United States Department of Agriculture

Forest Service

Pacific Northwest Region

Draft Environmental Impact Statement

Dosewallips Road Washout Project

Hood Canal Ranger District, Olympic National Forest
Olympic National Park
Jefferson County, Washington

May 2008

U.S. Department of Transportation

Federal Highway Administration

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Dosewallips Road Washout
Jefferson County, Washington
Draft Environmental Impact Statement

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U.S. Department of Agriculture, U.S. Forest Service, Olympic National Forest

U.S. Department of Transportation, Federal Highway Administration
Western Federal Lands Highway Division

Cooperating Agencies
U.S. Department of Interior, National Park Service, Olympic National Park

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Dosewallips Road Washout Project
Draft Environmental Impact Statement
Jefferson County, Washington

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Abstract: The Forest Service (FS) and the Western Federal Lands Highway Division (WFLHD), in cooperation with the National Park Service (NPS), propose to reestablish road access previously provided by Forest Service Road (FSR) 2610 to FS and NPS recreational facilities. Initially the proposed action was to rebuild FSR 2610 through the washout area with a low-water crossing, which was formerly Alternative E. However Alternative E was dropped from further consideration and now the proposed action is Alternative B. FSR 2610 would be rerouted along the hillslope above and to the north of the washout to restore access for passenger cars, recreational vehicles, and vehicles pulling trailers. Approximately 0.84 mile of single lane road with turnouts would be constructed using standard construction methods. The NPS and WFLHD propose to repair damage to the park's Dosewallips Road in the vicinity of the Dosewallips River Falls. This Draft Environmental Impact Statement (DEIS) considers four alternatives in detail, including the No Action alternative.

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Email:	**comments-pacificnorthwest-olympic@fs.fed.us**
Date Comments Must Be Received:	**Comment period ends 60 days following the date of publication of the notice of availability (NOA) in the Federal Register.**

Reviewers should provide the FS with their comments during the review period of the DEIS. This will enable the FS, WFLHD, and NPS to analyze and respond to the comments at one time and to use information acquired in the preparation of the final environmental impact statement, thus avoiding undue delay in the decisionmaking process. Reviewers have an obligation to structure their participation in the National Environmental Policy Act process so that it is meaningful and alerts the agency to the reviewers' position and contentions (Vermont Yankee Nuclear Power Corp. v. NRDC, 435 U.S. 519, 553 (1978)). Environmental objections that could have been raised at the draft stage may be waived if not raised until after completion of the FEIS (City of Angoon v. Hodel (9th Circuit, l986) and Wisconsin Heritages, Inc. v. Harris, 490 F. Supp. 1334, 1338 (E.D. Wis. 1980)). Comments on the DEIS should be specific and should address the adequacy of the statement and the merits of the alternatives discussed (40 CFR 1503.3).

Comments received, including the names and addresses of those who comment, will be considered part of the public record on this proposal and will be available for public inspection. Individual respondents may request that their name and address be withheld from the planning record, which will be honored to the extent allowable by law. If you wish your name and address to be withheld, you must state this prominently at the beginning of your comment. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.

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Abbreviations

AHZ	Avulsion Hazard Zone
AMA	Adaptive Management Area
ATM	Access and Travel Management
BEMA	Bald Eagle Management Area
CBA	Choosing By Advantage
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CHU	Critical Habitat Unit
CMZ	Channel Migration Zone
CWA	Clean Water Act
DBH	Diameter Breast Height
DEIS	Draft Environmental Impact Statement
EA	Environmental Assessment
EDT	Ecosystem Diagnosis Treatment
EFH	Essential Fish Habitat
EHZ	Erosion Hazard Zone
EIS	Environmental Impact Statement
EO	Executive Order
ERFO	Emergency Relief for Federally Owned roads
ESA	Endangered Species Act
ESU	Evolutionary Significant Unit
FEIS	Final Environmental Impact Statement
FHWA	Federal Highway Administration
FSR	Forest System Road
HMZ	Historic Migration Zone
IDT	Interdisciplinary Team
IRA	Inventoried Roadless Area
LSR	Late Successional Reserve
LWD	Large Woody Debris
MIS	Management Indicator Species
MOU	Memorandum Of Understanding
MP	Mile Post
MRDG	Minimum Requirement Decision Guide
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NFSL	National Forest System Land
NHPA	National Register of Historic Places
NLAA	Not Likely to Adversely Affect
NMFS	National Marine Fisheries Service
NOI	Notice Of Intent
NPS	National Park Service
ONF	Olympic National Forest
ONP	Olympic National Park
PDO	Pacific Decadal Oscillation

