difference associated with 50 year recurrence interval storm. The differences are most pronounced in the Cedar Creek and North Fork Alder Creek drainages associated with decommissioning of stream crossings in those areas. As with the Proposed Action, sediment delivery associated with implementation is very small when compared to the 1021 tons per year for the current condition and 535 tons per year associated with this alternative.

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 Proposed Action alternative analysis does. Under the current condition the roads would not receive proper maintenance due to funding limitations. 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. 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 probable and flow actively eroding across the road and fill.

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 in the Wildcat Creek subwatershed.

Alternative 2 – Proposed Action

The Proposed Action alternative would reduce the number of stream crossings from 273 to 182 and high and moderate risk stream crossing from 121 to 79. It is assumed that the decommissioned roads in the Proposed Action alternative are no longer producing sediment because natural drainage patterns have been restored. 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).

Alternative 3

Effects associated with implementation of Alternative 3 are very similar to the implementation of the proposed action. The overall reduction in stream crossings is from 273 to 175 (compared

182 for the Proposed Action). Cedar Creek subwatershed would see an additional 6 stream crossings removed associated with decommissioning of the 3626105. The number of high and moderate risk stream crossing is the same in Proposed Action and Alternative 3.

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.

Section 303D

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).

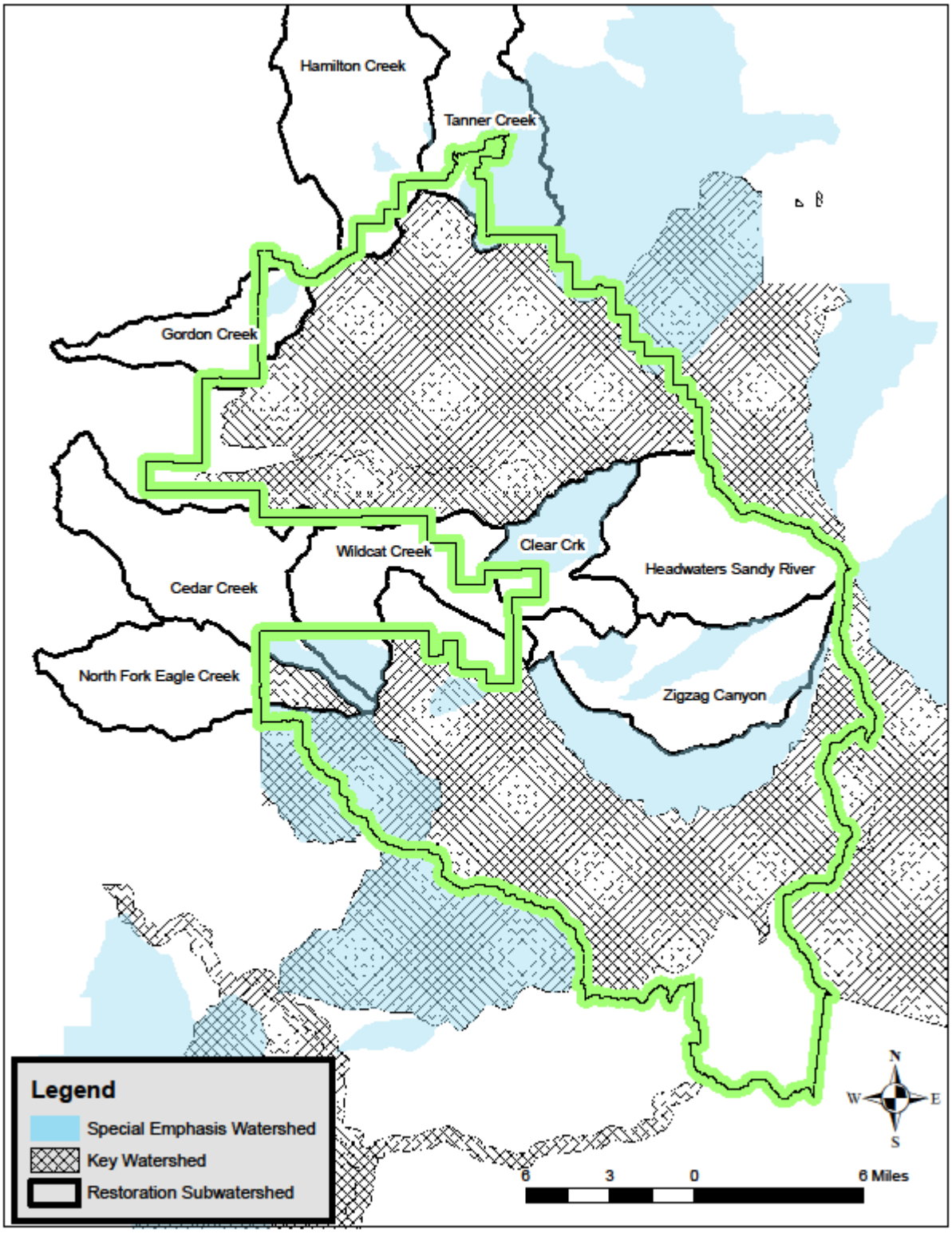
For each listed waterbody, the CWA requires States to establish a Total Maximum Daily Load (TMDL) for the parameter(s) causing beneficial use impairment. A TMDL is the sum of the waste load allocation for point sources of pollution (for example, outflow from a manufacturing plant) plus the load allocation 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. There are no streams in the emphasis subwatersheds on the 2004/2006 State of Oregon 303(d) list other than Bear Creek in the North Fork Eagle Creek subwatershed. This stream is listed for stream temperature and the entire drainage area associated with this stream is outside of National Forest System lands.

Consistency with Mt Hood Land and Resource Management Plan Standards and Guidelines

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 3.10. 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.

North Fork Eagle Creek is within a Tier 2 Key Watershed the Proposed Action is consistent with Standards and Guidelines by reducing existing system road mileage.

Special Emphasis Watersheds

The goal of Special Emphasis Watersheds is to maintain or improve watershed, riparian, and aquatic habitat conditions and water quality for municipal uses and/or long term fish production. Cedar Creek, Clear Creek, Gordon Creek, Hamilton Creek, Tanner Creek and Zigzag Canyon 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 Proposed Action is 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 Proposed Action is 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 Proposed Action is 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 Proposed Action 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

Restoration subwatersheds for this project with greater than 0.3 tons of sediment yield to the stream system associated with the average storm event were used for the cumulative effects analysis areas. There were three subwatersheds (Clear Creek, Gordon Creek and Zigzag Canyon) with 0.1 tons per year of sediment yield associated with project implementation. These subwatersheds were eliminated from cumulative effects analysis because of the very small (2 cubic feet of sediment yield per year) amount of sediment generated. The Headwaters Sandy River subwatershed (22,213 acres), however, has approximately 0.3 tons per year of sediment yield associated with project implementation. Therefore, this subwatershed was used for the cumulative effects analysis area.

Table 3.10. Headwaters Sandy River - past, present, and reasonably foreseeable projects.

Project	Sediment yield tons per year
Off-Highway Vehicle EIS	Reduction in sediment delivery to streams associated with closure of all areas and roads in Headwaters Sandy River subwatershed.
Invasive Plant EIS	No impacts predicted to short-term sediment yield.
Modeled Road Related Sediment	198 tons per year
Historical Timber Harvest Activities (from Upper Sandy Watershed Analysis)	2.6 tons per year
Proposed Action	0.3 (total yield in tons, from analysis for road decommissioning project)

As detailed by Table 3.10, the amount of short-term sediment associated with surface erosion at decommissioned stream crossings is very small when compared to the modeled amounts of sediment from the existing road system. The amount of sediment associated with the decommissioned stream crossings is only 0.1% of the subwatershed total and would be spread out among 45 stream crossings. This increase in sediment is not anticipated to have any adverse impacts on the aquatic system.

Table 3.11. Comparison of alternatives.

