Environmental Assessment

United States
Department of
Agriculture

Forest Service

Pacific Northwest
Region

Dec 2006

Bull Run Watershed Road Decommissioning

Mt. Hood National Forest
Zigzag Ranger District

I. - PURPOSE AND NEED FOR ACTION

A. Introduction

This Environmental Assessment (EA) describes the analysis of a proposed action to decommission unneeded roads within the Bull Run Watershed Management Unit (BRWMU). This EA is tiered to: the Final Environmental Impact Statement for the Mt. Hood National Forest Land and Resource Management Plan, 1990. This EA is also tiered to the Final Environmental Impact Statement for the Northwest Forest Plan, 1994.

B. Background and History of the Bull Run Watershed Management Unit

The BRWMU is located about 25 miles east of Portland and 5 miles west of Mt. Hood on the forested western slopes of the Oregon Cascades (see Figure I-1). It is optimally suited as a water supply watershed receiving about 80-180 inches of precipitation, mainly as rain, and producing an average 98.4 inches of runoff annually.

A water supply source was needed for the city of Portland, and in 1892 President Harrison, by proclamation established boundaries and prohibited entry or development of the Bull Run watershed. The initial Bull Run supply system was completed in 1895. In 1904 Congress passed the Bull Run Trespass Act for the protection of Bull Run Forest Reserve and the sources of Portland's water supply.

After 1958, a number of non-water resource management activities began in the watershed, including recreation in outlying areas of the original Reserve boundary, and timber management. These actions continued until 1976, when court action enjoined further recreation and logging. In 1977, Public Law 95-200 established the BRWMU with an objective of producing "…pure, clear, raw potable water…for the City of Portland and other local government units and persons in the Portland metropolitan area…".

Figure I-1 Vicinity Map of Bull Run Watershed, Oregon

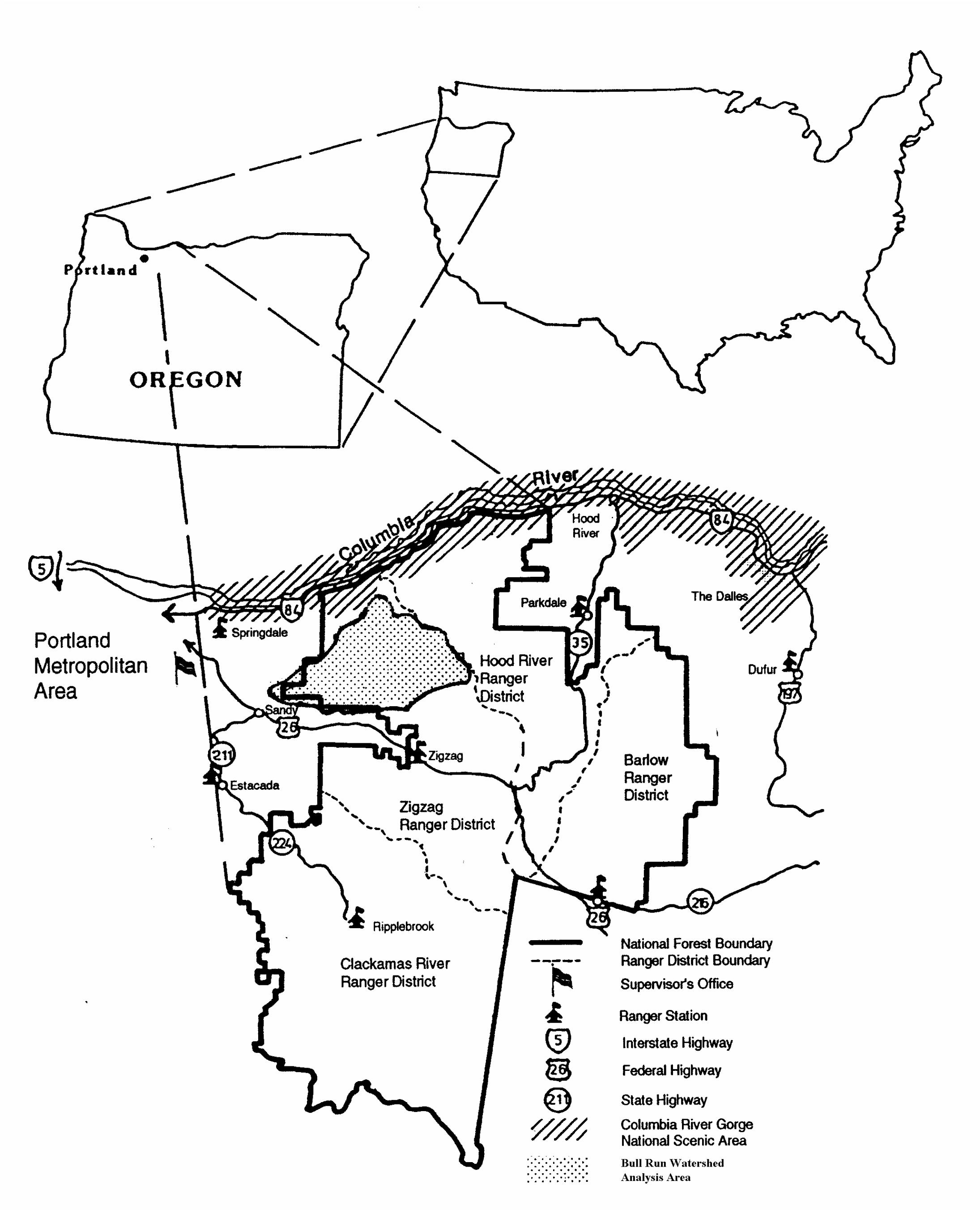
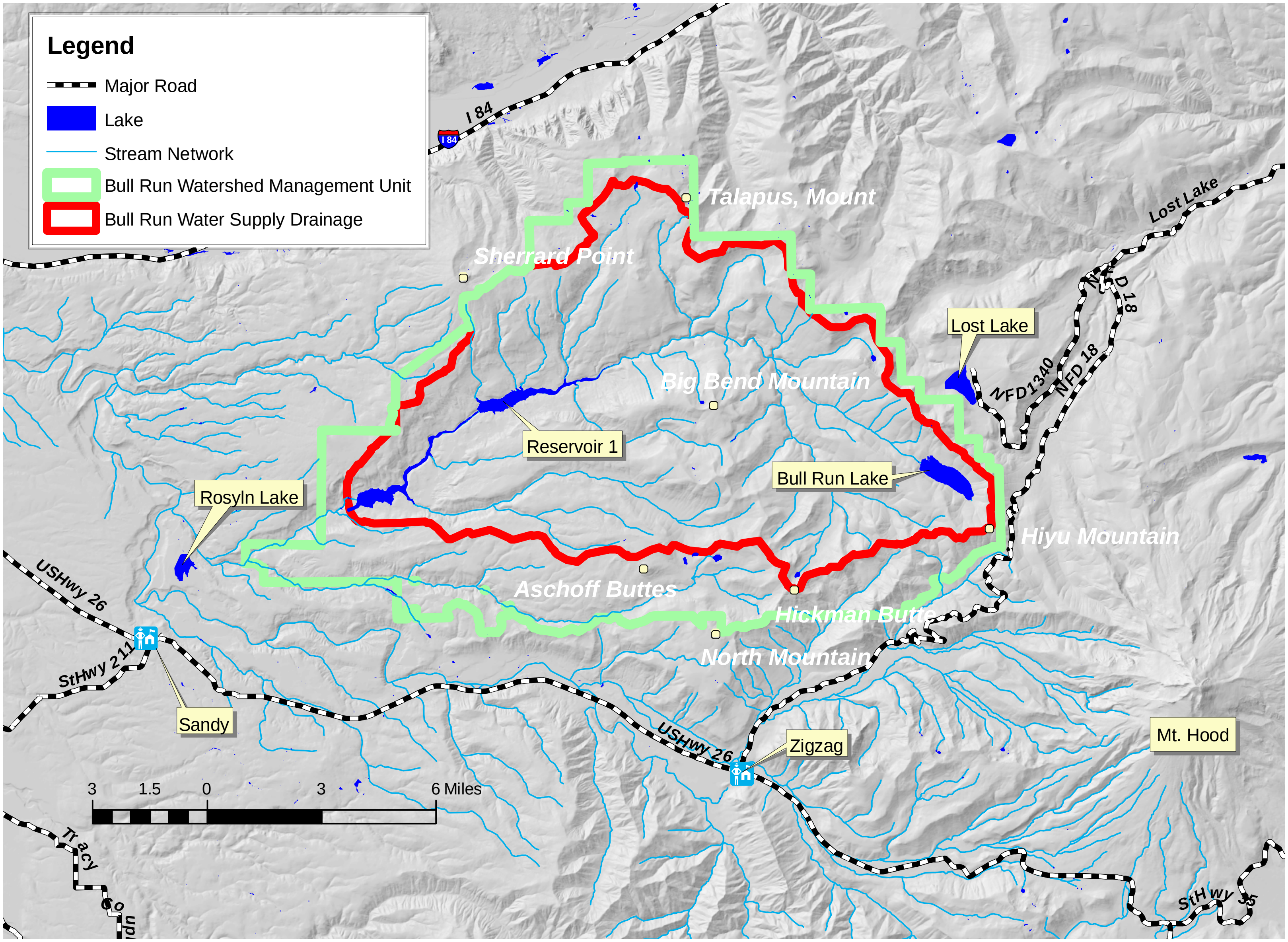


Figure I-2 Bull Run Watershed Map



C. Current Management Direction

Management direction for the BRWMU and specifically for this project area has changed dramatically in the past ten years. About 74% of the BRWMU was identified as a Late Successional Reserve (LSR) for the protection of Northern Spotted Owl by the Federal Ecosystem Management Assessment Team in 1990, and designated as part of President Clinton's Northwest Forest Plan. Timber harvest and salvage operations are severely restricted under the LSR designation of the Northwest Forest Plan. Still, concerns about timber harvest in the BRWMU persisted and Bull Run watershed interest groups worked with the City of Portland to initiate efforts in 1993 to further limit timber harvest in the watershed.

Congressional management direction was provided by the Trespass Act of 1904, Bull Run Protection Act, PL 95-200 (1977) and now is given by PL95-200 as amended by the Oregon Resources Conservation Act (ORCA, PL 104-208 1996).

ORCA amended Bull Run federal legislation (PL 95-200), by generally prohibiting timber harvest on all National Forest System Lands within the 65,000-acre water supply drainage and an additional 3,350 acres that drain to the lower Bull Run River. In 2001, these same prohibitions were extended to the remaining lands in the BRWMU and the management unit was expanded to include all public lands in the Little Sandy hydrographic boundary (Little Sandy River Watershed Protection Act of 2001 (P.L. 107-30). Under this legislation, limited tree removal is allowed to maintain and protect facilities such as roads, trails, power lines, microwave transmitters, and buildings. Salvage of fire-killed or windthrown trees within the BRWMU is prohibited.

These Congressional actions, along with substantially changed administrative direction, firmly established the land management direction for federal lands in the BRWMU. To respond to this direction and to other regulatory requirements, the Forest Service and the City of Portland, Bureau of Water Works, have initiated the Bull Run Watershed Collaborative Stewardship strategy for the long-term stewardship of the BRWMU. Under this strategy the two agencies are preparing a Memorandum of Understanding (MOU) to document the stewardship strategy. Management strategy contained in the MOU will be focused to support:

- Production of pure, clean raw potable water
- Compliance with the requirements of the Safe Drinking Water Act
- Protection of forested ecosystems under the provisions of the 1994 Northwest Forest Plan

- Protection of terrestrial and aquatic species under the provisions of the Endangered Species Act.

By the late 1990s, the road network within the BRWMU consisted of approximately 346 miles of roads. Many of these roads were constructed for timber management. As a result of the new land management direction described above, timber management activities no longer occur within the BRWMU and therefore a large part of the road network is no longer needed.

A 1999 EA and Decision Notice approved the decommissioning of approximately 40 miles of roads within the Maintstem subdrainage of the Bull Run River above Reservoir Number 1. This 2006 EA documents the effects of decommissioning an additional 136 miles of road within the BRWMU that were outside of the area covered by the 1999 EA.

The Aquatic Conservation Strategy (ACS) is a key element of the Northwest Forest Plan and the amended Mt. Hood NF Plan. It identifies the Bull Run Watershed, including the Mainstem subwatershed, as a Tier II Key Watershed and as a source of high quality water. Key Watersheds are the highest priority for restoration. The management emphasis within Key Watersheds is to reduce existing system and non-system road mileage. Priority should be given to roads that pose the greatest risks to riparian and aquatic ecosystems. The objectives of the ACS are to:

- Maintain and restore connectivity within watersheds that provide unobstructed routes to critical areas for aquatic/riparian dependent species
- Maintain and restore the physical integrity of the stream banks and beds
- Maintain and restore water quality necessary to support healthy ecosystems
- Maintain and restore the natural sediment regime
- Maintain and restore the species composition and structural diversity of plant communities in riparian areas
- Maintain and restore habitat to support well-distributed populations of plant, invertebrates and vertebrates which are riparian dependent

D. Proposed Action

The Zigzag Ranger District, Mt. Hood NF, in coordination with the City of Portland, is proposing to decommission approximately 136 miles of roads within the BRWMU. This action would begin efforts to eventually decommission approximately 45% of the current road network within the BRWMU as recommended in the Bull Run Watershed Analysis, and as recommended by the Zigzag Ranger District Access and Travel Management Plan (ATM). See Appendix A for a detailed list of roads to be decommissioned, and a complete description of the Proposed Action in Chapter II of this EA.

Decommissioned roads, including roads that are decommissioned by letting natural vegetation grow in to close the road ("walk away roads") are removed from the road system and if reopened or reconstructed in the future, that activity would be considered to be new road construction. Most of the BRWMU is within a Late Successional Reserve (LSR) and new road construction is not allowed within LSRs, therefore decommissioning of roads is considered a permanent action.

Active road decommissioning activities would be limited to 15 miles of road in the water supply drainage per year and 15 miles of road per year in the project area outside of the water supply drainage. The rationale for this criterion is twofold:

1. The maximum number of miles of new road construction in any given year in any subwatershed in the water supply drainage historically was approximately 15 miles with no detectable impact to water quality, with the assumption is that road decommissioning and road construction have similar water quality impacts the 15 mile limit is used to ensure there would be no effects to water quality in the reservoirs

2. Based on experience associated with the 1999 Road Decommissioning EA 15 miles of decommissioning is the amount that one contractor with one set of equipment can accomplish in the summer operating season.

E. Purpose and Need for Action

<u>The objectives of this action include:</u>

1. Reduce risks to water quality, aquatic habitat, and TES aquatic species caused by landslides, gullying, and surface erosion associated with unneeded roads.

2. Respond to recent Congressional actions and substantially changed administrative direction and regulatory requirements. This new direction emphasizes reducing risks to water quality from roads.

3. Reduce road maintenance costs of unneeded roads.

Action is Needed Because:

1. Since timber harvest is no longer an activity within the BRWMU, approximately 45 % of the roads within the BRWMU are no longer needed, and there is no funding to maintain the unneeded roads. Funding for road maintenance in the BRWMU receives a low priority because the watershed is closed to the public and appropriated road maintenance funds are directed to roads that the public uses.

2. There are miles of unneeded roads have not been maintained or repaired since 1994. Many roads are no longer driveable due to brush encroachment. Routine inspection of culverts and ditches on these roads is no longer possible due to the difficulty of access and time involved. If these roads are not maintained or decommissioned in the near future, risks would increase for surface erosion, gullying, and landslides. Such potential future risks may translate into increased sedimentation to receiving streams and increased turbidities in downstream reservoirs supplying the primary source of the Portland metropolitan area's drinking water.

F. Scoping and Identification of Issues

Scoping is an integral part of the environmental analysis. Scoping includes refining the Proposed Action, identifying the interdisciplinary team (IDT) and the preliminary issues and identifying interested and affected persons. The results of scoping are used to 1) identify public involvement methods; 2) refine the issues; and 3) explore alternatives to the Proposed Action and associated potential effects.

Scoping for this project first appeared in quarterly publications of the 2004 and 2005 Mt. Hood National Forest Schedule of Proposed Actions. In 2005, a letter and map describing the project was mailed to a list of 70 individuals, agencies and organizations that have been identified as being interested in projects on the Mt. Hood National Forest. In addition, the scoping letter and map are posted on the Mt. Hood Forest public web site (http://www.fs.fed.us/r6/mthood/projects/). As of February, 2006 two written responses have been received. The responses from scoping produced no issues, unresolved conflicts, or public concerns with the Proposed Action.

Summary of Responses Received from Scoping

- I fully support the objectives of this project. Unneeded roads are best decommissioned when substantial benefits are realized or risk to water quality reduced.

- I support meeting the goals of the Aquatic Conservation Strategy. The benefits of meeting these objectives are broad and long-lasting.

- Reducing road maintenance costs in the BRWMU is wise and a good prioritization by the Forest Service.

- Decommissioning these roads would help meet Aquatic Conservation Strategy Objectives by reducing risks to water quality from roads.

- Preserving water quality in the Bull Run Watershed is well worth the cost of decommissioning these and other roads.

II. - ALTERNATIVES INCLUDING THE PROPOSED ACTION

Introduction

Chapter II describes the alternatives and summarizes the environmental consequences of implementing the alternatives considered in detail, Alternative 1, No Action and Alternative 2, the Proposed Action. This chapter describes the alternatives proposed and alternatives considered but eliminated from detailed analysis.

A. Alternatives Considered but Eliminated from Detailed Study

National Environmental Policy Act (NEPA) regulations require this Environmental Assessment (EA) to discuss the reasons for eliminating any alternatives explored, but not developed in detail (40 CFR 1502.14[a]).

During the initial stages of alternative development, three additional alternatives were discussed and analyzed. These alternatives did not adequately meet the Purpose and Need for action; therefore they were eliminated from further analysis or incorporated into the Proposed Action for detailed analysis in this EA.

- Essential Roads Alternative - This alternative was a minimal road network that would decommission all roads not needed to meet mandated agency direction, policies and responsibilities. This alternative was eliminated because it did not provide the City of Portland, Bureau of Water Works (Water Bureau), access to manage their infrastructure, including Bull Run Lake.

- Additional Increment Roads Alternative - This alternative would keep some non-essential roads that were added to the essential road network. This alternative provided adequate access for the Water Bureau infrastructure but it was eliminated because it did not provide access for response to natural disasters such as fires or floods.

- Keep Desireable Roads Open Alternative - This alternative would keep all roads open that the Forest Service would desire to keep open if there were no maintenance funding constraints. This alternative was eliminated as unrealistic because limited funding constraints are well known.

B. Alternatives Considered in Detail

The process of developing alternatives began with public scoping as described in Chapter I. The response from scoping produced no issues, unresolved conflicts, or public concerns with the Proposed Action. The purpose and need for this project is narrow in scope and therefore, only the No Action Alternative and the Proposed Action Alternative have been considered in detail.

Alternative 1 - No Action

As required by NEPA, a No Action Alternative is included in this analysis as a benchmark against which the Action Alternative can be compared. The No Action Alternative does not address the Purpose and Need for the Proposed Action.

All roads would remain unchanged and would continue to receive limited levels of maintenance, or no maintenance. In the Bull Run Watershed, the roads are closed to public access and management direction precludes timber stand management. The last timber harvest activity in the Bull Run Watershed was completed in 1993. The limited federal funds for road maintenance on the Mt. Hood NF are focused on the roads outside of the BRWMU on roads used by the public and where the funds collected for timber sales continue to fund the timber haul routes over the Forest road system.

The present level of road maintenance funding would be inadequate to cover all of the road maintenance needs in the BRWMU. Only about 25 percent of the roads needed for Forest Service access are receiving drainage structure inspection and maintenance annually. The City of Portland, Bureau of Water Works, is maintaining the road system needed for the administration of their water supply facilities.

Alternative 2 - The Proposed Action

The Zigzag Ranger District, Mt. Hood NF is proposing to decommission approximately 136 miles of unneeded roads within the BRWMU. This action would continue efforts to eventually close roads no longer needed as recommended in the Bull Run Watershed Analysis developed under the Northwest Forest Plan and by the Zigzag Ranger District Access and Travel Management Plan (ATM). This action is also recommended by the Bull Run Watershed Collaborative Stewardship Project Memorandum of Understanding (described in Chapter I).

Road decommissioning is accomplished by both active, mechanical methods, and by inactive, "walkaway" methods. These methods are described in detail in the following paragraphs. Decommissioned roads no longer need maintenance of any kind, and over time the ground occupied by decommissioned roads would return to a more natural, forested landscape.

Summary of Proposed Road Decommissioning

Of the approximately 136 miles of road proposed to be decommissioned, 73 miles would be decommissioned by active, mechanical methods. Roads proposed for active decommissioning are roads that cross streams and require work such as slope rehabilitation and culvert removal to prevent erosion and sedimentation. To decommission a road, it is critical that any drainage structures such as culverts, bridges, or fords be removed or treated in such a way that natural drainages and intercepted drainage from the hill slope is routed across the road prism as close as possible to the natural site where it crosses the road. This usually involves the excavation of the road fill and removal of the culvert for drainages and streams, restoring the natural contours of the stream channel to its natural shape. For road surface drainage and intercepted shallow groundwater (springs and sheet wash) cross drains are excavated, pipes (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.

The remaining 63 miles of roads would be decommissioned as "walk away" roads. Walk away roads would be decommissioned by allowing them to return to a natural condition as native vegetation appears. Since many of these roads have not been maintained since 1993, natural vegetation has already made them inaccessible by vehicle. Most walk-away roads are on relatively flat terrain such as ridge tops where erosion and sedimentation are not a potential risk. Some walk-away roads do not have culverts or stream crossings. Other walk-away roads may have culverts or stream crossings that are in a hydrologically stable condition and natural drainage patterns have been restored. Walk-away roads in this condition do not pose a threat of erosion and associated sedimentation; therefore there is no need to remove culverts.

Detailed Description of Methods Proposed for Road Decommissioning

Appendix A lists all of the roads that are proposed for decommissioning. For each road or road segment, the appendix lists the surface type, beginning and ending points, length, maintenance level (Level 1 or Level 2 maintenance level), and the number of culverts that need to be removed during decommissioning. The appendix also includes a "Photograph" column. A sample of the table follows:

Sample of Appendix A

RD #	RX	SURF	BEG TERM	END TERM	BMP	EMP	DIST.	ML	PHOTOGRAPHS (Figure #)	REMARKS / REASONS
1000404	A	PAV	10 LT @ 10.8	END OF PAV	0	0.83	0.83	1	1,2,4,7,8,14	6 CMPS
1000404	A	AGG	1000404 @ 0.83	END ROAD	0.83	1.61	0.78	1	2,7,14	2 CMPS
1010400	A	AGG	1010 LT @ 8.8	END ROAD	0	1.14	1.14	1	2,7,14	6 CMPS

Table Heading Key:

RD = Road
RX = Prescription for road decommissioning
A = Active, mechanical decommissioning
WA = Walk away decommissioning
SURF = Road surface type
AGG = Gravel road surface
PAV = Paved road surface
NAT = Native road surface
BEG TERM = Beginning of road segment
END TERM = End of road segment
BMP = Beginning mile post
EMP = Ending mile post
DIST = Distance in miles
ML = Maintenance Level (Maintenance Level 1 roads are closed roads. Basic custodial maintenance is performed to keep damage to adjacent resources to an acceptable level and to perpetuate the road to facilitate future management activities. Maintenance Level 2 roads are open roads maintained to be used use by high-clearance vehicles).
FIGURE # = The Figure number corresponds to photographs and text descriptions of the type of road decommissioning that would occur for each road segment
CMPS = Culverts
RT = Right
LT = Left

Photo Illustrated Description of Proposed Road Decommissioning Methods

The following photographs, drawings and corresponding text captions illustrate the various types of road decommissioning that are proposed by this alternative. This Photo/text section is designed to be used in conjunction with Appendix A. The Figure number with each photograph corresponds to the Photograph column in Appendix A (sample excerpt of the appendix is shown above).

Active Road Decommissioning by 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 on average is 4-6" in depth. The asphalt is 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 is created to speed the establishment of plants. The entire road surface would be decommissioned.

Figure II-1 Decommissioned Road Surface

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 (ferns, willow and/or cottonwood cuttings) would be planted when available. This practice has worked effectively in establishing vegetation on road surfaces that were decommissioned under the 1999 EA. 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 watershed, 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.

Figure II-2 Cross Drain

Figure II-3 Cross Drain view from outlet

Figure II-4 Decommissioned Road Surface with Objectives Labeled

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.

Figure II-5 Decommissioned Stream Crossing

Figure II-6 Culvert Removal - Cross Section

Cross Vane or Upstream U

Boulder weirs (upstream U's) are to 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.

Figure II-7 Rock Cross Vane Diagram

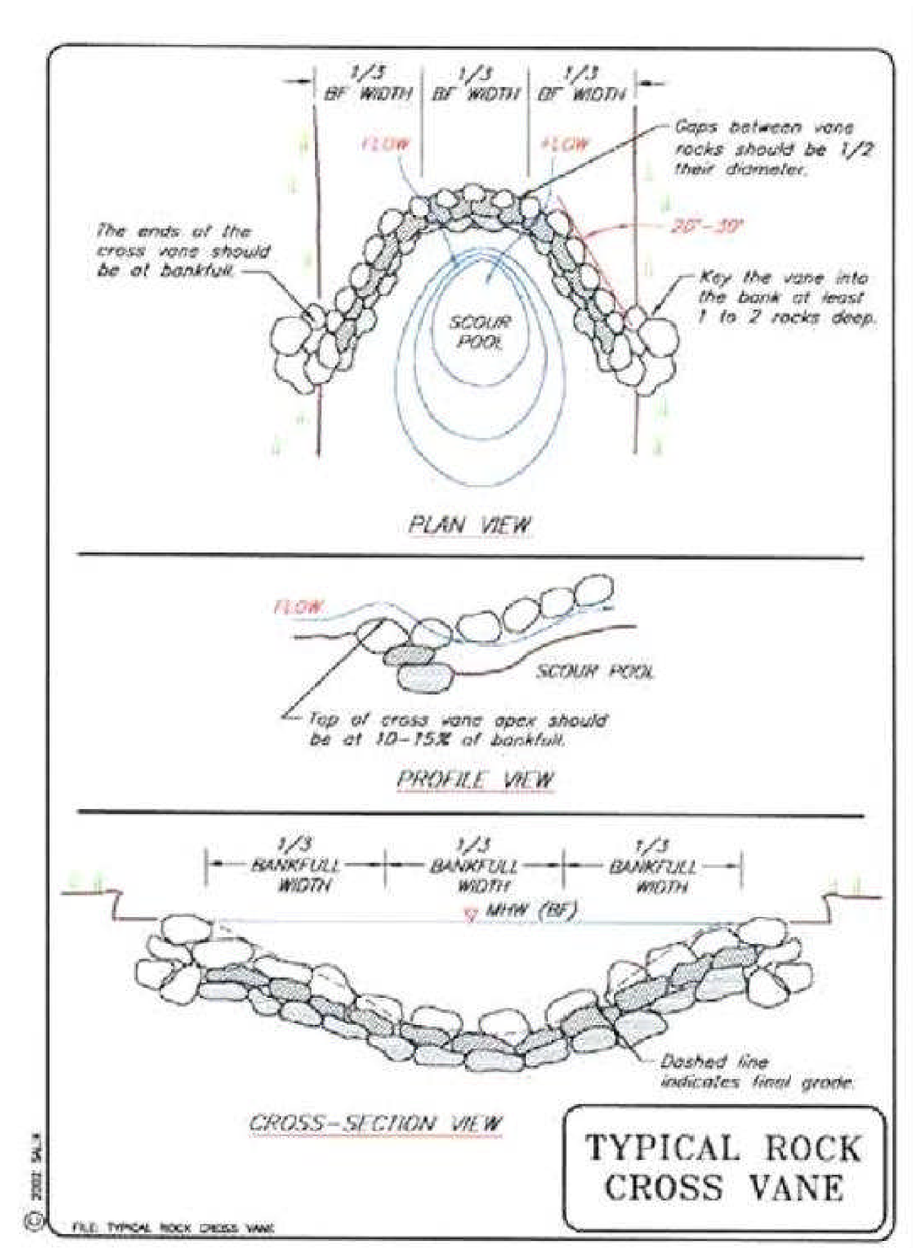
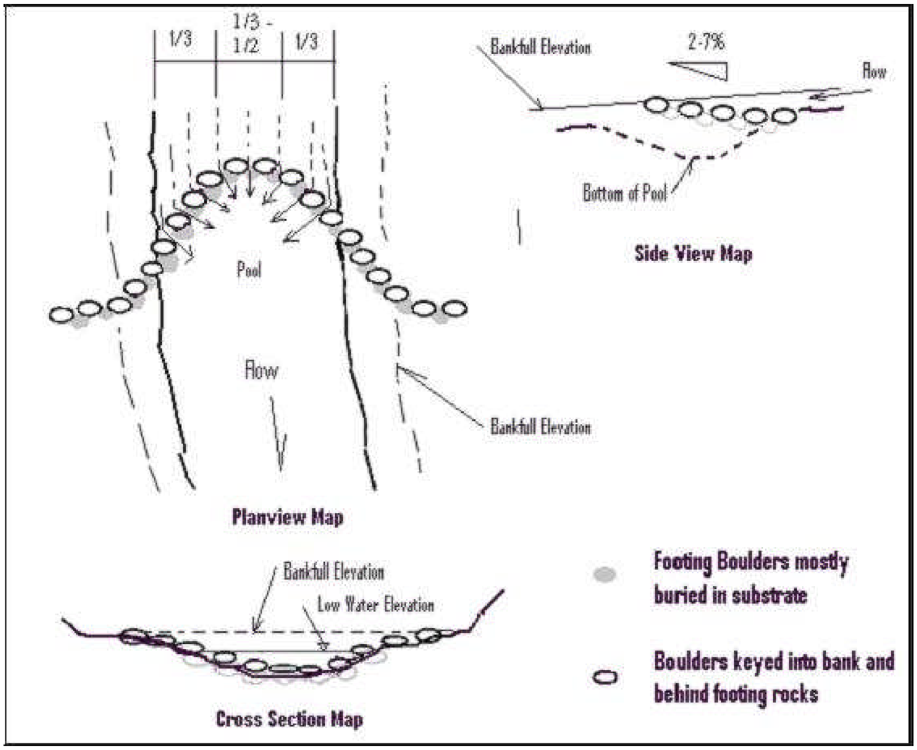


Figure II-8 Cross Vane Diagram 2



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.

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 re-vegetated. 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.

Figure II-9 Bridge Deck Removal

Figure II-10 Bridge Removal – Technique to keep Debris out of Stream

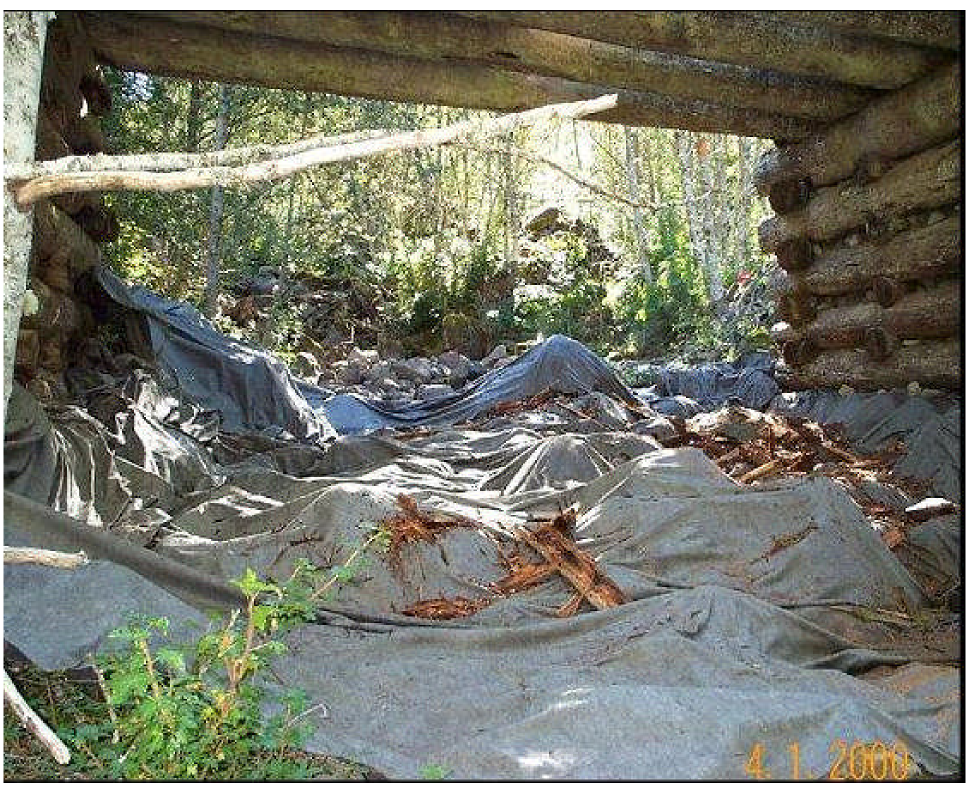


Figure II-11 Finished Bridge Decommissioning

Erosion Control with Seed and Mulch

Immediately 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. Attempts would be made to seed disturbed areas during conditions favorable for germination. In the first spring following earthwork, a variety of tree species are planted including, Douglas-fir, Western redcedar, Western hemlock, noble fir, Western white pine, red alder, vaccinium (spp), and elderberry. The variety of species is intended to provide plant diversity in keeping with the management direction for the Late-Successional Reserve (LSR). When possible, plant materials are saved and stockpiled from the areas of excavation and replanted on the disturbed areas. This includes ferns, salmonberry, alders, willows, beargrass, and mosses. Native plants may also be transplanted to openings created in the wheel tread portion of the pavement.

Mulch would be applied at the rate of 4000 pounds per acre. Annual ryegrass would be applied at the rate of 150 pounds per acre.

Figure II-12 Erosion Control with Seed and Mulch

Conifers would be planted, and if available, willow and cottonwood cuttings from local sources would be also be planted.