RM	River Mile
ROD	Record Of Decision
RMO	Road Management Objective
SOPA	Schedule Of Proposed Action
T&E	Threatened or Endangered
USDA	United States Department of Agriculture
USDI	United States Department of Interior
VQO	Visual Quality Objective
WFLHD	Western Federal Lands Highway Division
WSL	Water Surface Level

Draft Environmental Impact Statement
Dosewallips Road Washout Project

SUMMARY

Introduction

The Dosewallips Road Washout Project (DRWP) addresses conditions created by a storm in January 2002 which washed away a portion of Forest Service Road (FSR) 2610. Subsequent storms also damaged a portion of Olympic National Park's (ONP's or park's) Dosewallips Road about 4 miles west of the damage on FSR 2610. Reestablishing road access is needed to restore motorized access to developed recreation facilities on both the Olympic National Forest (ONF) and ONP thereby meeting Forest objectives and desired conditions as identified in the Olympic National Forest Land and Resource Management Plan (1990) and park goals and mission. This draft environmental impact statement (DEIS) assesses three alternatives for reestablishing road access on FSR 2610, with the proposed repair on the Dosewallips Road in the park being consistent with each alternative. The Olympic National Forest (ONF) of the U.S. Forest Service and Western Federal Lands Highway Division (WFLHD) of the Federal Highway Administration (FHWA) are co-lead agencies in the preparation of this DEIS, and the Olympic National Park (ONP) is a cooperating agency. Collectively all three are referred to as the Agencies.

Project Location

Project areas are located on the Hood Canal Ranger District of the ONF, and on the ONP; both in Jefferson County, Washington. Proposed Forest Service (FS) activities are located along FSR 2610 about 10 miles west of Brinnon, Washington and Highway 101. The project area is bounded on the north by the Buckhorn Wilderness, on the south by The Brothers Wilderness, and is within the Dosewallips Key Watershed (77,800 acres) as identified in the Northwest Forest Plan Record of Decision (USDA/USDI 1994). The legal description is Township 26 North, Range 3 West, Sections 16 and 17. Proposed park activities are located along its Dosewallips Road about 4 miles west of the FS project area, legal description is Township 26 North, Range 4 West, Sections 23 and 24.

Background

During a storm in January 2002 approximately 310 feet of FSR 2610 washed out. The washout size had increased to slightly over 500 feet as measured in December 2007. The washout cut off road access to approximately 5 miles of FS and ONP roads which had

provided access to the ONF Elkhorn Campground and the ONP Dosewallips Ranger Station, campground, and several trailheads. FSR 2610 and the Dosewallips Road provide one of two motorized access portals into ONP on the east side of the Olympic peninsula.

FSR 2610 is a single lane road with turnouts, surfaced with aggregate (crushed rock). This road up to Elkhorn Campground, which includes the washout section, is maintained for passenger cars (FS maintenance level 3).[1] Prior to the washout it had provided access to Elkhorn Campground for vehicles pulling trailers and recreational vehicles (RVs). In 2001 approximately 1900 people used campsites at Elkhorn.

In May 2002 the FS prepared an environmental assessment (EA) to analyze management alternatives for responding to the conditions created by the washout. Based on a need for additional information that EA was revised in February 2003. After a public comment period on the February 2003 EA a decision was made in March 2004 to reestablish road access via a reroute located upslope and north of the washout. This decision was subsequently withdrawn to complete a more detailed analysis, which is documented in this draft environmental impact statement (DEIS).

In late 2003 about 120 feet of the Dosewallips Road in the ONP at Milepost (MP) 0.85 (0.85 mile from the park boundary and about 4 miles from the washout on FSR 2610) near the Dosewallips Falls sustained damage when log retaining walls failed. These cedar log retaining structures were constructed in the 1940's along a very steep area of the exposed bedrock side channel and supported the outbound lane of the road. Failure of the retaining structures resulted in slumping of the road fill material.

The Dosewallips Road is an extension of FSR 2610 that dead-ends in the park. It is a single lane road with turnouts, surfaced with aggregate, and is maintained at park primitive road standards. A steep section of the road in the vicinity of the road failure is not recommended for large RVs and vehicles pulling trailers. Prior to the washout and road failure it had provided access to the Dosewallips Campgound, Ranger Station and several trailheads. In 1999 approximately 4300 vehicles used the road annually, and in 2001 use levels were at about 200 vehicles per day (counted in both directions). The road also provided motorized access for park trail maintenance operations on the east side of ONP and a helicopter search and rescue base located near the campground.

Purpose and Need for Action

Existing Condition

FSR 2610 has washed out at about MP 3.1, and the ONP Dosewallips Road at MP 0.85 beyond the park boundary is damaged and nearly impassible due to a failure of the road's log structure retaining wall. These two roads had provided motorized access to both ONF and ONP recreational facilities along the Dosewallips River, including the Dosewallips Campground and trailhead where the Dosewallips Road dead-ends in ONP.