Items of Comparison	Proposed Action	Alternative 3	Current Condition
Flow Regime			
Miles of road	87.7	84.0	130.1
Channel network expansion by roads	2%	2%	4%
Soils and Geology			
Roads in high and moderate hazard areas for landslides	66.8 miles	66.8 miles	87.8 miles
Sediment Yield			
Number of stream crossings	182	175	273
Number of high and moderate risk stream crossings	79	79	121
Road related sediment delivery (modeled tons/year) for properly maintained roads	543	535	1021
Short-term estimated road sediment production	0.5 tons per year	0.6 tons per year	No change
Long-term estimated road sediment production	No change	No change	100 times increase

3.3 Fisheries

Affected Environment

The proposed activities in this analysis are located within the following subwatersheds of the Sandy River: Gordon Creek (11,177 ac.), Clear Creek (11,954 ac.), Wildcat Creek (18,240 ac.), Zigzag Canyon (23,357 ac.), Cedar Creek (22,604 ac.), and the Headwaters of the Sandy River (22,213 ac.). Also included in the project are Tanner Creek (29,472 ac.) and Hamilton Creek (28,212ac.)[2], which are subwatersheds of the Columbia River; and North Fork Eagle Creek (17,842 ac.), which is a subwatershed of the Clackamas River. The subwatersheds included in this project total 185,071 acres.

The headwaters of the Sandy and Zigzag Canyon subwatersheds are glacially influenced stream systems with glacial runoff and sediment loading influencing their hydrology and generally have colder water temperatures. Gordon Creek, Clear Creek, Wildcat Creek, Cedar Creek, Tanner Creek, Hamilton Creek, and North Fork Eagle Creek subwatersheds are not glacially influenced and are driven more by seasonal snow runoff and precipitation patterns.

Past land management activities have had impacts on the watersheds throughout the basin, but natural conditions and processes also dictate current conditions. Management activities that have had negative impacts on fish, water quality and aquatic resources, include road building, timber harvest, channel cleanout and straightening, water diversions, hydroelectric development, residential developments, 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 complexity and large woody debris, and loss of pools

[2] Hamilton Creek subwatershed was assessed for potential road decommissioning; however, no roads are proposed for decommissioning in this analysis.

from historic reference conditions. Despite past impacts, most streams within the nine watersheds contain fair to good quality habitat for aquatic species.

All of the watersheds in this EA either directly provide rearing habitat and/or high quality water downstream to regionally significant fish runs within the lower Columbia Basin. Despite their significance, most anadromous fish stocks and populations have declined from historic levels with most stocks diminished to the point of being federally listed as threatened species. Lower Columbia (LCR) steelhead (*Oncorhynchus mykiss*), Lower Columbia Chinook (LCR) salmon (*Oncorhynchus tshawytscha*), Upper Willamette (UWR) Chinook salmon (*Oncorhynchus tshawytscha*), and Lower Columbia (LCR) coho salmon (*Oncorhynchus kisutch*) are found within or directly downstream some distance of the watershed areas in this project. These species and their designated critical habitat are listed as Threatened and are protected under the Endangered Species Act (ESA). Other fish occupying these watersheds include large-scale suckers (*Catostomus balteatus*), sculpin (*Cottus species*), longnose dace (*Rhinichthys cataractae*), and pacific lamprey (*Lampetra tridentate*). All of the subwatersheds within the project area support populations of resident rainbow (*Oncorhynchus mykiss*) and/or cutthroat trout (*Oncorhynchus clarki*). Another federally listed migratory fish, bull trout (*Salvelinus confluentus*), have occasionally been caught in recent years within the lower Sandy River watershed but their life history status within the basin is unknown.

Environmental Effects

Alternative 2 – Proposed Action and Alternative 3

Impacts to fisheries and aquatic resources caused by the implementation of Alternatives 2 and 3 would be similar. Both alternatives have similar potential to cause a short-term degradation of water quality by increasing sediment delivery to streams. This sediment input could increase turbidity and fine sediment deposition, which may have an effect on aquatic species and special status species and their habitats.

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. 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 (as described in Section 2.4), 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 would have short-term, construction-related effects.

Indirect Effects – Short Term

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 downstream impacts from increased amount of fine sediments are degradation of spawning habitat, a reduction in rearing habitat caused by sediments filling in pools and reduced water quality for domestic drinking water. 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 Alternative 2 and 3 is expected to be low due to the time of year when the projects are implemented 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 still present. By following ODFW in-stream work guidelines, project design criteria, use of aggressive erosion control measures, and adherence to applicable BMP focusing on reducing sediment production, would insure that any effects to aquatic species or their habitats would be negligible at the watershed scale.

Indirect Effects – Long Term

In the long term, road decommissioning would decrease artificial watershed drainage networks that can contribute to elevated peak flows, eliminate stream-road crossings and impassable barriers to aquatic organisms, and reduce areas of soil compaction. Long-term beneficial effects to both fish species and their critical habitat and to special status species and to water quality would occur. 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 and aquatic organisms to move more naturally through these stream and river systems.

Cumulative Effects

There have been many management actions in the past that have affected fish habitat and water quality and there are also many ongoing restoration actions designed to restore fish habitat and improve water quality including side-channel enhancement, addition of large woody debris to streams, restoration thinning, and past and current road decommissioning projects that have at least, short-term effects. Other potential cumulative effect might involve "danger" (hazard) tree removal along roads, Oregon Department of Transportation widening of State Highway 26, and road decommissioning and aquatic restoration projects occurring on nearby Bureau of Land Management and Forest Service properties. The cumulative effects analysis for fish, aquatic resources, and water quality focuses on increases in peak stream flows and fine sediment input into streams. In areas where there are many created openings and roads in the transient snow zone, peak flow increases result from rapid snow melt during rain-on-snow events (Christner 1982). Peak flow increases can also result as a side-effect from the more efficient routing of water to streams by road drainage ditches. Sediment transport to stream systems can result from surface erosion during a rainfall event from areas where soil has been disturbed during treatment activities and prior to protective vegetation being re-established. Potential stream temperature increases can result from the loss of stream shading following land treatment activities that disturb riparian vegetation.

Adherence to BMPs, mitigation measures and project design criteria would minimize the contribution that this project would have to cumulative effects. In the long term, the action alternatives (Alternatives 2 and 3) would 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 would be implemented over multiple years in a number of different subwatersheds. The recovery from short-term effects from one project may be completed 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. The Fisheries Programmatic Biological Opinions (NMFS) contain guidance for spreading out the impacts of restoration projects so that only a few of them occur cumulatively in any given year.

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 and other aquatic species populations above and below man-made barriers, restoration of hydrologic function, and more natural routing of wood and sediment through stream systems.

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

The 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.

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 either in the past or currently. 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 3.12. List of Proposed, Endangered, Threatened, or Sensitive (PETS) Fish and Aquatic Mollusk Species found on the Forest and the effects of this project.

	Date of Listing & Critical Habitat	Suitable Habitat Present	Species Present	Effects of Alternatives		
Endangered Species Act Listing by ESU/DPS: Threatened				**Alt 1**	**Alt 2**	**Alt 3**
Lower Columbia River steelhead & CH (*Oncorhynchus mykiss*)	3/98 9/05	Y	Y	NE	LAA	LAA
Lower Columbia River Chinook & CH (*Oncorhynchus tshawytscha*)	3/99 9/05	Y	Y	NE	LAA	LAA
Columbia River Bull Trout* (*Salvelinus confluentus*)	6/98	Y	N	NE	NE	NE
Middle Columbia River steelhead & CH (*Oncorhynchus mykiss*)	3/99 9/05	Y	N	NE	NE	NE
Upper Willamette River Chinook & CH (*Oncorhynchus tshawytscha)*	3/99 9/05	Y	N	NE	NE	NE
Lower Columbia River coho* & CH *(Oncorhynchus kisutch)*	6/05	Y	Y	NE	LAA	LAA
Regional Forester's Special Status Species List						
Interior Redband Trout *(Oncorhynchus mykiss spp.)*	7/04	Y	UNK	NI	NI	NI
Columbia duskysnail *(Colligyrus sp. nov. 1)*	1/08	Y	UNK	NI	MIIH	MIIH
Barren Juga *(Juga hemphilli hemphilli)*	1/08	Y	UNK	NI	MIIH	MIIH
Purple-lipped Juga *(Juga hemphilli maupinensis)*	1/08	Y	UNK	NI	MIIH	MIIH
Scott's Apatanian Caddisfly *(Allomyia scotti)*	1/08	Y	UNK	NI	MIIH	MIIH

Endangered Species Act Abbreviations/ Acronyms:		**Essential Fish Habitat Abbreviations/ Acronyms:**	
NE	No Effect	NAA	Not Adversely Affected
NLAA	May Affect, Not Likely to Adversely Affect	AE	Adverse Effects
LAA	May Affect, Likely to Adversely Affect		
LOBA	May Affect, Likely to Only Beneficially Affect		
Regional Forester's Special Status Species List Abbreviations/ Acronyms:			
Unk	Species presence unknown but suspected		
NI	No Impact		

MIIH	May impact individuals or habitat, but will not likely contribute to a trend towards Federal listing or loss of viability to the population or species

*****Critical habitat is not designated for these species on Federal lands

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 both 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 alternative would not significantly affect habitat or species persistence at each site.