Figure II-13 Planting a Stream Crossing

Walk Away Roads

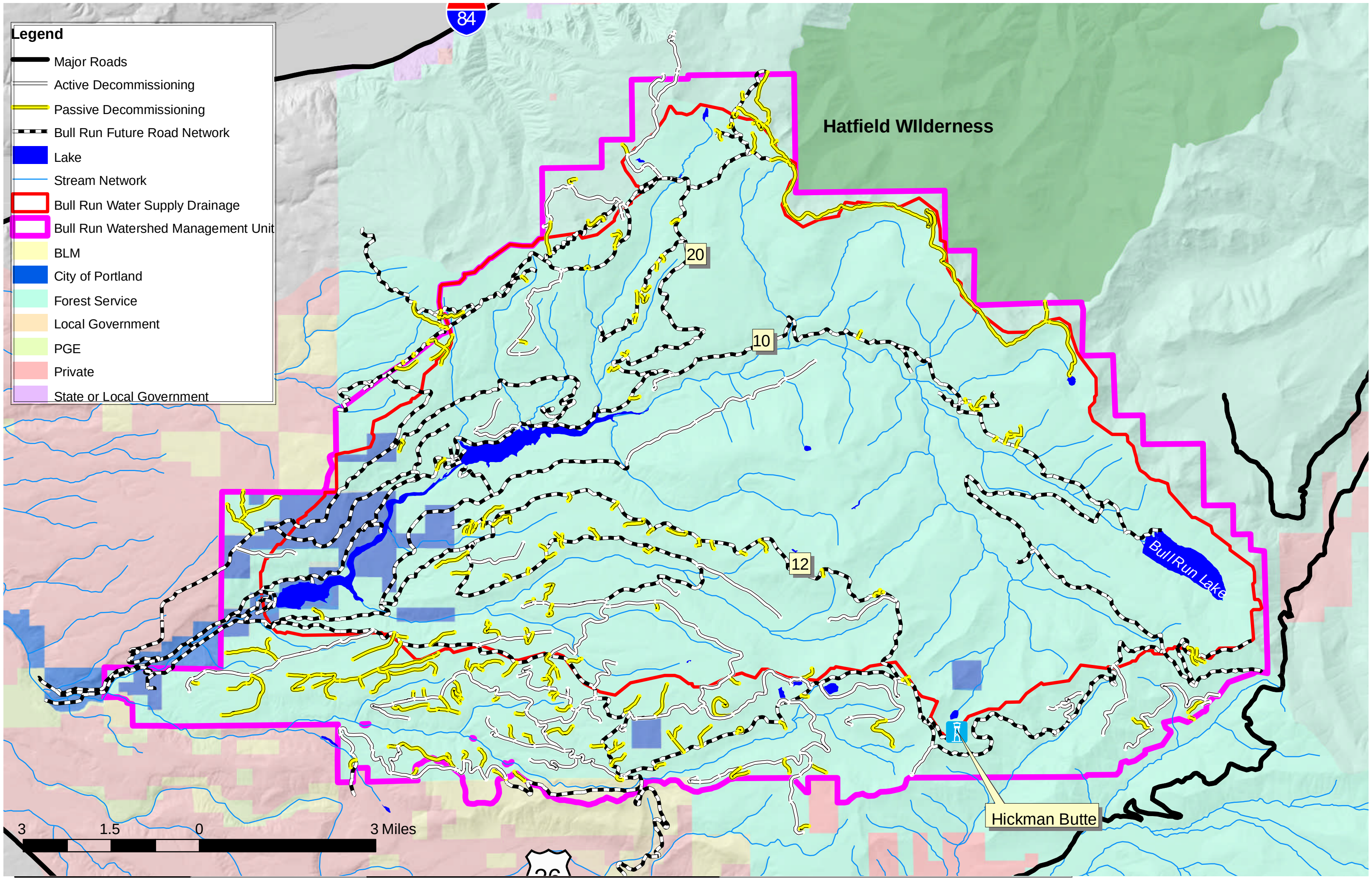
Walk away roads are roads that do not have culverts or stream crossings, and are on relatively flat terrain such as ridge tops where erosion and sedimentation are not a potential risk. Walk away roads would be decommissioned by allowing them to return to a natural condition as native vegetation appears. Since many of these roads have not been maintained since 1993, natural vegetation has already made them inaccessible by vehicle.

Figure II-14 Walk Away Road 1

Figure II-15 Walk Away Road 2

Figure II-16 Walk Away Road 3

Figure II-17 Proposed Action



C. Design Features

Design features are an integral part of the Proposed Action. Design features incorporate applicable ***standards and guidelines*** from the Mt. Hood Forest Plan, as Amended, to avoid, minimize, rectify, and reduce or eliminate project impacts.

Fisheries Design Features

Note: All of the Fisheries design features address the following five Forest Plan Standards & Guidelines: FW 137, 139, 145, 146 and 147.

- ✶ A fisheries biologist and/or hydrologist should participate in the design and implementation of each project. (F1)

- ✶ Dispose of slide and waste material in stable, non-floodplain sites. Disposal of slide and waste material within existing road prism or adjacent hillslopes is acceptable to restore natural or near-natural contours, as approved by a geotechnical engineer or other qualified personnel. (F2)

- ✶ Minimize disturbance of existing vegetation in ditches and at stream crossings to the extent necessary to restore the hydrologic function of the subject road. (F3)

- ✶ Minimize soil disturbance and displacement, but where sediment risks warrant, prevent off-site soil movement through use of filter materials (such as straw bales or silt fencing) if vegetation strips are not available. (F4)

- ✶ Maximize activities during late summer anD early fall during dry conditions. (F5)

- ✶ Follow ODFW Guidelines for Timing of In-Water Work (July 15-August 31) where relevant, except where the potential for greater damage to water quality and fish habitat exists. Does not include work conducted between September and April 30 in known bull trout spawning areas. Exceptions to ODFW guidelines for timing of in-water work must be requested and granted from the regulatory agencies. (F6)

- ✶ Refuel power equipment, or use absorbent pads for immobile equipment, at least 150 feet from water bodies to prevent direct delivery of contaminants into a water body, or as far as possible from the water body where local site conditions do not allow a 150-foot setback. (F7)

- ✶ Develop and implement an approved spill containment plan that includes having a spill containment kit on-site located at previously identified containment locations. (F8)

Wildlife Design Features

- ✶ 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 (DA1-026 and FW-219 to 229). (W1)

- ✶ Trees that need to be cut down during project implementation would be directionally felled, where feasible, away from the road prism and into the surrounding forestland. Trees would not be bucked and would be left undisturbed to the maximum extent possible (DA1-026 and FW-219 to 229). (W2)

- ✶ 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 annual ryegrass or wheat straw, at approximately 4000 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. In the first spring following earthwork, a variety of hardwood and conifer woody species would be planted, including but not limited to: Douglas-fir, western redcedar, western hemlock, noble fir, western white pine, red alder, cottonwood, willow, vaccinium (spp), and elderberry. This variety of species is intended to provide plant diversity in keeping with the management direction for this Late-Successional Reserve (LSR). When possible and if funding is available, plant materials would be saved and stockpiled from the areas of excavation and replanted on the disturbed areas. These include ferns, salmonberry, alders, willows, beargrass, and mosses. Investigate using willow and cottonwood cuttings from local sources (FW 148, 149, 150, and 175). (W3)

Botany Design Features

Note: All of the Botany design features address the following five Forest Plan Standards & Guidelines: FW 148, 149, 150, and 175. Also, the design features address Standard and Guideline C-19, from the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl.

- ✶ The year prior to implementation of any decommissioning, culvert or bridge removal, or any other work associated with this project, invasive plant surveys should be performed on all roads to be decommissioned (in the following year). If any invasive plants are found on the roads, the full extent of the invasion shall also be determined by surveying off road to the extent that it is reasonable to assume the invasive species may have spread. The invasive plant infestations shall then be mapped and weed site reports completed. Depending upon the seriousness of the weed invasion, as determined by a trained Botanist, and in consultation with a Mt. Hood NF Botanist, recommendations for treatment of the weed site would be made and an updated Noxious Weed Risk Analysis and Mitigation Report would be prepared. The above work and report would be completed for each year in which decommissioning is scheduled. These surveys and reports shall be funded by the same source as that which funds the decommissioning or, if not permissible, this work shall be funded by another means. (B1)

- ✶ Avoid or remove sources of weed seed and propagules to prevent new weed infestations and the spread of existing weeds. Clean project equipment (i.e., dozers or other equipment) before entering National Forest System lands. Remove mud, dirt, and plant parts; clean wheels, tires, undercarriage, radiator, and any other equipment parts that may harbor weed seed or seed carriers before moving it into a project area. This practice does not apply to service vehicles traveling frequently in and out of the project area that would remain on the roadway. (B2)

- ✶ In those vegetation types with relatively closed canopies, retain shade to the extent possible to suppress weeds and prevent their establishment and growth. (B3)

- ✶ Retain native vegetation in and around project activity to the maximum extent possible consistent with project objectives. (B4)

- ✶ Avoid creating soil conditions that promote weed germination and establishment. (B5)

- ✶ Minimize soil disturbance to the extent practical, consistent with project objectives. (B6)

- ✶ Implement measure W3

- ✶ Educate the contractor in simple techniques to avoid spreading weeds. Practice: Give the flyer, *Simple Things You Can Do to Help Stop the Spread of Weeds* to the contractors who would implement these Projects. (B7)

Water Quality Design Features

These design features address Mt. Hood Land and Resource Mangement Plan Standards FW-055, FW-056, FW-057, FW-058, DA1-032).

- ✶ Active road decommissioning activities would be limited to 15 miles of road in the water supply drainage per year and 15 miles of road per year in the project area outside the water supply drainage. *The rationale for this criteria is twofold: 1) the maximum number of miles of new road construction in any given year in any subwatershed in the water supply drainage historically was approximately 15 miles with no detectable impact to water quality, with the assumption is that road decommissioning and road construction have similar water quality impacts the 15 mile limit is used to ensure there would be no effects to water quality in the reservoirs 2) based on experience associated with the 1999 Road Decommissioning EA 15 miles of decommissioning is the amount that one contractor with one set of equipment can accomplish in the summer operating season.* (WQ1)

- ✶ Road decommissioning activities would be suspended if there are more than 2 inches of rain in a 24 hour period in the project area. (WQ2)

- ✶ Activities for the season would be suspended for the season if soil moisture is recharged and streamflows rise above baseflow levels (i.e. 200 cfs in the Bull Run River upstream of the reservoirs). (WQ3)

- ✶ Implement measure W3

- ✶ 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. (WQ4)

- ✶ 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. (WQ5)

- ✶ All fill materials would be tamped by the bucket of the excavator to reduce settling. (WQ6)

- ✶ 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). (WQ7)

- ✶ 75% of the compacted road surface would be de-compacted through the sub-grade, and existing vegetation (ferns, willow and/or cottonwood cuttings) would be planted when available. (WQ8)

- All perennial streams would be evaluated to determine if “Upstream U’s” are necessary to prevent stream bed and bank erosion. Structures would be installed as outlined in the following table (WQ9):

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

The ends of structures need to 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.

  - Maximum spacing between boulders should be ¼ the diameter of the boulder used or less

- Activities associated with culvert or bridge removal in streams with active streamflow would be suspended if the turbidity criteria is exceeded. Turbidity Criteria: Changes in natural turbidity levels resulting from the construction activities may not exceed 10 NTU's for more than one half hour at a designated sampling site located below the construction site. Samples would be collected and analyzed every half hour while turbidity is elevated to a point that it is visible. If changes in turbidity levels, as compared with natural levels upstream from the activity, are maintained at or above 10 NTUs for more than one half hour, then it is the responsibility of the COR to correct the situation immediately. A turbidimeter is required to assess turbidity levels. (WQ10)

- Removal-Fill Permits would be obtained for project activities when appropriate. (WQ11)

- Live streams would be diverted during excavation to prevent mobilization of fill material. A site specific water quality control plan must be submitted and approved for each stream diversion prior to the start of excavation. (WQ12)

- 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. (WQ13)

- ✶ All vehicles and machinery must be free of petroleum leaks. Any leaks that develop while in the watershed must be immediately repaired. (WQ14)

- ✶ All maintenance work and fueling of equipment shall be done in an area where no contamination of streams can occur. (WQ15)

- ✶ Absorbent pads would be required under all stationary equipment and fuel storage containers, and during all servicing and refueling operations. (WQ16)

- ✶ All trucks used for refueling shall carry a hazardous material recovery kit. Any contaminated soil, vegetation or debris must be removed from National Forest System Lands and disposed of in accordance with state laws. (WQ17)

- ✶ All petroleum products being transported or stored must be in approved containers meeting OSHA standards. (WQ18)

- ✶ All vehicles hauling more than 300 gallons of fuel must have an approved radio system with which to report accidental spills. If any fuel or fluid storage container exceeds a capacity of 660 gallons, the contractor shall prepare a spill prevention control countermeasures plan. Such plan shall meet applicable EPA requirements (40 CFR 112) including certification by a registered professional engineer. (WQ19)

- ✶ The contractor shall be liable for cleanup of any hazardous material or fuel spill occurring as a result of his/her work on this contract. (WQ20)

- ✶ The contractor shall, on a daily basis, remove all trash and refuse from the project work area and remove from the Bull Run Watershed Management Unit. (WQ21)

- ✶ Camping is not permitted in the Bull Run Watershed Management Unit. (WQ22)

- ✶ Chemical toilets are required when working in the Bull Run Water Supply Drainage. (WQ23)

D. Monitoring

Previous water quality monitoring associated with timber harvest and road construction within the BRWMU has indicated that with the implementation of BMPs, turbidity or suspended sediment was not produced (Bull Run Annual Activity Schedule 1994, pg 39). The following monitoring efforts would be implemented as necessary:

Stream Monitoring Water Quality Monitoring associated with compliance of State Water Quality Standards, 404/401 Permit Requirements, and design features in the Environmental Assessment would be completed by sampling above and below the project sites during project activities and analyzing the samples for compliance immediately with an on site turbidimeter. Monitoring would be implemented by on site personnel at 2 hour intervals during earth disturbing activities adjacent to streams.

Photopoints would be planned at selected road crossings. Photopoints would be re-photographed every year until the site had re-vegetated or as soon as possible following a major flow event such as a 5 year storm. In addition, at key sites stream cross sections and longitudinal profiles of the stream channel would be completed to assess stream bed and bank erosion.

On-site inspections, would be planned during and after storms if concerns about levels of sediment input associated with the major storms have occurred. On-site inspections would be used to visually separate project-related water quality impacts from natural conditions. Turbidity grab samples would be collected at sites other than the stream monitoring locations.

Helicopter flights would be considered, when roads are inaccessible, to determine if storm-related problems have developed at high-risk sites. It is recognized that much of the project area is inaccessible and/or under a cover of snow for much of the winter, severely limiting the ability to visit project areas frequently.

Stream monitoring may be necessary at sites downstream if severe erosion has occurred at project sites and cumulative downstream effects are possible. Monitoring of turbidity and stream flow at historical source search sites would be implemented and the results would be compared to the data collected prior to the road decommissioning activity.

Reporting of the results of the monitoring described previously would be provided to the City and interested citizens at least once each year by the USFS. USFS watershed specialists in consultation with the City watershed specialists would use data from the current and past monitoring of road decommissioning projects to evaluate both the ***on-site*** and cumulative effects of the road decommissioning program, and recommend changes to techniques being used and/or changes to the monitoring program (adaptive management).

III. - THE AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Introduction

This chapter describes the environmental consequences of implementing the No Action and Proposed Actions alternatives as described in Chapter II. The analysis includes the direct, indirect, short-term, long-term, and cumulative impacts on the physical and biological environment as well as the social and economic environments described. The analysis provides the decision maker with information needed to compare the alternatives and select an appropriate course of action. The analysis of the No Action and Proposed Action alternatives are organized by resource area (Fisheries, Wildlife, Botany, etc.).

This EA discloses project specific and cumulative impacts that are projected to occur with the selection of either the No Action Alternative, or with the selection of the Proposed Action alternative. It is important to note that the disclosure of impacts in this EA is meant to provide a worst case projection of the impacts. Design features, listed in Chapter II, are incorporated into the Proposed Action alternative to avoid, minimize, reduce, rectify or compensate for impacts to the physical, biological or human environments.

An "impact" or "effect" is described as any change in physical, biological, social or economic factors, which directly or indirectly results from implementation of an action. Impacts may be adverse or beneficial, depending upon the type of change and resource area being discussed. The following impact definitions are used in this EA:

Short-Term Impact – An impact that occurs during construction and/or for one to two growing seasons thereafter; or an impact that may occur after brief activities associated with operation and maintenance.

Long-Term Impact – An impact that continues for an extended period of years or may be permanent.

Direct Impact – An impact that occurs as the direct result of an action, including construction, operations and maintenance.

Indirect Impact – An impact that develops as the result of a direct impact and that would not have occurred otherwise.

CEQ regulations (40 CFR 1508.7) require that cumulative impacts be considered in the analysis of the alternatives. A cumulative effect is defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions." Cumulative actions applicable to this EA are identified under each resource area, along with an indication of the spatial and temporal scale of the cumulative impact.

A. Water Resources

Table III-1 Comparison of Alternatives – Water Resources

Items of Comparison	Proposed Action	No Action
Water Resources		
Flow Regime		
Miles of Road	164.8	300.8
Miles of Road in Areas with Impervious Soils (BULLWA)	8.4	16.5
Channel Network Expansion by Roads (BRWMU)	9.6%	14.2%
Topography		
Miles of Midslope Roads (BULLWA)	105.6 miles	186.1 miles
Soils and Geology		
Roads in Schulz High Hazard Areas for Landslides (BULLDRAIN)	7.3 miles	8.0 miles
Roads in High Hazard Areas for Landslides	16.8 miles	24.4 miles
Sediment Yield		
Number of Stream Crossings	365	547
Road related Sediment Delivery (modeled tons/year) for properly maintained roads	470	729
Short Term Estimated Road Sediment Production	0.45 tons per year	No Change
Long Term Estimated Road Sediment Production	No change	Considerable Increase

Introduction

The effects to water resources would be addressed by four elements:

a. Flow Regime;
b. Slope Position;
c. Soils and Geology; and;
d. Sediment Yield.

The following Affected Environment section is a general description that covers all four water quality elements. Following the general Affected Environment section, effects to each of the four water quality elements will be analyzed in detail.

Affected Environment - General

The road network analyzed is within the Bull Run Management Unit with key access roads (10 road, 20 road, and 14 road) outside the BRMU added in (these roads would stay as key access roads under the proposed action), and a few small spurs that originate in the BRMU and terminate outside the BRMU analyzed. The BRMU contains portions of seven fifth field watersheds with the large majority (88%) contained in the Bull Run Watershed .

Table III-2 Fifth Field Watersheds associated with the Bull Run Management Unit

Watershed	Acres	Percent of Total
Bull Run River	82738	88
Columbia Gorge Tributaries	2870	3
Lower Sandy River	1144	1
Middle Columbia/Eagle Creek	632	1
Middle Sandy River	82	0
Upper Sandy River	4606	5
West Fork Hood River	1576	2
Total	93647	100

There are 13 subwatersheds associated with the seven fifth field watersheds in the BRMU. In order to facilitate analysis, subwatersheds were aggregaded into seven areas based on: fifth field watershed, beneficial uses (drinking water supply, resident or anadromous fisheries), or special management area (Columbia River Gorge).

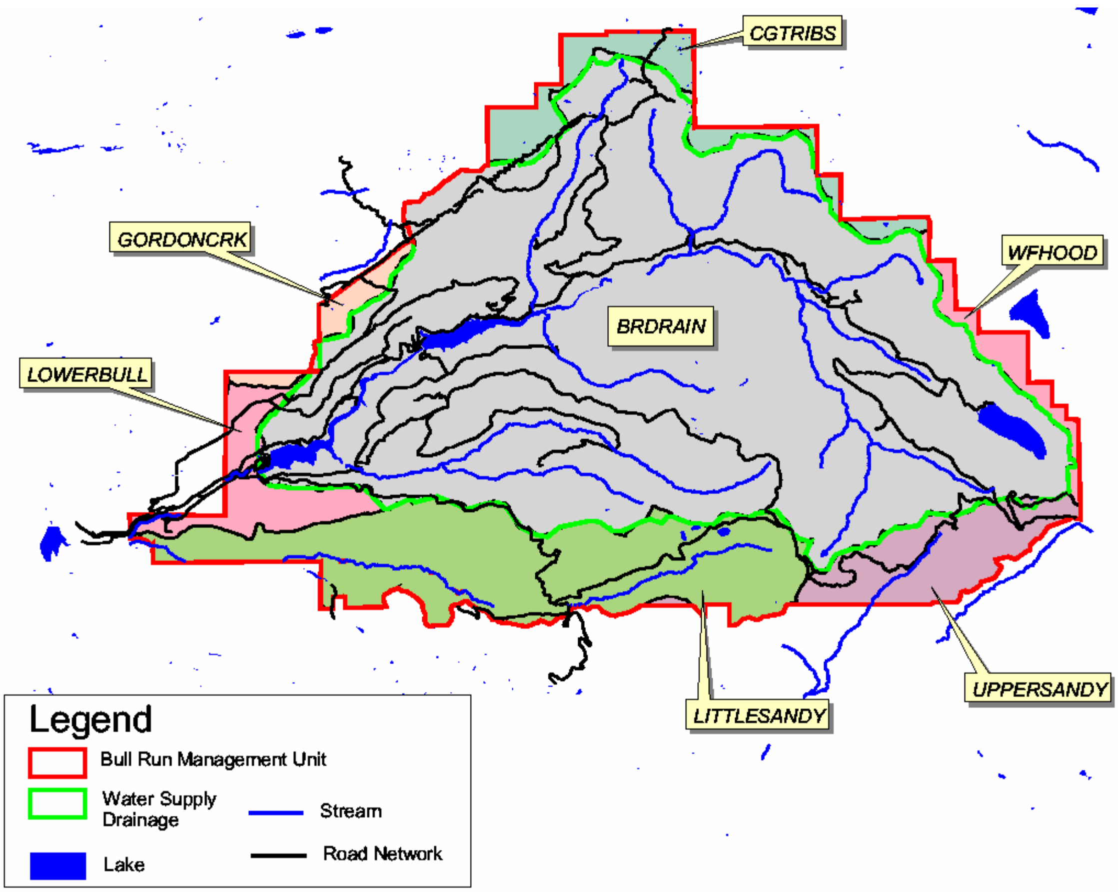
Table III-3 Analysis Areas

Analysis Area	Abbreviation	Acres	Percent of Total
Bull Run Water Supply Drainage	BRDRAIN	65391	70
Columbia Gorge Tributaries	CGTRIBS	3503	4
Gordon Creek	GORDONCRK	1133	1
Little Sandy	LITTLESANDY	14051	15
Lower Bull Run River	LOWERBULL	3293	4
Upper Sandy	UPPERSANDY	4689	5
West Fork Hood River	WFHOOD	1576	2
Total		93635	100

For this analysis the drainages (fifth and sixth field watersheds) associated with the analysis areas are clipped to the BRMU boundary.

In addition the anadromous fish area is used as an analysis area for certain processes. The anadromous fish area is the combination of Gordon Creek, Little Sandy, Lower Bull Run River, and Upper Sandy analysis areas.

Figure III-1 Analysis Areas used in the Water Resources Assessment



With respect to water quantity and quality, the Bull Run Watershed is unique in a local, regional, and even national perspective. Unit runoffs (inches per year) observed in this watershed can not be witnessed elsewhere in the United States outside of the Pacific Northwest. Even in a regional context, values seen here are rare. The Bull Run Watershed provides a great deal of water from a relatively small area. It is a highly concentrated and intense water source area (Aumen, Hawkins and Grizzard, 1989).

By any objective standard, the water quality of the Bull Run Watershed's streams can only be described as extraordinary. From the earliest days of using the basin as Portland's water supply, its purity has been lauded. At present, chemical measurement of dissolved species in the water require the utmost in analytical skill because of the minimal amounts of their concentrations -- generally at or near the limits of detection for accepted analytical methodologies (Aumen, Hawkins and Grizzard, 1989).

Climate

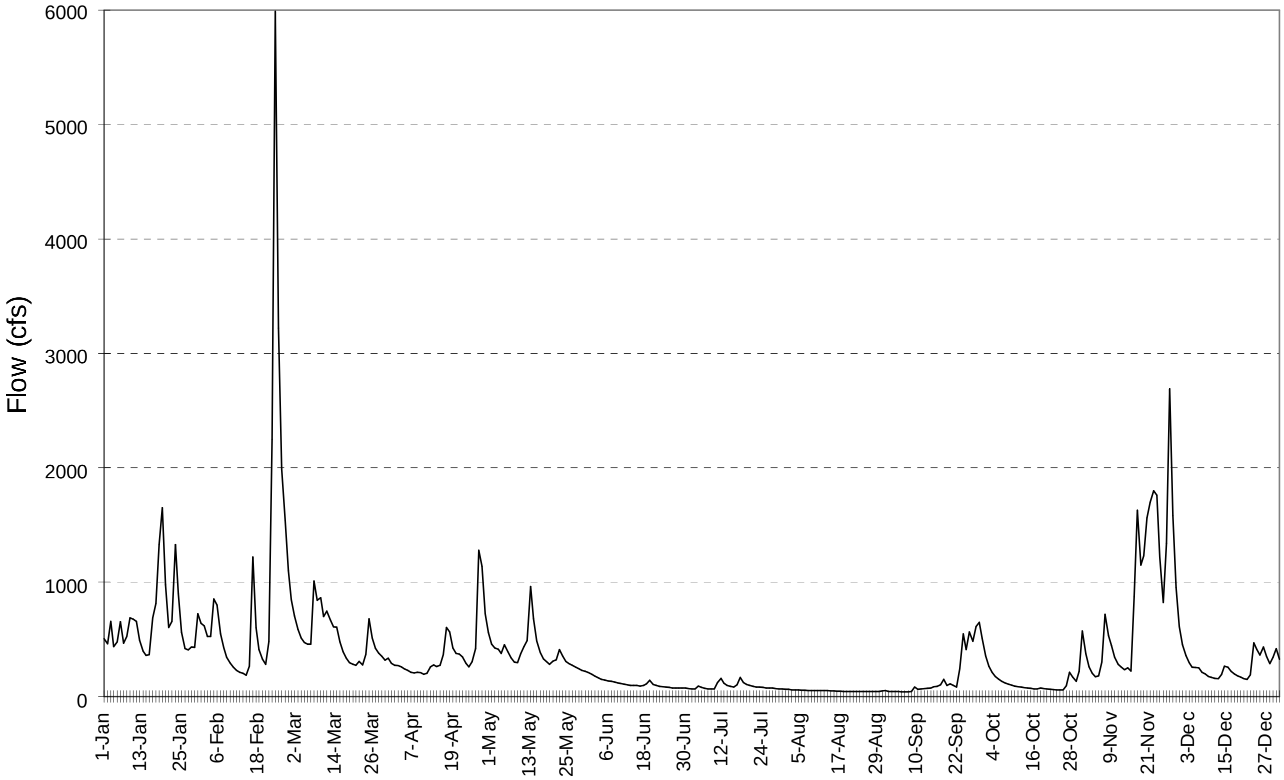
Climate is significant in determining: patterns of river and stream flow, moisture content of the soil, and plants that inhabit an area. Climatic conditions within the Bull Run Watershed are typical of the Western Cascade foothills. Temperatures are normally mild, with January lows just below freezing to the mid-20s, and July highs of approximately 80 degrees (Blowdown FEIS).

Average annual precipitation ranges from 52-118 inches. July and August are the driest months; November, December, and January are the wettest. Precipitation at the lower elevations is primarily in the form of rain. At higher elevations, 25 to 30% of the annual precipitation may be in the form of snow. Snowpack depth and period of accumulation vary with elevation. Snowfall is rare below 2,000 feet, while it often reaches a depth of 6 to 10 feet above 4000 feet. (Blowdown FEIS).

Streamflow

Streamflows within the Bull Run Watershed are characterized by low flows in the late summer (August and September) and high flows generated by, typically, a dozen distinct storm events during October through April (Aumen, Grizzard, and Hawkins, 1989). Flows from the Bull Run River gage, plotted in Figure III-2, demonstrate August and September's low flow period, and the high flows associated with October through April's storm events. The peak flow event in February and was generated by a rain-on-snow event. 1986 was selected as a representative year because of the typical low flow period and the rain-on-snow event in February.

Figure III-2 Stream flow (cfs) Bull Run River Upstream of Reservoirs (USGS Station 14138850, Calendar Year 1986)



a. Flow Regime Affected Environment

Total precipitation in the Bull Run Management Unit averages greater than 96 inches per year. The relatively impermeable surfaces of roads cause surface runoff of rain and snowmelt water that 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 pg 4-160). This process increases flow routing efficiency and may result in increased peak stream flows.

Soils developing in glacial till in the upper valleys of Mainstem Bull Run River, Blazed Alder Creek, and Cedar Creek exhibit perched water tables during periods of heavy rain (Bull Run Watershed Analysis, 1997, pg 4-38). Additional precipitation runs off quickly and such soils have been termed impervious. Figure III-3 shows the locations of these soils within the Bull Run Watershed (including the Little Sandy subwatershed). This process was not analyzed outside the Bull Run Watershed because the data was not available. Where roads intercept these soils, the channelizing effects to storm runoff is accelerated making the decommissioning of such roads a priority. 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 III-3 Roads in Impervious Soils (Bull Run Watershed)

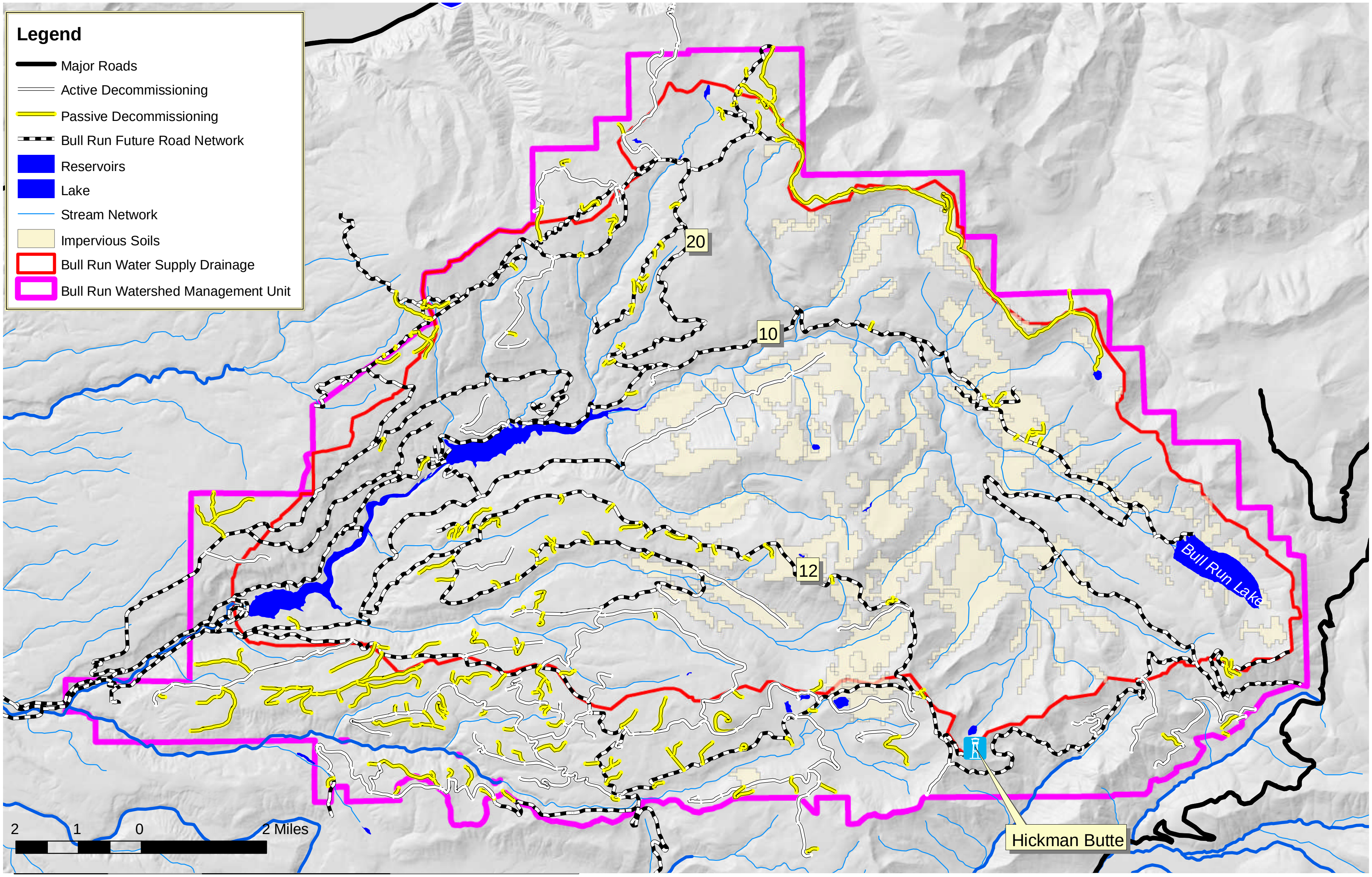


Figure III-4 Roads in Impervious Soils (Bull Run Watershed)

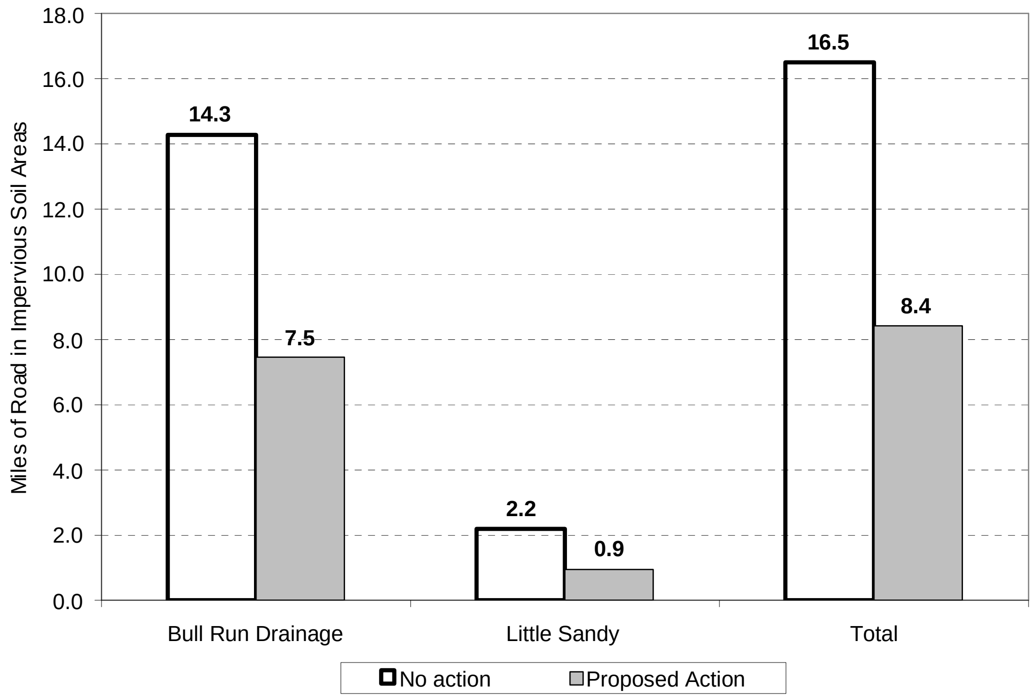


Table III-4 Miles of Road in Impervious Soils

Subwatershed	No action	Proposed Action	Percent Reduction
Bull Run Drainage	14.3	7.5	48
Little Sandy	2.2	0.9	57
Total	16.5	8.4	49

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. 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 analysis areas within the Bull Run Management Unit because the watershed area needs to be defined to calculate the increases in the stream drainage network. For this section of the analysis it was assumed that under the No Action alternative ditchlines on all roads still have the potential to increase the stream drainage network. Likewise, all decommissioned roads (either active of passive decommissioning) would no longer have ditchlines with the potential to increase the stream drainage network.

Figure III-5 and Table III-5 show that roads currently in the Bull Run Management Unit increase the channel network length by 14%. Increases in stream drainage network enhancement vary from 6 to 27% based on analysis area. Within areas with anadromous fish habitat the increase is 19%.