[1] Maintenance Level 3 – Road is open to public travel and is maintained for passenger car use.

Desired Condition

The desired condition is to restore public and administrative motorized access to pre-washout standards on FSR 2610 and ONP Dosewallips Road to existing FS and ONP recreational facilities along the Dosewallips River. Access for passenger cars, vehicles pulling trailers, and RVs would be provided to Elkhorn Campground, with passenger car access to Dosewallips Campground, Ranger Station, and trailheads.

Project Purpose

Based on the established need as identified by the diffence between the existing and desired conditions for FSR 2610 and Dosewallips Road the purpose of this project is to reestablish road access on FSR 2610 and Dosewallips Road to ONF and ONP recreational facilities.

This project is consistent with direction in the 1990 ONF Land and Resource Management Plan (Forest Plan), as amended. The Forest Plan established management prescription *A3 Developed Recreation Sites and Administrative Sites* for the Elkhorn Campground area. This management prescription is dependent on the road access provided by FSR 2610. The Forest Plan also identified this site for reconstruction/expansion to meet the projected increase in demand for developed campgrounds (USDA 1990a). The Northwest Forest Plan amendment (USDA/USDI 1994) also provides management direction for the project area, identifying the area as Late-Successional Reserve and Riparian Reserve. This direction envisions that existing uses and developments will remain as maintenance of existing facilities is expected to have less effect on current old-growth conditions than development of new facilities.

The park's road system, in this case the Dosewallips Road, is managed to facilitate accomplishment of park purpose, significance, and mission. Park roads are intended to enhance visitor experience while providing safe and efficient accomodation of park visitiors and to serve essential management access needs. Roads are both a means and an end for visitors – they enable one visitor to reach a desired goal, for another they are the goal. FSR 2610 and ONP Dosewallips Road help meet the ONP mission as they provide one of the two motorized access points on the east side of the park. The roads provide access for a more primitive recreational experience for park visitors than those found at the more developed sites with road access elsewhere in the park. This assists the park in meeting its goal of providing a wide range of recreational opportunities.

Proposed Action[2]

The FS and WFLHD propose to meet the purpose and need by rebuilding the damaged

[2] A proposed action is a proposal to authorize, recommend, or implement an action to meet a specific purpose and need. It is formed at that stage in the development of an action when agencies, in this case the FS, WFLHD, and NPS, have a goal and are actively preparing to make a decision on one or more alternative means to accomplish that goal (40 CFR 1508.23).

portion of FSR 2610 and Dosewallips Road to their condition prior to the storm events. Initially the proposed action was to rebuild FSR 2610 through the washout area with a low-water crossing, which was formerally Alternative E. However Alternative E was dropped from futher consideration and now the proposed action is Alternative B. With Alternative B FSR 2610 would be rerouted along the hillslope above and to the north of the washout to restore access for passenger cars, recreational vehicles, and vehicles pulling trailers. Approximately 0.84 mile of single lane road with turnouts would be constructed using standard construction methods. At the damaged site on Dosewallips Road approximately 120 feet of road would be repaired and reconstructed to current road standards. A retaining wall would be constructed and no in-stream work would be required.

Should Alternative B be selected, then the ONF would need to include a proposal for non-significant Forest Plan amendments, which would waive compliance with certain standards and guidelines for Late-Successional Reserves and Riparian Reserves as identifed in the Record of Decision for the Northwest Forest Plan.

Management Direction

ONF management direction is primarily provided by the Forest Plan. The Northwest Forest Plan is a major amendment to the Forest Plan and provides the following management direction.

- Late-Successional Reserves (LSR): The objective of this land allocation is to protect and enhance conditions of late-successional and old-growth forest ecosystems. The project area is within the Hood Canal North LSR.
- Riparian Reserves (RR): This allocation consists of portions of watersheds where riparian-dependent resources receive primary emphasis, which are required for maintaining hydrologic, geomorphic, and ecological processes that directly affect waterbodies. The entire ONF project area was considered to be within this allocation.
- Key Watershed: This is a component of the Northwest Forest Plan's Aquatic Conservation Strategy (ACS) and is a system of large refugia comprising watersheds that are crucial to at-risk fish species and provide high quality water. The Dosewallips watershed is a Tier 1 Key Watershed.