Effects Determination to ESA Listed Fish

The implementation of road decommissioning and culvert removal projects in Alternatives 2 and 3, which occur in a Riparian Reserve warrants a ***May Affect, Likely to Adversely Affect*** **(LAA)** determination for threatened LCR steelhead, LCR chinook, and LCR coho salmon found in or downstream of the project area. This is due to the probability of take, in terms of harassment and the potential for short-term increases of sediment into the stream channel which these species reproduce, rear or feed in.

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 LCR chinook and LCR steelhead occurs in close proximity or downstream of many of the proposed project areas in the mainstem Sandy River, Zigzag River, and some of the connected tributaries. 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 Sandy and Clackamas Rivers and their 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 occur. 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 widely within the Sandy River Basin, the Eagle Creek, Tanner Creek, and Hamilton Creek watersheds where project work will occur and within many waters of Mt. Hood National Forest in general. Chinook and coho salmon utilize mainstem as well as tributaries 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.

Effects Determination to Regional Forester's Special Status Species

The effects determination for special status species for Alternatives 2 and 3 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 are not known to occur within the Sandy River basin therefore, the effects determination is ***No Effect*** **(NE)** for this species.

3.4 Wildlife

The Biological Evaluation (BE) for this project is located in the project file located at the Supervisor's Office in Sandy, Oregon. The BE is incorporated by reference and summarized in the analysis below. Informal consultation for the Northern Spotted Owl (disturbance only) is required for this project. This project is consistent with the Letter of Concurrence from the U.S. Fish and Wildlife Service dated August 20, 2009, subject: Biological Assessment of activities with potential to disturb Northern Spotted Owls – FY 2010-2013.

The Management Indicator Species (MIS) found in the project area include the northern spotted owl, pileated woodpecker, pine marten, deer, elk, salmonid smolts, and legal trout (Forest Plan p. four-13).

Northern Spotted Owl (Threatened)

Habitat Characteristics

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 defined as either suitable or dispersal habitat. Suitable habitat for the owl consists of habitat used by owls for nesting, roosting, and foraging (NFR). Generally suitable habitat is 120 years of age or older, multi-storied and has sufficient snags and down wood to provide opportunities for NFR. 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.

Existing Condition of Project Area

Many of the roads proposed for decommissioning occur within spotted owl habitat. Two of these roads occur within a Late-Successional Reserve 100 (LSR 100). Many of the roads occur within the 1998 Spotted Owl Critical Habitat Unit (CHU, OR-9 or OR- 10). Part of the project area also occurs within an Oregon Managed Owl Conservation Area (OMOCA-01). However, the project proposal does not involve the removal of suitable or dispersal habitat for spotted owls.

Direct and Indirect Effects – Northern Spotted Owl (Threatened)

Alternative 1 – No Action

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. However, 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 spotted owl habitat.

Alternative 2 (Proposed Action) and Alternative 3

Effects to Owl Habitat

The Proposed Action includes decommissioning about 42 miles of roads within nine subwatersheds. Alternative 3 would decommission about 45 miles of road. 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. In the long-term the decommissioned roads would grow into forest stands and would likely produce more prey than on the current roads. These roads would likely become dispersal or suitable habitat for the spotted owl in the future. Alternative 3 has a slightly greater area that could potentially become spotted owl habitat in the future because it decommissions three more miles of roads.

A high fire hazard situation exists in some parts of the project area. 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. This reduction in habitat for the spotted owl could have negative effects to the spotted owl population residing in the area.

In the action alternatives, 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. Alternative 3 has slightly more roads proposed for decommissioning than the Proposed Action and therefore would have a slightly increased potential for a greater loss of spotted owl habitat due to wildfire.

Because the loss of habitat from a fire is only hypothetical, there would be no effects to spotted owl habitat from habitat alteration or removal.

Effects to Spotted Owl from Disturbance

Based on anecdotal information and effects to other bird species, significant noise, smoke and human presence can 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 the proposed actions, 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 effects is mainly associated with breeding behavior at active nest sites.

The proposed action would occur in proximity to several spotted owl activity centers as well as un-surveyed suitable habitat and have the potential to disrupt the normal behavior patterns of individual owls or breeding pairs potentially at the site. In the Central Cascades, 86 percent of owl young 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 decommissioning activities would comply with the standards contained within the Biological Assessment of Activities with the Potential to Disturb Spotted Owls, Willamette Planning Province – FY 2010-2013, and the associated Letter of Concurrence. These standards 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 1st – July 15th). This standard equates to the following seasonal restrictions:
    - Chainsaw Use: Restricted during March 1st to July 15th if within 65 yards of a known or predicted owl site.
    - Heavy Equipment: Restricted during March 1st to July 15th if within 35 yards of a known or predicted owl site.
    - Helicopter or aircraft fixed wing use: Restricted during March 1st to July 15th if within 120 yards of a known or predicted owl site.

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

For this project, there are two historic and one predicted activity center within close proximity to the proposed road decommissioning. Since the current location of the nest trees is not known, the 300 meter no treatment buffer will need to be used. If the location of the nest site is found prior to project implementation, the no treatment buffers listed above may be used.

Table 3.13. Roads within close proximity to spotted owl activity centers and seasonal restrictions that may be necessary.

Road Number	Seasonal Restriction	Historic/Predicted Activity Center
3626-110	March 1st to July 15th	Historic
1825-052	March 1st to July 15th	Historic
1825-053	March 1st to July 15th	Predicted

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. Disturbance from the proposed actions are not likely to adversely affect spotted owls because although adverse effects are possible, they are not reasonably certain to occur. No additional restrictions are required in the Late Successional Reserves or 1998 Critical Habitat Units or OMOCAs.

Cumulative Effects – Northern Spotted Owl (Threatened)

A cumulative effects analysis has not been conducted for this species since there would be no impacts to spotted owl habitat, and the effects to spotted owls from disturbance are expected to be minimal.

Endangered Species Act Compliance

The northern spotted owl is listed as threatened throughout its range under the Endangered Species Act (55 CFR 26114) on June 22, 1990. Any action that would result in a beneficial effect or could result in an adverse impact to the spotted owl would result in a may affect determination and would require consultation with the U.S. Fish and Wildlife Service.

Negative effects are possible for "disturbance only". Therefore, the proposed actions contained in this project are covered under the Spotted Owl Programmatic Disturbance Biological Assessment for the Willamette Province – FY 2010 to 2013 and associated Letter of Concurrence. If any of the proposed actions are implemented after September 30, 2013, the appropriate level of consultation will need to have been completed for the project to occur. Consultation requirements have been completed.

Special Status Species

The following table summarizes effects to Sensitive Species from the Biological Evaluation which is incorporated by reference.

Table 3.14. List of sensitive species and the effect of this project.

Species	Suitable Habitat Presence	Impact of Alternatives 2 and 3
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	No	No Impact
Townsend's Big-eared Bat	No	No Impact
Fringed Myotis	No	No Impact
California Wolverine	Yes	No Impact
Puget Oregonian	No	No Impact
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

* "NI" = No Impact
"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, falling and dragging trees, and noise.

Effects of Rare and Uncommon Species

The Puget Oregonian, Columbia Oregonian, evening fieldslug, Crater Lake tightcoil and crowned tightcoil are ***terrestrial mollusk*** species with ranges that include the project area. 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.

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.

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.

Habitat for ***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 conducted for this species due to lack of impacts to habitat.

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. If there is a road that crosses within 100 meters of a meadow or natural open area ten acres or greater, a seasonal restriction would be required to avoid potential disturbance to this species during the breeding season.

- Canada lynx: This species is federally listed as threatened, but is not known or suspected to occur on the 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 be assessed for bat habitat. If bats are found to be using a bridge, then additional bat roosting habitat (e.g., bat boxes or snags) would be provided in the vicinity of the bridge.