Figure III-5 Stream Drainage Network Expansion

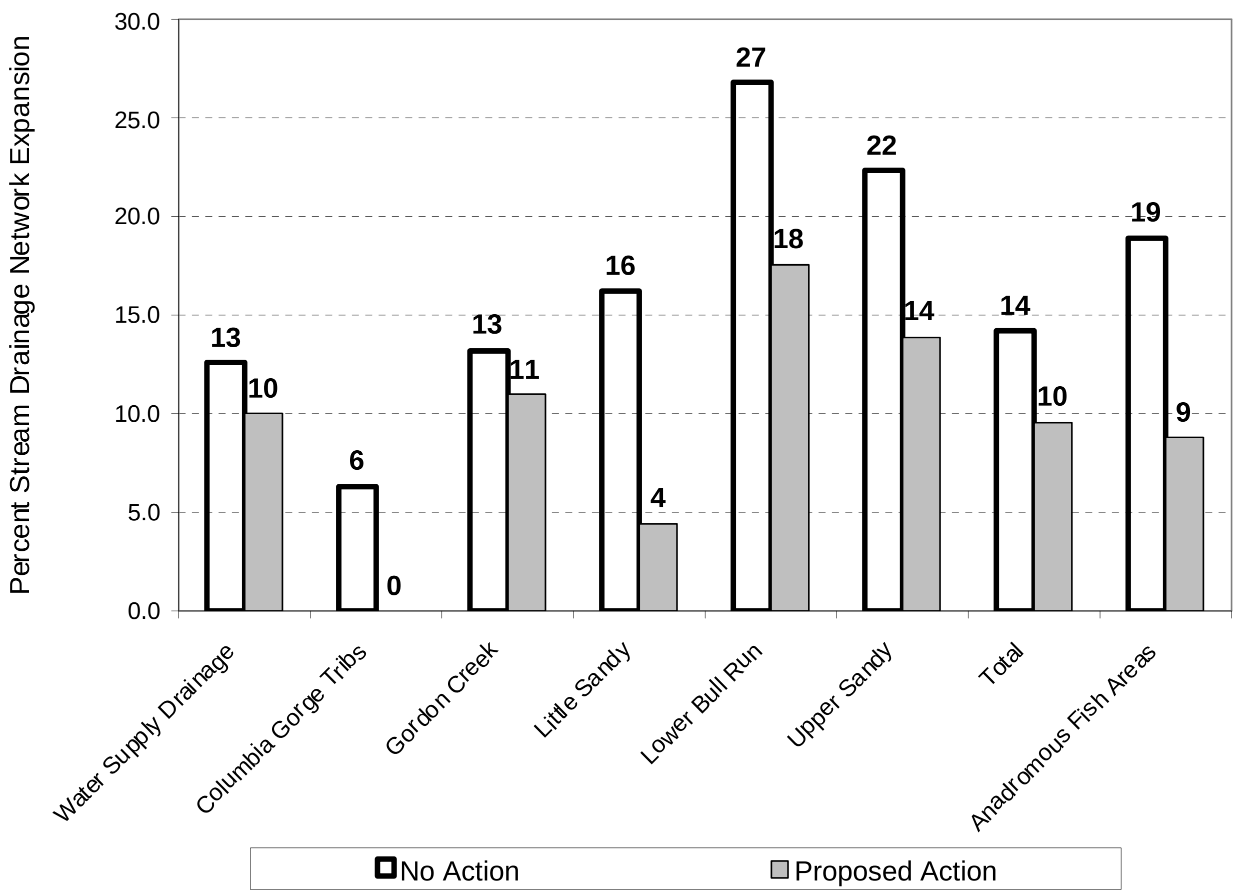


Table III-5 Percent Stream Drainage Network Expansion

Subwatershed	No Action	Proposed Action	Percent Reduction
Water Supply Drainage	12.6	10.0	2.6
Columbia Gorge Tribs	6.3	0.0	6.3
Gordon Creek	13.2	11.0	2.2
Little Sandy	16.2	4.4	11.8
Lower Bull Run	26.8	17.6	9.2
Upper Sandy	22.3	13.9	8.5
Total	14.2	9.6	4.7
Anadromous Fish Areas	18.9	8.8	10.1

Water Resources Flow Regime Environmental Consequences

No Action Alternative

The No Action alternative would not reduce the effects of interception and diversion of subsurface and surface flows for the areas with impervious soil layers by roads. The No Action alternative would ***not*** reduce the road ditch related lengths of channel network expansion. Greater stress would be placed on the road drainage system as encroaching woody vegetation reduces drainage structure efficiency. The likelihood of ditch and culvert inlet overflow would increase with time as roads receive less frequent maintenance. The concentrated but uncontrolled flows would likely erode soils and create gullies in road fills. The risk of these adverse effects would increase with time. For the past 30 years, the nearby stream channels have adjusted to the increased flows from road interception and diversion. As the road drainage loses efficiency with brush encroachment and less frequent maintenance, peak stream flows may reduce with time until the risk of debris flows and landslides increases during storms as the road drainage system fails to function effectively

Proposed Action Alternative

The Proposed Action alternative would reduce the amount of roads in impervious soil areas by 49%. In addition the total increase in the stream network associated with roads would be reduced from 14% to 10%. 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 gaging methods. Peak flow increases greater than 10% offer the possibility for adverse effects (DNR, 1993).

The area within the Bull Run Management Unit and anadromous fish area would be below the threshold of concern for adverse effects. These modeled reductions for the Proposed Action would occur immediately and would continue, because a critical part of the natural drainage patterns would be re-established.

b. Water Resources Hillslope Position Affected Environment

Hillslope position importantly influences the potential for water quality impacts from roads. The position of the road on the topography determines the slope distance to flowing waters in a channel network. Roads along streams have an increased potential for delivery of eroded materials to streams by surface erosion from the road, cut and fill slopes, and also an increased potential for delivery from landslides. These roads also typically cross steep side slopes, since in the Pacific Northwest many streams have oversteepened slopes known as inner gorges. The road prism and its alignment can isolate floodplains, constrict the channel, constrain channel migration and simplify riparian and aquatic habitat. Sediment delivery to streams can be affected by roads based on landform type, slope gradient, vegetative cover and physical distance from fish bearing portions of the stream network. These impacts are minimal for those roads located over 200 feet from a stream.

In contrast, ridge position roads have the greatest distance to streams and are located most often on gentle slopes.

Mid-slope roads are commonly on steep slopes and cross most tributary streams. In the past many of these roads were "balanced fill" where material from the cutslope was balanced as support material for about half of the road surface. For slopes greater than 50%, these fills have a much greater chance of failure.

Based on the data from the Mt. Hood National Forest Roads Analysis detailing roads within 200 feet of streams, it was determined that none of the roads in the analysis area could be considered valley bottom roads.

Miles of mid-slope roads were calculated for the Bull Run Watershed (including the Little Sandy Drainage) using the convexity index. Convexity index is a quantitative measure of topography that describes the terrain surrounding a given area. Large values indicate that the surrounding terrain is lower elevation, while small values indicate surrounding terrain is higher in elevation. When combined with slope data it can be used to identify ridgetops, sideslopes, and valley bottoms (UTOOLS).

The values calculated using the convexity index tool were compared to Mt. Hood National Forests Major Ridges coverage (http://www.reo.gov/mth/mth_data_www.htm) to determine the break point in the convexity index between midslope and ridgeline. Since there are very few valley bottom roads in the analysis area so roads that were not classified as ridgetop were by default midslope.

This area analyzed was selected because of the datasets available for the analysis. This area covers 89% of the lands within the Bull Run Watershed Management Unit.

For this process it was assumed that under the No Action alternative all roads would continue to function as roads with the associated effects. For the action alternative all decommissioned roads (either active or passive decommissioning) would cease to function as roads with the associated reduction in effects.

Figure III-6 Miles of Midslope Roads

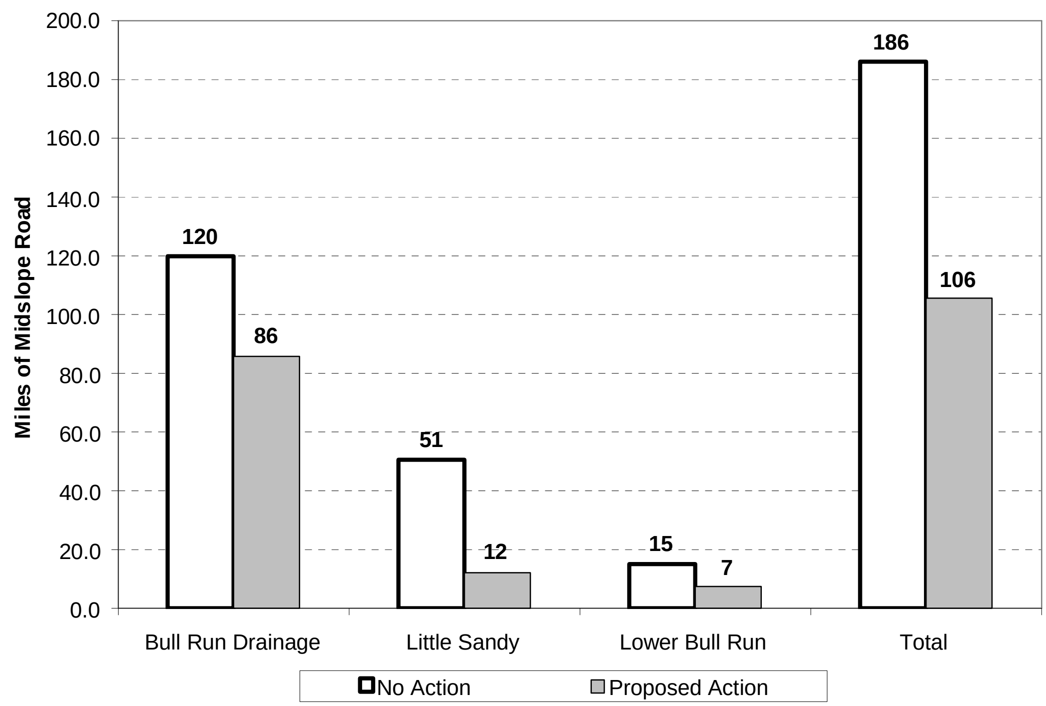


Table III-6 Miles of Midslope Roads

Analysis Area	No Action (miles of midslope road)	Proposed Action (miles of midslope road)	% Reduction
Bull Run Drainage	119.9	85.8	29
Little Sandy	50.6	12.1	76
Lower Bull Run	15.0	7.4	51
Total	186.1	105.6	43

Examples of major roads planned for decommissioning that are midslope roads include the 1211 road and the 1210428 road. These roads have sections of "balanced fill" construction and in some cases have indicators such as "tension cracks", that indicate some areas of these fills may fail.

Water Resources Topography Environmental Consequences

No Action Alternative

The No Action alternative would rely on very limited road maintenance funds to repair failed sections of road. Additional funds would be required to reconstruct these sections of roads at considerable cost. The failed fill deposits would remain as exposed soil downslope of the road and would be available for potential movement reaching streams as delivered sediments. It is likely that funding limitations would prevent repair and the road would be blocked beyond the point of failure.

Proposed Action Alternative

The Proposed Action alternative would decommission these midslope roads and reduce potential impacts to the tributary streams from possible culvert plugging and fill failure (Figure III-6 and Table III-6). Roads with unstable fills would be treated by pulling back material and hauling to stable disposal locations.

c. Water Resources Soils and Geology Affected Environment

The geology of the Bull Run Watershed is well documented. Geologic studies have been conducted by Beaulieu (1974), Schulz (1980), Vogt (1981), Sherrod (1989), and Snyder and Brownell, (1996). Most of the geology is stable and resistant to fluvial erosion in the project area. Less than 2 % of the total watershed area is in a high landslide hazard rating. One of the rock types associated commonly with landslides is the Rhododendron Formation, comprised of pyroclastic flows breccias and lahars which filled depressions. Failures along contacts with other rock units may occur. Breccias may contain red clay pods which weather readily to fine colloidal clays which remain suspended for considerable periods of time producing an alarming source of turbidity for the water supply if disturbed. Fortunately, the red clay pods are relatively rare. Figure III-7 shows the location of the Rhododendron Formation and areas of High Hazard as identified by Schulz (1980) in the project area. As an example much of the 1211 Road is located on the Rhododendron Formation.

Schulz (1980) developed a landslide hazard rating system for shallow landslides and deep-seated landslides in the Bull Run Watershed. The following geologic factors were included: geologic unit (rock type), soil type, slope, and drainage characteristics.

Schulz (1980) inventoried 86 landslides within the Bull Run Watershed Management Unit. In his semi-quantitative study, Schulz used chi-square tests and multiple regression analysis to establish the relative importance of certain geologic factors to mass movement occurrence within this watershed. Schulz summed the weighting points for all the geologic factors present in a given area and produced a mass movement hazard map for the Bull Run Watershed Management Unit.

Schulz used a three-tier hazard rating system (high, medium, low) and classified shallow landslides (debris slide / debris flow) and deep-seated landslides (slump / earthflow). Figure III-7 combines the shallow and deep landslide ratings for an overall landslide hazard.

Schulz found the greatest density of slump-earthflows on the Rhododendron Formation, and the greatest density of debris slides on shallow soils in steep canyons formed by Columbia River Basalt. Contacts between geologic units were found to be particularly susceptible to mass movements. Additionally, Schulz reported that weathering of pyroclastic material (such as the Rhododendron Formation) produced zones of clay-rich material that increased the incidence of mass wasting.

The Schulz map accurately noted slope instability that was activated by the November 1995 and February 1996 storm events. All known landslides within the watershed resulting from these storm events occurred on areas mapped by Schulz as “high” hazard.

In addition during the Roads Analysis for the Mt. Hood National Forest a Forest-wide 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.

Figure III-7 Landslide Hazard

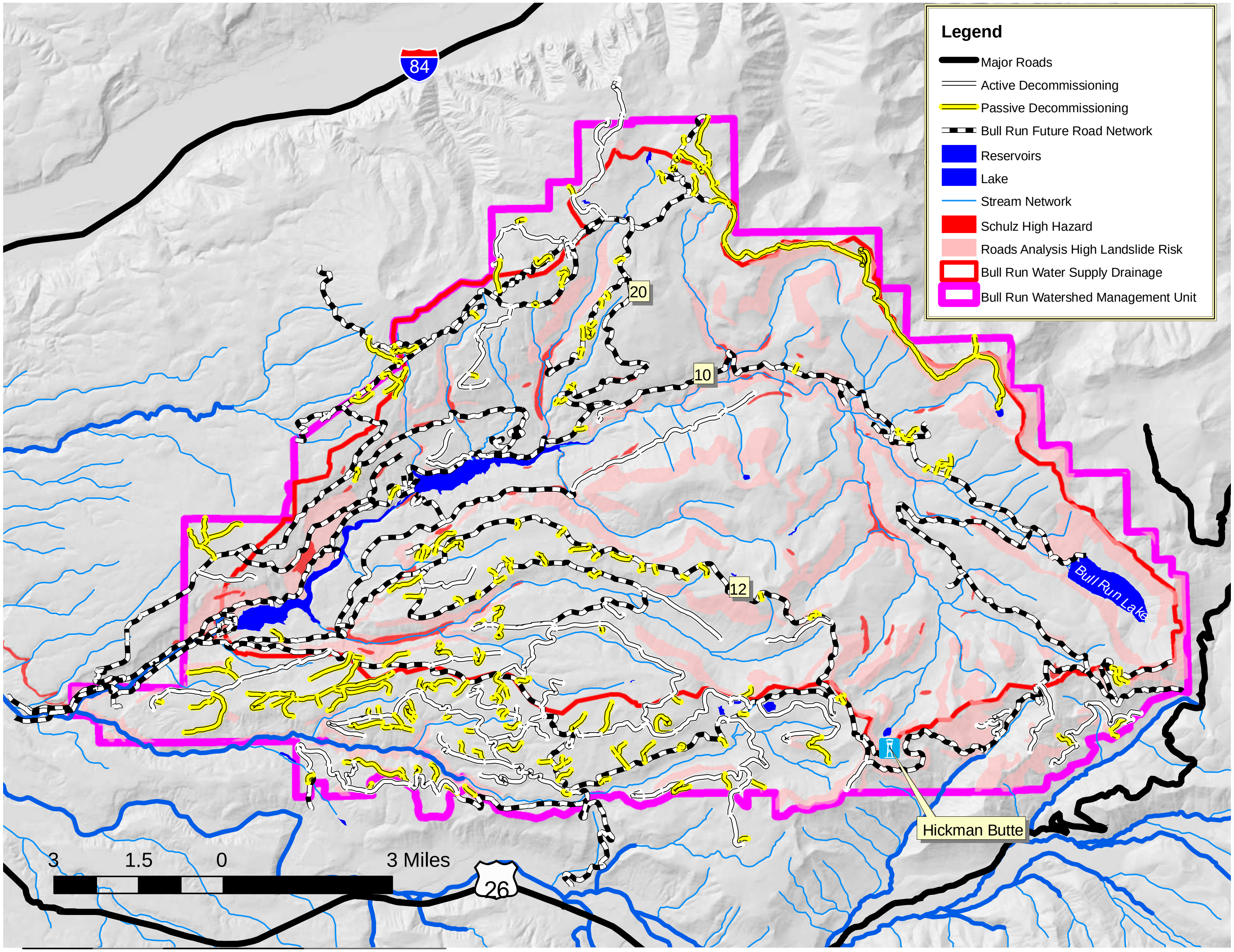


Figure III-8 and Table III-8 detail miles of road in high landslide hazard areas identified in the Roads Analysis. It should be noted that the landslide hazard areas identified in the Roads Analysis did not cover areas outside the National Forest or many areas in the Gordon Creek and Columbia Gorge Tributaries analysis areas because geomorphic mapping associated with Watershed Analyses are not available for these areas.

Table III-7 Miles of Road in Schulz High Hazard Area

Area	No Action (miles)	Proposed Action (miles)	Mileage Reduction	Percent Reduction
Water Supply Drainage	6.7	6.0	0.7	10.2
Lower Bull Run	1.3	1.3	0	0.0
Total	8.0	7.3	0.7	8.5

Figure III-8 Miles of Road in High Landslide Area (from Roads Analysis)

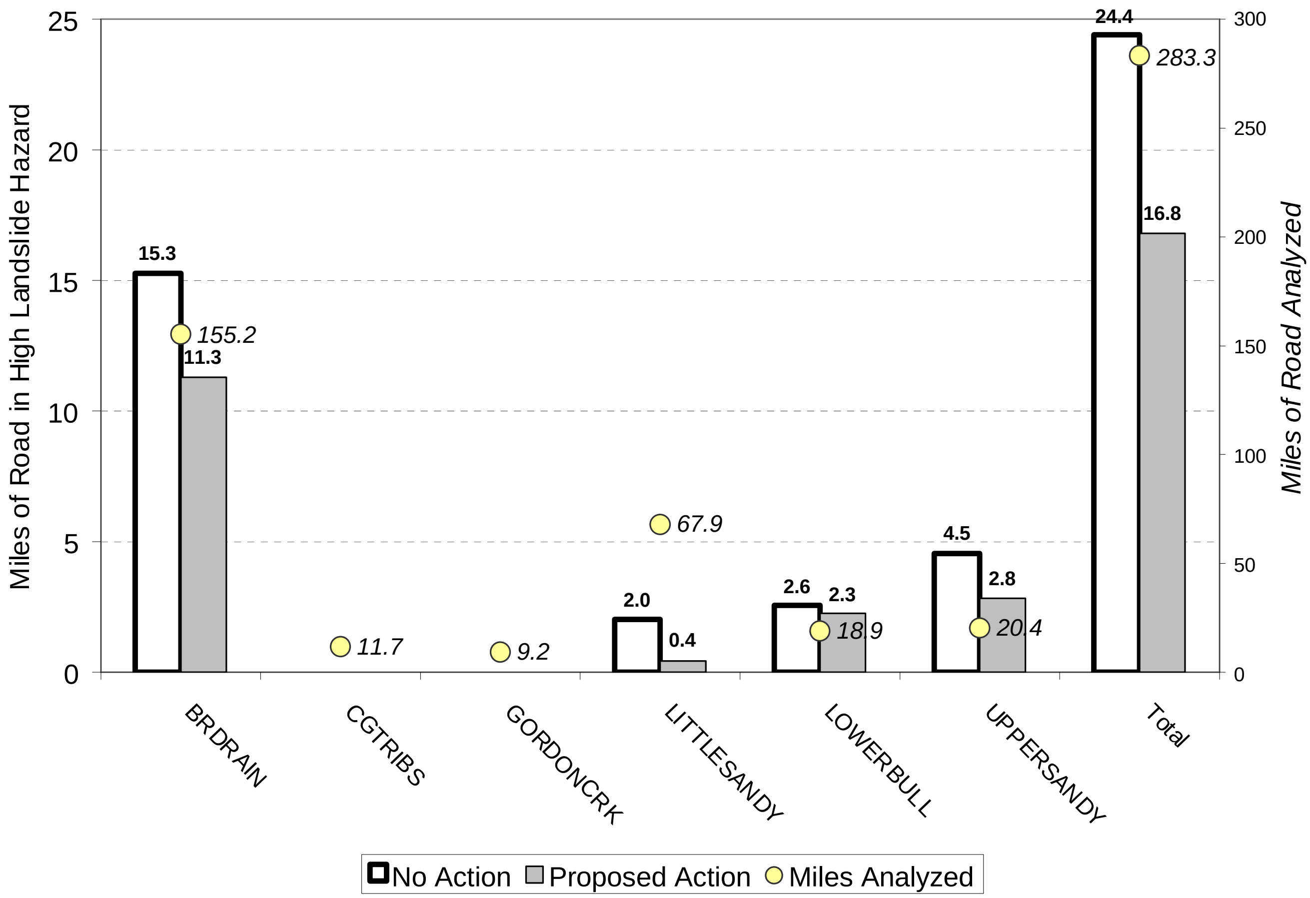


Table III-8 Miles of Road in High Landslide Hazard

Area	No Action	Proposed Action	Mileage Reduction	Miles analyzed
Bull Run Water Supply Drainage	15.3	11.3	4.0	155.2
Columbia Gorge Tributaries	0.0	0.0	0	11.7
Gordon Creek	0.0	0.0	0	9.2
Little Sandy	2.0	0.4	1.6	67.9
Lower Bull Run River	2.6	2.3	0.3	18.9
Upper Sandy	4.5	2.8	1.7	20.4
Total	24.4	16.8	7.6	283.3

Water Resources Soils and Geology Environmental Consequences

No Action Alternative

This analysis demonstrates that there is a potential for landslides associated with the roads in this project area especially in the Bull Run Water Supply Drainage, Little Sandy and Upper Sandy Analysis Areas. The No Action alternative would continue the present risk of landslides of the current road system.

Proposed Action Alternative

The Proposed Action alternative would reduce the potential of landslides from existing roads by reducing roads in Schulz high hazard and high landslide hazard areas from the No Action, especially with the limited funding available for maintaining these roads.

d. Water Resources Sediment Yield Affected Environment

Road crossings of drainages create a potential for sedimentation due to the immediate proximity of the road to the stream being crossed. The relatively impermeable surfaces of roads cause surface runoff that bypasses longer, slower, subsurface flow routes to streams. 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, picking 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.

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.

The Bull Run Watershed Analysis (1997) assessed sediment yield associated with a properly maintained road network (Bull Run Watershed Analysis, page 4-24). 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 III-9 Stream Crossings by Alternative

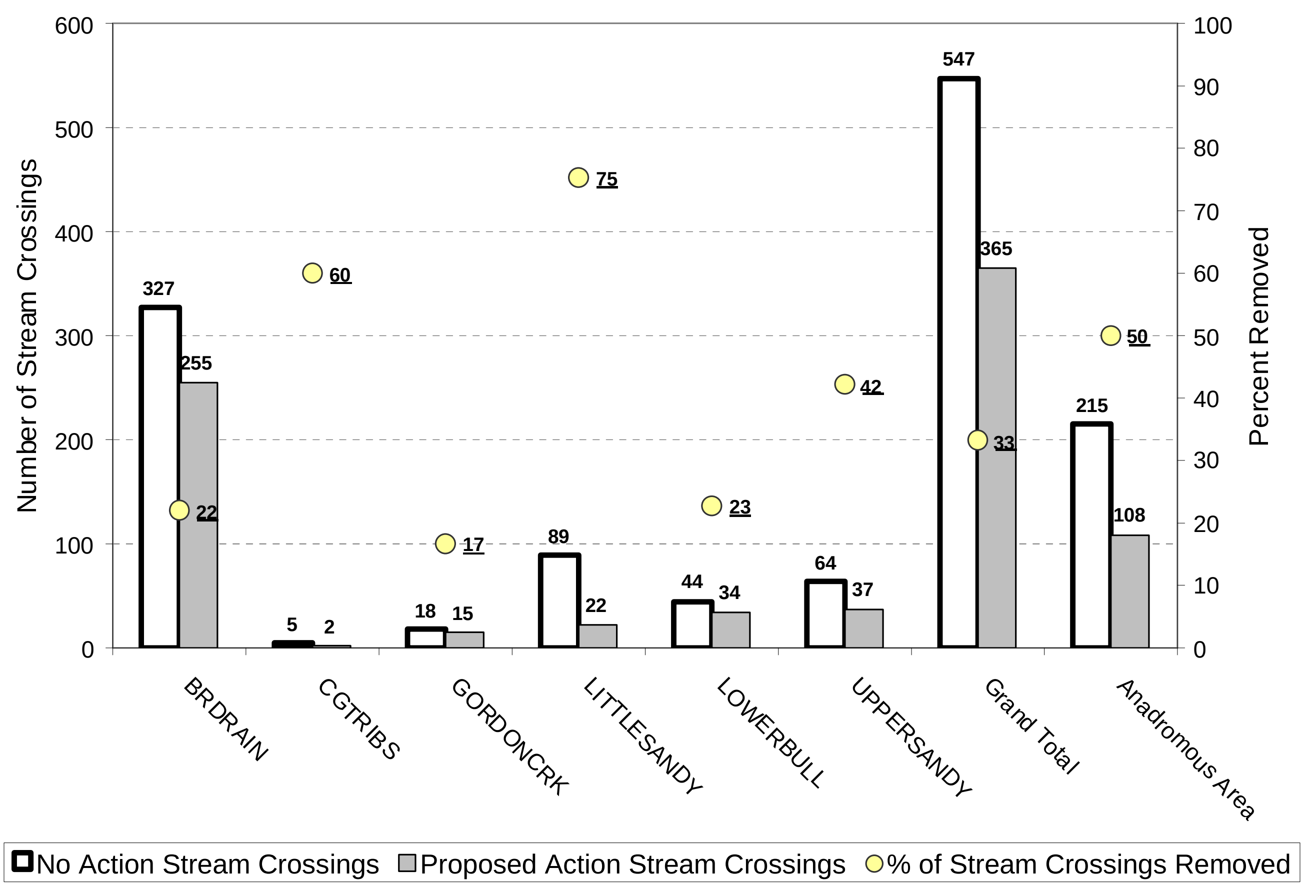


Table III-9 Stream Crossings by Alternative

Analysis Area	No Action	Proposed Action	% Decommissioned
Bull Run Water Supply Drainage	327	255	22
Columbia Gorge Tributaries	5	2	60
Gordon Creek	18	15	17
Little Sandy	89	22	75
Lower Bull Run River	44	34	23
Upper Sandy	64	37	42
Total	547	365	33
Anadromous Areas	215	108	50

Modeling of the changes in sediment yield associated with Proposed Action alternative uses the same approach as in the Bull Run Watershed Analysis (1997).

Figure III-10 Modeled Road Related Sediment Delivery

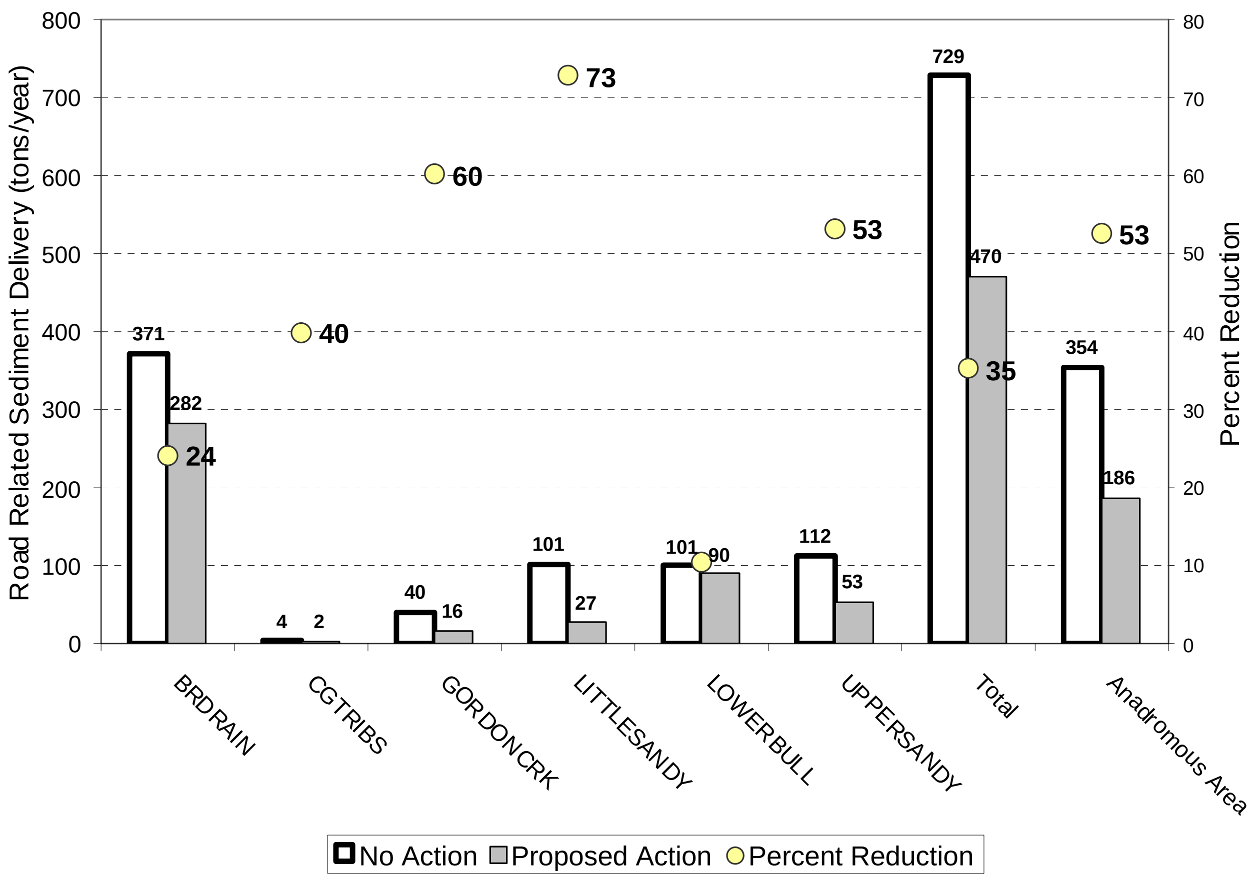


Table III-10 Modeled Road Related Sediment Delivery

Area	No Action	Proposed Action	Percent Reduction
Bull Run Water Supply Drainage	371	282	24
Columbia Gorge Tributaries	4	2	40
Gordon Creek	40	16	60
Little Sandy	101	27	73
Lower Bull Run River	101	90	10
Upper Sandy	112	53	53
Total	729	470	35
Anadromous Area	354	186	53

Water Resources Sediment Yield Environmental Consequences (Short Term)

No Action Alternative

Short term measurable increases in sediment transport from the No Action alternative 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. At present, the number of such failed culverts and ditch lines is not severe enough to produce measurable additions of sediment to the stream system. In about five years such impacts could be expected to become measurable at some sites of drainage structure plugging and fill erosion. All of these roads survived the severe winter of 1995-96 quite well. The November 1999 storm event which was the highest stream flow event for the approximate 40 years of record at the Bull Run River stream flow gage above the reservoirs, and was well in exceedance of a 50 year recurrence interval storm, resulted in scour in and around culvert inlets on the 10 road between the junctions of the 20 road and 1015 road.

Proposed Action Alternative

In the short term, decommissioning of roads as in the Proposed Action would produce some sediments 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 on the 1015 road were measured to use as estimates for different stream order crossings) and aggregated up for each analysis area. In order to estimate the annual yield it was assumed that 15 miles of road decommissioning in the water supply drainage plus and additional 15 miles of road decommissioning in the project area outside the water supply drainage would occur each year.

The WEPP analysis was completed for 50 years of climate data and resulted in an average yield in the Water Supply Drainage of 0.21 tons of sediment delivery per year and 0.24 tons per year in the project area outside the Water Supply Drainage for a total of 0.45 tons 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 0.08 tons per year for the project area. The 50 year return period event results in 16.86 tons per year for the project area.

Table III-11 Short Term Sediment Yield Based on WEPP Analysis

Return Period Climatic Events	Drainage	Buffer	Total	Ananadromous Area
50	7.99	8.86	16.86	8.61
25	0.35	0.42	0.78	0.41
10	0.20	0.25	0.45	0.24
5	0.05	0.08	0.13	0.08
2.5	0.03	0.05	0.08	0.05
Average	0.21	0.24	0.45	0.23

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 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.

Water Resources Sediment Yield Environmental Consequences (Long Term)

No Action Alternative

To properly understand the potential risks of sediment production, it is important to look beyond the modeling of current sediment production which assumes that all roads are maintained, as the Proposed Action alternative analysis does. Under the No Action alternative 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 (Figure III-11). If flows are sufficiently large or continuous, a headcut scarp would 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, the 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. It is also important to realize that in 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.

In addition, associated with the November 1999 flood on the 1820 road water ponded in the ditchline, in part due to the lack of ditchline maintenance, causing the fill to supersaturate and fail into Clear Creek.

To predict the potential volume of sediment produced from culvert plugging is simply 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 No Action alternative there is a risk of erosion, sedimentation, and downstream effects to turbidity and suspended sediment conditions as well as potential loss of reservoir storage capacity 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 III-11 - Examples of Catastrophic Fill and Culvert Failure from the Mt. Hood National Forest Roads Analysis (examples are not in the Bull Run Watershed Management Unit)

Proposed Action Alternative

The Proposed Action alternative would reduce the number of stream crossings from 547 to 365. 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.

Table III-10 and Figure III-10 detail estimates of sediment delivery attributed to properly maintained roads. Also detailed are the reductions in sediment delivery associated with implementation of the Proposed Action. The Proposed Action would provide a 35% reduction in sediment delivery for the project area. Within the Water Supply Drainage there is a 24% reduction in sediment delivery.

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 No Action Alternative.

Watershed Processes - Cumulative Effects

A cumulative effects analysis was performed for watershed processes where adverse direct and/or indirect effects associated with Alternative 2 (the proposed action) were identified. These processes include sediment yield. Cumulative effects analysis areas were delineated based on the zone of influence associated with effects from these processes (all of which deposit sediment to the stream channel).

Key depositional stream reaches were identified downstream of the project area to simplify the analysis. These depositional areas are where any sediment generated from the project activities would reside. Based on the key depositional stream reaches identified watershed areas upstream were identified and these watershed areas are the cumulative effects analysis areas analyzed. Fine sediment delivery to stream channels and transport to depositional reaches can degrade water quality for municipal water supply and alter substrate competition important to aquatic species (invertebrates, amphibians, fish, and plants).

Table III-12 – Cumulative Effects Analysis Areas

Analysis Area	Acres	Delineation Point and Criteria
Bull Run Watershed	65,481	Intake point for municipal water supply on Reservoir #1. The lower reservoir acts a depositional area for fine sediment generated in the water supply drainage and this area is critical for municipal water supply.
Little Sandy	15,897	Little Sandy just upstream of the Bull Run River. This area acts as the key depositional area for fine sediment generated in the Little Sandy and is potential spawning habitat for coho and spring chinook salmon and steelhead trout. This area is identified as anchor habitat for steelhead trout by the Sandy River Basin Working Group. http://www.oregontrout.org/images/8success/Sandy%20Habitat%20Report.pdf
Lower Bull Run	7,603	Confluence of Bull Run River and Sandy River. Spawning habitat has been identified in this area as part of the Ecosystem and Diagnosis Treatment processes for the Sandy Basin. This is potential spawning habitat for coho and spring chinook salmon and steelhead trout.
Clear Creek	4,075	Key spawning habitat identified from Roads Analysis. This area is potential spawning habitat for coho and spring chinook salmon and steelhead trout
Clear Fork	4,752	Key spawning habitat identified from Roads Analysis. This area is potential spawning habitat for coho and Chinook salmon and steelhead trout. This area has been identified as anchor habitat for steelhead, spring Chinook and coho salmon by the Sandy River Basin Working Group.