ONP activities are directed primarily from their Master Plan (NPS 1976) and the ONP: Statement for Management (NPS 1996) The proposed repairs are consistent with these planning documents. Currently ONP is in the process of revising their general management plan. ONP issued a *Draft General Management Plan/Environmental Impact Statement* (May 2006) in June of 2006. The Final General Management Plan/Environmental Impact Statement and Record of Decision is expected sometime in 2008. While ONP has not selected an alternative, the proposed action is consistent with ONP's preferred alternative identified in their draft plan.

Issues

In addition to issues identified by the Agencies, comments from the public, other agencies, and tribes were used to identify issues concerning the proposed action that are truly

significant to the action and thus deserving of study. The identified issues will also be used to aid in distinquishing and comparing the alternatives. The final decision will be based on a comparison of the respective alternative's ability to address the identified issues as well as the overall purpose and need for the proposed action.

Road Management

The proposed action would have short-term construction and long-term maintenance costs, and user safety is an important consideration.

Geotechnical and Geomorphic Processes

Concerns were expressed regarding the uncertainty of geotechnical conditions along the proposed reroute alternatives for FSR 2610, especially in the area of slope stability. Also an understanding of the geomorphic processes (those processes which create or shape land forms) is important in evaluating the alternatives, especially in the dismissal of those alternatives which would repair FSR 2610 approximately on the original road location along the river. Geomorphic processes have the potential to affect future structure failures and sediment supply.

Soil Productivity

Some concerns were expressed that newly constructed or reconstructed roads have the potential to locally reduce soil productivity and negatively impact site productivity, water quality and aquatic habitat conditions. These and other associated management activities could result in soil compaction, surface erosion, mass wasting (such as landslides), modifications of surface and subsurface hydrology, alteration of wetland functions, and sedimentation into nearby streamcourses. Others think that these concerns can be addressed through appropriate project design and implementation of mitigation measures.

Aquatic Species and Habitat Conditions

Fish bearing streams within the project area include the Dosewallips River and an unnamed tributary located just downstream of the washout. Some are concerned that road reconstruction may alter channel dynamics, sediment delivery, and riparian conditions in these waterbodies. They think the proposed action could affect the amount and quality of spawning and rearing habitat for a number of anadromous fish species, including Endangered Species Act (ESA) listed Chinook salmon. Others think that road access can be restored in an environmentally acceptable manner and that effects to aquatic habitat can be kept to acceptable levels through project design and mitigation measures.

Terrestrial Species and Habitat

Some are concerned that proposed activities may affect Threatened and Endangered (T&E) species; FS Sensitive species; Management Indicator Species (MIS); Species of Concern; the habitat functions of Late-Successional Reserves; or the functions of marbled murrelet and

northern spotted owl critical habitat units. Others think that road access can be restored in an environmentally acceptable manner and the effects to terrestrial wildlife and habitat can be kept to acceptable levels through project design and mitigation measures.

Botanical Species and Habitat

Concerns were expressed that project activities have the potential to affect botanical species and habitat.

Invasive Plants

There are existing populations of invasive plants in the project area. Road construction activities, resulting in the exposure of mineral soil, create conditions favorable to the spread of invasive plants.

Access and Recreation Use

There are concerns with reestablishing the road and thereby allowing motorized access past the washout area. Some think that non-motorized access past the washout area provides opportunities to enjoy the features of the area (river corridor and adjacent wilderness areas) in a quieter and more slow-paced manner. They think the relatively easy walk on the road past the washout provides a valuable, low-elevation hiking opportunity. Others believe it is important to provide road access past the washout in order to provide access to all users and not restrict visitation to those physically able or having the time to make the walk past the washout. They want everyone to be able to experience the more remote Forest and park areas that exists past the washout.

Wilderness

Project activity is proposed within a narrow corridor between the Buckhorn and The Brothers Wildernesses. While no activities are proposed within the Wilderness areas themselves, there could be impacts to wilderness values.

Social/Economic

Some have expressed concerns with respect to the social and economic effects of on-going restricted access past the washout to the communities along Highway 101 in the vicinity of the Dosewallips River. They think that road access to Forest and park recreational facilities past the washout are an important aspect of the local and southern Jefferson County economies. Others think that the economic impacts of the restricted access are overstated and that reopening the road would cost too much.

Visual Quality (ONF only)

Proposed activities could affect the visual quality of the project area.

Climate Change

Concerns were expressed regarding the potential for increasing stream flow conditions as a result of climate trends and how this would relate to the risk of future road washouts.

Soundscapes (specific to ONP)

A National Park Service (NPS) policy states that the NPS will strive to preserve the natural quiet and natural sounds associated with the physical and biological resources of parks. The noise associated with the proposed repair on ONP land could temporarily adversely affect park resources by modifying or intruding upon the natural soundscape.