Direct and Indirect Effects – Snags and Terrestrial Down Wood

<u>Alternative 1 – No Action</u>

No effect to the snag and terrestrial down wood habitat components would occur with the no-action alternative.

Alternative 2 (Proposed Action) and Alternative 3

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 – Snags and Terrestrial Down Wood

There would be no cumulative effects due to lack of direct and indirect effects.

Deer and Elk Habitat (Management Indicator Species)

Roosevelt elk herds on the Zigzag Ranger District likely exhibit a close association with riparian habitat in areas of gentle terrain and low road density. Elk tend to frequent often 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 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.

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; several miles per day was not uncommon.

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 infrequently occurs on the district, few elk remain today due to a lack of forage.

Most of the Forest Plan Standards and Guidelines have minimum requirements for optimal cover and thermal cover habitat components but no specific level for hiding cover or forage. Briefly thermal cover for elk is defined as a stand of coniferous trees at least 40 feet tall with an average crown closure of 70 percent or more. Thermal cover for deer may include saplings, shrubs, or trees at least five feet tall with a 75 percent crown closure. Optimal cover is found mainly in multi-storied mature and old growth stands. Available thermal cover, especially optimal cover is important to over-wintering deer and elk, especially in cold hard winters. Minimum levels of optimum and thermal cover are set under the Forest Plan.

The Forest Plan states that motorized vehicular traffic should be reduced to not exceed two miles per square mile within inventoried deer and elk winter range and 2.5 miles per square mile within deer and elk summer range. Key summer and winter range should not exceed 1.5 miles

per square mile. Area analysis was conducted by fixed analysis areas, known collectively as Range X. 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.

Direct, Indirect and Cumulative Effects – Deer and Elk

Alternative 1 (No Action)

Elk and deer populations would continue to decline as a result of fewer openings providing forage for the ungulates. There would be no disturbance created as a result of implementation of the proposed road decommissioning. 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 closures.

Alternative 2 (Proposed Action) and Alternative 3

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 revegatate and provide additional forage and cover for the deer and elk residing in the area. The proposed road decommissioning occurs within summer and winter range for deer and elk.

Up to 43 miles in Alternative 2 and 46 miles in Alternative 3 would be decommissioned, therefore preventing most motorized traffic from traveling on the road. The proposed road decommissioning would occur scattered throughout the eight subwatersheds and would reduce the current road density of 127 miles to 85 miles in Alternative 2 and 81 miles in Alternative 3 in both summer and winter range.

The proposed road decommissioning occurs within summer (SR) and winter range (WR) for deer and elk. The following Table displays the amount of roads being closed in winter and summer range.

Table 3-15. Road decommissioning in ungulate summer/winter range.

Range Designation	Miles of road decommissioning proposed for Alternative 2 (Proposed Action)	Miles of road decommissioning proposed for Alternative 3
Summer range	29	32
Winter range	17	18

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 the proposed road closures

Table 3-16. Road density analysis.

Analysis area	Total acres	Miles of road currently open	Alternative 1 (No Action)	Forest Plan Standard (mi./sq.mi.)	Alternative 2 (Proposed Action)	Alternative 2 (Proposed Action)	Alternative 3	Alternative 3
			Open road density (mi./sq.mi.)		Proposed road closures (miles)	Open road density (mi./sq.mi.)	Proposed road closures (miles)	Open road density (mi./sq.mi.)
Clear Creek SR*	5852	16.0	1.7	**2.5**	0.9	**0.7**	0.9	**0.7**
Clear Creek WR**	6943	22.1	2.0	**2.0**	7.1	**1.4**	7.1	**1.4**
Gordon Creek SR	2647	5.6	1.4	**2.5**	2.3	**0.6**	2.3	**0.6**
Gordon Creek WR	5656	12.5	1.4	**2.0**	3.5	**0.9**	3.5	**0.9**
Headwaters Sandy SR	7191	33.8	3.0	**2.5**	11.8	**1.6**	11.8	**1.6**
South Clear Creek SR	2871	3.8	0.8	**2.5**	2.9	**0.2**	2.9	**0.2**
Tanner Creek SR	5240	6.6	0.8	**2.5**	1.3	**0.2**	1.3	**0.2**
Wildcat SR	3415	16.3	3.1	**2.5**	7.5	**1.6**	10.5	**1.1**
Wildcat WR	4559	11.6	1.6	**2.0**	5.1	**0.9**	6.0	**0.8**
Zigzag Canyon SR	4589	16.4	2.6	**2.5**	3.1	**2.1**	3.1	**2.1**
Zigzag Canyon WR	4068	20.9	3.3	**2.0**	1.4	**3.1**	1.4	**3.1**

*SR = Summer Range
**WR = Winter Range

Currently seven out of the 11 Range X Analysis Areas currently meet or exceed Road Density Forest Plan Standards. Implementation of the action alternatives would further reduce road densities for these areas. The remaining four Range X areas (Headwaters Sandy SR, Wildcat SR, Zigzag Canyon SR and WR.) currently do not meet Forest Plan Standards. Implementation of both action alternatives would decommission enough roads for three of these four Range X Areas to exceed Forest Plan Road Density Standards. Only Zigzag Canyon WR would still not meet Standards. The reason it does not meet is because this area contains a portion of Highway 26 and the Summer Home Area of the District. It is not feasible to close the highway or the roads providing access to the Summer Homes. The road density of 3.1 miles per square mile is likely close to the lowest level this area is capable of achieving while still allowing the access needs described above.

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 most substantial in the four winter ranges in the project area. By reducing road densities in these areas, crucial winter habitat would be improved. Habitat for ungulates would be slightly more improved in alternative 3 than 2 due to the increase in road decommissioning.

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 and related activities. Due to the abundance of similar quality habitat in the surrounding area, individuals would be able to alter their foraging and dispersal patterns to another area. 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 road decommissioning would improve the habitat being provided for deer and elk, a lack of 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 which was historically the ungulates source for forage. This continuing lack of forage would continue to suppress ungulate numbers in the project area. Although the level of road closures in the watershed would improve security for the ungulates, it would not be able to off-set the negative effects of forage reduction. Populations would continue to decline in the future.

There is an increased risk of a wildfire due to the decrease in the road network. This could potentially increase habitat for ungulates by creating large amounts of forage. However, wildfire is a hypothetical and natural element of nature.

Pine Marten & Pileated Woodpecker (Management Indicator Species)

The status and condition of management indicator species are presumed to represent the status and condition of many other species. This EA 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 a 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)

Pine 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 – Pine Marten & Pileated Woodpecker

Alternative 1 (No Action)

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.

Alternative 2 (Proposed Action) and Alternative 3

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 closures, 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.
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 more pileated woodpecker and pine marten habitat.

No cumulative effects anticipated from this project.

Land Birds

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 within the watershed 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 (USDA 1995).

Direct and Indirect Effects – Land Birds

Alternative 1 (No Action)

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 opportunites and can increase species richness, but it can also introduce an increase in predation and nest parasitism.

Alternative 2 (Proposed Action) and Alternative 3

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.

Increased risk from wildfires by reducing road densities would have a short-term negative effect on the production of some species in the year of the fire, but in the long term some species that require early seral habitats would increase while late-seral species would decline. Some species would benefit from the increase in snag numbers from the fire.

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.
No cumulative effects anticipated from this project.

3.5 Recreation

Affected Environment

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 is approximately 3,400 total miles of roads on the Forest. This 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, 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 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.

Of particular concern to recreation users are roads that access trailheads. Roads to campgrounds are generally major roads not considered for closure. Roads that access more remote trailheads may be considered for closure. In some cases, there may be a proposal to "convert the road to a trail". This has the potential to change the scenic trail setting as a decommissioned road has a much wider clearing, longer sight lines, and a full bench construction. In addition, converting roads to trails can lengthen the hike on the trail making a particular destination longer, or making it unlikely to be used by day hikers when it is too long.

Many of these roads being considered for closure are gravel or native surface roads that are currently 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". The Forest has issued a Draft Environmental Impact Statement (DEIS) for OHV Management Plan in August 2009 that will define and designate OHV riding areas for four-wheel drive trucks, quads, motorcycles, and sand rails. This will restrict use on many of the gravel and native surface system and user-created roads and off-road areas that non-street legal off-road vehicles currently access. None of the drainages being considered in this EA are proposed as a designated OHV location in the DEIS for OHV Management Plan. Therefore, roads considered for closure in this EA may be affected by the travel management planning process.