Figure III-12 – Cumulative Effects Analysis Areas

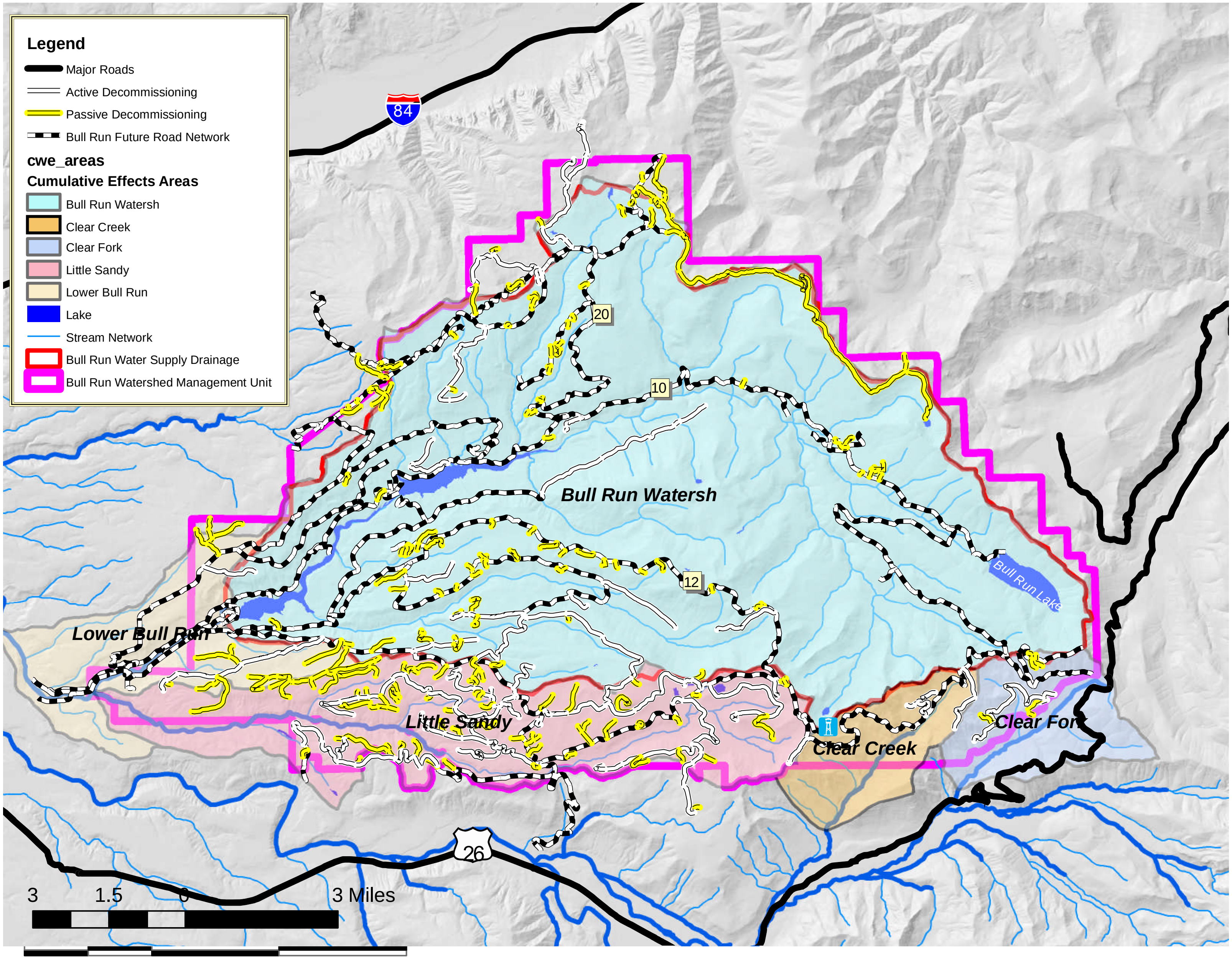


Table III-13 - Bull Run Watershed - Past, Present, and Reasonably Forseeable Projects

Project	Sediment Yield tons per year
Historical Harvest	1.49 (tons per year, from Bull Run Watershed Analysis)
Roads	371 (tons per year, from analysis for road decommissioning project)
Proposed Action	0.41 (total yield in tons, from analysis for road decommissioning project)

As detailed by Table III-13, the only foreseeable activities with the potential to deposit fine sediment in the stream system in the Bull Run Water Supply Drainage are associated with road decommissioning. 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 and harvest units (as stated in the Bull Run Watershed Analysis the modeled rates of sediment are likely overestimates because of the vegetation and lightly traveled road surfaces in the Bull Run).

Rates of road decommissioning in the water supply drainage associated with this project are expected to be similar to that of activities associated with the 1999 Road Decommissioning EA. Based on experience and monitoring results from activities associated with the 1999 Road Decommissioning EA there are generally some short term pulses of sediment following the first large storm event after the culvert removal activities and after that point the stream crossing is stabilized. Effects associated with earlier road decommissioning activities were not detectable downstream of the activities or in the reservoirs. Based on the similarity of activities planned under the proposed action downstream instream fine sediment levels and/or impacts to water quality in the reservoirs are not anticipated.

Table III-14 - Lower Bull Run - Past, Present, and Reasonably Forseeable Projects

Project	Sediment Yield
Historical Harvest	1.49 (tons per year, from Bull Run Watershed Analysis)
Roads	137 (tons per year, from analysis for road decommissioning project)
Proposed Action	0.06 (total yield in tons, from analysis for road decommissioning project)
Walker Creek Culvert Replacement	0.01 (total yield in tons, calculated using the same methodology as road decommissioning project
Gravel Placement	Project augmenting gravel in lower Bull Run River to replace natural gravel recruitment blocked by the Bull Run dams. Though the gravel itself is not considered fine sediment there would be some stream bed and bank disturbance associated with the project generating small amounts of fine sediment.

Cumulative effects associated with sediment yield in the lower Bull Run River are associated with historical harvest, the existing road system, and restoration projects tied to road decommissioning or the Habitat Conservation Plan for the Bull Run. As with the Bull Run Water Supply Drainage sediment yield associated with road decommissioning are very small when compared to other activities in the analysis area.

Currently less than 10% of the stream surface is covered by fine sediment in the lower Bull Run River (based on EDT input) this is well within the Mt Hood Land and Resource Management Plan Standard of less than 25% embeddedness (FW102). Implementation of planned activities is not expected to result in increases in fine sediment that would result in non-compliance with Mt. Hood Land and Resource Management Plan Standards.

Table III-15 - Little Sandy - Past, Present, and Reasonably Forseeable Projects

Project	Sediment Yield
Historical Harvest	2.39 (tons per year, from Bull Run Watershed Analysis)
Roads	101(tons per year, from analysis for road decommissioning project)
Proposed Action	0.48 (total yield in tons, from analysis for road decommissioning project)
Little Sandy Diversion Removal	4000 (total yield in tons)
LWD Placement	Slight increase due to stream bed and bank disturbance associated with activities

Currently at the Little Sandy diversion dam (river mile 1.8) all of the streamflow in the Little Sandy River is diverted to Roslyn Lake. There is some leakage, and with accretion flows, the summer low flow at the mouth is about 5 cfs. The decommissioning plan for the Bull Run Hydroelectric Project calls for the removal of the Little Sandy Diversion Dam during the summer of 2008. According to the decommissioning plan (http://www.portlandgeneral.com/about_pge/news/sandy_land/decommissioning_plan.pdf) since there is minimal sediment stored behind the Little Sandy Dam (approximately 4000 cubic yards) and the Little Sandy riverbed is sediment poor, the sediments would be allowed to flush downstream with the natural flows in the river. The sediment would be reshaped to facilitate sediment transport and to minimize blockages in the river. Compared to the other sediment generating activities in the analysis area the amount of sediment generated from road decommissioning activities is very small.

Currently less than 10% of the stream surface is covered by fine sediment in the lower Little Sandy River (based on EDT input) this is well within the Mt Hood Land and Resource Management Plan Standard of less than 25% embeddedness (FW102). Implementation of planned activities is not expected to result in increases in fine sediment that would result in non-compliance with Mt. Hood Land and Resource Management Plan Standards.

Table III-16 - Clear Fork - Past, Present, and Reasonably Forseeable Projects

Project	Sediment Yield
Historical Harvest	3.15 (tons per year, from Upper Sandy Watershed Analysis)
Roads	178 (tons per year, from analysis for road decommissioning project)
Proposed Action	0.11 (total yield in tons, from analysis for road decommissioning project)

The majority of sediment generating activities in the Clear Fork analysis area are associated with the existing road network. The major road systems in this area are the 18 and 1828 roads which run parallel to Clear Fork on the North and South side of the stream respectively. These roads are midslope roads which intersect a large number of tributary streams to Clear Fork resulting in a high level of modeled sediment to the stream system. The only reasonably foreseeable activities in this area are road decommissioning under the proposed action which generates a very small amount of sediment when compared to other activities.

Based on data used for the Ecosystem Diagnosis and Treatment Model current instream fine sediment levels are the same as those in an undisturbed system (less than 6% fines less than 0.85 mm particle size). Implementation of the proposed action should not result in any increase in instream fine sediment levels.

Table III-17 - Clear Creek - Past, Present, and Reasonably Forseeable Projects

Project	Sediment Yield tons per year
Historical Harvest	0 (tons per year, from Upper Sandy Watershed Analysis)
Roads	47 (tons per year, from analysis for road decommissioning project)
Proposed Action	0.04 (total yield in tons, from analysis for road decommissioning project)

Within the Clear Creek analysis area the majority of the sediment yield is associated with the existing road system in the headwaters area of the watershed. With the removal of the 1820 road from the forest boundary upstream to the junction with the 1200400 (which goes to Hickman Butte Lookout) there are minimal roads in this area. As with all the other analysis areas sediment yield associated with the proposed action is very small compared to other sediment generating activities.

Based on data used for the Ecosystem Diagnosis and Treatment Model current instream fine sediment levels are slightly higher than those in an undisturbed system (an approximate 0 to 7% increase in fines less than 0.85 mm particle size). Implementation of the proposed action should not result in any additional increase in instream fine sediment levels.

B. Fisheries

Table III-18 – Comparison of Alternatives Fisheries

Items of Comparison	Proposed Action	No Action
Fish Habitat		
Number of Stream Crossings associated with anadromous fish habitat	108	218
Road related Sediment Delivery (modeled tons/year) for properly maintained roads in areas associated with anadromous fish habitat	186	354
Short Term Estimated Sediment Production to anadromous fish habitat	0.69 tons	No Change
Short Term Habitat Quality	High	High
Long Term Habitat Quality	High	Low
Cumulative Habitat Quality	High	Decreasing

Affected Environment

The waters of the Mt. Hood National Forest provide important habitat for native populations of fish in over 1,600 miles of streams. Approximately 300 miles of streams support anadromous fish populations. Past land management activities have had impacts on watersheds throughout the Forest, but natural conditions and processes, such as highly erodible soils, also dictate current conditions. Management activities, which have had negative impacts on fish and aquatic resources, include road building, timber harvest, water diversions, hydroelectric development, grazing, and recreation.

There are several Tier One and Tier Two, Key watersheds, on the Mt. Hood National Forest. Tier One watersheds identified in the Northwest Forest Plan, provide refugia habitat that is critical for the conservation of at-risk anadromous salmonids, bull trout, and resident fish species, as well as having a high potential for successful watershed restoration. Tier Two Key watersheds have sources of high quality water and may not contain at-risk fish stocks.

These "key" watersheds support six federally listed salmon and trout "evolutionarily significant units" (ESU's) under the federal Endangered Species Act (ESA). These watersheds also support one species of fish that is included on the sensitive species list for Region 6 of the Forest Service, and 2 species of aquatic mollusks listed as "Survey and Manage". See table below.

The Bull Run Watershed is designated as a Tier 2 Key watershed. According to the Northwest Forest Plan, Tier One and Tier Two, Key watersheds should receive the highest priority for watershed restoration.

The majority of aquatic habitats on the forest are currently considered as in a degraded state due to past and current human-induced practices. Although most streams on the forest are currently undergoing aggressive restoration programs, they are generally still experiencing the effects of past and ongoing adverse impacts which prevent the attainment of being considered as fully recovered or as fully functioning aquatic ecosystems.

In the Bull Run Watershed Management Unit, past logging, dams, water withdrawal facilities, and the network of roads associated with these activities have resulted in impacts throughout the management unit.

Separately and cumulatively, these impacts have resulted in loss of connectivity, loss of stream shading, alteration in riparian vegetation and function, increased sedimentation, reduced instream large woody debris, and loss of pools.

The Proposed Action Alternative has the potential to affect streams in 6 subwatersheds: the mainstem Bull Run River above the dams, the Lower Bull Run River below the dams, the Little Sandy River watershed, the Upper Sandy River watershed, the Columbia River Gorge, and Gordon Creek watershed.

The Mt Hood National Forest (MHNF) uses salmonids (salmon, trout, and char) as management indicator species for aquatic habitats. Although other fish species are present in the watershed (sculpins, and dace for example) population trends are unknown. Because more information exists on salmonids, this group serves as a more optimum choice for monitoring aquatic environments.

Essential Fish Habitat Consultation

The Sustainable Fisheries Act of 1996 amended the Magnuson-Stevens Fishery Conservation and Management Act (MSA) to establish new requirements for Essential Fish Habitat (EFH) descriptions in federal fishery management plans and to require Federal action agencies to consult with NOAA Fisheries regarding any action or proposed action authorized, funded, or undertaken by the agency that may adversely affect essential fish habitat (EFH) identified under the MSA. Essential Fish Habitat means those “waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” EFH 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). Three salmonid species are identified under the MSA: chinook salmon, coho salmon and Puget Sound pink salmon. Chinook and coho salmon occur on the Forest in the Clackamas River, Hood River, and Sandy River basins therefore, EFH consultation is necessary for agency actions within these watersheds.
The Magnuson-Stevens Fishery Conservation Act requires the identification of habitat “essential” to conserve and enhance federal fishery resources that are commercially fished. Essential Fish Habitat (EFH) is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (50 CFR 600.10) EFH for Chinook and coho salmon includes all streams, lakes, ponds, wetlands tributaries and other water bodies currently viable and most of the habitat historically accessible to these.

Threatened, Endangered, Sensitive, Survey and Manage, and Management Indicator Species

There are no Endangered fish species on the Mt. Hood National Forest. Threatened, Sensitive, Survey and Manage, and Management Indicator aquatic species are known to exist on the Zigzag Ranger District and Columbia Gorge National Scenic Area, and are listed in the following table.

Table III-19 Federally listed aquatic species known to occur on the Zigzag Ranger District and Columbia River Gorge National Scenic Area East.

Species	ESU	Status	Watershed
Bull Trout (*Salvelinus confluentus*)	Columbia River Distinct Population Segment	Threatened 5/98	Hood River
Steelhead (*Oncorhynchus mykiss*)	Lower Columbia River	Threatened 3/98	Sandy River, Clackamas River, Hood River, West Columbia Gorge Tributaries
Chinook (*Oncorhynchus tshawytscha*)	Lower Columbia River	Threatened 3/99;	Sandy River, Hood River, West Columbia Gorge Tributaries
Coho (*Oncorhynchus kisutch*)	Lower Columbia River	Threatened 6/05	Sandy River, Clackamas River, West Columbia Gorge Tributaries
Redband Trout (*Oncorhynchus mykiss gairdneri*)	NA	Sensitive 7/04	Mill Creek, Badger-Tygh, Mile Creeks, West Fork Hood River; suspected in West Cascade streams
Cutthroat trout *Oncorhynchus clarkii clarkii*)	SW Washington/ Columbia River	Management Indicator Species	Sandy River, Clackamas River, Hood River, West Columbia Gorge Tributaries
Columbia dusky snail (Lyogyrus n. sp. 1)	NA	Survey and Manage	High elevation springs, Seeps throughout Forest/Scenic Area
Basalt Juga	NA	Survey and Manage	Low elevation springs, Seeps in Columbia River Gorge

a. Threatened Species

Lower Columbia River Steelhead (*Oncorhynchus mykiss*) - Threatened (NOAA Fisheries)

Lower Columbia River steelhead occur in Sandy River, including the Bull Run, Little Sandy, and Upper Sandy River, and Gordon Creek subbasins. They also occur in the West Columbia Gorge tributaries. Adult winter steelhead enter rivers and streams on the Forest primarily during April through June with peak migration occurring in May. Steelhead use the majority of the mainstem rivers and tributaries as spawning and rearing habitat. Adult steelhead spawn in late winter to spring (January–June), depending in part on the run type (summer or winter steelhead), discharge and water temperature. Winter steelhead fry emerge between late June and late July and rear in freshwater habitat for one to three years. Smolt emigration takes place March thru June during spring freshets.

The Lower Columbia River steelhead "threatened" listing has been attributed to a number of factors. Among them are dams, recreational fishing, habitat modification, hatchery influences, and non-point source pollution. Hydropower, irrigation, domestic water supply, and flood control dams have disrupted migrations and eliminated historically available habitat.

Columbia River Bull Trout (*Salvelinus confluentus*) - Threatened (USFW)

Columbia River Bull trout are presently found in the Hood River drainage. Bull trout presence has been documented in Middle Fork Hood River, Clear Branch Creek both above and below Clear Branch dam, Pinnacle Creek, Coe Branch Creek, and Eliot Branch Creek.

There are unconfirmed reports of their presence in the Sandy River basin in the late 1950's. However, recent fish sampling conducted in both the Sandy River and Clackamas River drainages failed to uncover any bull trout presence. Thus, for this analysis, Bull trout or their critical habitat are not expected to occur within any of the subwatersheds where the proposed action is to take place.

Lower Columbia River Chinook (*Oncorhynchus tshawytscha*) - Threatened (NOAA Fisheries)

Lower Columbia River Chinook salmon occur in the Sandy River basin, which includes the Bull Run, Little Sandy, and Upper Sandy river, and Gordon Creek subbasins. They also occur in the West Columbia Gorge tributaries. These stocks are made up of both a spring run and a fall run component. The spring run occurs in the Hood River and Sandy systems, while fall run Chinook are present in the Clackamas River and Sandy Rivers.

Chinook in the Sandy River basin utilize the mainstem Sandy River and upper basin tributary streams such as the Salmon River, Zigzag River, Still Creek, and Clear Fork of the Sandy River. They enter these watersheds from April through August and spawn from August through early October. The fall Chinook occurring within the Sandy and Clackamas Rivers primarily spawn and rear in the mainstem and larger tributaries downstream from Forest lands.

The Lower Columbia River Chinook ESU exhibits three major life history types: fall run ("tules"), late fall run ("brights"), and spring run. Spring-run Chinook salmon in the Sandy River have been influenced by spring-run Chinook salmon introduced from the Willamette River ESU. However, analyses suggest that considerable genetic resources still reside in the existing.

The fall Chinook populations in the Lower Columbia River Chinook salmon ESU are currently dominated by large-scale hatchery production, relatively high harvest and extensive habitat degradation. Most fall-run fish ESU emigrate to the marine environment as sub-yearlings. Modifications in the river environment have altered the duration of freshwater residence. Tule fall Chinook salmon return at adult ages 3 and 4, “bright” fall Chinook salmon return at ages 4, 5, and 6.

Lower Columbia River/SW Washington Coho Salmon (*Oncorhynchus kisutch*) -Threatened (NOAA Fisheries)

Coho stocks occurring on the Forest are currently found in the Sandy (including Bull Run, Little Sandy, Upper Sandy River, and Gordon Creek subbasins) and Clackamas River systems. Adult coho salmon enter the Sandy and Clackamas Rivers from September through February. Spawning occurs mid-January to the end of April with the peak occurring mid-February. Adults prefer deep pools and tributaries for over-wintering while juveniles would seek out inundated floodplains and other protected slow-water habitats such as side channels and slowwater pools. Woody debris and habitat diversity are important to this species. Lower Columbia/Sandy sub-basin has 4 major streams that contain more than five miles of anadromous fish habitat inside the National Forest land, including Sandy River, Salmon River, Still Cr, and Zigzag River. Still Cr. holds roughly 7 miles of anadromous fish habitat inside Mt. Hood NF land.

b. Sensitive Species

Redband Trout *(Oncorhynchus mykiss gairdneri)* - Sensitive (Forest Service Region 6)

Redband rainbow trout occur in the White River, Mill Creek, Badger-Tygh, Mile Creeks, and Mill Creek watersheds on the Mt. Hood National Forest. Their presence is suspected in westside Cascade streams of the Sandy River Basin as evidenced by smolt trapping in Still Creek, Lost Creek, and Clear Fork.

Like other salmonids, redband rainbow trout require adequate water quality and quantity, cover (provided by large and small wood, boulders, brush, substrate, and/or surface turbulence), invertebrate food, and various sizes and distributions of pool and riffle units. Preferred spawning substrate includes well oxygenated, loose small to medium gravels. Spawning occurs in the spring, usually in riffles or the downstream end of pools. Fry emergence from the gravel normally occurs by the middle of July, but depends on water temperature and exact time of spawning.

Rearing habitat is often along stream margins, associated with instream structure provided by boulders, brush and wood.

c. Survey and Manage Species

Columbia Dusky Snail (*Lyogyrus n. sp. 1*) - Survey and Manage Species, Forest Service Region 6

This species of aquatic mollusk has been found across the Forest during surveys conducted over the past several years. Although surveys have not been conducted in the Bull Run Management Unit, they are likely present in habitats described below. Habitat requirements for this species are fairly specific: cold, well oxygenated springs, seeps, and small streams, preferring areas without macrophytes (macroscopic emergent and submerged aquatic plants), but they may occur in areas with watercress and water hemlock. Individuals have not been found in larger streams and rivers, or glacial streams.

Potential habitat for the Columbia dusky snail occurs in the Action Area. Based on habitat definitions and known locations for this species, all seeps, springs, and small, non-glacial streams within the Forest and Scenic Area are identified as potential habitat.

The Survey protocols for aquatic mollusk species from the Northwest Forest Plan (v. 2.0-October 29, 1997) state that road closures or decommissioning projects do not require pre-project surveys for Survey and Manage aquatic mollusks (page 6). Road decommissioning activities are limited to previously disturbed sites within the road prism and would not result in a long-term, adverse impact on the species habitat, its life cycle, microclimate, or life support requirements, or the persistence of the species at the site.

Basalt Juga

These small snails have only been found at two location within the Oregon portion of the Scenic Area: in Canyon Creek just west of the town of Hood River and in several small seeps just above (south) Interstate 84 about ½ mile east of The Dalles Dam. Individuals have been found at several locations on the Washington side of the Scenic Area and east of the Scenic Area on both sides of the river. They have never been found in any survey conducted on the Forest and they are not believed to reside in the Forest. Their habitat is restricted to springs in small drainages tributary to the Columbia River in the Columbia Gorge, at low elevations and thus this species is not expected to occur within any of the proposed action areas.

d. Management Indicator Species

Southwestern Washington/Columbia River Cutthroat Trout (*Oncorhynchus clarki*) -Management Indicator Species (Mt Hood National Forest Service)

Southwest Washington/Columbia River coastal cutthroat trout occurring in waters of the Mt. Hood National Forest are composed of two native stocks: an anadromous (sea-run) form and resident stock. Resident populations of cutthroat appear healthy in the Clackamas River, Sandy River, Hood River, and Mile Creeks basins. They are also found in the West Columbia Gorge tributaries. High numbers are usually seen by USFS personnel while conducting snorkel or electrofishing surveys. Historically sea-run cutthroat trout occurred in the Clackamas River, Sandy River, and Hood River basins. More recently, anadromous cutthroat populations appear to have greatly declined throughout these watersheds. We do not have consistent indicators of trends in abundance for most populations of searun cutthroat trout. However, anecdotal information, creel surveys and fish counts at dams have raised concerns that anadromous populations in Oregon may be experiencing a widespread decline. The anadromous cutthroat trout is likely at a very depressed level, possibly near extinction.

Coastal cutthroat trout tend to spawn in very small (first and second order) tributaries. They spawn from December-May; alevins (24 mm) emerge from gravel during June and July. Young fry move into channel margin and backwater habitats during the first several weeks. During the winter, juvenile cutthroat trout use low velocity pools and side channels with complex habitat created by large wood. Coastal searun cutthroat juveniles rear on freshwater for 2-3 years. At 10-25 cm the smolts migrate during April and May to estuaries and marine water; reside close to shore, usually over cobble/sand beaches influenced by freshwater source (e.g. creek or stream). Immatures and adults return to over winter in freshwater streams in fall and return to estuarine areas in spring. Adults hold in tidal pools as early as July in preparation for spawning migration as 4-5 year olds.

Critical Habitat

Critical habitat has been designated for Columbia River bull trout, Lower Columbia River steelhead trout, Mid-Columbia River steelhead trout, Lower Columbia River chinook salmon, and Upper Willamette River chinook salmon. Much of the discussion concerning critical habitat, including effects analyses, would center on the primary constituent elements (PCE) described for each species (see below).

Bull Trout Critical Habitat

Bull trout critical habitat was designated in the mainstem Hood River, West Fork Hood River, Middle Fork Hood River, and a short section of the East Fork Hood River (70 FR 56233, September 26, 2005). The upper limit of designated critical habitat was halted at the Forest boundary in the West Fork and Middle Fork. No bull trout critical habitat was designated elsewhere on the Forest or Scenic Area.

Steelhead Trout and Chinook Salmon Critical Habitat

Critical habitat for several evolutionary significant units of the above species was designated in September 2005 by the National Marine Fisheries Service (70 FR 52630, September 2, 2005). Unlike bull trout critical habitat, which was somewhat limited in scope on the Forest and Scenic Area, critical habitat for steelhead and Chinook encompasses a large amount of the available riverine habitat across the administrative units. Lower Columbia River (LCR) steelhead and Chinook critical habitat is the most ubiquitous across the Forest and Scenic Area because these species are the most widespread.

Primary constituent elements for steelhead and Chinook are sites and habitat components that support one or more life stages. The first three, listed below, refer to freshwater habitat components, whereas the last three relate to estuarine or marine habitat components. Nothing proposed in any alternative outlined in this EIS would have any affect on estuarine or marine habitat components, thus they are not listed nor discussed.

(1) Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development.
(2) Freshwater rearing sites with:
    a. Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility;

b. Water quality and forage supporting juvenile development; and
c. Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

(3) Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

FISH PRESENCE WITHIN THE ACTION AREA

Bull Run Watershed

Information for this section is taken from the Bull Run Watershed Analysis (1997 Watershed Analysis) and includes the Little Sandy River, Lower Bull Run, and Bull Run mainstem subwatersheds.

Aquatic Species Presence

The Bull Run watershed supports both anadromous and resident species of salmonids however the dams in the Bull Run watershed have effectively disconnected fish populations in the rivers and tributaries above the headworks. Currently, anadromous fish are only present below the dams, to Rm 1.5 in the Little Sandy River and to Rm 6.2 in the Bull Run mainstem. However, with the proposed decommissioning of the Little Sandy River Dam in 2008, an additional 6.5 miles of anadromous habitat would be accessible. For this analysis, it is assumed that anadromous habitat in the Little Sandy River would include historical habitat above the dam, a total 8.2 miles.

Lower Columbia River (LCR) Steelhead trout, LCR Chinook salmon, LCR Coho salmon, Columbia River/SW Washington (CR/SW) cutthroat trout, rainbow trout, and Pacific Lamprey are present in these reaches. Columbia River (CR) Bull trout are not documented in these reaches.

Critical habitat for LCR Steelhead, LCR Coho, and LCR Chinook exists on the Lower Bull Run River up to the passage barrier at the lower dams (to Rm 6.2) on the Bull Run River. Critical habitat exists to Rm 8.2 on the Little Sandy River.

Essential Fish Habitat (EFH) exists for coho and Chinook salmon in these streams, to Rm 6.2 on the Bull Run River and Rm 8.2 on the Little Sandy River.

In the Upper Bull Run and Little Sandy Rivers above the headworks, Redband Trout presence is suspected. Resident fish species rainbow trout, cutthroat trout, and brook trout are present in streams and lakes.

Other species known to be present in the Bull Run watershed (both above and below the dams) are Longnose Dace, mountain whitefish, and torrent and shortnose sculpin but complete distribution information on these species is lacking.

Habitat for the Columbia Dusky Snail is suspected to occur above and below the headworks on both rivers. Habitat for Basalt Juga is not expected in the Upper or Lower Bull Run watersheds.

Habitat Conditions

In the anadromous reaches below the dams (comprising 19% of the historical habitat), severely altered flow regimes exist as a result of the dams, with both the Bull Run and Little Sandy Rivers being essentially dewatered during the summer low flow period. Pool counts are at the low end of the range of natural variation (RNV) but pool volumes are above RNV. Large woody debris (LWD) levels are low but within RNV while LWD recruitment potential is well below the undisturbed condition.

The flow of sand, gravel, cobble, and boulder size sediment from the upper watershed to the lower Bull Run and Little Sandy Rivers has been interrupted by the reservoirs and the diversion of the Little Sandy. This interruption may affect the availability of spawning gravels in the Lower Bull Run River.

Above the dams, aquatic habitat types, pool volumes, large woody debris levels and LWD recruitment are in the mid- to upper RNV.

Recommendations for restoration from the watershed analysis include: riparian tree plantings to increase stream shade and to increase LWD potential, reduction in road and stream crossings to reduce the stream drainage network, decompaction of roadbeds to reduce subsurface interception, and increasing culvert spacing to restore natural drainage patterns and reduce sedimentation.

Columbia River Gorge Subwatershed

Information for this section is taken from the 1998 Columbia River Gorge Watershed Analysis.

Aquatic Species Presence

LCR Chinook, LCR coho, and LCR Steelhead anadromous fish stocks are present in Eagle and Tanner Creeks but their presence is limited to only the first mile or two of the streams. In Eagle creek, a barrier to anadromy exists at Rm 2.0, over 8 miles downstream of the proposed decommissioning of roads. In Tanner Creek, a barrier to anadromy exists at Rm 1.6, over 4 miles downstream of the proposed road decommissioning.

Critical habitat for these fish exists below these barriers.

Essential Fish Habitat (EFH) exists for coho and chinook salmon in these streams below these barriers (Rm 2.0 in Eagle Creek, and Rm 1.6 in Tanner Creek).

Redband trout presence is suspected above these barriers. Cutthroat trout and rainbow trout are also present in these anadromous sections. Bull trout could potentially be able to use the tributary mouths but no documentation of this occurring exists. Resident fish species rainbow trout, cutthroat trout, and brook trout are also suspected to be present in the headwater streams above these barriers.

Habitat for the Columbia Dusky Snail is suspected to occur in this area . Habitat for Basalt Juga is expected in Columbia Gorge streams.

Habitat Conditions

Because most of the fish migration routes are blocked by waterfalls within a mile or two of creek mouths, limited anadromous production exists.

Today, the fish habitat in the upper reaches of the streams above barriers are probably within the range of natural variability while anadromous fish habitat in the lower reaches have been altered due to railroads, highways, fish hatcheries, logging, and other developments resulting in less than optimal conditions. An increase in human population and activities in the Gorge has led to a general decline in all native fish. Due to these ongoing impacts, the lower stream reaches are heavily influenced by these and thus is not expected to meet ACS objectives in the foreseeable future.

Recommendations for restoration projects are: adding large wood to anadromous streams to provide fish cover and pools for juvenile rearing and restoring hardwoods in riparian habitats.

Gordon Creek subwatershed

Information for the following section is taken from the Gordon Creek Stream Survey (1990).

Aquatic Species Presence

Anadromous habitat for LCR Steelhead, LCR Coho, and LCR Chinook exists on private lands over 3 miles downstream from the proposed road decommissioning. Critical habitat exists down in these reaches and continues down into where Gordon Creek flows into the Sandy River.

Essential Fish Habitat (EFH) exists for coho and Chinook salmon in the off-forest stream reaches.

Higher up in the watershed, where the proposed action is to take place, The 1990 Stream survey of headwater tributaries surveyed 0.94 miles of stream upstream of the forest boundary on tributary 2 and 0.2 miles of stream above the forest boundary on tributary 3. Both of these tributaries lie above Rm 8.0 of Gordon Creek. The survey found no fish and surmised that the culverts on Roads 20 and 1509 were barriers to fish passage. Resident fish species rainbow trout, cutthroat trout, and brook trout are expected to be present below these culverts. Redband trout presence is also suspected.

Habitat for the Columbia Dusky Snail is suspected to occur in Gordon Creek. Habitat for Basalt Juga is not expected in this higher elevation portion of the subwatershed where the proposed action is to take place.

Habitat Conditions

Relatively small amounts of Gordon Creek lie within federal jurisdiction and thus no watershed analysis that assesses habitat conditions is available. From the 1990 Stream Survey, Forest Service crews found high degrees of sedimentation in both tributaries with embeddedness exceeding 35% in all areas. Instream cover rated fair to good (20-30%) in most areas of both tributaries. Pools over 2.0 feet deep were rare (2 of 27) on Tributary 2 and non existent on tributary 3.

Upper Sandy River Basin

Information for this section is taken from the 1996 Upper Sandy River Basin Watershed Analysis.

Aquatic Species Presence

The Upper Sandy River basin supports both anadromous and resident species of salmonids. Anadromous fish habitat exists in Clear Creek and Clear Fork, streams both potentially affected by the Proposed Action Alternative. Clear Creek lies within the Bull Run Watershed Management Unit while Clear Fork borders the unit.

Lower Columbia River (LCR) Steelhead trout, LCR Chinook salmon, LCR Coho salmon, Redband trout are known to exist in the Clear Fork and in Clear Creek of the Upper Sandy River Basin. There is no documented evidence of Bull Trout being present in either of these streams. CR/SW Washington (CR/SW) cutthroat trout, rainbow trout, and Pacific Lamprey are also known to occur in these streams.

Critical habitat for LCR Steelhead, LCR Coho, and LCR Chinook exists in and downstream of both Clear Creek and Clear Fork. Essential Fish Habitat (EFH) also exists for coho and chinook salmon in Clear Creek and Clear Fork.

Other species known to be present in the Upper Sandy River Basin are Longnose Dace, mountain whitefish, and torrent and shortnose sculpin but complete distribution information on these species is lacking.

Habitat for the Columbia Dusky Snail is suspected to occur in all streams of the Upper Sandy River Basin and thus is suspected to occur in Clear Creek and Clear Fork of the Bull Run Management Unit. Habitat for Basalt Juga is not expected in the Upper Sandy River basin.

Habitat Conditions

Habitat connectivity in the Upper Sandy River Basin for aquatic and riparian-dependent species has been altered through channel straightening and cleanout. A 1988 DEQ nonpoint assessment identified severe problems with stream structure (large woody debris, pools, and aquatic habitat type). Clear Fork and Clear Creek have historically exceeded state water quality standards of 14.4 degrees C. Alder Creek and Clear Creek are known to be demonstrating increased summer stream temperatures. The riparian areas within the Upper Sandy Watershed are outside the range of natural variation for stand structure. For LWD levels, none of the surveyed streams meet PIG standards. Aquatic habitat, pool levels, and large woody debris levels are outside the RNV in 1 and 2 stream order streams.

Recommendations for restoration in the Upper Sandy River Basin Watershed Analysis include: active road obliteration and revegetation of road cuts and fills to reduce sediment production and delivery to stream channels; promotion of infiltration through tilling and mulching on Road 1200400 (Upper Clear Creek) to reduce subsurface intercept of water; reduction of road and stream crossings to restore peak flows to RNV, and reducing effects of increased peak flow on channel stability and fish habitat.

Additional restoration activities recommended include riparian silviculture and plantings to restore structural complexity of riparian vegetation, conifer plantings in alder dominated riparian areas to increase large woody debris recruitment, promotion of conditions conducive to natural regeneration, pulling of all knapweed, increasing stream shade in subwatersheds where stream temperatures do not meet state standards.

Fisheries Environmental Consequences

A summary of anticipated effects for Proposed [for Federal Listing], Endangered, Threatened, and Sensitive (PETS) aquatic species that are found within the Forest and Scenic Area from each of the Alternatives are summarized in Table III-20

No Action Alternative

The No Action Alternative would result in no changes to the existing conditions.

There would be no direct impacts to **LCR Steelhead, LCR Coho, LCR Chinook and their habitats** under The No Action Alternative as no ground disturbance would take place, no instream work would occur, and no sedimentation transport mechanisms would be created. Fish would not be harassed by machinery and there would be no potential for chemical contamination. No riparian vegetation would be removed and there would be no fill removal, recontouring, or alteration of streambanks and channel.