Park Operations (specific to ONP)

Park operations refer to the quality and effectiveness of their facilities. For the proposed project, an issue was developed regarding the park's ability to maintain the Dosewallips Road in order to adequately protect and preserve vital resources, maintain existing facilities and trails in the Dosewallips area, and provide for a successful visitor experience.

Forest Plan Amendments

All action alternatives include non-significant amendment(s) as defined under the National Forest Management Act (NFMA) to the 1990 Olympic National Forest Land and Resource Management Plan. The need for these amendments is due to changed physical conditions, i.e. the road washout. These proposed amendments are site-specific and only apply to the Dosewallips Road Washout project area.

The amendments involve plan components established in the 1994 Northwest Forest Plan Record of Decision (1994 NWFP ROD). The implementation section of the 1994 NWFP ROD (E-18) states "Changes or adjustments to these standards and guidelines may be made through amendments to those plans [Forest Plans] required by regulations as described above. The authority to change or amend those plans remains as specified in applicable regulations. The amendments will be reviewed by the Regional Interagency Executive Committee to assure consistency with the objectives of these standards and guidelines". A review by the Regional Interagency Executive Committee will be conducted prior to the Olympic National Forest Supervisor signing a ROD for this proposed project.

Alternatives Evaluated in Detail but Eliminated from Consideration

Although Alternatives D and E were evaluated in detail by the interdisciplinary team (IDT)[3] they were eventually eliminated from futher consideration. In a December 20, 2006,

[3] An interdisciplinary team is an interagency team of experts such as biologists, geologists, engineers, etc. who help to develop the project and study its effects.

interagency meeting the Agency executives considered the results of the IDT alternative evaluations and scoping input from National Oceanic Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS). NMFS stated serious concerns about replacing the washed-out road into the Dosewallips River channel, as this potential placement could result in a serious long-term affect so great as to jeopardize the continued existence of the Puget Sound Chinook salmon Evolutionary Significant Unit (ESU). Based on their review the Agency executives determined that the two alternatives (Alternatives D and E) which propose establishing the road bed into the river channel have unacceptable environmental impacts and will be dismissed from further consideration.

A more complete description of these alternatives can be found in Appendix A, and a detailed analysis can be found in Appendix B and project specialist reports.

Replace-in-Kind – Formerally Alternative D

This alternative would be designed to meet the project's purpose and need, minimize impacts to terrestrial habitats by avoiding the clearing associated with road construction in LSR, and minimize construction costs. This alternative would reestablish road access in the washout area as close to the preexisting conditions as possible.

A single lane road about 500 feet in length would be reconstructed similar to what existed prior to the washout. It would provide access for passenger cars, recreational vehicles, and vehicles pulling trailers. The horizontal alignment would swing into the hillside as much as possible without undercutting the slope while also providing sufficient catchment area at the base of the slope to accommodate bank sloughing and ravel. Near the upstream portion of the washout the road fill would occupy about one-half of the existing bankfull channel width. The bluff slope would be laid back to a slope angle of 1 horizontal:1 vertical to create a more stable slope. This would require moving the top of the slope back about 60 feet and removing about 0.7 acre of ground. There would be clearing of danger trees for approximately 100 feet from the top of the laid back slope, involving about 1 acre of forest within LSR. Road bank protection (most likely in the form of rip rap) would extend along the new construction area and approaches for a distance of about 680 feet.

This alternative would also include mitigation activities of the construction of approximately five constructed log complexes near the project area. These complexes are designed to dissipate the increased flow energy being translated downstream from the project site, redirect flow toward the south stream bank at the mid-level terrace to encourage channel migration in that direction and possible recruitment of spawning gravels and large wood from a high terrace, and create cover, rearing, and spawning habitat.

The cost of road construction, including construction related road maintenance and log jam mitigation, was estimated at $1.72 million (estimate was made in the spring of 2006 and has not been updated).

This alternative would include two site-specific, non-significant amendments to the Forest Plan. These amendments are associated with Aquatic Conservation Strategy (ACS)

objectives and management direction for Key Watersheds.

Additionally ONP and WFLHD would repair the Dosewallips Road at MP 0.85 in the vicinity of the Dosewallips Falls, at an estimated cost of $350,000. Approximately 120 feet of road that was constructed in the 1940's on log retaining wall/structures failed in late 2003. The road would be repaired by removing the old road fill material and reconstructing the road prism by using riprap and crushed rock to form a foundation on which structural backfill would be constructed. Stabilization techniques would be used to protect the stabilized fill from erosion. All of the construction would be above the ordinary high water line of the river. The park would need to conduct road maintenance that has been deferred on the Dosewallips Road prior to the repair work at an estimated cost of $4,500.