Some of the roads considered in this EA 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 at 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; however, in many cases, these inappropriate uses move to other open roads rather than being eliminated all together. 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. Several areas with proposed road closures have specific issues associated with them including adverse impacts to recreation users associated with previous active or passive road closures that may be further aggravated by the proposed action. Also, some have continuing management problems summarized above that may benefit from proposed actions. Following are some more site specific known recreation use patterns and management issues by area:

Wildcat Mountain Area (North Fork Eagle Creek, Wildcat Creek, Cedar Creek): Douglas and Plaza Trails and the Wildcat Quarry

The existing trailhead for Douglas, McIntyre and Plaza Trails is currently located at the end of the Wildcat Quarry, a large open area also used for drinking parties, OHV use, dumping, and especially target shooting. Some OHVs (motorcycles and quads) are trespassing onto the Douglas and McIntyre Ridge Trails, which are in wilderness. Shooters tend to be unaware of the close proximity of the Douglas Trail that surrounds two sides of the quarry and signs to make them aware get shot up. The District regularly gets calls and emails from hikers and equestrians who feared returning to their cars as they felt they had to walk into the line of fire to get back to the trailhead. A Code of Federal Regulation prohibiting shooting in the area has not been very successful as the signs posting the restriction are regularly shot up. Even gunfire resistant signs have been destroyed routinely. Illegal dumping is also pervasive and constant. "Dump Stoppers", a joint Forest Service and County funded program that cleans up large dump sites, comes and cleans up some of the larger messes (abandoned cars, appliances, construction materials); however, the prolific shell casings, broken glass, and smaller trash is a constant problem. The basic problem of having the trailhead located in the quarry is that it is far larger than needed to provide hiker and equestrian parking, and therefore invites these other conflicting uses.

Lower Douglas, Douglas Tie and Eagle Creek Trailhead

There is a trailhead on Road 3626-255 that accessed lower Douglas, Douglas Tie, and Eagle Creek Trails. Many people used this trailhead as an alternative to the Wildcat Quarry Trailhead for Douglas to avoid the shooting and other safety issues. There is currently trailhead access to the Eagle Creek Trail from the small community of George several miles away; however it is very limited in size, is on Bureau of Land Management (BLM) lands, and the BLM has been interested in closing the trailhead access road at least one mile back from the trailhead. When the BLM proposed closing the trailhead near George, the Forest built the "Douglas Tie Trail" to ensure the public had access to both Douglas and Eagle Creek trails. After the Tie Trail was constructed several years ago, access to the Road 255 trailhead was blocked when an abandoned car was burned on the bridge over Eagle Creek and destroyed the bridge. Subsequently, Road

3626-255 was blocked at Road 3626 eliminating this trailhead and convenient access to the lower part of Douglas, Douglas Tie and Eagle Creek Trails.

McIntyre Ridge Trail

The trailhead to McIntyre Ridge was previously located off of Highway 26 west of Brightwood. The BLM closed Road 110 with little warning, because of significant OHV damage in the area. This effectively closed access to the McIntyre Ridge Trail, which was three miles beyond the barrier. Hikers wanting to access McIntyre must park at Wildcat Quarry described above.

OHV Use in Wildcat Mountain Area

There are numerous system and user-created roads and OHV trails in the Wildcat Mountain area that have both legal and illegal OHV use with occasional trespass onto the McIntyre Ridge and Douglas Trails and into designated wilderness. Some of the roads were illegally extended by OHV users to connect with roads located on BLM lands and private timber company lands to the north in sections 33, 34 and 35. Most of those have been blocked with some success, although motorcycles and quads can still maneuver around the barriers. In 2006, the District funded a large scale effort to block illegal OHV routes with huge rocks in the Wildcat Mountain area. This has had some success, although some barriers have been breached, and users have developed new user OHV trails since then. In 2009, Congress expanded sections of the Salmon-Huckleberry Wilderness to include portions of the Wildcat Mountain area including some of the OHV use areas. The Mt. Hood OHV Management Plan DEIS does not propose any designated OHV locations in the Wildcat Mountain area.

The closure of trailhead access to Lower Douglas, Douglas Tie, Eagle Creek and McIntyre Ridge, combined with the extreme user conflicts (shooting, dumping, lack of signs, vehicle vandalism, etc.) present at the main Douglas Trailhead at Wildcat Quarry has been a source of numerous complaints from the recreating public. In addition, there are many roads in the Wildcat Mountain area that are also popular for dumping, inappropriate target shooting (shooting dumped junk, trees off the stump, etc.) and as jump off points for illegal OHV use. Closing some of these roads may reduce these problems at least in the immediate area.

Sandy River, Clear Creek of the Sandy River, Old Maid Flat Area, and Lolo Pass Area

The Old Maid Flat area is a special geologic area designated in the Forest Plan. It contains three developed campgrounds, five major trailheads, numerous dispersed sites and popular mushroom picking habitat. Several of the affected roads being considered in this EA have had dispersed sites multiply over time as well as new "user-created" roads become established or lengthened. The ground is fairly flat and with open grown vegetation making it easier to take vehicles off road. Many of the popular dispersed campsites are located along the banks of the Sandy River. The growing non-system roads and OHV use has adversely impacted the sensitive moss and vegetation in the area. Dispersed sites and some roads are also magnets for dumping, human waste, escaped campfires, and tree damage. In 2009, the Mt. Hood Wilderness was expanded to areas within Old Maid Flat. Some of the roads proposed for closure are now in designated wilderness.

The Riley Horse Camp Day Use parking area is the trailhead for the Horseshoe, Cast Creek, and Sandy River Trails. Road 1825-380, beyond Riley Horse Camp, accesses the Cast Creek Trail and two upper sections of the Horseshoe Trail. Some hikers park up at these "unofficial" trailheads. Equestrians staying at the campground use a combination of the 380 road and the Horseshoe Trail as a short loop ride. Some mountain bikers that live in the area also ride up the 380 road. In spring 2009, the 380 road washed out partially blocking access to these upper trailheads. Equestrians were not blocked from using the road.

Zigzag Canyon

The Zigzag Canyon area includes the Camp Creek drainage. The area has numerous campgrounds, trails, summer homes, and dispersed recreation use areas. The area affected by the proposed action includes a collection of dispersed sites near Camp Creek in the area below Laurel Hill Quarry. The roads include 2600-038, 072, 086, and 092. These roads also are used by mountain bikers that want to get off of the Pioneer Bridle Road where it parallels Highway 26 with all its noise. Road 2627 east of the first switchback has a few dispersed sites and is used by local summer home owners for hiking and some OHV use (motorcycles and quads) occasionally.

Gordon Creek and Tanner Creek

The Gordon Creek area is located on the western flanks of popular and scenic Larch Mountain. It is the watershed for the town of Corbett. Forest Road 15 takes recreationists to nearly the summit of Larch Mountain ending at Sherrard Point Picnic Area with views of five Cascade peaks. The road system south west of the road to the summit, Roads 20 and 1509 were blocked with gates more than ten years ago due to illegal target shooting, dumping and other inappropriate uses that could adversely affect the Corbett Watershed. The loop roads behind the gates are used by dispersed recreationists for mountain bike riding, horseback riding, hiking, hunting, and special forest product collection. Gating the area has greatly reduced the previous dumping and target shooting problems.

Tanner Creek drainage is mostly roadless. Only one road (Road 2030-050) would be considered in this EA. The 050 is likely used by hunters and other recreation users wanting to access a large rugged roadless area.

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 of the problem areas described in the affected environment section, that are prone to illegal and more nefarious uses. As mentioned in the affected environment, 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 under the No Action Alternative.

The Mt. Hood OHV Management Plan DEIS issued in August 2009 will establish OHV locations when it is finalized. Since none of the locations proposed for designated OHV use in the DEIS are located in drainages considered in this EA, then it is possible that the existing OHV use patterns and illegal OHV use problems would continue. This would make enforcement of any future decisions made under the OHV Management Plan DEIS difficult to implement under the No Action Alternative.