For the same reasons, The No Action Alternative would result in no direct effects for **Essential Fish Habitat,** for **Sensitive Redband trout** and **Management Indicator Species Cutthroat trout and their habitats.**

The No Action Alternative would also result in no direct impacts **to Survey and Manage Aquatic Snails or their habitats.**

However, in the long term, the **No Action** alternative would not reduce the effects of interception and diversion of subsurface and surface flows for the areas with impervious soil layers by roads. Greater stress would be placed on the road drainage system as encroaching woody vegetation reduces drainage structure efficiency. The likelihood of ditch and culvert inlet overflow would increase with time as roads receive less frequent maintenance. The concentrated but uncontrolled flows would erode soils and create gullies in road fills. The risk of these adverse effects would increase with time. As the road drainage loses efficiency with brush encroachment and less frequent maintenance, peak stream flows may reduce with time until the risk of debris flows and landslides increases during storms as the road drainage system fails to function effectively.

As road maintenance becomes less frequent, the ability of road runoff to be effectively mitigated by culverts and ditches would be adversely affected as encroachment of road vegetation blocks or impedes water runoff. As overflowing waters run across roads, new erosion cycles would begin with gully erosion progressing upslope from the toe of the road fill. For large storms, there would be increased risk of unmaintained drainage crossings to fail, moving large volumes of earth into drainages.

Streams downstream of major fill failures would experience habitat loss for fish and aquatic organism due to increased sedimentation, decreased water quality, and loss of habitat complexity through filling of pools and loss of water depth, excessive fines in stream gravels, and filling of pools for rearing. Additional channel widening would add more fine sediments to the stream environment. A cycle of stream channel adjustment would ensue which would make habitat features less stable and more transitory. Fish spawning, egg incubation, fry emergence, and rearing success would decline in such reaches. Long-term road sediment production associated with the No Action Alternative is expected to increase considerably, degrading fish habitat quality over the long term.

The No Action Alternative would rely on very limited road maintenance funds to deal with failed sections of road. Additional funds would be required to reconstruct these sections of roads at considerable cost. The failed fill deposits would remain as exposed soil downslope of the road and would be available for potential movement reaching streams as delivered sediments. It is likely that funding limitations would prevent repair and the road would be blocked beyond the point of failure.

Sediment yield and turbidity for the No Action Alternative would develop in time as drainage crossing failures increased and erosion of the fills continued until washed away. Effects from a number of road fill failures would increase the habitat losses further downstream. When a number of tributaries with road failures contribute increased sediment loads, the downstream rivers may also suffer habitat losses and develop less stable stream channels. An increased risk of fish population declines would occur.

It is speculated that it would take about five years before fill failures on unmaintained roads begin to occur, about another five years before the effects become widespread, and about five years for sediment transport to the mouth of the Mainstem subwatershed. This means that effects may become measurable in about 15 years. As more road/stream crossings failed, the sediment loads would continue to increase for several decades

Proposed Action Alternative

Refer to Table III-20 Comparison of the Alternatives for this section. Project Design Features for Fisheries/Aquatics for the Proposed Action Alternative are listed in Chapter II.

One of the most important aquatic components of watershed restoration is control and prevention of road-related runoff and sediment production. Road related projects include repair, decommissioning, and storm-proofing. These projects involve work within the existing road prism and involve removal of bedload material, removal of culverts, pullback of sideslopes, and recontouring.

Many projects involve work within or adjacent to the active stream channel. These projects may cause a short-term degradation of water quality due to sediment input and alteration of flows. Stream bank condition and habitat substrate may also be adversely affected in the short term.

Activities that occur in or near streams can disturb or harm adult and juvenile fish. Culvert upgrades, removals, and valley bottom road removals may take several hours or days to complete. During this time, it is probable that listed fish would move into habitats above or below work sites to avoid equipment in or near stream channels, and then quickly reoccupy the vacated habitats as flows are reestablished within the completed channels.

The use of heavy mechanized equipment, such as a track hoe or walking excavator, could disturb the stream influence zone, disturb fish, and cause incidental mortality. There is also the potential of an accidental fuel/oil spill. However, with careful project design (see Fisheries/Aquatics Design Features in Chapter II), these effects are expected to be of a limited extent and duration.

Potential Direct Effects

Potential direct effects to fish species resulting from implementing road projects are increased turbidity levels which may reduce feeding efficiency or affect gill function 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 an in-stream work phase was completed, generally within a few hours. This is likely to only occur in the vicinity of stream crossings where project work may directly impact stream habitat, as in the case of culvert removal during road decommissioning.

Any time there is digging or equipment used within the live stream channel there is a possibility fish could be 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.

In the process of removing drainage crossings, primarily culverts and fills, some additional sediment would escape and be transported downstream. Measures that are approved as BMP's (Best Management Practices) have been designed to minimize these short-term losses and to restore the stream channel stability across the road prism. Additionally, ditch relief culverts would be removed on most of the roads (not for the walk away roads where the roads and ditches are no longer producing surface runoff) and the exposed slopes graded to less than 2.5 to 1 forming cross drains.

Indirect effects

Indirect effects are possible from increased amounts of fine sediment degrading aquatic habitat after project implementation is completed. Fine sediment sources include material mobilized from the stream channel during construction or erosion of exposed soil during and after project implementation. Potential impacts from increased amounts of fine sediments are degradation of spawning habitat. Wood placed in the stream channel would cause changes in channel hydraulics and may cause bank erosion and/or streambed scour. Although these processes occur naturally, the addition of large wood or changes in channel geometry as a result of restoration activities could cause localized areas of erosion until the channel reaches equilibrium at those sites.

Riparian vegetation can be disturbed when culverts are removed, over-steepened fills are pulled back, and when roads are inactivated or permanently removed. When culverts are removed, riparian shrubs and trees may be cut and excavated to access each site and restore proper channel dimensions. This type of activity is likely to have no localized effects on stream shade and water temperature because of the small amount of vegetation being removed. Culvert removal could only affect water temperature if numerous culverts were removed in the same drainage, or when completed in conjunction with other vegetation-altering activities. Removal or closure of valley bottom roads would have a positive effect on stream temperature in the long term. Trees and other riparian vegetation would re-colonize a decommissioned or obliterated roadbed and, in time, help shade the stream.

However, effects are unlikely to be prolonged, result in substantial changes in substrate composition, or decrease growth or survival of freshwater life stages of listed fish species. The proposed PDCs (*e.g.*, timing of work, requirements for disposal of fill material, use of sediment trapping material-see see Fisheries/Aquatics Design Features in Chapter II) would help to limit sediment effects. If road decommissioning and obliteration projects are successfully implemented, substrate quality should actually improve over time, because chronic sediment sources would be corrected.

The Proposed Action Alternative would benefit aquatic fish species in the long term by curtailing the erosion and sediment production from the decommissioned roads. As upper slope and midslope roads are decommissioned, the risk of road section or fill failures would decrease, serving to protect the stream channels which are presently in good condition.

Road decommissioning projects would also tend to restore hydrology by reducing peak flows (reducing the amount of non-permeable surface thus reducing run-off) and reducing drainage network.

Watershed conditions would also be improved as road densities are reduced and riparian reserves are restored. These projects may also potentially improve floodplain connectivity where culverts are removed and where roads parallel stream channels along the valley bottom.

The Proposed Action Alternative would result in improved long-term water quality. Areas of chronic sediment supply would be stabilized and re-vegetated and treatments proposed in this document would hasten the recovery of watershed health and longterm water quality conditions. Long-term beneficial effects result from restoration of hydrologic functions, reduced risk of washouts and landslides, and reduction of sediment delivery to streams.

The long-term effects of reducing the mileage of roads in the Mainstem subdrainage of the Bull Run Watershed would be a reduction of the risks of erosion and sedimentation and a reduction of the potential adverse effects to water turbidity and streambed changes from accelerated sedimentation.

Revegetation is rapid in the Bull Run Watershed because the annual precipitation is high. A vegetation canopy over the road often develops within five years from edge vegetation. Woody shrubs and trees become established in the centers of gravel surfaced roads and in cracks and fractures of paved asphalt road surfaces. Forbs become established on new soils developed from litter of the developing vegetation canopy over the road and from the neighboring forest canopy. Newly established plants send roots into depressions and cracks and eventually penetrate the pavement causing additional cracking and increasing the rate of pavement breakup. This means that the risk of erosion from the decommissioned roads would decrease more rapidly in this project area than in other watersheds where revegetation is less vigorous.

The Proposed Action Alternative would decommission approximately 136 miles of roads through either active decommissioning or passive decommissioning. Channel network expansion would decrease from 14.2% to 9.6% and reduce by almost half the miles of roads in areas with impervious soils (16.5 miles vs. 8.4 miles). The miles of midslope roads would be reduced from 186 miles to 105.6 miles and roads in high hazard areas for landslides would be reduced 31%, from 24.4 miles to 16.8 miles. Road stream crossings would be reduced from 547 to 365, or a 33% reduction while number of stream crossings associated with anadromous fish habitat would be reduced by 505, from 218 crossings to 108. Road related sediment delivery (modeled tons/year) for properly maintained roads would be reduced by 36%, from 729 tons per year to 470 tons per year. Road related sediment delivery (modeled tons/year) for properly maintained roads associated with anadromous habitat would be reduced by 47%, from 354 tons per year to 186 tons per year.

Following is an analysis by subwatershed of potential effects to aquatic species:

Lower Bull Run Watershed

In the Lower Bull Run River below the headworks, 3.9 miles of road are proposed for active decommissioning and 6.2 miles of roads are proposed for passive restoration. Thirty-six percent of all roads in this subwatershed would be decommissioned.

In the long term, decommissioning of roads would help establish better functioning aquatic habitats. Ten of 44 road crossings (23%) would be removed, there would be a 12% reduction in landslide risk, a 50.5% reduction in miles of midslope roads, a 9-10% reduction in stream drainage network, and there would be a 10% reduction in road related sediment delivery from a current level of 101 tons per year to 90 tons per year.

Decommissioning of road crossings at streams, the reduction in sediment delivery, and decrease in water interception would all contribute to returning these streams to a more natural condition. In the long term, decommissioning of 3.9 miles of road below the headworks would help establish better functioning aquatic habitat. Ten road crossings would be obliterated, returning the stream at these sites to a natural condition. Sediments generated would be controlled by timing of ODFW inwater work window guidelines, Best Management Practices, and incorporation of instream grade control structures.

Because of the incorporation of design features to control sedimentation, any sedimentation generated is expected to be short in duration and low in intensity and thus the Proposed Action Alternative is not expected to have any long term adverse effects.

However, because the Proposed Action Alternative would result in ground disturbance in the riparian areas at stream crossings and there is a potential for sediment delivery mechanisms to be created, a **May Affect, Likely to Adversely Affect (LAA)** call for **LCR Steelhead, LCR coho, or LCR Chinook salmon and their habitats** is warranted. Over the long term, the Proposed Action Alternative would result in Beneficial Effects to federally listed aquatic species and their habitats.

The Proposed Action Alternative **May Impact Individuals or Habitat, But Will Not Likely Contribute To A Trend Towards Federal Listing or Cause A Loss Of Viability To the Population or Species (MIIH)** on Forest Service Sensitive species Redband trout. Over the long term, the Proposed Action Alternative would result in **Beneficial Impact (BI)** to federally listed aquatic species.

Survey and Manage Species

Due to potential short term sedimentation effects, the Proposed Action Alternative **May Impact Individuals or Habitat, But Will Not Likely Contribute To A Trend Towards Federal Listing or Cause A Loss Of Viability To the Population or Species (MIIH)** of Survey and Manage Columbia Dusky Snail.

Essential Fish Habitat

The Proposed Action Alternative may result in short-term adverse effects to habitat features. These effects include increased sedimentation of riparian and aquatic habitats, possible chemical contamination of water quality, and altered channel morphology. The Proposed Action Alternative would **Adversely Affect Essential Fish Habitat** for Chinook and coho salmon due to ground disturbance in the riparian areas and the potential for sedimentation transport mechanisms to be created.

Upper Bull Run Watershed

Above the headworks, 24.2 miles are proposed for active decommissioning and 24.2 miles are proposed for passive decommissioning. Thirty-one percent of all roads in this subwatershed would be decommissioned.

In the long term, decommissioning of roads help establish better functioning aquatic habitat. Seventy-two of 327 road crossings (22%) would be removed, there would be a 28.5% reduction in miles of midslope roads, a 26% reduction in landslide risk, and road related sediment delivery would decrease 24%, from 371 tons per year to 282 tons per year.

Decommissioning of road crossings at streams, the reduction in sediment delivery, and decrease in water interception would all contribute to returning these streams to a natural condition. Any potential sedimentation generated by the active decommissioning would be controlled by timing of ODFW inwater work window guidelines, Best Management Practices, and incorporation of instream grade control structures.

Above the headworks, the proposed decommissioning of 24.1 miles of road would have **NO EFFECT on LCR Steelhead, LCR coho, or LCR Chinook salmon or their habitats** due to locations above the headwork dams. Any potential sedimentation generated would be mitigated by the presence of the two reservoirs downstream which would act as traps for settling out any sediments reaching stream courses.

The Proposed Action Alternative would also have **NO ADVERSE AFFECT on Essential Fish Habitat** as no habitat exists for these species in the upper watershed above the dams. Any potential sedimentation generated is expected to be short in duration and low in intensity and the presence of the dams downstream would minimize any sedimentation reaching anadromous habitat downstream below the headwork dams.

However, because the Proposed Action Alternative would result in ground disturbance in the riparian areas at stream crossings and sediment delivery mechanisms would be created, the Proposed Action Alternative **May Impact Individuals or Habitat, But Will Not Likely Contribute To A Trend Towards Federal Listing or Cause A Loss Of Viability To the Population or Species (MIIH)** on Forest Service Sensitive resident fish species Redband trout. Over the long term, the Proposed Action Alternative would result in **Beneficial Impact (BI)** to federally listed aquatic species.

Survey and Manage Species

Due to potential short term sedimentation effects, the Proposed Action Alternative **May Impact Individuals or Habitat, But Will Not Likely Contribute To A Trend Towards Federal Listing or Cause A Loss Of Viability To the Population or Species (MIIH)** of Survey and Manage Columbia Dusky Snail.

Little Sandy River

In the Little Sandy River, 32.1 miles are proposed for active decommissioning and 22.1 miles of road are proposed for passive decommissioning. Seventy-seven percent of all roads in this subwatershed would be decommissioned. This is the single largest amount of proposed decommissioning of all the subwatersheds.

In the long term, decommissioning of roads help establish better functioning aquatic habitat. Sixty-seven of 89 stream crossings (75%) would be removed, there would be a 76% reduction in miles of midslope roads, a 78% reduction in landslide risk, and road related sediment delivery would decrease by 73%, from a current level of 101 tons per year to 27 tons per year.

Decommissioning of road crossings at streams, the reduction in sediment delivery, and decrease in water interception would all contribute to returning these streams to a natural condition. Any potential sedimentation generated by the active decommissioning is expected to be short in duration and low in intensity and would be controlled by implementation of design features such as timing of ODFW inwater work window guidelines, Best Management Practices, and incorporation of instream grade control structures.

However, because the Proposed Action Alternative would result in ground disturbance in the riparian areas at stream crossings and there is a potential for sediment delivery mechanisms to be created, a **May Affect, Likely to Adversely Affect (LAA) call for LCR Steelhead, LCR coho, or LCR Chinook salmon and their habitats** is warranted. Over the long term, the Proposed Action Alternative would result in Beneficial Effects to federally listed aquatic species and their habitats.

The Proposed Action Alternative **May Impact Individuals or Habitat, But Will Not Likely Contribute To A Trend Towards Federal Listing or Cause A Loss Of Viability To the Population or Species (MIIH)** on Forest Service Sensitive resident fish species Redband trout. Over the long term, the Proposed Action Alternative would result in **Beneficial Impact (BI)** to federally listed aquatic species.

Survey and Manage Species

Due to potential short term sedimentation effects, the Proposed Action Alternative **May Impact Individuals or Habitat, But Will Not Likely Contribute To A Trend Towards Federal Listing or Cause A Loss Of Viability To the Population or Species (MIIH)** of Survey and Manage Columbia Dusky Snail.

Essential Fish Habitat

The Proposed Action Alternative may result in short-term adverse effects to habitat features. These effects include increased sedimentation of riparian and aquatic habitats, possible chemical contamination of water quality, and altered channel morphology. The Proposed Action Alternative would **Adversely Affect Essential Fish Habitat** for Chinook and coho salmon due to ground disturbance in the riparian areas and the potential for sedimentation transport mechanisms to be created.

Over the long term, the decommissioning of roads would beneficially affect Essential Fish Habitat by returning stream crossings and drainage patterns to a more natural state.

Upper Sandy River Basin

In the Upper Sandy River Basin, 8 miles of road are proposed for active decommissioning and 2.2 miles are proposed for passive decommissioning. These totals represent a 41% reduction in roads in this subwatershed.

In the long term, decommissioning of roads help establish better functioning aquatic habitat. Twenty-seven of 64 stream crossings (42%) would be removed, there would be a 19% reduction in miles of midslope roads, a 38% reduction in landslide risk, and road related sediment delivery would decrease by 53%, from a current level of 112 tons per year to 53 tons per year.

Decommissioning of road crossings at streams, the reduction in sediment delivery, and decrease in water interception would all contribute to returning these streams to a natural condition. Any potential sedimentation generated by the active decommissioning is expected to be short in duration and low in intensity and would be controlled by implementation of design features such as timing of ODFW inwater work window guidelines, Best Management Practices, and incorporation of instream grade control structures.

However, because the Proposed Action Alternative would result in ground disturbance in the riparian areas at stream crossings and there is a potential for sediment delivery mechanisms to be created, a **May Affect, Likely to Adversely Affect (LAA)** call for **LCR Steelhead, LCR coho, or LCR Chinook salmon and their habitats** is warranted. Over the long term, the Proposed Action Alternative would result in Beneficial Effects to federally listed aquatic species and their habitats.

The Proposed Action Alternative **May Impact Individuals or Habitat, But Will Not Likely Contribute To A Trend Towards Federal Listing or Cause A Loss**

Of Viability To the Population or Species (MIIH) on Forest Service Sensitive resident fish species Redband trout. Over the long term, the Proposed Action Alternative would result in **Beneficial Impact (BI)** to federally listed aquatic species.

Survey and Manage Species

Due to potential short term sedimentation effects, the Proposed Action Alternative **May Impact Individuals or Habitat, But Will Not Likely Contribute To A Trend Towards Federal Listing or Cause A Loss Of Viability To the Population or Species (MIIH)** of Survey and Manage Columbia Dusky Snail.

Essential Fish Habitat

The Proposed Action Alternative may result in short-term adverse effects to habitat features. These effects include increased sedimentation of riparian and aquatic habitats, possible chemical contamination of water quality, and altered channel morphology. The Proposed Action Alternative would **Adversely Affect Essential Fish Habitat** for Chinook and coho salmon due to ground disturbance in the riparian areas and the potential for sedimentation transport mechanisms to be created.

Over the long term, the decommissioning of roads would beneficially affect Essential Fish Habitat by returning stream crossings and drainage patterns to a more natural state

Columbia Gorge Tributaries

The Proposed Action Alternative would actively decommission 5.1 miles of road connected to Columbia River Gorge streams and passively decommission 5.0 miles of road. Seventy-eight percent of all roads in the upper subwatersheds would be decommissioned as a result of the Proposed Action Alternative. Portions of these roads lie in the upper headwater areas of Eagle, Tanner, Horsetail, Moffett, and Bell creeks subwatersheds.

In the long term, decommissioning of roads help establish better functioning aquatic habitat. There would be a 100% reduction in miles of midslope roads (all midslope roads decommissioned), 60% of the existing stream crossings would be removed (from 5 to 2 crossings), and a 50% reduction in road sediment delivery from 4 tons/year to 2 tons/year would result.

Decommissioning of road crossings at streams, the reduction in sediment delivery, and decrease in water interception would all contribute to returning these streams to a natural condition.

Sediments generated by the active decommissioning would be controlled by timing of ODFW inwater work window guidelines, Best Management Practices, and incorporation of instream grade control structures.

Because of the large distances to anadromous fish habitat of Columbia River stocks, the small number of road crossings being decommissioned, and the design features employed to mitigate any sedimentation, the Proposed Action Alternative is expected to have **NO EFFECT on LCR Steelhead, LCR coho, or LCR Chinook salmon or their habitats.**

However, because the Proposed Action Alternative would result in ground disturbance in the riparian areas at stream crossings where Redband Trout are suspected, and sediment delivery mechanisms would be created, the Proposed Action Alternative **May Impact Individuals or Habitat, But Will Not Likely Contribute To A Trend Towards Federal Listing or Cause A Loss Of Viability To the Population or Species (MIIH**) on Forest Service Sensitive species Redband trout. Over the long term, the Proposed Action Alternative would result in **Beneficial Impact (BI)** to federally listed aquatic species.

Survey and Manage Species

Due to potential short term sedimentation effects, the Proposed Action Alternative **May Impact Individuals or Habitat, But Will Not Likely Contribute To A Trend Towards Federal Listing or Cause A Loss Of Viability To the Population or Species (MIIH)** of Survey and Manage Columbia Dusky Snail.

Essential Fish Habitat

Because of the large distances to anadromous fish habitat of Columbia River stocks, the small number of road crossings being decommissioned, and the design features employed to mitigate any sedimentation, the Proposed Action Alternative is expected to have **No Adverse Affect on Essential Fish Habitat for Chinook and coho salmon**. Over the long term, the decommissioning of roads would beneficially affect Essential Fish Habitat by returning stream crossings and drainage patterns to a more natural state.

Gordon Creek

In drainages within the Gordon Creek subwatershed, 3.0 miles are proposed for passive decommissioning. No roads are proposed for active decommissioning. Thirty-three percent of all roads in this subwatershed are proposed for decommissioning. Three stream crossing would be removed, representing a 17%

reduction in stream crossings in the upper subwatershed. Sediment delivery would be reduced from 40 tons per year to 16 tons per year, a 60% reduction.

Anadromous habitat for LCR Steelhead, LCR Coho, and LCR Chinook exists on private lands approximately 3 miles downstream from the proposed road decommissioning.

In the long term, decommissioning of road crossings at streams, the reduction in sediment delivery, and decrease in water interception would all contribute to returning these streams to a natural condition.

However, since no active decommissioning is proposed for this subwatershed, because there would be no ground disturbance, and due to the large distance from the sites to anadromous reaches, the Proposed Action Alternative would have **NO EFFECT on LCR Steelhead, LCR coho, or LCR Chinook Salmon and their habitats and NO IMPACT to Redband trout, Columbia Dusky Snail, Basalt Juga, or their habitats.**

Essential Fish Habitat

Because there is no ground disturbance proposed and because of the large distances to anadromous fish habitat downstream in Gordon Creek, the Proposed Action Alternative is expected to have **No Adverse Affect on Essential Fish Habitat for Chinook and coho salmon**. Over the long term, the decommissioning of roads would beneficially affect Essential Fish Habitat by returning stream crossings and drainage patterns to a more natural state.

Fisheries Cumulative Effects

Cumulative effects are additive through time and space. They are the impacts of the proposed action when added to other past, present, and reasonably foreseeable future actions across a larger landscape regardless of who undertakes those actions.

No Action Alternative

The No Action Alternative would not result in any incremental changes to the existing condition and thus there would not be any cumulative effects. The No Action Alternative would not contribute to short-term cumulative effects since no ground disturbance would occur, there would be no change in stream shading, temperature, flows, sediment, or channel morphology.

Proposed Action Alternative

For the **Proposed Action** cumulative effects to sediment yield and stream turbidity are limited to the period of short term effects, about five years, plus the time needed to transport these sediments downstream to the mouth of the Mainstem subwatershed, about another five years. This means a total of about ten years depending on intensity of storms encountered during the winters for this project area. Due to the four to five year period that is expected to be needed to decommission all of the roads in the Mainstem subwatershed, the early project sites should be nearly recovered by the time that the last roads are decommissioned.

Many decommissioning and restoration projects result in short-term sedimentation until erosion control measures take effect. Other projects that occur in the same watersheds such as timber harvest and road construction have the potential to contribute cumulatively to the sediment load moving down streams and rivers.

Projects on federal lands are designed to be consistent with the Aquatic Conservation Strategy of the Northwest Forest Plan and Best Management Practices.

A cumulative effects analysis was performed for watershed processes where adverse direct and/or indirect effects associated with the proposed action were identified. These processes include sediment yield. Cumulative effects analysis areas were delineated based on the zone of influence associated with effects from these processes (all of which deposit sediment to the stream channel). Past, present, and reasonably forseeable projects were identified for each watershed where cumulative effects were thought to occur (Bull Run Watershed, Little Sandy, Lower Bull Run, Clear Creek, and Clear Fork).

See Watershed Processes – Cumulative Effects Section for a list of past, present, and reasonably foreseeable projects by watershed and for a more detailed explanation of how sediment cumulative effects analysis was conducted.

The amount of short term sediment associated with surface erosion at decommissioned stream crossings in all of the watersheds is very small when compared to the modeled amounts of sediment from the past, present, and foreseeable future projects, for each watershed.

The short-term sedimentation associated with road decommissioning projects when combined with all other sources would additionally be minimized for the following reasons:

- Each project would contain mitigations to minimize or eliminate sources of erosion by applying grass seed and/or mulch to areas of bare soil.

- Some projects would be designed to avoid ground disturbance by using passive decommissioning techniques.
- Use of instream grade controls (U boulder weirs) at stream crossings would accelerate stabilization of streambed and return of streamchannel morphology to natural conditions.
- Seasonal restrictions would be observed where appropriate to accomplish work during the dry season.

In addition, the road decommissioning project would be implemented over multiple years in a number of different watersheds, spreading out sediment effects over a longer time frame and reducing intensity of effects at the watershed and subwatershed level. The proposed action calls for actively decommissioning 15 miles of roads within the Bull Run drainage per year and 15 miles outside of the drainage (but still within the Bull Run Management Unit) per year for a total of 30 miles annually.

The recovery from short-term effects from decommissioning one road may be complete by the time another road in the same watershed is implemented. In addition, some of the projects would result in immediate benefits such as projects repairing stream crossings damaged by roads, reduction in ground water interception, and reduction in road related sediment inputs.

Table III-20 summary of anticipated effects for aquatic PETS species that are found within the Forest and Scenic Area from the Proposed Action.

Species	DPS/ESU	Proposed Action	Rationale
Bull Trout	Columbia River	NE	No fish presence in Action Area
Steelhead Trout	Lower Columbia	LAA	Potential short term sediment disturbance in Lower Bull Run, Little Sandy, Upper Sandy River
Chinook Salmon	Lower Columbia	LAA	Potential short term sediment disturbance in Lower Bull Run, Little Sandy, Upper Sandy River
Coho Salmon	Lower Columbia/ SW WA	LAA	Potential short term sediment disturbance in Lower Bull Run, Little Sandy, Upper Sandy River
Cutthroat Trout	SW Washington/ Columbia R.	MIIH	Potential short term sediment disturbance in Upper & Lower Bull Run, Little Sandy, Upper Sandy River, & Columbia River Gorge
Redband/Inland Rainbow Trout	NA	MIIH	Potential short term sediment disturbance in Upper Bull Run, Little Sandy, Upper Sandy River, & Columbia River Gorge
Columbia duskysnail	NA	MIIH	Potential short term sediment disturbance in Upper & Lower Bull Run, Little Sandy, Upper Sandy Rivers, & Columbia River Gorge
Basalt Juga	NA	NE	No presence in Action Area
Bull Trout Critical Habitat		NE	No habitat presence
Steelhead, Coho, and Chinook Critical Habitat		LAA	Potential short term sediment disturbance
Essential Fish Habitat		AA	Potential short term sediment disturbance

Table Key

NE	No Effect
LAA	May Affect, Likely to Adversely Affect
MIIH	May impact individuals or habitat, but will not likely contribute towards Federal Listing or a loss of viability to the population or species
NI	No Impact
NAA	Not Adversely Affected
AA	Adverse Affect

Consultation with Others

The proposed action is consistent with activities outlined for *U.S. Forest Service and Bureau of Land Management Programmatic Activities in Northwestern Oregon.* Effects calls for the proposed action and the recommended design criteria for implementation are consistent with Road decommissioning and obliteration activities outlined in the programmatic.

For *May Affect*, *Likely to Adversely Affect* activities for Proposed, threatened, and Endangered aquatic species, and *Adverse Affect* activities for Essential Fish Habitat consistent with the Programmatic, formal consultation has been initiated programmatically, a biological opinion has been issued, and thus no further consultation is necessary.

C. Wildlife

Table III-21 – Comparison of Alternatives Wildlife

Items of Comparison	Proposed Action	No Action
Wildlife		
Northern spotted owl habitat	Improvement to habitat	No Change
Bald eagle habitat	Improvement to habitat	No change
Sensitive species	See Sensitive Species table in Chapter III	
Survey & Manage species	No change	No change
Snags & down wood	Improvement to habitat	No Change
Deer & elk habitat	Improvement to habitat	No Change
Pine martins, Pileated woodpeckers, and migratory birds	Improvement to habitat	No Change

Introduction

The Bull Run Decommissioning Biological Evaluation is located in the appendix and is incorporated by reference and summarized below. The Bull Run Decommissioning Project is covered by a Programmatic Disturbance-Only Biological Assessment (USDA 2005). Consultation with the U.S. Fish and Wildlife Service occurs on a programmatic level for projects that have the potential to disturb spotted owls but would not modify their habitats. The current biological assessment is titled "Biological Assessment of Activities with the Potential to Disturb Northern Spotted Owls or Bald Eagles, Willamette Province – FY 2006-2007 (dated July 28, 2005)." The Fish and Wildlife Service issued the Biological Opinion for this document in February of 2006. Projects such as the Bull Run Decommissioning project fits in the category listed in the above Biological Assessment/Opinion as "Road and Dike Repair" and covers most activities associated with road decommissioning and obliteration. The Biological Opinion would allow for road decommissioning and obliteration to occur within all land allocations and during the entire breeding season for spotted owls. Since it is likely road decommissioning projects covered under this EA would occur after fiscal year 2007, future disturbance biological assessments would need to be reviewed to insure compliance.

Affected Environment - Northern Spotted Owl (Threatened)

Habitat for the owl is defined as either suitable or dispersal habitat. Suitable habitat for the northern spotted owl consists of habitat used by owls for nesting, roosting and foraging (NRF). Generally this habitat is 80 years of age or older, multi-storied and has sufficient snags and down wood to provide opportunities for nesting, roosting and foraging. The canopy closure generally exceeds 60 percent. Dispersal habitat for the owl generally consists of mid-seral stage stands between 40 and 80 years of age with a canopy closure of 40 percent or greater and an average dbh of 11". Spotted owls use dispersal habitat to move between blocks of suitable habitat; juveniles use it to disperse from natal territories. Dispersal habitat may have roosting and foraging components, enabling spotted owls to survive, but lack structure suitable for nesting.

The project area and essentially all the roads proposed for decommissioning occur within the BRWMU, which is composed of most of the Bull Run Watershed and a small portion of the Middle Sandy River Watershed. A total of 74% of the BRWMU is designated as an LSR (RO 201) by the Northwest Forest Plan. In additional a Critical Habitat Unit (CHU OR-9) encompasses 86% of the BRWMU.

The Bull Run Watershed contains some of the best and most contiguous owl habitat within the Mt. Hood National Forest. It also serves as an important connection between the Forest and lands in Washington state (USDA 1997). In the mid 1990's, the Bull Run watershed contained a large amount of northern spotted owls. At that time twenty pairs were known to reside within the watershed. Although spotted owl surveys have not been completed in the area since the mid 1990s, current habitat conditions are likely very similar to what they were a decade ago.

Surveys for spotted owls were conducted in the Bull Run Watershed in 1993 and 1994; in which the Regional protocol per Regional Forester's direction of March, 1993 was followed (survey information on file at district office). These surveys are not considered current and valid for project planning effects analysis. Current management direction is to assume that all suitable habitat for spotted owls is currently occupied and to manage the site accordingly.

For this project the spotted owl analysis area (93,649 acres) is the BRWMU and includes mostly National Forest System lands with some private ownership. Currently the analysis area contains approximately 51,037 acres (54%) of suitable habitat and 19,158 acres (20%) of dispersal habitat for the spotted owl. There is both suitable and dispersal habitat directly adjacent to most of the roads proposed for decommissioning.

Northern Spotted Owl - Environmental Consequences - Analysis of Direct and Indirect Effects

No Action Alternative

The paved roads would remain open in the watershed and would continue to contribute to fragmentation in the watershed. This fragmentation would continue to negatively impact the amount and quality of spotted owl habitat potentially available within the analysis area. The unused, abandoned and under utilized gravel roads would continue to be encroached by brush and trees due to their lack of maintenance and use. This natural colonization of brush and trees on many of the roads within the project area would continue to restore fragmentation and improve spotted owl habitat. In addition, there would be no potential effects to the nesting and reproductive success of spotted owls in the project area as a result of increased noise levels from road decommissioning activities; since no road decommissioning activities would occur under the No Action Alternative.

Proposed Action Alternative

North Willamette Late-Successional Reserve Areas and Critical Habitat Units (i.e. Related to the USFWS Habitat Rule): Many of the roads proposed for decommissioning occur within LSR RO-201 and CHU OR-9. Approximately 64 miles of roads are proposed for decommissioning in the LSR and 100 miles within the CHU. There is much overlap between the LSR and CHU so many of the roads to be decommissioned occur in both designations. Although most of these roads are currently closed to the public, they are still being utilized for administrative purposes and contribute to fragmentation within the CHU and LSR. The proposed action would reduce the total miles of roads within LSR RO-201 from 159 miles to 95 miles and from 219 miles to 121 miles within CHU OR-9. The benefits of these road closures would occur slowly over time, as the roads proposed for passive decommissioning naturally close, and as money becomes available to actively decommission the roads with drainage concerns.

In the long-term, the proposed action would improve the habitat for spotted owls being provided within CHU OR-9 and LSR RO-201.

Direct/Indirect Effects to Suitable and Dispersal Habitat

Road decommissioning would not remove or alter suitable or dispersal habitat for spotted owls. All of the measurable ground disturbance would occur within the road prism of the roads proposed for decommissioning. However, some of the roads that are proposed for active decommissioning would incur a short-term loss of vegetation because they already have vegetation growing in the road prism, such as well established alder and some conifers. Access is needed on these roads mostly for culvert removal. On these roads the successional "cloak" would be reset as a result of disturbing these abandoned roads.

Any effects to owls would occur as a result of disturbance to owls potentially present in the surrounding suitable habitat. There is the potential for disturbance from the mechanized equipment used to decommission the proposed roads. The equipment would produce noise above the current ambient levels.

Road decommissioning could occur during any part of the breeding season for spotted owls (March 1st to September 30th). Activities occurring in the early part of the breeding season (March 1st – July 15th) have a higher risk of affecting nesting and reproductive success. Roads that are decommissioned after July 15th have less risk of affecting nesting and reproductive success than activities conducted during the early breeding season. However, owls rarely nest at or immediately adjacent to road or edges (Kerns et al. 1992, Perkins 2000). In addition, although this activity has the potential to adversely affect breeding spotted owls, it is not reasonably certain that an active spotted owl nest would occur at or near a proposed project due to the low density of actively nesting spotted owls and the small proportion of the action area that would be disturbed (USDI 2006). Therefore, this proposed action would have a **May Affect, Not Likely to Adversely Affect** call on spotted owls (Disturbance Only.).

The Bull Run Decommissioning project would improve connectivity within the watershed by actively decommissioning approximately 73 miles of road that are currently fragmenting potentially large patches of interior forest. This would allow an estimated 219 acres of land to be revegetated. These additional acres of forested lands have the potential to become spotted owl habitat in the future. Within approximately 30 years after project implementation, the decommissioned roads would have revegetated to the point where they would no longer be contributing to fragmentation. This reduction in fragmentation would create much larger blocks of interior forest, thus improving the quality of suitable habitat within the watershed. Connectivity between suitable habitat blocks would also be enhanced.

Effects to spotted owl on the entire range of the species (Washington, Oregon, and California)

The Northwest Forest Plan established a system of land allocations and a rate of timber harvest (probable sale quantity) that is considered to be consistent with maintaining viability for the northern spotted owl across its range (USDA USDI 1994). The Bull Run road decommissioning project would not significantly alter the landscape's capability to provide for the continued viability of the northern spotted owl on Federal Lands.