Low-water Revetment – Formerally Alternative E

This alternative would be designed to meet the project's purpose and need, minimize impacts to terrestrial habitats by avoiding the clearing associated with road construction in LSR, and minimize construction costs. It would also lessen aquatic habitat and riparian function impacts by reducing the reconstructed road's encroachment into the river, thereby allowing some gravel recruitment from the high bank.

About 500 feet of single land road would be reconstucted. It would provide seasonal access for passenger cars, recreational vehicles, and vehicles pulling trailers. The horizontal alignment would be similar to former Alternative D and would swing into the hillside as much as possible without undercutting the slope, while also providing sufficient catchment at the base of the slope to accommodate bank sloughing and ravel. In the area close to the upstream portion of the washout the road fill would occupy about one-third of the existing bankfull channel width. There would be no scaling back of the bluff slope but there would be clearing of danger trees for approximately 100 feet from the top of the slope, involving about 1 acre of forest within LSR.

The height of the roadway surface would be at a grade to minimize the road's footprint while meeting design criteria for a 10-year flood (Q10). The design would be such that the road would be overtopped by the river during moderately large flood events, such as a 10-year flood.

The cost of road construction, including log jam mitigation, was estimated at $1.40 million (estimate was made in the spring of 2006 and has not been updated). This alternative also would have long-term road maintenance needs due to slope ravel and repairs to the road's surface after flood events.

This alternative would include two site-specific, non-significant amendments to the Forest Plan. These amendments are associated with Aquatic Conservation Strategy (ACS) objectives and management direction for Key Watersheds.

Additionally ONP and WFLHD would repair the Dosewallips Road at MP 0.85 in the vicinity of the Dosewallips Falls, at an estimated cost of $350,000. Approximately 120 feet

of road that was constructed in the 1940's on log retaining wall/structures failed in late 2003. The road would be repaired by removing the old road fill material and reconstructing the road prism by using riprap and crushed rock to form a foundation on which structural backfill would be constructed. Stabilization techniques would be used to protect the stabilized fill from erosion. All of the construction would be above the ordinary high water line of the river. The park would need to conduct road maintenance that has been deferred on the Dosewallips Road prior to the repair work at an estimated cost of $4,500.

Alternatives Considered but Eliminated from Detailed Study

Alternatives to ONF Proposed Action

Southern Road

This alternative would establish road access beyond the washout site on the south side of the river by utilizing FSR 2610-010 (Six Mile bridge) and FSR 2610-012, and constructing a 2-mile connector road to FSR 2610-040 (Ten Mile bridge). This alternative was eliminated from detailed consideration for the following reasons: the route crosses The Brothers Wilderness (a Wilderness area boundary adjustment would require congressional approval), it is longer than the reroutes on the north side of the river (2 miles new construction and 2.5 miles reconstruction), the route crosses areas of very steep ground and cliff line, and the route crosses stands of late-successional character which are higher quality (than the re-reoute alternatives) because they are farther from existing roads than the late-successional stands crossed by two of the alternatives considered in detail.

Eight Percent Grade Reroute

This alternative would relocate FSR 2610 above and north of the current washout site utilizing an 8 percent grade to facilitate easier access for large recreational vehicles. This alternative was eliminated from detailed consideration because: an 8 percent slope road would construct approximately 50 percent more road than the reroute alternatives; would encroach on the Buckhorn Wilderness; vehicles would still have to negotiate the existing 18 percent grade to reach the facilities in the park (the park does not recommend large recreational vehicles or vehicles pulling trailers use this section of road); and an improvement to the previous road condition would not qualify for ERFO funding.

Wetland Avoidance

This alternative would relocate FSR 2610 above and north of the current washout site with an alignment that would avoid impacts to the wetlands located adjacent to FSR 2610 east of the washout. This alternative was eliminated from detailed consideration because: the reroute would have been longer with a greater impact on late successional reserve habitat and more of the reroute would have been on steep and potentially unstable slopes.

Decommission FSR 2610 and Convert to Trail

This alternative would decommission FSR 2610 and the park's Dosewallips Road above the washout and convert these roads to non-motorized trails. With this as the main theme several variations were suggested which included building new campground and ranger station

facilities below the washout and constructing a new trail network to tie into the existing trail system above the washout. While the decommission/convert to trail alternative was considered in the 2003 EA, it was eliminated from detailed consideration in this analysis because it would not meet the project's purpose and need of restoring road access for motorized vehicles on FSR 2610 to the ONF and ONP recreational facilities and the park's Dosewallips Road.

Footbridge

An alternative was proposed that would construct a footbridge over the washout area and utilize a shuttle system to transport visitors to Elkhorn Campground and the park's facilities. This alternative was eliminated from detailed consideration because it would not meet the project's purpose and need of restoring road access for motorized vehicles on FSR 2610 and the park's Dosewallips Road.