Specific problem areas include the Wildcat Mountain area (Wildcat Creek-North Fork Eagle Creek). Trail users in the area would continue to have restricted access to the McIntyre Ridge Trail, Lower Douglas, and Douglas Tie Trail. The problems with OHV use, wilderness trespass, dumping, dumping, car stripping, trail user safety and inappropriate target shooting would continue under the No Action Alternative. The Old Maid Flat area (Clear Creek – Sandy River) would continue existing recreational use patterns as well as uses that adversely impact the sensitive natural resources and designated wilderness areas in the area. Recreationists currently using the Zigzag Canyon area, Tanner Creek or Gordon Creek area behind the gates would have no effects to these use patterns under the No Action Alternative.

Alternative 2 – Proposed Action

The Proposed Action would close over 42 miles of roads in eight drainages on the Zigzag 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 closure access hunting grounds, fishing holes, and special forest product collection areas. Closure of 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. It would help address some of the management problems on these roads. It would also help restore larger areas of unroaded areas for hikers wanting larger unroaded areas. Below is a more site specific discussion of the effects of the Proposed Action on recreation users by area.

Wildcat Mountain Area (Wildcat Creek, North Fork Eagle Creek, and Cedar Creek): Douglas and Plaza Trails and Wildcat Quarry

Alternative 2 would close public access to the Wildcat Quarry to reduce long standing safety and management issues. The Douglas Trailhead would be relocated to a more confined area along the upper section of Road 3626-105 where it is within 100 feet of the Douglas Trail. The trailhead would be constructed to allow access for horse trailer turn-around and the part of the 105 road beyond the trailhead would be decommissioned. The relocation and large reduction in area established for the trailhead would eliminate or at least reduce the scope of many of the user conflicts that were present when the trailhead was located within the large, unconfined quarry. The new trailhead location would be less attractive to large drinking parties, people dumping, or target shooting. Trail users would not be as likely to be shot at, or their vehicles vandalized. Dumpers and car thieves would have fewer and more visible areas to dump or strip cars. While it is hopeful to assume these problems would be eliminated as a result of moving the trailhead, it is more likely that these inappropriate or illegal uses would move to some other location on the Forest. At least the numerous conflicts with the trail users would be reduced in this area under the Proposed Action.

Lower Douglas, Douglas Tie and Eagle Creek Trail

Alternative 2 would leave part of Road 3626-155 and part of Road 3626-255 open to re-establish access to the lower Douglas Trailhead in the future by constructing a third of a mile of road[3] to connect the 155 road and 255 road south of the North Fork of Eagle Creek. The road would be located within a 15-year old clear cut harvest unit. Analysis for construction of the 1/3 mile would be done under a separate NEPA document when funding becomes available. The northern section of Road 3626-255 between 3626 and the new spur road as well as the section of Road 255 beyond (west of) the trailhead would be decommissioned, including the old burned up bridge crossing. The section of Road 3626-155 would be closed beyond (south) the new spur road leading to 255. Reopening the access to the Lower Douglas Trailhead would provide access to the lower part of the Douglas Trail, the Douglas Tie Trail, and the Eagle Creek Trail. If BLM closes access to the Eagle Creek Trail in the future, this re-established Lower Douglas Trailhead would allow continued access to this special trail. While equestrians are not as hampered by longer travel distances when trailheads are blocked, day hikers are definitely limited in their hiking opportunities.

McIntyre Ridge Trail

Alternative 2 would restore access to the McIntyre Ridge Trail by establishing a trailhead at the end of the 3626-108 spur. There is a small turn-around at this location that would be expanded to allow for equestrian trailer access and parking. The new trailhead location is about 100 feet from the trail. Additional barriers would be needed at the end of the 108 spur to limit OHV access beyond the trailhead and onto the trail itself.

OHV and Dispersed Recreation Use in Wildcat Mountain Area

Alternative 2 would close over 12 miles of the remaining roads in the Wildcat Mountain area not leading to a (re-established or relocated) trailhead. These include all roads north of 3626 except 3626-108 and all roads south of Road 3626, including those in and around the Wildcat Quarry, except sections of Roads 3626-105, 155, and 255. More than half of the road mileage planned for decommissioning could be delayed for anywhere from five to ten years after planned thinning of timber stands. Closure and future decommissioning of these roads would restrict legitimate vehicle use and limit OHV access. Since the Wildcat Mountain area is not considered as one of the proposed OHV areas in the OHV Travel Management DEIS, then the closure and decommissioning would help limit illegal OHV use of these areas in the future, as well as trespass onto the private timberland and BLM areas to the north. Illegal OHV use is difficult to control or enforce when there are so many access points on both system roads and user-created roads and trails. Closure including delayed closure, of the roads under this alternative would

[3] This project does not propose to construct any roads. This alternative simply does not forgo any future opportunities to re-establish access to the existing Douglas Trailhead. Additional NEPA analysis would be required if decided access is needed at this particular location.

also limit legitimate dispersed recreational use of these areas including target shooting, dispersed camping, collection of special forest products, and recreational driving. Closure of these roads would greatly reduce dumping, illegal target shooting and high school partying that currently takes place in the area. Delayed closure of the roads would perpetuate the need to manage these problems until the roads are closed.

Sandy River, Clear Creek, and Old Maid Flat Area

Alternative 2 proposes to close 23 miles of Forest roads in the Sandy River and Clear Creek drainages. These include popular spur roads that access dispersed sites along the Sandy River (Roads 1825-043, 050 and 055). It would close roads used for past timber sales that access higher elevations that offer views of the Old Maid Flat area (Roads 1825-101,111, 388, and Roads 1828-180 and 011). It would also close and decommission the longer mid-slope Road 1825-125 above Clear Creek. There are some dispersed sites along this road as well as presumed hunting access that would be affected by this closure. Alternative 2 would also close and decommission Road 1825-380 above Riley Horse Camp past the crossing with Cast Creek Trail. As explained in the affected environment, this road is used as a riding loop (along with Horseshoe Trail) by equestrians. Also scoping for the EA indicated that local mountain bike riders also use this road for mountain bike riding. Decommissioning the road would remove large and deeply buried culverts along this road making it unlikely that existing uses could continue on this road, or at least parts of it. The removed culverts would leave fairly steep banks at the crossings with Cast Creek and Short Creek making it difficult to cross the creeks even with horses.

Alternative 2 would close many roads in the Old Maid Flat and Lolo Pass area that are relatively popular to dispersed recreationists. These recreationists may choose to hike in to use their traditional use areas or they would be displaced to other areas accessible by remaining roads.

Zigzag Canyon

Alternative 2 would close roads in the Camp Creek/laurel Hill quarry area blocking access to the dispersed sites in the area. It would also reduce problems with dumping and target shooting where large amounts of shells are left on site. Mountain bikers that use these roads as an alternative to the Pioneer Bridle along Highway 26 may still be able to use their route if the decommissioning did not completely eliminate the tread. Local summer home owners and recreation users that access Road 2627, east of the first switchback on Enola Hill, would be able to hike in the area. Access to dispersed sites would be limited.

Gordon Creek and Tanner Creek

Alternative 2 would decommission Forest Road 20 and several spur roads in the area effectively eliminating the "Road 1509-Road 20 loop" used by hikers and mountain bikers. It is possible hikers may still be able to access the loop, but mountain bikes may be displaced. Alternative 2 would decommission the 1.3 miles of Road 2030-050 in Tanner Creek.

<u>Alternative 3</u>

Alternative 3 would close over 46 miles of roads in eight drainages on the Zigzag Ranger District. Most of the 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.

Wildcat Mountain Area (Wildcat Creek, North Fork Eagle Creek, Cedar Creek) and Douglas and Plaza Trails and Wildcat Quarry

Alternative 3 would not relocate the Douglas Trailhead out of the Wildcat Quarry. It would close the 3626-105 spur road that provided alternative trailhead access in Alternative 2. The effects to trail users would be similar to the No Action Alternative 1. In addition, the illegal OHV use and vehicle trespass onto the trails, dumping, illegal target shooting, car stripping, large parties, sign destruction and other significant safety and management issues would continue to occur in Alternative 3.