A report titled "Scientific evaluation of the status of the Northern Spotted Owl" was published by Sustainable Ecosystems Institute (Courtney 2004). The report is a review and synthesis of information on the status of the Northern Spotted Owl. The report was prepared to aid the U.S. Fish and Wildlife Service in their 5-year status review process, as set out in the Endangered Species Act. The report did not make recommendations on listing status or on management, but focused on identifying the best available science and the most appropriate interpretations of that science. The focus is on new information developed since the time of listing in 1990. The report relied on demography studies summarized in a report titled "Status and Trends in Demography of Northern Spotted Owls, 1985-2003" (Anthony 2004).

The information does not reveal effects concerning the impacts of the Bull Run road decommissioning proposal in a manner or extent not previously considered.

Cumulative Effects to Northern Spotted Owls

The landscape pattern of vegetation has been affected by historic timber harvest activities, thus substantially impacting the habitat for spotted owls. Some ecologically important features of landscape pattern are: amount of edge habitat, degree of fragmentation of late-successional forest, and amount of interior forest. As fragmentation of a landscape pattern increases, the amount of interior forest habitat decreases and the amount of edge habitat increases. As fragmentation increases, the amount of interior forest habitat decreases, impacting organisms that prefer large patches of interior habitat, such as the spotted owl. Although there has been a loss of suitable habitat and increase in fragmentation in the Bull Run Watershed, primarily due to timber harvest, this watershed still contains some of the best and most continuous owl habitat within the Mt. Hood National Forest. It also serves as an important connection between Forest and lands in Washington State (USDA 1997).

The barred owl has been expanding into northern spotted owl territory from northeastern Canada since about 1900, moving into Washington, Oregon and Northern California and in some cases has been displacing spotted owls. Barred owls are known to be present on the Forest. Barred owls may be expanding their range because of changes to forest structure from logging, wildfire or climate change.

Currently, there are no foreseeable future actions within the watershed that are predicted to adversely impact spotted owl habitat. The future landscape pattern in the LSR and City of Portland lands within the watershed would likely be dominated by unfragmented landscapes of late-successional forest with scattered natural openings such as lakes, wetlands, talus slopes, etc. As forest succession progresses and edge effects diminish, the amount of interior habitat and connectivity would greatly increase even in the short-term (USDA 1997).

Affected Environment - Northern Bald Eagle (Threatened)

The bald eagle is a permanent resident in Oregon. Their nests are usually located in multi-storied stands with old-growth components, and are near water bodies that support an adequate food supply. Nests, which usually consist of a bulky platform of sticks, are usually located in the super-canopy of trees, or even on a cliff. Nest sites are usually within ¼ mile of water in the Cascades.

Adequate forage sources are possibly the most critical component of bald eagle breeding and wintering habitat. Fish, waterfowl, rabbits, and various types of carrion comprise the most common food sources for eagles in the Pacific Recovery Plan area. Wintering bald eagles perch on a variety of substrates, proximity to a food source being the most important factor influencing perch selection. Eagles tend to use the highest perch sites available that provides a good view of the surrounding area. Communal roosts are invariably near a rich food source and in forest stands that are multi-storied and have at least a remnant old growth component.

In the winter, bald eagles are observed on the Columbia River and lower elevations. During the spring and summer breeding seasons, they move up into the Bull Run drainage to forage (USDA 1997). Although bald eagles sightings have been documented in the watershed, nesting activity has not. For the most part, bald eagle nesting and foraging habitat in the Bull Run Watershed occurs around Bull Run Lake and both reservoirs. The most likely sites for nesting, where suitable nest trees occur are within a ½ mile radius of the lake and the reservoirs.

There are several roads within 1 mile of reservoir's #1 and 2 that are proposed for decommissioning.

Northern Bald Eagle - Environmental Consequences - Analysis of Direct and Indirect Effects

No Action Alternative

The current road system in the watershed would remain unchanged in the short-term. Roads that are adjacent to potential bald eagle habitat and are closing in by themselves with the encroachment of vegetation would continue to reduce the potential disturbance to bald eagles in the area. The roads directly adjacent to potential bald eagle habitat that would have been actively decommissioned with the action alternative would remain open in the short-term and continue to increase the potential for human disturbance to any bald eagle foraging in the area. Although these roads are not open to the general public, they still receive moderate levels of use for administrative and other purposes.

Proposed Action Alternative

There would be no adverse effects to individual bald eagles or bald eagle habitat. The decommissioning of roads would have no negative impacts on the availability of bald eagle habitat in the watershed. Since there are currently no known bald eagle nests or roost sites within or directly adjacent to the watershed, there would be no predictable adverse effects to bald eagles. However, since several of the roads proposed for decommissioning occur close to potential bald eagle habitat surrounding Reservoir's #1 and 2, the Biological Assessment of Activities with the Potential to Disturb Northern Spotted Owls or Bald Eagles, Willamette Planning Province – FY 2006-2007 (USDA2005) provides guidance to issue a **May Affect, Not Likely to Adversely Affect** call for the project.

The closure of roads near the potential bald eagle habitat surrounding Reservoir's #1 and 2 would reduce the potential for disturbance of any bald eagle foraging in the area. It would also potentially increase the chances of a bald eagle nesting or roosting in the area due to an increase in security.

Prior or during the course of project implementation, it is possible a bald eagle nest or roost site would become known within the disruption distance (described within the Biological Assessment) of the roads proposed for decommissioning. The current Biological Assessment would not allow the project to be implemented within this disruption distance during the breeding season for bald eagles (January 1st – August 31st) for a known nest site and during the roosting period (November 15th – March 15th) for a roost site.

Cumulative Effects to Northern Bald Eagles

No adverse cumulative effects are predicted with the Proposed Action Alternative. Conditions in the watershed should continue to provide good foraging and nesting habitat for the bald eagle.

Sensitive Species

The following table summarizes effects from the Biological Evaluation, found in Appendix C, which is incorporated by reference.

Table III-22 Summary of Effects from the Biological Evaluation

Species	Suitable Habitat Presence	Impact of Alternatives Action Alternative B (Proposed Action)
Oregon Slender Salamander	No	No Impact
Larch Mountain Salamander	No	No Impact
Cope's Giant Salamander	Yes	May Impact Individuals, But Not Likely to Cause a Trend Towards Federal Listing or Loss of Viability
Cascade Torrent Salamander	Yes	May Impact Individuals, But Not Likely to Cause a Trend Towards Federal Listing or Loss of Viability
Oregon Spotted Frog	Yes	May Impact Individuals, But Not Likely to Cause a Trend Towards Federal Listing or Loss of Viability
Painted Turtle	No	No Impact
Northwestern Pond Turtle	No	No Impact
Horned Grebe	Yes	May Impact Individuals, But Not Likely to Cause a Trend Towards Federal Listing or Loss of Viability
Bufflehead	Yes	May Impact Individuals, But Not Likely to Cause a Trend Towards Federal Listing or Loss of Viability
Harlequin Duck	Yes	May Impact Individuals, But Not Likely to Cause a Trend Towards Federal Listing or Loss of Viability
American Peregrine Falcon	Yes	May Impact Individuals, But Not Likely to Cause a Trend Towards Federal Listing or Loss of Viability
Gray Flycatcher	No	No Impact
Baird's Shrew	No	No Impact
Pacific Fringe-tailed Bat	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*	No	No Impact

*These species are Survey and Manage Species and are also classified as a Sensitive species on the Region 6 Regional Forester's Sensitive Species list for the Mt. Hood National Forest.

Effects to the species listed above include changes to habitat as well as potential harm to individuals caused by physical impacts of excavation and other types of equipment, noise, and other actions connected to road decommissioning.

Survey and Manage Species: Terrestrial Mollusks, Red Tree Voles, Salamanders and Great Gray Owls

The Mt. Hood Forest Plan was amended by the 2001 Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines. Annual species reviews have been conducted since then to incorporate the new information gained from surveys and from other research. Changes to species lists were made that include moving species to different categories, changing their range or taking them off the list. The most recent annual species review was documented in a memo on December 19, 2003.

This report documents compliance with the 2001 Record of Decision for survey and manage standards and guidelines as amended or modified as of March 21, 2004.

Methodology of surveys

For some categories of species, site-specific pre-disturbance surveys are normally conducted prior to signing decision documents for habitat-disturbing activities. These are "clearance" surveys that focus on the project unit with the objective of reducing the inadvertent loss of undiscovered sites by searching specified potential habitats prior to making decisions about habitat-disturbing activities. The surveys are not designed to find all individuals. Sometimes surveys are conducted outside the actual project area if the project might affect adjacent habitat. Surveys are done according to the Survey Protocols that are designed by taxa experts. Survey protocols can be found at the following web site: http://www.or.blm.gov/surveyandmanage/sp.htm. Pre-disturbance surveys are normally conducted for species in Categories A and C where the species ranges overlap a project. Data is entered into the Interagency Species Management System (ISMS) database and the Geographic Biotic Observations Geodatabase (GeoBOB).

- Surveys were not conducted for terrestrial mollusks, red tree vole, salamanders or great gray owls because habitat for these species is not affected by the project.

Results of surveys - Management of Known Sites

Some species require the management of known sites; those known before or discovered during surveys. Species in categories A, B and E require the management of all known sites and species in categories C and D require the management of high-priority sites. Data is entered into the Interagency Species Management System (ISMS) database and the Geographic Biotic Observations Geodatabase (GeoBOB). Management Recommendations can be found at the following web site: http://www.or.blm.gov/surveyandmanage/mr.htm

There are no known sites affecting the project. No changes are needed. This project is consistent with the Survey and Manage standards and guidelines.

Affected Environment - Snags and Down Wood

No quantitative assessment of snag habitat has been conducted for the Bull Run Watershed. However, due to the watershed's high volume of late-seral forests, its overall low level of harvest, and its low acreages impacted with recent fire, the Bull Run most likely has the highest number of snags than other watersheds on the Mt. Hood National Forest.

Large snags are most abundant within the unmanaged large conifer stands that are widely distributed throughout the watershed. However, most of the areas affected by windthrow and subsequent salvage (such as Otter Creek) have low levels of snags and a current, open stand structure (USDA 1997).

The watershed also contains trees infected with laminated root disease (P. weirii). These trees continually add to snag levels, however these snags are less stable and are inevitably windthrown. The biology of P. weirii does not contribute to rot higher up in trees, and therefore may not create good habitat for cavity nesters.

Coarse woody debris levels follow a similar pattern as snag levels. Unmanaged large conifer stands have higher levels of coarse woody debris than managed plantations. Most blowdown areas with subsequent salvage also experienced various fuels treatments which reduced the coarse woody debris levels. Some areas with a recent fire history (Linket and Log Creek fires) have experienced reduced coarse woody debris levels.

Snags and Down Wood - Environmental Consequences - Analysis of Direct and Indirect Effects

No Action Alternative

Due to the current management direction within the Bull Run watershed, trends for coarse woody debris and snags are likely to increase in the future as a result of more stands becoming late-successional habitat.

Proposed Action Alternative

The Proposed Action Alternative would not have a measurable effect on the snag and down woody debris resource in the watershed. The majority of project activity would occur within the road prism of the roads to be decommissioned, an area where few to no snags and large down wood would be present.

There is the potential that an occasional large down woody debris piece would need to be moved out of the road prism of a road to be decommissioned. The piece of down woody would likely only be moved to the adjacent forested area and would still have the potential to be used by species utilizing down wood. As a result, there would essentially be no effect to the down woody debris resource in the area and thus no effect to species utilizing this resource.

There is the potential that an occasional snag would need to be cut down for safety reasons that was directly adjacent to the road prism of a road to be decommissioned. Although this would result in a loss of snag habitat in the area, the loss would be minimal and almost immeasurable due to the abundance of snags in the watershed. The loss of snags might affect a few individuals utilizing that particular component piece, but would have essentially no effect on any of the wildlife populations utilizing snags in the watershed. All snags cut down as a result of project implementation would be left on site.

The roads to be decommissioned or just closed would eventually revegetate and become forested habitat. This would add to the forest land base in the watershed and provide more of an opportunity for future snags and down wood. Although most of the watershed is closed off to public access, fewer roads within the watershed landscape means less of an opportunity for snags to be cut down illegally.

Snags and Down Wood Cumulative Effects

No substantial cumulative effects would occur with implementation of the proposed action. As is stated in the no action alternative, trends for coarse woody debris and snags within the watershed are likely to increase in the future as a result of more stands becoming late-successional habitat. The proposed action would slightly hasten this attainment by providing more lands capable of producing snags and down wood.

Affected Environment - Deer and Elk Habitat (Management Indicator Species)

Deer and elk, although not a “species of concern,” are an important recreational and economic resource both to hunters and those wishing to view the animal.

Although most of the Bull Run Watershed is closed to public access and hunting, portions of the lower Little Sandy subwatershed allow hunting on foot and gated roads. Approximately 44,803 acres within the BRWMU is allocated as deer and elk winter range, with 839 acres of this within the Lower Little Sandy subwatershed classified as Forest Plan B10 deer and elk winter range. The remaining 48,197 acres consists of deer and elk summer range.

Deer and elk need both forage and cover within their home range if they are to acquire and conserve the energy they require daily. Areas with high quality forage and cover with reasonable freedom from human disturbance provide the most productive habitat for deer and elk.

Roads may inhibit deer and elk use of quality foraging, rearing, and wintering areas. A Mt. Hood Forest Plan standard states that roads open to motorized vehicular access should be reduced to no greater than 2.0 mi./sq. mile within inventoried deer and elk winter range and 2.5 mi./sq. mile within deer and elk summer range (FW-208).

Road densities in the project area are displayed in Table III-23. Road densities meet both the winter and summer range standard in almost all areas of the BRWMU. The one exception is the B10 land allocation within the Lower Little Sandy subwatershed, the road densities of which exceed the winter range standard. Overall, actual road use in the BRWMU is low compared to watersheds with public entry.

Table III-23 Current Road Densities within the Bull Run Watershed Management Unit on Federal Lands

Bull Run Watershed Management Unit - Deer and Elk Range Type	Forest Plan Road Density Standard (miles per square mile)	Current Road Density (miles per square mile on Federal Lands Only)
Deer and Elk Winter Range	2.0	2.3
Forest Plan B10 allocated Winter Range	1.5	3.0
Deer and Elk Summer Range	2.5	1.5

Overall, elk population numbers appear to be declining within the Zigzag and Columbia Gorge Ranger Districts, and thus are also likely to be declining within the Bull Run Watershed. High human presence and high road densities are probably not as much of a limiting factor for deer and elk in this watershed as they are in other parts of the district due to the watershed being closed off to public access. However, the low amount of available forage is likely the primary limiting factor for deer and elk in the area.

Deer and Elk Habitat - Environmental Consequences - Analysis of Direct and Indirect Effects

No Action Alternative

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 the proposed road decommissioning. There would also be no increased security provided to the deer and elk as a result of the road closures.

Proposed Action Alternative

There would be no direct effects to deer and elk habitat with implementation of the proposed action. The majority of ground disturbance would occur within the road prism, thus no alteration of deer and elk habitat would occur.

Deer and elk currently within the area during project implementation could be displaced for the short-term due to the noise levels and activity produced by the road decommissioning and related activities. Since there are no known areas within the watershed in which deer or elk tend to concentrate within the summer or fall (in general, project implementation would not be allowed during the winter and spring, due to the wet soil conditions), it is likely this disturbance to individuals would not be highly disruptive to many animals, only to a few that happen to be in the area at the time of project implementation. 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. Project implementation would likely not occur during calving season or during the wintertime, the periods when deer and elk are most vulnerable to disturbance.

The reduction in road density caused by the road decommissioning would improve the quality of habitat for deer and elk currently being provided in the watershed by increasing the level of security for the ungulates. Although the watershed is currently closed to the public, there is a moderate amount of administrative traffic currently present on the roads. Closure of these roads would increase the level of security for the deer and elk herds in the area. The following table displays the reduction in road density per watershed that would occur with implementation of all 136 miles of proposed road closures.

Table III-24 Miles of Proposed Road Closures and Road Densities after Project Implementation (Federal Lands Only)

Bull Run Watershed Management Unit - Deer and Elk Range Type	Miles of Road Closures Proposed	Road Density - (miles per square mile) - Current Condition	Road Density – (miles per square mile) - After Full Project Implementation	Forest Plan Road Density Standard (miles per square mile)
Deer and Elk Winter Range	70	2.3	1.3	2.0
Forest Plan B10 allocated Winter Range	4	3.0	0	1.5
Deer and Elk Summer Range	58	1.5	0.7	2.5

Deer and Elk Habitat Cumulative Effects

Based on an analysis of life history guilds within the Bull Run Watershed Analysis, 14% of the watershed is potential habitat for elk, whereas 98% of the watershed is available for deer. Historically, only 6% of the watershed was potential habitat for elk, indicating an increase in elk habitat from created openings (USDA 1997). However, since harvest operations are currently not occurring within the watershed, and are not predicted to resume due to current and likely future management objectives in the Bull Run Watershed, the level of openings within the watershed is expected to decline eventually back down to historical levels. The concurrent reduction in forage could potentially cause a further reduction of elk/deer numbers in the watershed. Although the current trend of road closures being implemented 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.

Affected Environment - 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.

These two species rely on older forest structure, while the pileated woodpecker also relies on snags and live trees with the elements of wood decay. The majority of roads proposed for decommissioning occur adjacent to suitable pine marten and pileated woodpecker habitat.

Pine Martins and Pileated Woodpeckers - Environmental Consequences - Analysis of Direct and Indirect Effects

No Action Alternative

There would be no effects to the pine marten or pileated woodpecker with this alternative. The stands within the watershed currently providing habitat for these species would continue to function as potential habitat. There would be no benefits gained from the proposed road decommissioning proposed in the action alternative. The additional habitat that would have been provided for the species would not occur as well as the additional protection for snags and less fragmented habitats.

Proposed Action Alternative

Road decommissioning would not remove or alter potential suitable habitat for the pine marten or pileated woodpecker. There would be no effects to pine marten or pileated woodpecker habitat as a result of project implementation. All of the measurable ground disturbance would occur within the road prism of the roads proposed for decommissioning. As the roads are decommissioned and start to grow into forested habitats, there would be a gain in potential pine marten and pileated woodpecker habitat in the long-term. In addition, this reduction in road density would reduce the potential for future snag loss, a necessary habitat component of the pileated woodpecker. Also, less roads would mean less fragmented habitat for these species.

Pine Martin and Pileated Woodpecker Cumulative Effects

There is currently abundant potential habitat for the pine marten and pileated woodpecker within the watershed. Due to the management objectives of this watershed, suitable habitat for these species would increase both in quantity and quality. Implementation of the proposed action would further hasten the attainment of additional habitats for the pine marten and pileated woodpecker.

Affected Environment - Migratory Birds

Close to 30 species of migratory birds occur within the BRWMU, some of which are likely present within the area during the breeding season. Some species favor habitat with late-seral characteristics while others favor early-successional habitat with large trees.

Migratory Birds - Environmental Consequences - Analysis of Direct, Indirect and Cumulative Effects

No Action Alternative

There would be no alteration of habitat for migratory birds. There would be no benefits to migratory birds as a result of the proposed road decommissioning.

Proposed Action Alternative

The decommissioning of roads would likely not have a measurable negative effect on migratory birds or their habitat in the project area (BRWMU). Although there is the slight chance that the noise-generating activities produced by decommissioning roads would disrupt reproductive behavior of a few individuals, it is more likely this disturbance would just cause a redistribution of individuals in the area. No measurable change in the population of any migratory bird species is predicted with implementation of this action alternative.

The eventual reduction in fragmentation of the available habitat in the area as a result of the road closures and active decommissioning is likely to improve habitat for those migratory bird species that prefers large blocks of contiguous habitat.

D. Botany

Table III-25 - Comparison of Alternatives Botany

Items of Comparison	Proposed Action	No Action
Botany		
Risk of introducing and spreading invasive plants	Reduced risk	No Change
Effects to Sensitive species and Survey & Manage species	Long-term benefits	No Change

Botany Affected Environment

Native plant communities on the west side of the crest of the Cascade Range in northwestern Oregon, including the Bull Run watershed, consist, for the most part, of dense, moist forests of western hemlock (*Tsuga heterophylla*), Douglas-fir (*Pseudotsuga menziesii*), Pacific silver fir (*Abies amabilis*), western red cedar (*Thuja plicata*), and mountain hemlock (*Tsuga mertensiana*). On a broad scale, the diversity of forested plant communities in the western Cascade Range can be grouped into a handful of major vegetation zones that are determined largely by environmental gradients in temperature and moisture (i.e., climate) resulting from elevation change and maritime influence. Each vegetation zone is named after the dominant reproducing tree species for that zone. For example, the western hemlock zone dominates lower elevations (less than 2,000 to 3,000 feet). Above this low-elevation zone, from roughly 3,000 to 4,500 feet in elevation where it is cooler and moister, is the Pacific silver fir zone. Above this zone at still higher elevations, roughly 4,500 to 6,000 feet, lies the mountain hemlock zone. And above this zone lie the subalpine and alpine zones with subalpine fir (*Abies lasiocarpa*), whitebark pine (*Pinus albicaulis*) and treeless environments above timberline.

Sixty percent of the Bull Run watershed is in the western hemlock zone, 40% in the Pacific silver fir zone, and less than 1% in the mountain hemlock zone (Bull Run Watershed Analysis 1997). The western hemlock zone dominates the western portions of the watershed and forms a crescent-shaped band that extends up the main fork of the Bull Run River and its adjacent slopes. The Pacific silver fir zone, on average, occurs at lower elevations in the watershed than commonly found across the Mt. Hood National Forest. More than two-thirds of the watershed is comprised of highly productive moist- or wet-site plant associations with the western hemlock/swordfern/oxalis plant association dominant and reaching to the far-eastern extent of the watershed because of the east-west orientation of the watershed's principal drainages that allow penetration of warm, moist marine storms deep into the watershed's interior. Forest structure in the watershed consists of the following classes: 50% small conifer stands (9-21 inch dbh trees), 33% large conifer stands (over 21 inch dbh trees), 15% openings (resulting from timber harvest, windthrown trees, timber salvage, or fire), and 2% non-revegetated areas. Presently, late-seral, or late-successional, forests occupy roughly 45% of the watershed and include mature and old-growth age classes (i.e., stands with trees over 21 inches dbh as well as small conifer stands in the Pacific silver fir and mountain hemlock zones with multiple canopies that include at least some trees over 21 inches dbh). Most large conifer stands in the watershed are over 500 years in age and have well-developed old-growth characteristics.

The watershed supports a high diversity of plant species, including vascular plants, bryophytes, lichens, and fungi. Seventy-seven species (60%) of vascular plants on the Survey and Manage list (Northwest Forest Plan), which additionally are closely associated with old-growth forest, are found in the watershed. The watershed is home to 27 plant species on the Regional Forester's Sensitive Species, the Northwest Forest Plan's Survey and Manage, or the Mt. Hood National Forest's Inventory plant lists. Old-growth forests (500 years+ in age) support a high diversity of lichen species, including Region 6 sensitive and Survey and Manage species only associated with old forests (e.g., *Hypogymnia duplicata, Pseudocyphellaria rainierensis*). Six invasive plants have been identified in the watershed: Canada thistle (*Cirsium arvense*), diffuse knapweed (*Centaurea diffusa*), meadow knapweed (*Centaurea pratensis*), Scotch broom (*Cytisus scoparius*), St. Johns-wort (*Hypericum perforatum*), and tansy ragwort (*Senecio jacobaea*). Additionally, brown knapweed (*Centaurea jacea),* yellow/meadow hawkweed *(Hieracium pratense),* orange hawkweed *(Hieracium aurantiacum),* Japanese knotweed *(Polygonum cuspidatum),* giant knotweed *(Polygonum sachalinense),* and other invasive plant species are potential invaders.

Invasive plants tend to occur where ground disturbance has occurred and/or forest openings have been created as a result of timber harvest, windthrow, road construction, or some other disturbance. No large infestations of knapweed have been noted in the watershed. Canada thistle is common in timber harvest and other disturbed areas, particularly in the west end of the watershed. Scotch broom is found along roadsides and reservoir edges; St. Johns-wort along sandy, gravelly roadsides; and tansy ragwort along roadsides and in clearcuts. Nearby, outside the watershed, on its west side, along the Lolo Pass road and Bonneville Power Association utility (powerline) corridor, are yellow and orange hawkweed infestations. These infestations are primarily on private land but spreading to adjacent national forest land. The yellow and orange hawkweed infestations are being treated with herbicides by the Oregon Department of Agriculture. These infestations have grown from a few acres in the early 1990s to about 1,000 acres currently and have the potential to invade the Bull Run watershed. Additionally, west and south of the watershed, throughout the Sandy River basin (including the Sandy River, Salmon River, and their tributaries) are populations of Japanese knotweed, which have the potential to invade the watershed.

Botany Environmental Consequences - Analysis of Direct, Indirect and Cumulative Effects

No Action Alternative

The No Action Alternative would provide less opportunity for introducing and spreading invasive plants in the Bull Run watershed than the Proposed Action Alternative because existing asphalt road surfaces would not be broken up and disturbed by heavy equipment; the persistence of asphalt road surfaces, although progressively deteriorating with age, discourages the colonization of plants, including invasive plants. Aerial photos taken of roads no longer used or maintained in the watershed, however, show that asphalt road surfaces are not exempt from plant colonization and do provide growing space for plants over time. Photos reveal shrubs and trees growing on or through cracks, cavities, and soft spots in asphalt road surfaces that are no longer used or maintained in the watershed. Hence, even without ground-disturbing activities (such as road decommissioning), road corridors, whether containing gravel or asphalt road surfaces, provide openings in forest canopies that can be exploited by invasive plant species.

Road corridors are conduits for the introduction and spread of invasive plants because they are disturbed ground and provide forest openings that can be exploited by invasive plants. Invasive plant species such as tansy ragwort, common ragwort (*Tanacetum vulgare*), St. Johns-wort, scotch broom, and Himalayan blackberry (*Rubus discolor*) infest many road corridors within the Mt. Hood National Forest already and have the potential, as well, to infest roads no longer used or maintained in the Bull Run watershed. With access to the watershed denied to the public, however, the potential for introducing invasive plants through the transport of whole plants, seeds, or vegetative reproductive parts on vehicles is greatly reduced.

Proposed Action Alternative

One of the objectives of the Proposed Action is to return no-longer used, needed, or desired asphalt road surfaces in the Bull Run watershed to native vegetation and forest cover. Decommissioning roads (breaking up impervious asphalt road surfaces with heavy equipment) is a ground-disturbing activity that, compared to the no-action alternative, would increase the risk of introducing and spreading invasive plants. Breakup of road surfaces creates potential growing space for invasive plants adapted to disturbed (e.g., cleared or compacted) ground, and heavy equipment used to break up the road surfaces could transport invasive plants (whole plants, seeds, or other vegetative reproductive plant parts) into road corridors during road decommissioning work. Some examples of invasive plants common to the Mt. Hood National Forest that could potentially colonize broken road surfaces in the watershed are tansy ragwort, common ragwort, St. Johns-wort, scotch broom, knapweeds, hawkweeds, and Himalayan blackberry. There could be potential for Japanese and giant knotweed (*Polygonum cuspidatum* and *P. sachalinense*), highly invasive species, to colonize disturbed ground along roads being decommissioned that cross or are located near riparian zones, although this potential should be low, assuming there are currently no knotweed sources in the watershed. Other non-native, invasive plant species, either documented on the Mt. Hood National Forest or in the Portland metropolitan area, are also capable of invading broken road surfaces or nearby disturbed ground. Invasive plants are opportunists able to outcompete native plants in colonizing growing space created by moderate to severe ground disturbance (e.g., road construction, road decommissioning/obliteration, timber harvest operations, high-severity fire, landslides, avalanches, mudflows, flooding).

Once colonized and established on a disturbed site, invasive plants can quickly expand in numbers either vegetatively (e.g., from rhizomes, root fragments, sprouting) or by seed and spread across the landscape, thereby displacing native plants, including species on the Regional Forester's Sensitive Species, the Survey and Manage, and the Mt. Hood National Forest Inventory plant lists, resulting in the alteration or displacement of native plant communities. "Displacement of native plant communities by non-native plants results in alterations to the structure and function of ecosystems (MacDonald et al.1991), and constitutes a principal mechanism for loss of biodiversity at regional and global scales" (Preventing and Managing Invasive Plants FEIS 2005). Degradation of ecosystem structure and functions, due to alteration or displacement of native plant communities, results in a loss of forest and soil health with negative repercussions for air and water quality, fish and wildlife, and scenic and recreational values.

The Proposed Action Alternative incorporates project design freatures (a suite of design features that include Best Management Practices) to reduce, if not prevent, the risk of introducing and spreading invasive plants.

Active restoration of decommissioned roads would greatly reduce the risk of introducing and spreading invasive plants. Active restoration consists of planting native grass species, shrubs, and/or tree seedlings or non-native non-invasive grass species following breakup of road surfaces. This restoration action gives a needed head-start to native plants in order to thwart colonization by invasive plants and restore native plant communities on broken asphalt surfaces that, in the long run, would allow for forest development over time. Planting may occur only along the road prism shoulder of broken asphalt road surfaces or in the cracks of broken asphalt surfaces themselves. The latter would be more difficult to accomplish with seeding of native grass species perhaps offering the best prospect for actively restoring cracks between broken surfaces. Passive restoration (i.e., not planting following road surface breakup and, instead, allowing nature to take its course) would be less successful in reducing the potential risk of introducing and spreading invasive plants following road decommissioning activities.

Scattered populations of two lichen species, which are both Region 6 sensitive and Survey and Manage species, *Hypogymnia duplicata* and *Pseudocyphellaria rainierensis*, have been found in the watershed, including along previously decommissioned roads (Known Site Surveys in 2002); however, although found along the edge of the road prism (at the forest edge), these populations were outside the affected area where road decommissioning occurred and therefore not impacted. *Usnea longissima*, another Region 6 sensitive and Survey and Manage lichen species, can be found growing in road corridors in the Bull Run watershed, hanging from tree branches above roads or along roadsides. It is possible that this lichen may occur in road corridors where roads are proposed for decommissioning. Road decommissioning activities potentially could disturb and harm some *U. longissima* individuals, but in general unknown populations of *U. longissima*, *H. duplicata*, *P. rainierensis*, and other Region 6 sensitive and/or Survey and Manage plant species that may occur in or along road corridors where road decommissioning is proposed would be expected to benefit in the long term as native vegetation and eventually forest return to the broken road surfaces over time.

Surveys for Survey and Manage botanical species were not done in the Bull Run watershed for the proposed road decommissioning project because road corridors and other highly disturbed ground are not habitat where rare botanical species tend to occur; therefore, road decommissioning is expected to have little to no impact on Survey and Manage botanical species. The lichen, *U. longissima*, is an exception because it appears to thrive in open areas, such as road corridors, in moist forests on the west side of the Mt. Hood National Forest, including the Bull Run watershed, probably because of greater light availability. This lichen species can be found in numerous locations, in the Bull Run watershed and on the Clackamas River Ranger District, especially in riparian areas and in road corridors along riparian areas, rivers, and streams. Surveys for Survey and Manage fungi were not done because of the impracticality of conducting multiple-year surveys to detect fruiting bodies (e.g., mushrooms and truffles). Fruiting body production is highly variable from year to year, necessitating multiple-year surveys. The current policy is to assume that Survey and Manage fungi may be present in project areas and that ground- or habitat-disturbing activities may impact individuals or some populations but are not expected to threaten the viability of the species leading it to be federally listed as threatened or endangered.

In the long term, road decommissioning is beneficial to native plants and native plant communities, including rare plant species such as those on the R6 sensitive and Survey and Manage lists, despite the risk of potentially introducing invasive plants, because it would restore native plant communities and forest cover in road corridors, benefiting air and water quality, biological diversity (fish, wildlife, and plants), and soil resources in the Bull Run Watershed. Furthermore, the restoration of native vegetation and forest cover in road corridors would inhibit, if not prevent, the introduction of invasive plant species in the long term.

E. Wildfire Control Response Access

Table III-26 – Comparison of Alternatives Wildfire Control Response

Items of Comparison	Proposed Action	No Action
Wildfire Control Response Access		
Travel time to land within the BRWMU	Slight, but not significant delay time due to decommissioned roads	No Change

Affected Environment

The fire history of the Bull Run was evaluated by researchers from the University of Washington in the mid 1990s (Krusemark, Agee and Berry, 1996). The authors used the natural fire rotation (NFR) technique to quantitatively characterize the fire regime. NFR is defined as the number of years in which the equivalent acreage of a geographic area of interest (e.g., a watershed or a fire protection unit) burned. The NFR is computed as follows:

$$NFR = \frac{[\text{Time Period}]}{[\text{Proportion of Area Burned}]}$$

The average NFR for the Bull Run from 1493 to 1993 is 347 years, but the record is heavily influenced by a few large events (Krusemark, Agee and Berry, 1996). The literal interpretation of a 347 year NFR is that every 347 years an area equal in size to the watershed (68,000 acres) is burned.

Areas above 3300 feet elevation generally burned more frequently than areas below 3300 feet. This elevation represents the general break between the western hemlock (*Tsuga heterophylla*) and silver fir (*Abies amabilis*) plant zones. The overall NFR below 3300 feet (1493 – 1993) is 369 years. The overall NFR above

3300 feet (1493 – 1993) is 293 years (Krusemark et al, 1996). Although NFR is a useful measurement to characterize and compare the fire frequency regime of the BRWMU, it does not characterize the frequency of stand-replacing fires that have burned areas less than the full acreage of the Bull Run watershed

Fire ecology groups of the Bull Run watershed consist of one dominant and two minor. Fire Group 8 encompasses approximately 83 percent of the watershed, with scattered inclusions of fire group 6 and 9 comprising the remaining 17 percent.

Fire Group 8 includes the watershed's moist and wet western hemlock and Pacific silver fir plant associations. Very wet sites (indicated by devil's club and skunk cabbage) tend to halt or greatly slow the spread of surface fires during most years. Deep duff and large logs are typical of this group, resulting in "low" to "moderate" wildfire hazards (depending on weather conditions and canopy gaps. Fire frequency in similar habitat types average 200+ years. Average fire return intervals in sites with devil's club and skunk cabbage may easily exceed 300 years.

Fire Group 9 consists of dry western hemlock plant associations from 2000 to 2700 feet in the watershed's south to southwest slopes. Drier conditions in the understory in late summer provides live fuel in the form of cured grasses and shrubs with fine twigs. in more open canopies, tree crowns can reach closer to the ground, providing a ladder for fire to reach the canopy. Fuel loading in this fire group are highly variable, depending on individual stand and site conditions. Fire frequency communities average between 25-150 years, depending on specific location.

Fire Group 6 is found on cool sites on upper slopes and ridgetops above 2600 feet, primarily scattered along the watershed's eastside. Current evidence suggests that Fire Group 6 experiences high-intensity stand-replacing fires almost exclusively. With the exception of periods with prolonged drought, the understory in this Fire Group does not support fire. Fire exclusion probably has not altered the typical fuel loading and fire behavior. The heavy shrub loading still serves as a heat sink, preventing the start and spread of most fires during average burning conditions.

In conclusion the Bull Run appears to burn infrequently and contains a large proportion of old-growth forest as a result. Past large fires may actually have resulted from multiple fire starts from passing lightning storms that smoldered for several weeks or more until an east wind event caused the fires to flare-up and burn together into one large fire. This would be an unlikely scenario today given adequate suppression forces. The most likely fire scenario is for fires to spread from east to west, with dry dominant east wind that typically occur in September and October. Overall, the Bull Run has a history of stand replacing fires. Risk is low, yet a fire of multiple fires under the right weather conditions and in east wind event could result in large, stand replacement fire. The best, cost effective suppression strategy is to maintain early detection and early suppression efforts with sufficient road infrastructure for access.