Light Traffic Bridge

A proposal was suggested to construct a bridge over the washout area that would be suitable for use by vehicles such as wheelchairs, all terrain vehicles (ATVs), and light pick-ups (to be used for administrative purposes). This alternative was eliminated from detailed consideration because it would not meet the project's purpose and need of restoring road access for motorized vehicles on FSR 2610 and the park's Dosewallips Road.

Private Land Purchase

A suggestion was made to include the purchase of private land in the lower Dosewallips River valley and the decommissioning of roads within these areas as part of the alternatives. This proposal is outside the scope of the decision to be made for this project and for this reason was eliminated from detailed consideration.

Reroute Alternatives with LSR/AMA Exchange Forest Plan Amendment

A variation of the two reroute alternatives (Alternatives B and C) was considered which proposed a Forest Plan amendment to redesignate a block of Adaptive Management Area (AMA) Forest Plan allocation to LSR to mitigate the removal of LSR acres under the reroute alternatives. A potentially suitable stand of AMA was identified near Mt. Turner but after a field visit to the stand the proposal was eliminated from detailed consideration because the stand has lower quality biological and physical features when compared to the area of LSR affected by the reroute alternatives.

Alternatives to ONP Proposed Action

Bypass

A suggestion was made to construct a bypass uphill of the failed section of road away from the Dosewallips River. This proposal was eliminated from detailed consideration because the side slope is extremely steep and rocky and the road would need to be constructed on a very steep grade, about 18 percent. The financial cost of this option would be too high, and the environmental impacts would be unnecessarily severe to restore this section of road.

Alternatives Considered in Detail

Alternative A - No Action

Objective
This alternative would allow current geological processes, including the continued deterioriation of FSR 2610 and Dosewallips Road to continue with the associated risks and benefits. This alternative provides a baseline for comparison with other alternatives.

Description
Motorized access on FSR 2610 would end at or near the washout. Only measures to provide for public safety at the washout site would be implemented, such as blocking FSR 2610 to prevent a vehicle from plunging into the river. The road would be blocked with a traffic barrier (such as a jersey barrier) and would be signed to warn motorists of the road closure. Similarily, the Park's failed section of the Dosewallips Road near the Dosewallips Falls would not be repaired.

Current FS management plans would continue to guide management of the project area on ONF lands. Existing uses, such as parking along the edge of the road near the washout and in the adjacent dispersed camping area, would continue. The Elkhorn Campground would remain closed and would not be maintained.

On ONP lands, the Dosewallips Campground and restrooms would remain closed. The park's ranger station and quarters would continue to be closed or possibly converted to a backcountry site.

A future decision likely would be needed to determine appropriate management of the Forest and park roads and recreational facilities located beyond the washout.

Forest Plan Amendment
Selection of the No Action alternative would not require a site-specific non-significant amendment (as defined under the NFMA) to the Forest Plan.

Alternative B – Reroute 1 Bench Emphasis

Objective
This alternative is designed to meet the project's purpose and need by rerouting FSR 2610 past the washout site out of the river floodplain utilizing standard road construction techniques. This alternative was developed to minimize impacts to aquatic habitat and riparian function that would otherwise occur by allowing gravel recruitment from the high bank by the river.

Description
FSR 2610 would be rerouted along the hillslope above and to the north of the washout to restore access for passenger cars, recreational vehicles, and vehicles pulling trailers.

Approximately 0.84 mile of single lane road with turnouts would be constructed using standard construction methods. Construction would occur over a 3-year period. Standard construction methods involve trying to balance cuts and fills with no particular emphasis on minimizing the foot print of cleared area. Construction would involve the clearing of about 7.1 acres of LSR lands. Most of the route (95 percent) would be new road construction, with the remaining 5 percent following the alignment of an old timber harvest spur road. The road would have sustained grades up to a maximum of about 10 percent. Danger trees would be removed from within 100 feet of the top of cut or toe of fill.

The estimated cost to reconstruct FSR 2610 along this reroute is $2.55 million. Estimated maintanance costs for the reroute would be $33,900 for the first 2 years and annually $2,000 long-term. Estimated deferred maintenance on FSR 2610 from the washout up to the park boundary would be $15,400 initially, with long-term annual maintance estimated at $10,800.

During construction, FSR 2610 would be closed to the public from the Forest boundary up to the washout site to provide for public safety. Portions of FSR 2610 and previously disturbed dispersed camping areas (approximately 2 acres) near the washout would be used for construction equipment staging areas. The dispersed camping areas would be rehabilitated at the conclusion of construction activities. Rehabilitation would include soil improvement work, scattering of large wood, seeding/planting, and treatment for invasive species.