Lower Douglas, Douglas Tie and Eagle Creek Trail

Alternative 3 would decommission both the 3626-155 and 255 roads thereby eliminating the existing Lower Douglas Trailhead. Users would need to access these trails from the Wildcat Quarry (see above) with all its associated user conflicts. In addition, if the BLM closes access to the Eagle Creek Trailhead near the town of George in the future, it would possibly eliminate access to the Eagle Creek Trail altogether, especially for hikers who would have to hike an additional eight miles round trip to access the Eagle Creek Trail.

McIntyre Ridge Trail

The effects of Alternative 3 are the same as Alternative 2.

OHV and Dispersed Recreation Use in Wildcat Mountain Area

Alternative 3 would close over 16.5 miles of road in the Wildcat Mountain area. This represents all roads in the area except for 3626 to the intersection with 3626-108 (Relocated McIntyre Ridge Trailhead) and the section of road that accesses the Wildcat Quarry (a short section of Road 3626-105 and 150). The road closures that were identified to be delayed in Alternative 2 would be implemented much sooner under Alternative 3. This would close vehicular access to most of the Wildcat Mountain area for legitimate dispersed recreational uses including some OHV use, hunting, gathering of special forest products and target shooting. The closures and affected impacts to recreation would happen sooner than later as in Alternative 2. Any future OHV use restrictions in the Wildcat Mountain area being considered in the OHV Management Plan DEIS would be more easily enforced with fewer access points. Use of the Wildcat Mountain area for dispersed hiking in unroaded areas would be increased under this alternative.

Sandy River, Clear Creek, and Old Maid Flat Area

The effects of Alternative 3 are the same as Alternative 2 except that Alternative 3 would decommission the Forest Road 1825-380 past the Cast Creek Trail crossing and convert it to a non-motorized trail to accommodate existing equestrian and mountain bike use. The trail may have steeper slopes adjacent to the Cast Creek and Short Creek crossings than called for in trail design standards because the road culverts on these creeks have substantial amounts of fill over the culverts. The 380 road beyond the first crossing with Horseshoe Trail and Road 388 would be decommissioned restricting access to the upper access to the Horseshoe Trail.

Zigzag Canyon

The effects of Alternative 3 are the same as Alternative 2 except that Alternative 3 would gate Roads 2600-076 and 0862 for power line maintenance access rather than decommissioning them. This would allow mountain bikers that ride these roads as an alternate to the Pioneer Bridle Trail along the Highway to continue using them in their existing condition.

Gordon Creek and Tanner Creek

The effects of Alternative 3 are the same as Alternative 2.

3.6 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.
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 1509017, 1509019, 1509040, 1800025, 1800036, 1800048, 1800051, 1819018, 1825050, 1825053, 1825055, 1825071, 1825101, 1825380, 1828024, 1828118, 2000011, 2600070, 2600072, 2600073, 2600086, 2600088, 2600092, 2600440, 2627000, and 2639025. A total of 10.50 miles were surveyed and all surveys proved negative for the presence of archaeological properties.

However, there are two previously documented archaeological properties near roads 1509011 and 2000000 scheduled for decommissioning, which are discussed below:

- Archaeological sites 664EA39 and 664EA40 were found to lie outside of any areas of potential effect. No additional protective measures are required concerning these archaeological properties.

- Archaeological site 664EA2 (a, b, c, d, e and f), were found to lie outside of any area of potential effect. No additional measures area 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.

Alternative 3

Approximately two miles of road would be converted into a non-motorized trail, leave 0.2 miles of road 3626-150 open for trail access and would decommission an additional 8.3 miles of road under this alternative. 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), Alternative 3 would have no effect to heritage resources.

3.7 Transportation Costs

Background

In the past, timber sale operators constructed and upgraded roads and regularly maintained all of the roads they were using. In recent years the timber sale program has dramatically declined and there is insufficient funding to continue to maintain the entire network of roads to the standard it was maintained before. There are many miles of roads on the Forest that have not been properly maintained or repaired. Some of these roads are becoming unsafe and others are becoming

overgrown with vegetation and are undrivable. With the trend of declining budgets expected to continue, the Forest's backlog of roads needing maintenance could impact hydrologic function. Routine inspection of culverts and ditches on these roads is not always possible because of lack of access, personnel, and funding.

Costs of Road Decommissioning

Costs and mileage in this section are approximate. The Forestwide Roads Analysis (2003) contains a detailed discussion of the costs of road decommissioning and various options. 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 the project area the risks associated with roads proposed for decommissioning are relatively low. Based on the composite risk factor from the Forestwide Roads Analysis, 64% of the roads are very low risk, 31% are low risk, 4% are moderate risk, 1% are high risk and no roads are very high risk. Full obliteration with slope recontouring is not included for any roads in either alternative.

Table 3.17. Costs of road decommissioning from the Forestwide Roads Analysis (2003).

Decommission type	Cost per mile
Flat slope; no live stream culvert removal; no large fills	$2,000 - $5,000
Removal of some small culverts; minor to moderate live stream channel restoration; some fill pullback	$5,000 - $15,000
Large fills; large culvert removal; sidecast pullback; major stream channel restoration	$15,000 - $30,000

The Roads Analysis recommended careful analysis of the situation for each road with treatments tailored for each, commensurate with the resource risks involved. Recommendations for low risk roads include treatments such as berming or storm proofing. The following table shows the costs of the action alternative verses the No Action alternative. The recommendations for treatments are based on field surveys conducted in 2009.

Table 3.18. Cost of decommission by alternative. (***Note:*** The costs are estimates based on past experience. Also, the road decommissioning mileage differs due to differences in GIS, road logs, and/or INFRA.)

Treatment Emphasis	Cost per mile	No Action	Cost ($1,000)	Alternative 2	Cost ($1,000)	Alternative3	Cost ($1,000)
Records*	0	0	0	3.7*	0	3.7*	0
Entrance	$3,500	0	0	18.2	63.7	22.6	79.1
Stabilize	$16,000	0	0	24.2	387.2	21.0	336
Gate/Barrier	$5,000 per gate	0	0	0	0	2 gates	10
Road to Trail	$3,500	0	0	0	0	2	7
Totals		**0**	**0**	**46.1**	**450.9**	**49.3**	**415.1**

* The records mileage may differ from mileage stated elsewhere in other portions of the other specialist's reports; no analysis was need on these roads because they were decommissioned previously under other circumstance and were never updated in the data records.

Treatment Emphasis Strategy Definitions	
Records	Update transportation system records; roads are already hydrologically stable.
Entrance	Emphasize blocking entrance; roads are already hydrologically stable; includes updating transportation system records

Stabilize	Additional work needed to hydrologically stabilize road (e.g., remove culverts at stream crossings, stabilize channels/unstable slopes, etc.); includes blocking entrance; includes updating transportation system records.

The cost of entrance and stabilize management is difficult to translate to cost per mile. Some entrance treatments close several miles of roads while others only a quarter mile. Stabilize treatments are site specific due to depth of fill, size of culvert and size of the stream bed to be recontoured; therefore, these figures are averaged.

Cost Summary

Alternative 2 would save about $21,150 per year after an initial investment in decommissioning of $450,900. The No Action alternative would continue to cost $63,400 per year in road maintenance costs (see Table 3.17).

Alternative 3 would save about $22,750 per year after an initial investment in decommissioning of $415,100. The No Action alternative would continue to cost $63,400 per year in road maintenance costs.

Table 3.19. Annual road maintenance costs per alternative.

	Miles of level 1 & 2 roads	Road maintenance costs per year (based on $500 per mile)
No Action	126.8	$63,400
Alternative 2 – Proposed Action	84.5	$42,250
Alternative 3	81.3	$40,650

This cost analysis does not include any other costs associated with the resulting increased administrative costs of forest management, such as increased fire suppression cost, or the extra cost of walking in to stands for stand exams, precommercial thinning or invasive plant treatments or records update. Records updating is an annual function of the Forest's Roads and Engineering Department and is part of the Department's general annual funding costs. It also does not include the costs of future plantation thinning or the alternate cost of helicopter thinning. These analyses may be conducted in future EAs.

There are additional opportunities to reduce road maintenance costs including switching roads to a lower maintenance level and converting paved roads to aggregate surfacing. These options are outside the scope of this analysis.

3.8 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.