The Bull Run Watershed Fire Management Plan lists Hickman Butte Lookout, 2 patrols (one ODF and one FS), aerial detection flights, automated lightning detection and mapping service in the fire detection section. Hickman Butte lookout is located in the southeast portion of the Bull Run drainage and is generally staffed seven days a week with a volunteer fire lookout. This lookout is staffed from approximately mid-June until mid October, depending upon the fire weather conditions. Prevention patrols are provided by ODF and Mt. Hood Westside Fire Management. During periods of lightning activity or high to extreme fire danger, the Forest would utilize additional ground patrols as needed. Dry conditions coupled with forecasts predicting dry weather would generate a "severity request." Severity requests are supplemental sources of fire protection funds that may add additional resources. When the need arises, ODF or the Forest Service would initiate aerial detection flights, especially if the Forest experiences any significant lightning activity during fire season. In addition, the PWB, ODF, and the Forest Service currently subscribe to an automated lightning detection and mapping service.

The suppression resource available for the Bull Run Watershed include fire crews (type 1 and 2), engines, helicopters, dozers, retardant, and air resources (smokejumpers and/or rappelers).

Only about half of the roads in the project area are being maintained suitably to provide initial road-based response for fire suppression. Unmaintained roads <u>without</u> asphalt pavement are not presently accessible without brush removal. Unmaintained asphalt paved roads may be traveled at slow speeds in most areas, but need spot brushing to permit access in others. Only about 30 percent of the unmaintained roads in the project area are presently accessible without some brush removal work.

Currently 100% of the land (92,054 acres) within the BRWMU is within 2 miles of a road system. The outermost land from a road system within the BRWMU is in the upper NE corner. Although land with in the NE corner is further from existing roads, the Pacific Crest Trail provides foot access to this area.

Fire Control Response Access Environmental Consequences

No Action Alternative

In time, road access for fire suppression would decline to about half of the current system of roads. Brush would block the travel way on most unmaintained roads in 10 years. Blockages due to the plugging of culverts and loss of part of the road surface on unmaintained roads are estimated in 10 to 30 years. This is the period of time that the unmaintained roads for this alternative would be available for fire suppression access. The no action alternative current state has 100% of the land in the BRWMU is within 2 miles of a road system.

Proposed Action Alternative

Approximately 136 miles of road would be decommissioned under the Proposed Action Alternative and would not be available for fire control access. Once a road has been decommissioned, including "walk away" roads that are decommissioned by letting natural vegetation grow in to close the road; these roads are removed from the road system and if reopened or reconstructed in the future, that activity would be considered to be new road construction. Most of the BRWMU is within a Late Successional Reserve (LSR) and new road construction is not allowed within LSR's. Therefore, implementation of the alternative commits the Forest Service to no longer use the decommissioned and walk-away roads, for fire suppression activities.

After decommissioning, 99.5% (91,597 acres) of the land within the BRWMU would be within 2 miles from a road system. Approximately 0.5% (396 acres) of land within the BRWMU would be further than 2 miles from a road system. The furthest land from a road system would be 151 acres 2.5 miles from the nearest road. The outermost land from a road system within the BRWMU is in the upper NE corner. Although land within the NE corner is further from existing roads, the Pacific Crest Trail provides foot access to this area.

Initial response to un-road areas of the BRWMU would depend on foot travel from the nearest road, or by smokejumpers, helicopters, and aerial retardant applications.

The city also contracted a study of *Availability of Regional Fire Suppression Resources to Attack a Fire in the Bull Run Watershed, Oregon by Donald Carlton and Stanley Kunzman, April, 1998* which developed frequency distribution tables to show the availability of large air tankers and smokejumpers in Washington and Oregon during the fire season from 1993-1997. This study indicated that there was always at least one large airtanker available in Washington and Oregon. Also, for the same time period there were at least eight or more smokejumpers available from both states 94% of the time.

The analysis used the Initial Attack Assessment Model to study sizes of potential fires under worst case scenarios of 99th percentile rates of spread. The model produced a contained fire size of only 25 acres for an extremely rapid 20 chain per hour (0.25 miles per hour) rate of spread. Recognizing the very low percentile of occurrence, i.e. greater than 99th percentile of fire weather conditions, such fires are manageable and do not pose a significant threat to the watershed. Assumptions that go with this assessment include that the model used does not account for complex fire behavior such as spotting or fires burning into the Bull Run Watershed from outside the basin; and that regional fire suppression resources would remain constant.

Mt. Hood National Forest Fire Management staff has determined that the roads proposed for decommissioning would not delay travel times to potential fires within the BRWMU. The current state of the BRWMU has 100% of the land within 2 miles of a road system. With decommissioning approximately 136 miles of road the BRWMU would have 99.5% of the land within 2 miles of a road system and 0.5% of the land would be 2 miles to 2.5 miles from a road system.

F. Economics

Table III-27 – Comparison of Alternatives Economics

Items of Comparison	Proposed Action	No Action
Economics		
Annual Maintenance Costs	$137,383	$158,019
Decommissioning Costs	$952,900	$0

USFS costs to maintain Bull Run roads were calculated based on average road maintenance costs by Maintenance Level and Road Surface Type from the Mt. Hood National Forest Roads Analysis.

Table III-28 Cost of Road Maintenance by Maintenance Level and Surface Type

Maintenance Level	Surface Type	Annual Cost/Mile
1	All Surfaces	50
2	Native & Aggregate	380
2	*Asphalt or Paved	410
3	Native & Aggregate	2100
3	Asphalt or Paved	2000
4	Aggregate	3980
4/5	Asphalt or Paved	3530

- This includes all Asphalt Concrete and Bituminous Surface Treatment or more commonly known as "paved roads".

No Action Alternative

The annual cost to maintain roads within the BRWMU at the existing maintenance level is approximately $158,019. This cost estimation is based on cost analysis from the Mt. Hoods National Forest Roads Analysis and includes only routine maintenance activities.

Proposed Action Alternative

Under the Proposed Action Alternative, it would cost approximately $137,383 per year to maintain roads that would not be decommissioned. This cost analysis does not assess cost values for the risks related to water quality effects from keeping unneeded roads on the system which require regular maintenance and may suffer damage due to infrequent storms. Decommissioning of such roads would reduce these risks considerably by restoring the natural hydrologic soil conditions.

Also, the cost analysis does not include the periodic need for capital investments for reconstruction, widespread culvert replacement, or bridge replacement. Many of these costs would equal or exceed the decommissioning costs on a per mile basis. Many of the culverts are approaching 30 years of age and would need replacement in the next 10-20 years.

Based on experience in the Bull Run Watershed associated with road decommissioning from 2000 to 2004 average road decommissioning costs are $13,000 per mile. This would result in a total cost of $952,900 for activities under the Proposed Action.

G. Heritage Resources

Table III-29 – Comparison of Alternatives Heritage Resources

Items of Comparison	Proposed Action	No Action
Heritage Resources		
Effects to Historic properties	No Change	No Change

Affected Environment

Few prehistoric archaeological sites have been recorded with the BRWMU. Lithic material collected from a site (#669-113) at Bull Run Reservoir #2 includes projectile points typical of sites from the time period ca. 5,000 – 2,500 B.P. A limited number of lithic isolates have been recorded at higher elevations within the watershed and at nearby Roslyn Lake (outside of the BRWMU). An archaeological site (35CL264) has recently been recorded beneath lahar deposits along the Sandy River near the Marmot Dam (also nearby, but outside of the BRWMU). Radio carbon dating indicates an occupation from ca. 4,070 B.P.

Ethnohistorical data specific to the BRWMU is nearly nonexistent. This may be a result of the watershed's closure to the public as early as 1904 rather than an actual absence of human use patterns. Oral histories of the area may have been lost and forgotten once use was excluded. There is some documentary evidence that the uplands at the head of the watershed may have been used for huckleberry harvest by native people. It is also likely that native peoples took advantage of anadromous fisheries in the lower reaches of the Bull Run River and its tributaries.

There are historic archaeological sites, structures, and buildings throughout and adjacent to the BRWMU associated with early homesteads, railroad logging, Forest Service administration, City of Portland Water Bureau development and electric hydropower generation.

No Action Alternative

The No Action Alternative may have the potential to adversely affect yet unidentified historic properties and archeological material within the BRWMU if road culverts and fills become plugged and fills are eroded or fail. The effects of road failures have the potential to extend far beyond the existing road prism. Geographic features in the BRWMU with high probability for archaeological discovery include benches and terraces near streams. These features would be particularly at risk in the event of a debris torrent due to a road failure. The risk of adverse effects would increase with time as culverts lose capacity to carry stream flow due to lack of maintenance.

Proposed Action Alternative

Road decommissioning activities would include culvert and bridge removal, scarifying the road surface, water barring, and reestablishing natural drainage patterns. Decommissioning roads would lessen the potential for debris torrents resulting from road failures. All decommissioning activities would be limited to the existing road prism. The proposal has been reviewed to determine its potential to affect any historic properties as required by the National Historic Preservation Act. The Proposed Action Alternative would have little or no potential to affect any historic properties.

H. Disclosures

Short Term Uses and Long Term Productivity

The National Environmental Policy Act requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 Code of Federal Regulations 1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic and other requirements of recent and future generations of Americans (NEPA Section 101).

The Multiple Use - Sustained Yield Act of 1960 requires the Forest Service to manage national Forest System lands for multiple uses, including timber, recreation, fish and wildlife, range and watershed. All renewable resources are to be managed in such a way that they are available for future generations. Road decommissioning activities can be considered as a measure that enhances renewable resources by placing more land in a natural state and thereby restoring the productivity of the land.

Short-term impacts of road decommissioning are minimized by the design features incorporated into the Proposed Action Alternative. Decommissioning would lead to long-term increased land productivity.

Managing the productivity of the land is a complex, long-term objective. The Proposed Action Alternative increases the long-term productivity of the project area through the use of specific Forest Plan standards and guides, Design Features, and Best Management Practices.

Road decommissioning activities would have direct, indirect and cumulative effects on the economic, social and biological environment. Soil and water are two key factors in ecosystem productivity, and these resources would be protected and enhanced by the Proposed Action Alternative. Habitat and species productivity are best measured by Management Indicator Species identified by the USFS. Management Indicator Species are used to represent the habitat requirement of wildlife species found in the project area. The Proposed Action Alternative would provide and protect to a reasonable extent, the wildlife habitat necessary to contribute to the maintenance of viable, well-distributed populations of existing native and non-native species. The abundance and diversity of wildlife species depends on the quality, quantity and distribution of habitat, whether for breeding, feeding or resting. By managing habitat of indicator species, the other species associated with the same habitat would also benefit. The Proposed Action Alternative is consistent with Forest Plan Standards and Guidelines, and includes Design Features for maintaining long-term habitat and species productivity. The No Action and Proposed Action alternatives vary in degree of risk to wildlife habitat and habitat capability.

Unavoidable Adverse Impacts

Implementation of the Proposed Action Alternative would result in some unavoidable adverse impact. Although the design of the Proposed Action Alternative includes Design Features to reduce potential adverse impacts, some short-term adverse impacts could occur that cannot be completely eliminated. Where evident, these impacts are discussed in detail in the preceding sections on Water Resources, Fisheries, Wildlife, Botany, Wildfire Control Response Access, and Heritage Resources.

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 Proposed Action Alternative would not result in any irreversible or irretrievable commitments of resources.

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.

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

Executive Order #12 898, 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 Proposed Action Alternative. Decommissioning work would be implemented by contracts with private businesses. Project contracting for the Proposed Action Alternative would use approved management direction to protect the rights of these private companies.

Effects on American 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 Tribes of Warm Springs, the Confederated Tribes of Grande Ronde, and the Bureau of Indian Affairs have been contacted in reference to this Proposed Action and environmental analysis (see Chapter I, section F.; Scoping and Identification of Issues).

Effects on Farmlands, Rangelands, and Forestlands

Neither the No Action Alternative or the Proposed Action Alternative would have an adverse impact to the productivity of farmland which is not present, rangeland, which is not provided in the watershed, nor Forest Land which is not available for timber production as a management activity as provided by Congress in PL 104-208, The Bull Run Watershed Management Act as amended by the Oregon Resources Conservation Act (ORCA), 1996.

Table III-30 Comparison of Alternatives

Items of Comparison	Proposed Action	No Action
Water Resources		
Flow Regime		
Miles of Road	164.8	300.8
Miles of Road in Areas with Impervious Soils (BULLWA)	8.4	16.5
Channel Network Expansion by Roads (BRWMU)	9.6%	14.2%
Topography		
Miles of Midslope Roads (BULLWA)	105.6 miles	186.1 miles
Soils and Geology		
Roads in Schulz High Hazard Areas for Landslides (BULLDRAIN)	7.3 miles	8.0 miles
Roads in High Hazard Areas for Landslides	16.8 miles	24.4 miles
Sediment Yield		
Number of Stream Crossings	365	547
Road related Sediment Delivery (modeled tons/year) for properly maintained roads	470	729
Short Term Estimated Road Sediment Production	0.45 tons per year	No Change
Long Term Estimated Road Sediment Production	No change	Considerable Increase
Fish Habitat		
Number of Stream Crossings associated with anadromous fish habitat	108	218
Road related Sediment Delivery (modeled tons/year) for properly maintained roads in areas associated with anadromous fish habitat	186	354
Short Term Estimated Sediment Production to anadromous fish habitat	0.69 tons	No Change
Short Term Habitat Quality	High	High
Long Term Habitat Quality	High	Low
Cumulative Habitat Quality	High	Decreasing
Wildlife		
Northern spotted owl habitat	Improvement to habitat	No Change
Bald eagle habitat	Improvement to habitat	No change
Sensitive species	See Sensitive Species table in Chapter III	
Survey & Manage species	No change	No change

Items of Comparison	Proposed Action	No Action
Snags & down wood	Improvement to habitat	No Change
Deer & elk habitat	Improvement to habitat	No Change
Pine martins, Pileated woodpeckers, and migratory birds	Improvement to habitat	No Change
Botany		
Risk of introducing and spreading invasive plants	Reduced risk	No Change
Effects to Sensitive species and Survey & Manage species	Long-term benefits	No Change
Wildfire Control Response Access		
Travel time to land within the BRWMU	Slight, but not significant delay time due to decommissioned roads	No Change
Heritage Resources		
Effects to Historic properties	No Change	No Change
Economics		
Annual Maintenance Costs	$137,383	$158,019
Decommissioning Costs	$952,900	$0

IV. List of Preparers

Table IV-1 Interdisciplinary Team and Consultants

Contributor	Education and Experience	Contribution
Mike Malone ID Team Leader	Associate in Science - Forest Technology, Chemeketa Community College, 1977 Forest Engineering Institute - Oregon State University, 1984; 28 years with the Forest Service	IDT Leader, EA Writer/Editor, NEPA Coordinator
Todd Parker Hydrologist	BS in Forest Management and BS in Business Management. Oregon State U, 1981. Hydrologist on Columbia Gorge and Zigzag Ranger Districts since 1992	Watershed Resources, GIS, Analyst
David Saiget Fisheries Biologist	BS in Biology, Oregon State University, 1981. Fisheries Biologist with the Forest Service since 2000.	Fisheries Biologist
Sharon Hemandez Wildlife Biologist	BS in Wildlife Management, Michigan State University, 1992. Biologist with the Forest Service in Washington and Oregon for 14 years.	Wildlife Biologist
Carol Horvath Botanist	BS Community Health, University of Oregon. Biology/Botany Emphasis, PSU. The Nature Conservancy, summer 1992. Forest Service COOP ED student. Forest Service Botanist 10 years	Botany
Jeff Jaqua Archeologist	BS in Anthropology from University of Montana. BS in Zoology from Montana State University. 27 years with the USFS	Heritage Resources
Jennifer Harris	Associates Degree, General Studies, Mt. Hood Community College, 1996. 19 years with the Forest Service.	Fire Management
David Lebo Botanist	M.S. Forest Ecology - University of Washington. Survey and Manage Specialist – Regional Office and Mt. Hood National Forest (2001-2004). Interagency Ecologist – Winema National Forest and BLM-Klamath Falls Resource Area (1995-2000). 20+ years with U.S. Forest Service.	Botany

V. List of Agencies and Persons Consulted

Interest in the management of the Bull Run Watershed remains at a high level among water users in the Portland metropolitan area. Consultation with individuals, organizations and other agencies has occurred throughout this analysis.

A summary of the public involvement (scoping) and consultation with others appears in Chapter I. As a result of the public scoping, several letters were received, and are included in the Appendix. A complete synopsis of the comments and responses will be included in the Appendix after the completion of the 30-day comment period.

Following is a list of the agencies and persons contacted during scoping.

Agencies and Governments

City of Portland, Oregon, Bureau of Water Works
Columbia River Gorge National Scenic Area
Port of Cascade Locks
Clackamas County Board of Commissioners
Clackamas County
Oregon Department of Fish and Wildlife
Department of Natural Resources, Confederated Tribes, Warm Springs
City of Gladstone
City of Lake Oswego
City of Oregon City
City of West Linn
Confederated Tribes of Grande Ronde
Bureau of Indian Affairs
Oregon State Department of Environmental Quality
Environmental Protection Agency
NOAA National Marine Fisheries Service
Oregon Department of Fish and Wildlife
U.S. Fish and Wildlife Service
Bureau of Land Management
Bonneville Power Administration
U.S. Congressman Earl Blumenauer
U.S. Senator Ron Wyden
Portland City Commissioner Randy Leonard

Individuals and Organizations

South Fork Water Board
Clackamas River Basin Council
Oak Lodge Water District
Clackamas River Water District
Scott Water District
Sandy River Basin Watershed Council - Russ Plaeger
Portland Utility Review Board
Dr. Ralph Crawshaw
Western Rivers Conservancy - Sue Doroff
American Forest Resource Council - Chris West
Alex Kirnac
Longview Fiber Company
Chanterelle Study - Judy Roger
Port of Cascade Locks - Tim Lee
Bark
Oregon Natural Resources Council
David Mildrexler
Char & Dave Corkran
Cascade Anderson Geller
Jeff Boly
Large Water Users Coalition - Kent Craford
Floy Jones
Dr. Doug Larson
Bull Run Interest Group - Dr. Joseph Miller
Bob & Cathy Newcomb
League of Women Voters - Louise Questad
Sandra Ramaker
John Wish
Friends of Mt. Hood
Lady Creek Water System
Rhododendron Summer Homes Association
Mt. Hood Homeowners Association
Mountain Times
Native Plant Society of Oregon
Frank Gearhart
Government Camp Water Company - Mary Ann Hill
Michael P. Jones
Western Rivers Conservancy

Appendix A – Detailed Description of Decommissioning Method by Road Number

RD #	RX	SURF	BEG TERM	END TERM	BMP	EMP	DIST.	M L	PHOTOGRAPH (FIGURE #)	REMARKS / REASONS
1000017	A	AGG	10 RT @20.0	END ROAD	0	0.22	0.22	1	1,2,3,4,12	NO C.M.P.S
1000026	A	AGG	10 RT @ 4.4	JCT.1000101	0	0.29	0.29	1	1,2,3,4,12	OVERGROWN
1000404	A	PAV	10 LT @ 10.8	END OF PAV	0	0.83	0.83	1	1,2,3,4,5,6,12	6 CMPS
1000404	A	AGG	1000404 @ 0.83	END ROAD	0.83	1.61	0.78	1	1,2,3,4,5,6,12	2 CMPS
1010400	A	AGG	1010 LT @ 8.8	END ROAD	0	1.14	1.14	1	1,2,3,4,5,6,12	6 CMPS
1027444	A	AGG	1027 LT @ 1.3	END ROAD	0	1.49	1.49	1	1,2,3,4,5,6,12	14 CMPS
1200166	A	AGG	12 RT @ 17.1	JCT 1414	0	2.54	2.54	2	1,2,3,4,5,6,12	19 CMPS
1200222	A	AGG	12 LT @ 16.0	END ROAD	0	2.9	2.9	1	1,2,3,4,5,6,12	17 CMPS
1200345	A	PAV	12 RT @ 13.6	END ROAD	0	1.34	1.34	1	1,2,3,4,5,6,12	19 CMP
1210000	A	PAV	JCT 1414	JCT 14	8.1	10.1	2	2	1,2,3,4,5,6,7,8,12,13	24 CMPS
1210143	A	PAV	1210 LT @ 0.38	END ROAD	0	1.12	1.12	1	1,2,3,4,5,6,12	14 CMPS
1210202	A	PAV	1210 RT @ 8.0	END PAV	0	1.31	1.31	1	1,2,3,4,5,6,12	11 CMPS
1210202	A	NAT	1210202 @ 1.31	END ROAD	1.31	1.43	0.12	1	1,2,3,4,12	0 CMPS
1210381	A	AGG	1210 LT @ 6.97	END LANDING	0	0.41	0.41	1	1,2,3,4,5,6,12	8 CMPS
1210428	A	AGG	1210 LT @ 5.63	END LANDING	0	1.71	1.71	1	1,2,3,4,5,6,12	41 CMPS
1211000	A	PAV	1211 @ FISH CREEK	END ROAD	5.6	9.6	4	2	1,2,3,4,5,6,7,8,12,13	37 CMPS
1228000	A	PAV	1200000 LT @ 17.06	END PAV	0	4.3	4.3	2	1,2,3,4,5,6,7,8,9,10,11,12,13	36 CMPS
1228000	A	AGG	1228000 @ END PAV	END ROAD	4.3	5	0.7	1	1,2,3,4,5,6,12	3 CMPS
1228128	A	PAV	1228 RT @ 1.88	END LANDING	0	2.2	2.2	1	1,2,3,4,5,6,12	23 CMPS
1228128	A	AGG	1228128 @ END PAV	END PAV	2.2	2.33	0.13	1	1,2,3,4,12	0 CMPS
1400201	A	PAV	14 RT @ 4.1	END PAV	0	0.6	0.6	1	1,2,3,4,5,6,12	9 CMPS
1400201	A	AGG	1400201 @ END PAV	END ROAD	0.6	2	1.4	1	1,2,3,4,5,6,12	9 CMPS
1400320	A	AGG	14 LT @ 7.83	END ROAD	0	0.65	0.65	1	1,2,3,4,5,6,7,8,9,10,11,12,13	4 CMPS PLANTATION
1400410	A	PAV	14 RT @ 3.5	END ROAD	0	3.51	3.51	2	1,2,3,4,5,6,12	26 CMPS
1400440	A	PAV	14 LT @ 5.4	END ROAD	0	1	1	1	1,2,3,4,5,6,12	12 CMPS
1400440	A	AGG	1400440 @ END PAV	END ROAD	1	1.26	0.26	1	1,2,3,4,12	0 CMPS
1401000	A	PAV	14 RT @ 8.0	JCT 14	0	3.49	3.49	2	1,2,3,4,5,6,7,8,12,13	30 CMPS
1401059	A	NAT	1401386 RT @ 0.3	END ROAD	0	0.15	0.15	1	1,2,3,4,12	NO C.M.P.S

RD #	RX	SURF	BEG TERM	END TERM	BMP	EMP	DIST.	ML	PHOTOGRAPH (FIGURE #)	REMARKS / REASONS
1401122	A	NAT	1401 RT @ 2.4	END ROAD	0	0.85	0.85	1	1,2,3,4,5,6,12	8 CMPS
1401201	A	PAV	1401080 LT	END PAV	0	2.34	2.34	1	1,2,3,4,5,6,12	8 CMPS
1401201	A	AGG	1401201 @ END PAV	END ROAD	2.34	4.46	2.12	1	1,2,3,4,5,6,12	9 CMPS
1401212	A	AGG	1401 @ 2.06 RT	LANDING	0	1.8	1.8	1	1,2,3,4,5,6,12	13 CMPS
1401386	A	AGG	1401 RT.@ 0.43	END ROAD	0	1.52	1.52	1	1,2,3,4,5,6,12	4 CMPS
1401400	A	AGG	1401 LT @ 0.1	END ROAD	0	0.52	0.52	1	1,2,3,4,5,6,12	3 CMPS
1414000	A	PAV	14 LT @ 9.0	JCT 1210	0	4.1	4.1	2	1,2,3,4,5,6,12	37 CMPS
1509044	A	NAT	1509 @ 4.2	JCT 20	0	0.79	0.79	2	1,2,3,4,5,6,12	3 CMPS
1800210	A	AGG	18 RT @ 11.1	END ROAD	0	3.22	3.22	1	1,2,3,4,5,6,7,8,12,13	30 CMPS
1820500	A	AGG	1820 LT @ 4.5	END ROAD	0	0.48	0.48	1	1,2,3,4,5,6,12	4 WATER BARS 2003
1820525	A	AGG	1820500 RT. @ 0.4	END ROAD	0	0.14	0.14	1	1,2,3,4,5,6,12	1 CMP
2000014	A	NAT	20 LT @ 4.23	END ROAD	0	0.11	0.11	1	1,2,3,4,5,6,12	1 C.M.P.
2000065	A	NAT	2000062 LT @ 0.16	END ROAD	0	0.27	0.27	1	1,2,3,4,12	NO C.M.P.S
2000110	A	PAV	20 RT @ 5.5	END ROAD	0	2.5	2.5	2	1,2,3,4,5,6,12	31 C.M.P.S
2000140	A	AGG	20 LT @ 7.44	END ROAD	0	1.53	1.53	1	1,2,3,4,5,6,12	15 C.M.P.S
2000222	A	AGG	20 LT. @ 8.2	END ROAD	0	3.6	3.6	2	1,2,3,4,5,6,12	10 C.M.P.S.
2503000	A	AGG	JCT PRIVET DRIVE	END ROAD	0.8	3.86	3.06	2	1,2,3,4,5,6,12	17 C.M.P.S
2503150	A	AGG	2503 LT. @ 2.8	2503130	0	0.3	0.3	1	1,2,3,4,5,6,12	1 CMP
1000011	WA	NAT	10 LT @ 18.4	PIT	0	0.04	0.04	1	14,15,16	NO C.M.P.S
1000021	WA	NAT	10 LT @ 22.2	END ROAD	0	0.03	0.03	1	14,15,16	NO C.M.P.S
1000034	WA	NAT	10 rt @ 21.5	END AT LANDING	0	0.06	0.06	1	14,15,16	NO C.M.P.S
1000043	WA	AGG	1000401 LT @ 1.4	END ROAD	0	0.28	0.28	2	14,15,16	1 CMP
1000084	WA	NAT	10 RT @ 8.7	END ROAD	0	0.12	0.12	1	14,15,16	OVERGROWN
1000115	WA	AGG	10 RT @ 13.3	END ROAD	0	0.1	0.1	1	14,15,16	2 WATER BARS
1000117	WA	AGG	10 LT @ 19.5	END ROAD	0	0.23	0.23	2	14,15,16	1 CMP
1000402	WA	NAT	401 RT @ 1.4	END ROAD	0	0.05	0.05	1	14,15,16	NO C.M.P.S

RD #	RX	SURF	BEG TERM	END TERM	BMP	EMP	DIST.	M L	PHOTOGRAPH (FIGURE #)	REMARKS / REASONS
1010220	W A	AGG	1010 LT @ 5.2	END ROAD	0	0.24	0.24	1	14,15,16	2 CMPS NO WATER
1010230	W A	NAT	233 LT @ 0.4	END ROAD	0	0.23	0.23	1	14,15,16	NO C.M.P.S
1010233	W A	NAT	JCT 1010236	END ROAD	0	1	1	1	14,15,16	WATER BARS
1010236	W A	NAT	233 LT @ 0.3	END ROAD	0	0.34	0.34	1	14,15,16	NO C.M.P.S
1200011	W A	AGG	12 RT @ 20.0	END ROAD	0	0.29	0.29	1	14,15,16	NO C.M.P.S
1200013	W A	AGG	12 LT @ 19.6	END ROAD	0	0.42	0.42	1	14,15,16	NO C.M.P.S
1200014	W A	AGG	12 LT @ 20.6	END ROAD	0	0.19	0.19	1	14,15,16	2 CMPS
1200015	W A	AGG	12 RT @ 19.0	END ROAD	0	0.41	0.41	1	14,15,16	NO C.M.P.S
1200017	W A	AGG	12 LT @ 18.1	END ROAD	0	0.16	0.16	1	14,15,16	NO C.M.P.S
1200018	W A	AGG	12 LT @ 17.5	END ROAD	0	0.22	0.22	1	14,15,16	GOODFELLIOW LK
1200044	W A	NAT	1200166 RT @ 2.0	END ROAD	0	0.89	0.89	2	14,15,16	NO C.M.P.S
1200045	W A	NAT	1200000 LT.@17.4	END ROAD	0	0.13	0.13	1	14,15,16	NO C.M.P.S
1200055	W A	AGG	12 LT @ 15.3	END ROAD	0	0.11	0.11	2	14,15,16	ROCK PIT
1200056	W A	AGG	055 RT @ 0.04	JCT 400 @ 0.2	0	0.13	0.13	1	14,15,16	NO C.M.P.S
1200101	W A	AGG	1200000 LT.@1.02	END ROAD	0	0.26	0.26	1	14,15,16	NO C.M.P.S
1200131	W A	AGG	166 RT @ 0.2	END ROAD	0	0.29	0.29	1	14,15,16	2 CMPS NO WATER
1200212	W A	AGG	1200126 RT @ 0.2	END ROAD	0	0.44	0.44	2	14,15,16	2 CMPS
1200224	W A	AGG	1200222 LT @ 2.0	END ROAD	0	0.4	0.4	1	14,15,16	3 WATER BARS 2003
1200330	W A	NAT	12 @ ?	END ROAD	0	0.4	0.4	1	14,15,16	NO C.M.P.S
1200370	W A	AGG	12 RT @ 10.21	END ROAD	0	0.18	0.18	1	14,15,16	NO C.M.P.S
1200478	W A	AGG	1200400 RT @ 1.4	END ROAD	0	2.45	2.45	2	14,15,16	NO C.M.P.S

RD #	RX	SURF	BEG TERM	END TERM	BMP	EMP	DIST.	M L	PHOTOGRAPH (FIGURE #)	REMARKS / REASONS
1210051	W A	AGG	1210 RT @ 0.6	END ROAD	0	0.28	0.28	2	14,15,16	NO C.M.P.S
1210054	W A	AGG	1210 LT @ 2.0	END LANDING	0	0.13	0.13	1	14,15,16	NO C.M.P.S
1210056	W A	AGG	1210 RT @ 2.7	END LANDING	0	0.16	0.16	1	14,15,16	1 CMP
1210057	W A	AGG	1210 LT @ 2.9	END ROAD	0	0.11	0.11	1	14,15,16	NO C.M.P.S
1210058	W A	NAT	1210 LT @ 3.1	END ROAD	0	0.18	0.18	1	14,15,16	NO C.M.P.S
1210059	W A	NAT	058 LT @ 0.1	END ROAD	0	0.25	0.25	1	14,15,16	NO C.M.P.S
1210060	W A	NAT	1210 RT @ 3.2	END ROAD	0	0.1	0.1	1	14,15,16	NO C.M.P.S
1210061	W A	NAT	202 LT @ 0.9	END LANDING	0	0.12	0.12	1	14,15,16	4 WATER BARS
1210062	W A	AGG	202 RT @ 1.1	END LANDING	0	0.15	0.15	1	14,15,16	4 WATER BARS
1210063	W A	AGG	061 LT @ 0.1	END LANDING	0	0.15	0.15	1	14,15,16	7 WATER BARS
1210110	W A	AGG	1210 RT @ 0.2	END ROAD	0	0.6	0.6	1	14,15,16	2 CMPS NO WATER
1228030	W A	AGG	128 LT @ 0.55	END LANDING	0	0.54	0.54	1	14,15,16	3 CMPS NO WATER
1228040	W A	NAT	1228 LT @ 2.5	END ROAD	0	0.09	0.09	1	14,15,16	NO C.M.P.S
1228050	W A	NAT	128 LT @ 1.27	END ROAD	0	0.2	0.2	1	14,15,16	NO C.M.P.S
1228100	W A	AGG	12 @ ?	END ROAD	0	0.4	0.4	1	14,15,16	? CMPS
1228121	W A	AGG	1228 LT @ 3.4	END ROAD	0	1.7	1.7	1	14,15,16	7 CMPS LONG VIEW LAND
1228138	W A	NAT	1228148 RT @ 0.1	END ROAD	0	0.22	0.22	1	14,15,16	2 CMPS
1228148	W A	NAT	1228 LT @ 4.47	END ROAD	0	0.66	0.66	1	14,15,16	4 CMPS
1228158	W A	NAT	1228148 RT @ 0.55	END LANDING	0	0.21	0.21	1	14,15,16	1 CMP
1228168	W A	NAT	1228148 RT @ 0.18	END LANDING	0	0.27	0.27	1	14,15,16	1 CMP
1228178	W A	NAT	1228 LT @ 4.7	END ROAD	0	0.26	0.26	1	14,15,16	NO C.M.P.S

RD #	RX	SURF	BEG TERM	END TERM	BMP	EMP	DIST.	ML	PHOTOGRAPH (FIGURE #)	REMARKS / REASONS
1228200	WA	NAT	1228 LT @ ?	END ROAD	0	0.21	0.21	1	14,15,16	NO C.M.P.S
1400038	WA	NAT	201 RT @ 1.9	END ROAD	0	0.34	0.34	1	14,15,16	NO C.M.P.S
1400056	WA	AGG	1400000 RT.@ 6.85	END ROAD	0	0.53	0.53	1	14,15,16	NO C.M.P.S
1400076	WA	NAT	14 @ LT @ 9.9	END ROAD	0	0.11	0.11	1	14,15,16	NO C.M.P.S
1400077	WA	NAT	076 RT @ 0.1	END ROAD	0	0.13	0.13	1	14,15,16	2 CMPS 1 STREAM
1400110	WA	AGG	201 LT @ 0.6	END ROAD	0	1.19	1.19	1	14,15,16	12 CMP NO WATER
1400111	WA	AGG	1400110 RT @ 0.15	END LANDING	0	0.52	0.52	1	14,15,16	6 CMPS
1400140	WA	AGG	14 RT @ 3.9	END ROAD	0	0.87	0.87	1	14,15,16	5 CMPS
1400148	WA	NAT	1400 LT @ 4.0	END ROAD	0	0.3	0.3	1	14,15,16	NO C.M.P.S
1400150	WA	NAT	14 LT @ 7.19	END ROAD	0	0.42	0.42	1	14,15,16	END AT PUMP HOUSE
1400200	WA	AGG	1400000 RT. @ 6.2	END ROAD	0	0.3	0.3	1	14,15,16	2 CMPS
1400202	WA	AGG	201 LT @ 0.54	END ROAD	0	0.99	0.99	1	14,15,16	2 CMPS 2 WATER BARS
1400204	WA	AGG	201 LT @ 1.25	END ROAD	0	0.3	0.3	1	14,15,16	NO C.M.P.S
1400205	WA	AGG	201 LT @ 1.39	END ROAD	0	0.4	0.4	1	14,15,16	NO C.M.P.S
1400240	WA	NAT	1400440 LT @ 0.37	END ROAD	0	0.44	0.44	1	14,15,16	NO C.M.P.S
1400415	WA	AGG	1400410 RT @ 1.65	END ROAD	0	0.6	0.6	1	14,15,16	4 WATER BARS 2003
1400416	WA	NAT	1400415 RT @ 0.2	END ROAD	0	0.4	0.4	1	14,15,16	3 WATER BARS 2003
1400421	WA	AGG	1400420 RT @ 0.05	END ROAD	0	0.7	0.7	1	14,15,16	3 WATER BARS 2003
1400480	WA	AGG	1400000 LT @ 4.6	END ROAD	0	0.5	0.5	1	14,15,16	OVERGROWN
1401010	WA	AGG	212 RT @ 0.5	END LANDING	0	0.28	0.28	1	14,15,16	NO C.M.P.S
1401024	WA	AGG	1401122 RT @ 0.7	END ROAD	0	0.3	0.3	1	14,15,16	NO C.M.P.S

RD #	RX	SURF	BEG TERM	END TERM	BMP	EMP	DIST.	ML	PHOTOGRAPH (FIGURE #)	REMARKS / REASONS
1401026	WA	NAT	1401122 RT @ 0.8	END ROAD	0	0.2	0.2	1	14,15,16	NO C.M.P.S
1401032	WA	NAT	201 LT @ 0.35	END ROAD	0	0.15	0.15	1	14,15,16	NO C.M.P.S
1401036	WA	AGG	201 LT @ 1.35	END ROAD	0	0.15	0.15	1	14,15,16	NO C.M.P.S
1401038	WA	AGG	201 RT @ 1.9	END ROAD	0	0.71	0.71	1	14,15,16	4 CMPS NO WATER
1401040	WA	AGG	201 RT @ 1.9	END ROAD	0	0.16	0.16	1	14,15,16	1 CMP NO WATER
1401060	WA	AGG	386 LT @ 0.55	END ROAD	0	0.2	0.2	1	14,15,16	NO C.M.P.S
1401061	WA	AGG	386 RT @ 0.65	END ROAD	0	0.2	0.2	1	14,15,16	NO C.M.P.S
1401077	WA	AGG	190 RT @ 0.2	END ROAD	0	0.2	0.2	1	14,15,16	NO C.M.P.S
1401078	WA	AGG	201 RT @ 3.1	END ROAD	0	0.2	0.2	1	14,15,16	NO C.M.P.S
1401079	WA	NAT	201 RT @ 3.2	END ROAD	0	0.15	0.15	1	14,15,16	NO C.M.P.S
1401080	WA	AGG	201 LT @ 3.45	END ROAD	0	0.3	0.3	1	14,15,16	NO C.M.P.S
1401140	WA	AGG	212 RT @ 0.9	END ROAD	0	0.34	0.34	1	14,15,16	NO C.M.P.S
1401180	WA	AGG	201 LT @ 2.3	END LANDING	0	0.38	0.38	1	14,15,16	NO C.M.P.S
1401190	WA	AGG	201 LT @ 2.7	END ROAD	0	0.42	0.42	1	14,15,16	NO C.M.P.S
1401388	WA	AGG	386 LT @ 0.2	END ROAD	0	0.26	0.26	1	14,15,16	NO C.M.P.S
1414124	WA	AGG	1414 LT @0.5	END LANDING	0	0.62	0.62	1	14,15,16	4 CMPS NO WATER
1509017	WA	NAT	1509016 LT @ 0.8	END ROAD	0	0.23	0.23	1	14,15,16	NO C.M.P.S
1509019	WA	NAT	1509 LT @ 3.3	END ROAD	0	0.82	0.82	1	14,15,16	14 WATER BARS
1509040	WA	NAT	1509 LT @ 3.9	END ROAD	0	0.27	0.27	1	14,15,16	NO C.M.P.S
1509041	WA	NAT	1509 RT @ 1.8	END ROAD	0	0.21	0.21	1	14,15,16	NO C.M.P.S
1509042	WA	AGG	1509 RT @ 3.2	END ROAD	0	0.21	0.21	1	14,15,16	NO C.M.P.S

RD #	RX	SURF	BEG TERM	END TERM	BMP	EMP	DIST.	M L	PHOTOGRAPH (FIGURE #)	REMARKS / REASONS
1509043	W A	NAT	1509 RT @ 3.9	END LANDING	0	0.17	0.17	1	14,15,16	1 CMP 1 STREAM
1509046	W A	NAT	1509 RT @ 4.3	JCT 044 @ 0.06	0	0.13	0.13	1	14,15,16	NO C.M.P.S
1509048	W A	AGG	1509 RT @ 4.5	END ROAD	0	0.32	0.32	1	14,15,16	NO C.M.P.S
1509050	W A	NAT	1509 RT @ 4.6	JCT 20 @ 2.5	0	0.08	0.08	1	14,15,16	NO C.M.P.S
1509180	W A	AGG	1509 RT @ 2.3	RD BLOCKED	0	0.41	0.41	1	14,15,16	NO C.M.P.S
1509190	W A	NAT	1509 LT @ 2.3	END ROAD	0	0.25	0.25	1	14,15,16	NO C.M.P.S
1800021	W A	NAT	210 RT @ 2.5	END ROAD	0	0.37	0.37	2	14,15,16	2 CMPS 8 WATER BARS
1800211	W A	NAT	210 LT @ 0.3	END ROAD	0	0.05	0.05	1	14,15,16	NO C.M.P.S
1820013	W A	NAT	1820 RT. @ 6.0	END ROAD	0	0.22	0.22	1	14,15,16	NO C.M.P.S
1820016	W A	NAT	1820 RT. @ 4.4	END ROAD	0	0.1	0.1	1	14,15,16	NO C.M.P.S
2000011	W A	NAT	20 RT @ 2.0	1509 @ 4.35	0	0.73	0.73	1	14,15,16	NO C.M.P.S
2000013	W A	NAT	JCT 20 @ 4.2	END ROAD	0	0.5	0.5	1	14,15,16	3 C.M.P.S
2000017	W A	NAT	016 LT @ 0.2	END ROAD	0	0.52	0.52	1	14,15,16	NO C.M.P.S
2000024	W A	NAT	20 LT @ 5.9	JCT 20 @ 6.0	0	0.05	0.05	1	14,15,16	1 C.M.P.
2000025	W A	NAT	20 LT @ 6.6	END ROAD	0	0.89	0.89	1	14,15,16	NO C.M.P.S
2000038	W A	NAT	JCT 20 @ 7.6	END ROAD	0	0.21	0.21	1	14,15,16	NO C.M.P.S
2000041	W A	NAT	120 RT @ 1.4	END LANDING	0	0.18	0.18	1	14,15,16	NO C.M.P.S
2000044	W A	NAT	2000045 RT @ 0.05	END ROAD	0	0.03	0.03	1	14,15,16	NO C.M.P.S
2000053	W A	NAT	120 LT @ 0.5	END LANDING	0	0.11	0.11	1	14,15,16	NO C.M.P.S
2000055	W A	NAT	120 LT @ 1.3	END LANDING	0	0.13	0.13	1	14,15,16	NO C.M.P.S
2000056	W A	NAT	120 RT @ 1.18	END ROAD	0	0.08	0.08	1	14,15,16	NO C.M.P.S

RD #	RX	SURF	BEG TERM	END TERM	BMP	EMP	DIST.	M L	PHOTOGRAPH (FIGURE #)	REMARKS / REASONS
2000057	W A	NAT	2000215 RT @ 0.39	END ROAD	0	0.1	0.1	1	14,15,16	NO C.M.P.S
2000220	W A	AGG	2000222 LT @ 2.06	END ROAD	0	0.91	0.91	1	14,15,16	NO C.M.P.S
2030000	W A	NAT	20 LT @ 8.8	END ROAD	0	9.87	9.87	1	14,15,16	12 CMPS
2030021	W A	NAT	104 LT @ 0.55	END LANDING	0	0.23	0.23	1	14,15,16	4 WATER BARS
2030023	W A	NAT	104 RT @ 0.95	JCT 103	0	0.66	0.66	1	14,15,16	1 WATER BAR
2030042	W A	NAT	2030 LT @ 0.1	END ROAD	0	0.34	0.34	1	14,15,16	1 C.M.P.
2030045	W A	NAT	104 RT @ 2.1	END ROAD	0	0.18	0.18	1	14,15,16	NO C.M.P.S
2030047	W A	NAT	023 RT @ 0.4	END ROAD	0	0.11	0.11	1	14,15,16	NO C.M.P.S
2030048	W A	NAT	023 RT @ 0.5	JCT 2030103	0	0.08	0.08	1	14,15,16	NO C.M.P.S
2030049	W A	NAT	104 LT @ 2.6	END ROAD	0	0.12	0.12	1	14,15,16	NO C.M.P.S
2030103	W A	NAT	2030 LT @ 0.7	END ROAD	0	1.85	1.85	2	14,15,16	NO C.M.P.S
2030104	W A	AGG	JCT 2030	BULL RUN LINE	0	1.89	1.89	1	14,15,16	10 C.M.P.S.
2030135	W A	NAT	103 RT @ 0.4	END ROAD	0	0.11	0.11	1	14,15,16	NO C.M.P.S
2030223	W A	NAT	2030 RT @ 9.87	END ROAD	0	1.24	1.24	1	14,15,16	2 C.M.P.S
2503016	W A	NAT	2503 LT @ 2.66	END ROAD	0	0.41	0.41	1	14,15,16	1 C.M.P.
2503044	W A	NAT	2503 RT @ 3.2	BULL RUN LINE	0	0.35	0.35	1	14,15,16	NO C.M.P.S
2503100	W A	NAT	2503 LT @ 3.4	END ROAD	0	0.9	0.9	1	14,15,16	NO C.M.P.S
2503110	W A	NAT	2503 RT @ 3.8	END ROAD	0	0.25	0.25	1	14,15,16	NO C.M.P.S
2503120	W A	NAT	2503 LT @ 3.3	END ROAD	0	0.23	0.23	1	14,15,16	NO C.M.P.S
2503130	W A	AGG	2503 LT @ 3.8	END ROAD	0	0.43	0.43	1	14,15,16	NO C.M.P.S
2503140	W A	NAT	130 RT @ 0.1	END ROAD	0	0.13	0.13	1	14,15,16	NO C.M.P.S

RD #	RX	SURF	BEG TERM	END TERM	BMP	EMP	DIST.	M L	PHOTOGRAPH (FIGURE #)	REMARKS / REASONS
2503155	W A	NAT	2503 LT. @ 3.0	END ROAD	0	0.1	0.1	1	14,15,16	NO C.M.P.S
2503160	W A	NAT	2503 LT @ 0.75	END ROAD	0	0.15	0.15	1	14,15,16	NO C.M.P.S
							129.09			
						TOTAL	**129.09**			

WALK-A-WAY	**59.25**
ACTIVE	**69.84**
TOTAL	**129.09**

RD = ROAD
SURF = SURFACE TYPE
AGG = GRAVEL ROAD SURFACE
PAV = PAVED ROAD SURFACE
NAT = NATIVE ROAD SURFACE
BEG TERM = BEGINNING TERMINI
END TERM = ENDING TERMINI
BMP = BEGINNING MILE POST
EMP = ENDING MILE POST
DIST = DISTANCE (MILES)
ML = MAINTENANCE LEVEL
PHOTO = TYPE OF WORK
CMPS = CULVERTS
RT = RIGHT
LT = LEFT
RX = TREATMENT
A = ACTIVE DECOMMISSIONING
WA = WALKAWAY

Note: The total miles are listed in this table as 129 miles. This figure is from road logs. The analysis in the Environmental Assessment is based on 136 miles; this figure is based on GIS map miles, which should be more accurate.

Appendix B Soil and Water Protection Best Management Practices (BMPs)

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. Designed into each alternative are soil and water protection measures known as “Best Management Practices” (BMP’s). BMPs are designed to limit non-point source water pollution. BMPs would be applied during road decommissioning activities to achieve the water quality objectives for pure, clear, raw, potable water. BMPs are used to meet water quality standards (or water quality goals and objectives) under Section 319 of the CWA.

- If during project implementation new streams, wetlands, lakes or ponds are identified the appropriate riparian reserves would be delineated and the standards and guidelines for riparian reserves would be implemented.

- All equipment operating on the project would be in good repair and would be free of leakage of lubricants, fuel, coolants, and hydraulic fluid.

- Operators shall take appropriate preventive measures to ensure that any spill of oil, oil products, or other hazardous material does not enter any stream or other waters of the United States or any of the individual States. In the event of such a contaminant spill the operator would take all reasonable action to contain same.

- All contaminated soil, vegetation and debris shall be removed to approved locations off National Forest lands.

- For road decommissioning requiring culvert removals on stream crossings, all in-water work, including temporary fills or structures, shall occur within the Oregon Department of Wildlife's (ODFW) recommended period for in-water work (as specified in the most current version of Oregon Guidelines for Timing of In-Water Work to Protect Fish and Wildlife Resources). Exceptions to these recommended time periods require specific approval from the Corps permit project manager who would consult with ODFW. (For the Sandy River and all upstream tributaries this period is July 15- August 31.)

- Nationwide permit activity affecting "waters of the U.S." must not restrict the passage of aquatic life. Activities that require the placement of culverts, diversion structures, or changes to channel morphology must be designed to be consistent with passage standards developed by ODFW and NMFS entitled, ODFW Standards and Criteria for Stream Road Crossings.

* The authorized work shall not cause the turbidity of the affected stream or river to exceed 10% above natural turbidity 100 feet downstream of the discharge point. Turbidity shall be monitored frequently during in-water work. Monitoring points shall be 100 feet upstream (representative background) 100 feet downstream, and at the discharge point. A turbidimeter is recommended, however, visual gaging of turbidity is acceptable. Visible turbidity at 100 feet below the discharge would be considered to exceed the standard. The turbidity standard can be exceeded for a maximum of two hours in a 24-hour period provided all practicable erosion control measures have been implemented as applicable, including but not limited to:

    - Placing fill in the water that avoids disturbance to the maximum practicable extent (e.g. placing fill with a backhoe rather than end dumping from a truck)
    - Preventing constructed fill and related debris from entering the waterway or its adjacent wetlands by hydro-seeding of temporary or permanent disturbances. Additional measures may also be necessary such as filter bags, organic or fabric soil detention systems leave strips, berms or other measures sufficient to prevent the movement of soil and sediment.
    - Using fabric or plastic covers for soil stockpiles that are left idle during rainy seasons.
    - Periodic inspections and maintenance of erosion control measures, as necessary, to ensure their continued effectiveness.

* Petroleum products, chemicals, fresh cement, construction, or other deleterious waste materials shall not be allowed to enter water or wetlands. Special attention shall be given to preventing sandblasted material and chipped paint from entering these waters.

* Only clean fill, free of waste and polluted substances, shall be used when it is authorized as part of the permitted work. (Applies to all Section 404 NWPs.)

* Dredged and excavated material shall be placed upland and prevented from eroding back into waterways and wetlands (except discharges authorized under NWP #16 for return waters from upland contained disposal sites). Seeding with grass may be required when materials are placed permanently or would not be subject to being moved or reshaped for long periods of time. Materials shall not be placed on unstable slopes, and stockpiles shall not exceed 25 feet in height.

* Construction access roads and associated staging areas shall be protected with a gravel blanket or other suitable material to protect against erosion of sediments into waterways and wetlands.

* Machinery refueling is to occur off site or in a confined, designated area to prevent spillage into waterways and wetlands.

* Where appropriate, bioengineering techniques shall be the preferred method for preventing erosion. ODSL has described many such techniques in Guidelines on Riparian Restoration: Bioengineering which is included in their 1996 Erosion Control General Authorization. Its application includes, but is not limited to, maintaining/improving fish habitat, wildlife corridors, and riparian vegetation buffers.

* The Applicant Must Ensure Compliance with the Following Conditions for projects in Water Quality Limited (WQL) Waters and in Stream Segments Designated as Essential Indigenous Salmonid Habitat under State Rules. The Applicant can verify whether the water body falls into these Categories by consulting DEQ for WQL waters, and ODFW for Essential Indigenous Salmonid Habitat.

* Notification to ODFW is required prior to performing work in identified Essential Indigenous Salmonid Habitat.

Appendix C - RESPONSE TO COMMENTS

Bull Run Road Decommissioning Environmental Assessment

The Proposed Action and Preliminary Analysis for Bull Run Road Decommissioning was made available for public comment, (36 CFR 215, 5/13/03). Letters and e-mails were received during the 30-day comment period, which ended on August 9, 2006.

The responsible official has considered comments received and has developed the Bull Run Road Decommissioning Environmental Assessment in response to those comments.

This appendix responds to comments received through letters and E-mails. The E-mails and letters received are in the analysis file; the following is a summary.

Oregon Natural Resources Council (ONRC)

"In the section titled "Current Management Direction" the FS should note that Congressional Management Direction of the BRWMU is also provided by the Little Sandy Protection Act (2001)."

Forest Service Response

The Forest Service did consider the Little Sandy River Watershed Protection Act of 2001 (P.L. 107-30), and this is mentioned in the third paragraph under section "C" on page 1-4 of the Proposed Action and Preliminary Analysis. This section has been updated and the title was included in the completed Environmental Assessment.

Oregon Natural Resources Council (ONRC)

We encourage the decommissioning of as many more roads as possible in the BRWMU. Specifically, we encourage the removal of more roads in the BRDRAIN. The percent reduction in the stream drainage network expansion is only 2.6 percent for the Water Supply Drainage. The BRDRAIN contains a majority of the miles of mid-slope roads and yet the reduction in roads in this analysis area is the least of all at just 26%. Though the road network will be located in the BRDRAIN, we ask that the Forest Service look into decommissioning more roads in this critical drinking watershed.

Forest Service Response

Although the amount of roads to be decommissioned in the current Proposed Action is 26%, approximately 66 miles of roads within the Water Supply Drainage (BRDRAIN) have already been decommissioned since 1997. Approximately 40 miles of roads were decommissioned under the documentation of the 1999 Bull Run Road Decommissioning

Environmental Assessment, and approximately 26 miles were decommissioned under the 1997 “Repair of Road Drainage Conditions and Decommissioning of Roads in the Bull Run Watershed Management Unit” Categorical Exclusion and Decision Memo. The roads not planned for decommissioning in the current Proposed Action are roads that were considered necessary for administrative use connected to managing the BRWMU.

<u>Oregon Natural Resources Council (ONRC)</u>

In addition, the PA states, on page III-52, that further decommissioning of 3.9 miles of road below the headworks would help establish better functioning of aquatic habitat. We support this suggestion and ask that the Forest Service note in the EA when this additional road decommissioning might occur.

<u>Forest Service Response</u>

The 3.9 miles of road noted in your letter are not additional roads; they are a part of the 136 miles of roads that would be decommissioned by the current Proposed Action. The 3.9 miles of road below the headworks consists of Forest Road 1010400 and Forest Road 1400410 (see page 2 of Appendix A - Detailed Description of Decommissioning Method by Road Number).

<u>Oregon Natural Resources Council (ONRC)</u>

In regards to passive decommissioning procedures, ONRC requests that the Forest Service clarify in the EA whether proposed walk-away roads that will not have culverts or crossings repaired will be hydrologically stable. Additionally, if the walk-away roads require "basic custodial maintenance" we suggest that the Forest Service consider actively decommissioning roads that would require such maintenance considering the long-term cost of road maintenance and the associated risk to water quality. If the roads that are passively decommissioned are indeed considered closed roads, then there is little need to maintain them considering that if they were to be re-opened, the roads would be considered "new road construction", which does not fit with the management of the Bull Run as designated by federal law.

<u>Forest Service Response</u>

The Proposed Action and Preliminary Analysis states that walk-away roads are hydrologically stable and do not pose a threat of erosion and associated sedimentation. This discussion can be found in the second paragraph under the heading “Summary of Proposed Road Decommissioning” on page II-3. Roads that will be passively decommissioned (walk-away roads) do not require “basic custodial maintenance.” Basic custodial maintenance is a term used to describe Maintenance Level 1 roads (see page II-4). Many Maintenance Level 1 roads are listed to be decommissioned (see Appendix A –

Detailed Description of Decommissioning Method by Road Number), however, once these roads are decommissioned they will no longer require basic custodial maintenance.

Oregon Natural Resources Council (ONRC)

In regards to active decommissioning, ONRC would like the Forest Service to demonstrate in the EA the need for a hiking tread along decommissioned roads considering that the Bull Run is closed to human access. We feel road decommissioning would be more successful if the entire road were ground up.

Forest Service Response

In the Proposed Action and Preliminary Analysis (pg II-5, above Figure II-1) it is stated that a hiking tread would be left on the road surface. In the completed Environmental Assessment, a hiking tread is no longer included in the Proposed Action. The entire road surface would be ripped up. Instead of leaving an un-ripped hiking tread, some of the broken asphalt may be placed in a pattern that leaves a safe pathway for human foot travel. The BRWMU is closed to public human access, however human access is necessary for both Forest Service specialists and City of Portland Water Bureau employees. Access along decommissioned roads is needed for administrative uses such as inspecting decommissioned stream crossings after large storms (to insure the stream crossings are stable and there is not excessive stream bed or bank erosion); to provide access to plant stream banks immediately after decommissioning activities; to provide access to monitoring sites (photo points, stream crossing sections, stream longitudinal profiles; to provide access to in-stream water quality equipment; and to provide access for fire suppression and vegetation surveys.

Oregon Natural Resources Council (ONRC)

Please consider coordinating the EA with information newly assembled from the 2006 update of the Bull Run Fire Management Plan.

The risk of fire in the Bull Run Management Unit could be reduced by limiting campfires on Forest Service lands adjacent to the BRMU. The PA states that the possibility of fires entering the BRMU from outside the basin has been left out of modeling for management of fires in the BRMU. We strongly urge you to consider fires entering the BRMU from outside the basin and again, suggest limiting campfires on Forest Service land adjacent to the BRMU.

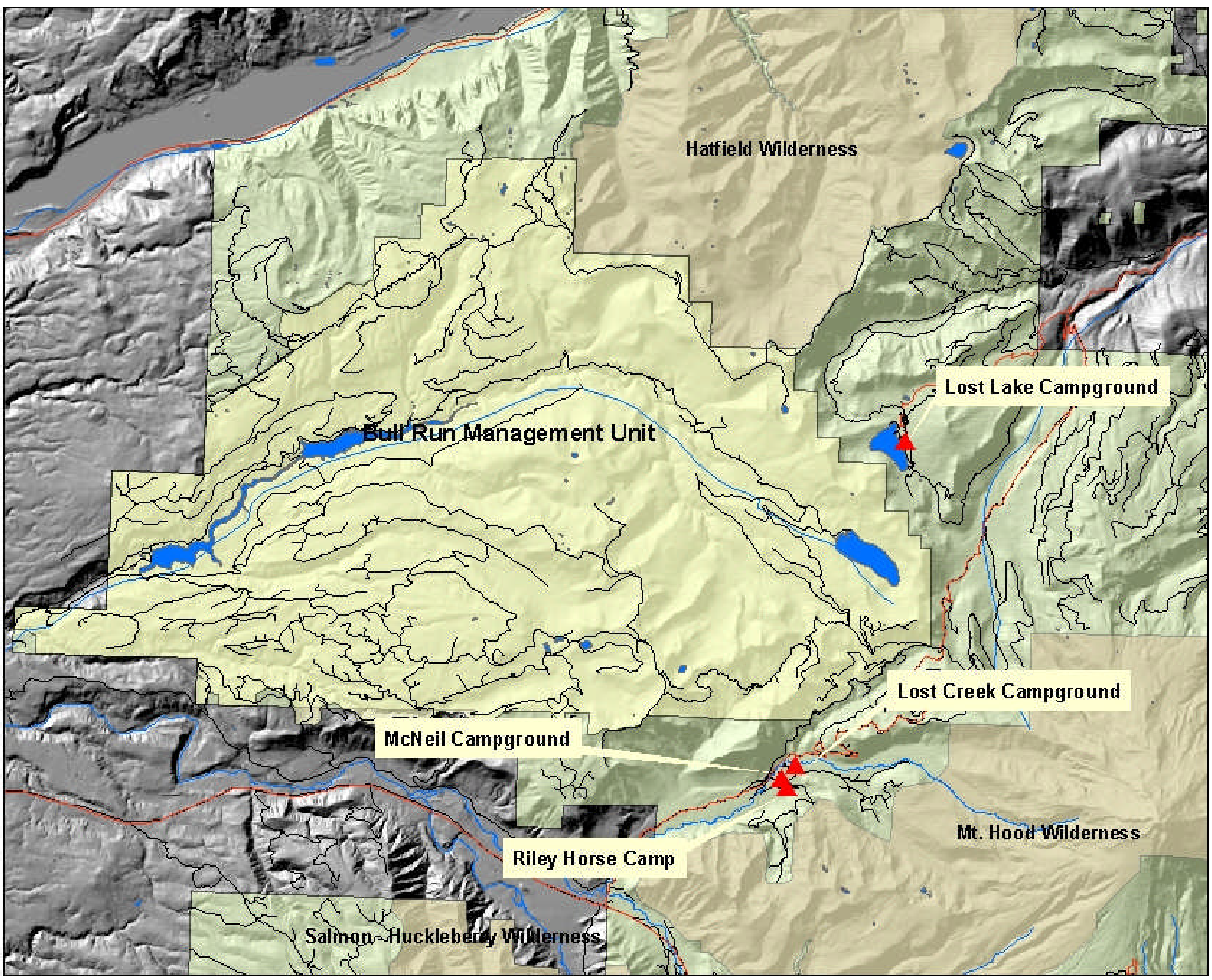
Forest Service Response

In response to the comment that “risk of fire in the Bull Run Management Unit could be reduced by limiting campfires on Forest Service lands adjacent to the BRMU” the Forest does this already. When fire danger reaches the point where escaped campfires can become a control problem the Forest implements Public Use Restrictions. These restrictions include.

1) Building, maintaining, attending, or using a fire, campfire or charcoal fire, except in locations described in Exhibit A [36 CFR 261.52 (a)].

2) Smoking, except within an enclosed vehicle or building, a developed campground or while stopped in an area at least three feet in diameter, which is barren or cleared of all flammable material [36 CFR 261.52 (c)].

Under these restrictions there are only 4 locations adjacent to the BRMU where campfires are permitted (see map below). These are permanent developed campgrounds with constructed fire rings where safe campfires can be built. Once implemented, these restrictions remain in place until the fire danger decreases.



Concerning fires burning into the BRMU from outside the basin: The study referred to in the Proposed Action was contracted by the City and was prepared by private individuals. The focus of the study was limited to the BRMU. When the Forest does fire preparedness planning, modeling is done using the Fire Program Analysis (FPA) process. In this model random fires are generated based on historic occurrence. Fuels, weather, and topography determine fire growth. There are no boundaries or borders within the modeled area.

Clackamas County Board of County Commissioners

While we recognize that the philosophy of the Forest Service is to close roads to reduce maintenance costs, the fact of the matter is that in most cases the cost of closing 136 miles of these roads permanently will cost $952,000 and will cause tremendous siltation. In our view, siltation will cost far more to deal with than a 10 year road maintenance plan.

Forest Service Response

The sediment yield associated with the proposed active road decommissioning was analyzed and determined to be approximately 0.45 tons (about half a yard of material) per year. The modeled sediment yield associated with a properly maintained road system was assessed at 729 tons per year for the existing road system versus an estimated 470 tons per year after decommissioning under the Proposed Action; resulting in a reduction of 259 tons per year. The 259 tons per year reduction in sediment yield associated with removing the roads from the landscape is much greater than the 0.45 tons per year of sediment yield that would be generated from the active decommissioning activities (see Table III-30, page III-96, Comparison of Alternatives, and discussion on page III-52).

Monitoring results associated with the 1999 road decommissioning EA indicated minimal sediment yield associated with active decommissioning activities with the following conclusions:

- After a brief limited increase in turbidity during project activities there are no statistically significant differences during a post activity storm event in turbidity levels between the upstream and downstream sites on Falls Creek.

- Post activity monitoring in No Name Creek indicates similar differences between the upstream and downstream sites as those during a pre-activity storm after an initial pulse of sediment moved through during the first large storm event after project activities.

These results appear to indicate that best management practices associated with the Bull Run Road Decommissioning are protecting water quality at culvert removal sites.

The philosophy of the Forest Service on the Mt Hood National Forest is to manage the 3400 mile road system in the most economical manner possible. The following figures may help understand the situation that the Forest Service faces in managing the transportation system on the Mt Hood National Forest:

FOREST ACCESS AND TRAVEL MANAGEMENT PLAN:

There are currently 3389 miles of specified road on the Mt Hood National Forest
460 miles or 14% of the system is maintained for passenger car traffic ML-3, 4 & 5.
1387 miles or 41% of the system is for high-clearance traffic ML-2.
1542 miles or 45% of the system is closed to public access ML-1.

Annual road maintenance funding needs associated with these roads are:
ML 3-5 - 460 Miles for Passenger Cars = $1,198,160
ML 2 - 1387 miles for High Clearance vehicles = $527,060
ML 1 - 1542 miles closed to public access = $77,100
TOTAL FOREST ANNUAL ROAD MAINTENANCE NEEDS = $1,802,320

BULL RUN ACCESS AND TRAVEL MANAGEMENT PLAN:

There are currently 288 miles of specified road in the Bull Run Watershed.
47.4 miles is maintained for passenger car traffic ML 3.
146.2 miles is maintained for high-clearance vehicles ML 2.
94.4 miles are closed ML 1.

Annual Road Maintenance funding needs associated with these roads are:
ML 3 - 47.4 miles Passenger Cars = $94,800,
ML 2 - 146.2 miles for High Clearance vehicles = $58,499
ML 1 - 94.4 miles closed = $ 4,720
TOTAL BULL RUN ANNUAL ROAD MAINTENANCE NEEDS = $158,019

MT HOOD ROADS BUDGET:
FY06 Total Roads budget was $758,574
FY06 Road Maintenance Budget was $257,373 or 34% of the Roads Budget

$1,198,160 is needed to maintain Forest Service ML 3-5 roads annually, however only $257,373 was allocated for FY06 Road Maintenance. This shortfall in funding illustrates the situation that the Forest Service faces related to road maintenance on the Mt Hood National Forest.

The primary focus in the annual road maintenance plan is on ML 3-5 roads since the Forest Service is required to meet certain Public Safety items for roads that are open to passenger car traffic. Since the Bull Run Watershed is closed to public access the roads in the Bull Run are not a high priority for the limited road maintenance funding.

The City of Portland has come to recognize this fact and over the years have taken on the majority of the road maintenance needs for their project roads both from a financial as well as performing the road maintenance work.

They also recognize that only about 50% of the roads in the Bull Run are needed for their administration and thus have pushed to get funding to decommission unneeded roads in the Bull Run to insure that their water quality is not affected by any catastrophic events in the watershed that could take out these unneeded roads.

The Forest Service has supported the City in the decommissioning efforts once that funding has become available through appropriations, by preparing and administering road decommissioning contracts and as well as doing the required environmental analysis and documentation.

Clackamas County Board of County Commissioners

Without cross ditching and culvert removal, watershed damage due to road failures is predicted to accelerate in the next ten years. The Forest had 66 failures in the Clackamas drainage during the '96 floods simply due to the fact that roads had grown shut with brush and un-maintained culverts became plugged.

Forest Service Response

The Proposed Action to decommission roads is designed to eliminate the types of problems caused by the 1996 floods. On roads planned for active decommissioning, cross ditching and culvert removal are key components of the decommissioning. Roads planned for passive decommissioning (walk-away roads) are hydrologically stable and are located in areas where there are no culverts or stream crossings.

Clackamas County Board of County Commissioners

The wildfire analysis, while very thorough, includes only lightning as a possible ignition source since except for the Pacific Crest Trail human access entry is illegal. Fire protection, community wildfire protection, access and management should be a priority and other considerations beside lightening should be included.

Forest Service Response

Entry into the watershed from the Pacific Crest Trail is illegal, and the portion of the trail that is within the BRWMU is heavily posted. The Proposed Action and Preliminary Analysis, and the completed Environmental Assessment, do address other sources of fire ignition besides lightening. The response to ONRC in this appendix provides additional fire response and prevention information.

Oregon Mycological Society

We would like to request that Rd 1401-201 remain open as we hope to continue our study for at least five more years. [Note: The Oregon Mycological Society, in cooperation with the Forest Service and the City of Portland, Bureau of Water Works, maintains a chanterelle mushroom study site within the BRWMU].

Forest Service Response

Active road decommissioning activities would be limited to 15 miles of road in the water supply drainage per year and 15 miles of road per year in the project area outside the water supply drainage (see page I-6 of the Proposed Action and Preliminary Analysis). Since the Forest Service will decommission no more than 15 miles of road per year in each of the two areas, it will be possible to delay decommissioning Forest Road 1401201 for at least five more years.

Oregon Mycological Society

We have concerns about the ability of both the Water Bureau and the Forest Service for fire fighting possibilities in the event of a large forest fire. The roads provide access and readymade fire lanes. Equipment would be severely limited in getting close enough to be effective. There needs to be surface capability besides air, especially in regards to the use of fire retardant drops by air, as that is putting potential contamination in a sensitive habitat and could affect water quality. Effective crews cannot reach, or will have trouble reaching, the fire areas due to lack of roads.

Forest Service Response

The Proposed Action and Preliminary Analysis, as well as the completed Environmental Assessment, considered the Bull Run Watershed Fire Management Plan (2006) (see page III-88). In addition to aerial resources, the Fire Management Plan includes ground resources such as type 1 and 2 crews, engines, and dozers.

The following excerpt from the 2006 Bull Run Watershed Fire Management Plan details the management of fire retardant:

> **"During initial attack situations, the parties agree that the Incident Commander has discretion to utilize retardants deployed from aerial resources without requiring approval from the Water Bureau Administrator or his/her designee. Retardant use near water courses during initial attack is permitted within the framework of agency policy. In order to minimize adverse effects to water quality and aquatic resources, use of retardants will comply with the Forest Service's national-level policy, which states:**

- **Avoid aerial application of retardant or foam within 300 feet of waterways.**

- **These guidelines do not require the pilot-in-command to fly in such a way as to endanger his or her aircraft, other aircraft, structures, or compromise ground personnel safety (National Interagency Fire Center, 2006).**

In the event of accidental retardant spills to waterways, immediate notification will be made the Portland Water Bureau, NOAA fisheries and Oregon Department of Environmental Quality. See phone numbers in Appendix B.

In extended attack situations (refer to Section V. Appropriate Management Response C. Extended Attack), the agencies agree that use of retardant in the Bull Run water supply drainage or in lands that drain directly to the lower Bull Run River require coordination with the Water Bureau representative in the position of the Resource Advisor (Section V. Appropriate Management Response B. Resource Advisor).

The Forest Service and ODF agree to jointly provide PWB with updated lists of the retardants scheduled to be in use at airtanker bases that will be utilized by their fleets to potentially respond to fires in the Management Unit. PWB will notify the Forest Service and ODF regarding results of their review of the Material Safety Data Sheets (MSDS) to establish a list of approved retardant chemicals for use in the water supply drainage portion of the Bull Run Watershed Management Unit."

Mt. Hood National Forest Fire Management staff has determined that the roads proposed for decommissioning would not delay travel times to potential fires within the BRWMU. The current state of the BRWMU has 100% of the land within 2 miles of a road system. With decommissioning approximately 136 miles of road the BRWMU will have 99.5% of the land within 2 miles of a road system and 0.5% of the land will be 2 miles to 2.5 miles from a road system (see page III-90).

<u>Oregon Mycological Society</u>

Our concerns for the overall project as proposed (active road decommissioning) would be the cost to benefit ratio, especially in light of severely restricted operating budgets; create a disproportionate disturbance of habitat: downing trees to tear up roads, digging large ditches, closing potential fire lanes and access, closing off access and browse for many of the fauna you wish to protect. Passive decommissioning, as some of *your roads have already done, seems a far less destructive and invasive procedure, and far less costly.*

Forest Service Response

The costs and benefits of decommissioning roads is described in detail in the response to the Clackamas County Board of County Commissioners in this appendix.

Some forage is provided along these roads for wildlife, but in general the motorized disturbance that occurs along these roads, even with low use as in the Bull Run Watershed, reduces the benefit and overall use of the forage being provided. Deer and elk usually obtain forage in other areas besides road prisms, such as riparian areas, natural openings adjacent to cover, and old growth stands. Once these roads are decommissioned, the benefits of reduced human and motorized disturbance as well as reduced habitat fragmentation will benefit wildlife species more than the small loss of forage that would eventually occur with decommissioning.

Of the 136 miles of roads listed for decommissioning, 59 miles (46%) would be passively decommissioned. Approximately 70 miles (54%) would be actively decommissioned. Passive decommissioning would not work on the 70 miles of roads planned for active decommissioning because of culverts that need to be removed, and slopes that need to be rehabilitated to prevent erosion and sedimentation. Design features (starting on page II-17) are included to minimize, rectify, and reduce or eliminate effects from active decommissioning. In addition to the design features, "Best Management Practices" (BMPs) are included to limit non-point source water pollution. BMPs would be applied during road decommissioning activities to achieve the water quality objectives for pure, clear, raw, potable water. BMPs are used to meet water quality standards (or water quality goals and objectives) under Section 319 of the CWA (see Appendix B).