4.0. List of Preparers

Team Member	Contribution
Serena Helvey	Transportation
Sharon Hernandez	Wildlife
Tom Horning	Fisheries
Michelle Lombardo	Team Leader/Writer-Editor
Debbie Maldonado	Heritage Resources
Todd Parker	Hydrology/GIS
Susie Rudisill	Heritage Resources
Kim Vieria	GIS
Kathleen Walker	Recreation

5.0. List of Agencies and Persons Consulted

Consultation with individuals, organizations, and other agencies has occurred throughout this analysis. A summary of comments and responses in included in Appendix B. Following is a list of agencies and organizations contacted. Please refer to the project files for individuals contacted.

4-Point Timber Company
Alder Creek Lumber Company
American Forest Resource Council
American Rivers Inc.
Associated Oregon Loggers
B&T Logging Company
Backcountry Horsemen
Bark
Bob Lamphere's Beaverton/Honda
Boise Cascade Corporation
CAMBA
Camp Baldwin, Boy Scouts of America
Cascade Resources Advocacy Group
Cascade Sled Dog Club
Clackamas CC Library
Clackamas River Basin Council
Clackamas River Water
Citizens Interested in Bull Run
City of Dufur
City of Estacada
City of Fairview
City of Hood River
City of Lake Oswego
City of Mosier
City of Portland
City of Sandy
City of The Dalles
Clackamas River Water
Clearwater National Forest
CM-FPA
Cogan, Owens, Cogan, LLC
Columbia Gorge Institute
Columbia Gorge Off-Road Association
Columbia Gorge Power Sledders
Columbia Helicopters
Columbia River Gorge Commission
Confederated Tribes of Warm Springs
Dakine
David Evans and Associates, Inc.
Discover Bicycles
Dodge Logging, Inc.
E&M Logging
Earls Bros Logging
Environmental Middle School
Erickson Air Crane Company
Estacada Fire Department
Fernwood Logging
Fifteenmile Watershed Council
Fir Mountain Timber LLC
Friends of the Columbia Gorge
Friends of Mt. Hood
Fun Country Power Sports
Geo-visions
Gifford Pinchot Task Force
Gorge Commission
Government Camp Water Company
Gresham's Honda
Gresham Outlook
Hanel Lumber Company
Helicopter Loggers Association
Hood River County
Hood River County Board of Commissioners
Hood River County Forestry Department
Hood River County Planning Department
Hood River Crag Rats
Hood River Valley Residents Committee
Hood River Watershed Council
KB Trees, LLC
Lady Creek Water Systems
Linnton Plywood Assn
Longview Fibre, Clackamas Tree Farm
Longview Fibre, Mid Columbia Tree Farm
Mason, Bruce & Girard, Inc.
Mazama Conservation Committee
Mid-Columbia Fire and Rescue
Middle Fork Irrigation District
Mountain Times
Mt. Hood Meadows
Mt. Hood Polaris
Mt. Hood Snowmobile Club
Mt. Scott Motorcycle Club
Mt. Scott Water District
Mt. View Cycles
Mule Deer Foundation
Multnomah County Library
Multnomah Falls Co., Inc.
National Marine Fisheries Service
Native Plant Society of Oregon
Natural Resources Mgmt Corp
Nature of the Northwest
North Santiam Paving
Northwest Ecosystem Alliance
Northwest Environmental
Northwest Rafters Association

Northwest Ski Club Council
Oak Lodge Water District
Ochoco Lumber Company
Oregon Department of Environmental Quality
Oregon Department of Fish and Wildlife
Oregon Department of Forestry
Oregon Department of Transportation
Oregon Hunters Association
Oregon Log Truckers Association
Oregon Nordic Club
Oregon Office of Governor
Oregon Parks & Recreation Department
Oregon Public Broadcasting
Oregon Wild
Our National Forests, Inc.
Pacific Crest Trail Association
Pacific Biodiversity Institute
Pacific Legal Foundation
Parametrix Library
PNW 4-Wheel Drive Association
Portland Audubon Society
Portland United Mountain Pedalers
Portland Water Bureau
Reed Forest Watch
Rocky Mountain Elk Foundation
Rosboro Lumber Company
Sandy Post Newspaper
Sandy River Basin Watershed Council
SDS Lumber Company
Sierra Club, Oregon Chapter
Skyline Hospital Sports Medicine & Physical Therapy
South Fork Water Board
Summit Ski Area
Timber Data Company
Timberline Lodge
Timberline Ski Area
The Dalles Watershed Council
The Nature Conservancy of Oregon
The Oregonian
The Resort at the Mountain
The Trust for Public Land
The Wilderness Society
Trout Unlimited
US Congressman David Wu
US Fish & Wildlife Service
US Senator Gordon Smith
US Senator Ron Wyden
USDA Office of General Counsel
Wasco County Board of Commissioners
Wasco County Court
Wasco County Planning & Development
Wasco County Soil & Water Conservation District
Wasco Electric Cooperative
West Side Fire District
Western Land Exchange Project
Western Wildlife Sportsman
Western Wood Products Association
Weyerhaeuser Company
Wild Wilderness
Wilderness Conservation Association, OSPIRG
Wildlife Management Institute
Winter Wildlands Alliance
Wolf Run Ditch Company

6.0. References

Aumen, N.G., Grizzard, T.G., and Hawkins, R.H. 1989. Task Force Final Report – Water Quality Monitoring in the Bull Run Watershed Oregon. Submitted to: City of Portland, Oregon Bureau of Water Works.

Csuti, B . et. al. 1997. Atlas of Oregon Wildlife: Distribution, Habitat, and Natural History. Oregon State University Press. Corvallis, OR

Department of Natural Resources. 1993. Washington Department of Natural Resources Watershed Analysis Manual, Version 2.0. October 1993.

La Husen, R.G. 1994. Variations in Turbidity in Streams of the Bull Run Watershed, Oregon 1989-90. US Geological Survey Water-Resources Investigations Report 93-4045.

Sandy River Basin Working Group. 2007. Sandy River basin aquatic habitat restoration strategy: an anchor habitat-based prioritization of restoration opportunities. Oregon Trout. Portland, OR.

Sharp, B.E. 1992. Neotropical migrants on National Forests in the Pacific Northwest: A compilation of existing information. Unpublished report prepared for the U.S. Forest Service.

USDA Forest Service. 1990. Mt. Hood National Forest Land and Resource Management Plan. Pacific Northwest Region. Portland, OR.

USDA Forest Service. 1990. Mt. Hood National Forest Land and Resource Management Plan: Final Environmental Impact Statement. Pacific Northwest Region. Portland, OR.

USDA Forest Service. 1997. Bull Run Watershed Analysis. Mt. Hood National Forest, Zigzag Ranger District. US Government Printing Office 591-971. Portland, OR. 522 pp.

USDA Forest Service. 1999. 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

USDA Forest Service, et al. 2000. Interior Columbia Basin Ecosystem Management Project. Pacific Northwest Region. Portland, OR.

USDA Forest Service. 2003. Roads Analysis Mt. Hood National Forest. Mt. Hood National Forest. Sandy, OR.

USDA Forest Service. 2005. Interagency Species Management System (ISMS) database. Pacific Northwest Region. Portland, OR.

USDA Forest Service. 2006. Bull Run Watershed Road Decommissioning Environmental Assessment. Mt. Hood National Forest. Sandy, OR.

USDA Forest Service/USDI Bureau of Land Management. 1994. Record of Decision for amendments to Forest Service and Bureau of Land Management planning documents within the range of the northern spotted owl. Portland, OR.

USDA/USDI (Willamette Level One Terrestrial Team). 2009. Biological Assessment of Activities with the Potential to Disturb Northern Spotted Owls in the Willamette Planning Province – FY 2010-2013. Eugene, OR

USDI, Fish and Wildlife Service. 2009. Letter of Concurrence for Activities with the Potential to Disturb Northern Spotted Owls in the Willamette Planning Province – FY 2010-2013. Portland, OR.

Wemple, B.C., Jones, J.A. and Grant, G.E. 1996. Channel Network Extension by Logging Roads in Two Basins, Western Cascades, Oregon. *Water Resources Bulletin* 32(6):1195-1207.

WEPP. 2000. Water Erosion Prediction Project soil erosion model. http://forest.moscowfsl.wsu.edu/fswepp/docs/distweppdoc.html.

Witmer, G.W., and D.S. DeCalesta. 1985. Effects of Forest Roads on Roosevelt Elk Habitat Use. Northwest Sci. 59: 122-125.