About 0.7 mile of FSR 2610, located on either side of the washout to the take off points for the reroute, would be decommissioned. The section of road to be decommissioned is in the riparian area, but not within the active (100 year) floodplain (see Figure 30). Decommissioning the section of road upstream of the washout would involve removal of drainage structures and the fill in draws and drainage pathways, but it is possible that not all of the fill that is present would be removed. The surfacing would be removed, the roadbed would be ripped or otherwise de-compacted and it would be replanted with appropriate native, woody vegetation. Decommissioning the section of road downstream of the washout would involve removal of drainage structures and the road fill to an extent to facilitate wetland restoration.

Additionally ONP and WFLHD would repair the Dosewallips Road at MP 0.85 in the vicinity of the Dosewallips Falls, at an estimated cost of $350,000. Approximately 120 feet of road that was constructed in the 1940's on log retaining wall/structures failed in late 2003. The road would be repaired by removing the old road fill material and reconstructing the road prism by using riprap and crushed rock to form a foundation on which structural backfill would be constructed. Stabilization techniques would be used to protect the stabilized fill from erosion. All of the construction would be above the ordinary high water line of the river. The park would need to conduct road maintenance that has been deferred on the Dosewallips Road prior to the repair work at an estimated cost of $4,500.

Forest Plan Amendments

Selection of this alternative would include five site-specific, non-significant amendments (as defined under the NFMA) to the Forest Plan. These amendments are to certain standards and guidelines for LSR (pre-project survey requirements, protection of murrelet habitat, neutral

or beneficial requirement, and minimize adverse road impact requirements) and Riparian Reserves (wetland avoidance) as identified in the Record of Decision for the Northwest Forest Plan.

Alternative C – Reroute 2 Retaining Wall Emphasis

Objective
This alternative is designed to meet the project's purpose and need by rerouting FSR 2610 past the washout site out of the river floodplain. Instead of using standard construction practices as described for Alternative B, this alternative would narrow the road's footprint to limit the amount of clearing and excavation needed for the proposed construction. This alternative was also developed to minimize impacts to aquatic habitat and riparian function that would otherwise occur with eliminated Alternatives D and E by allowing gravel recruitment from the high bank by the river.

Description
This alternative would generally follow the same alignment as proposed under Alternative B. However, some slight shifts in grade and horizontal alignment may be used to help minimize disturbance in the LSR as compared to Alternative B.

FSR 2610 would be rerouted along the hillslope above and to the north of the washout to restore access for passenger cars, recreational vehicles, and vehicles pulling trailers. Approximately 0.84 mile of single lane road with turnouts would be constructed. Construction would occur over a 3 year period. Construction of retaining walls and potential reinforcement built into fills would minimize the disturbed area. About 6.5 acres of LSR as designated in the Forest Plan would be cleared, about 8 percent less disturbance than Alternative B. Most of the route (95 percent) would be new road construction, with the remaining 5 percent following the alignment of an old timber harvest spur road. The road would have sustained grades up to a maximum of about 10 percent. Danger trees would be removed from within 100 feet of the top of cut or toe of fill.

The estimated cost to reconstruct FSR 2610 along this reroute is $3.76 million. Estimated maintanance costs for the reroute would be $34,200 for the first 2 years and annually $2,000 long-term. Estimated deferred maintenance on FSR 2610 from the washout up to the park boundary would be $15,400 initially, with long-term annual maintance estimated at $10,800.

During construction FSR 2610 would be closed to the public from the Forest boundary up to the washout site to provide for public safety. Portions of FSR 2610 and previously disturbed dispersed camping areas (approximately 2 acres) near the washout would be used for construction equipment staging areas. The dispersed camping areas would be rehabilitated at the conclusion of construction activities. Rehabilitation would include soil improvement work, scattering of large wood, seeding/planting, and treatment for invasive species.

About 0.7 mile of FSR 2610, located on either side of the washout to the take off points for the reroute, would be decommissioned. The section of road to be decommissioned is in the riparian area, but not within the active (100 year) floodplain (Figure 30). Decommissioning

the section of road upstream of the washout would involve removal of drainage structures and the fill in draws and drainage pathways, but it is possible that not all of the fill that is present would be removed. The surfacing would be removed, the roadbed would be ripped or otherwise de-compacted and it would be replanted with appropriate native, woody vegetation. Decommissioning the section of road downstream of the washout would involve removal of drainage structures and the road fill to an extent to facilitate wetland restoration.

Additionally ONP and WFLHD would repair the Dosewallips Road at MP 0.85 in the vicinity of the Dosewallips Falls, at an estimated cost of $350,000. Approximately 120 feet of road that was constructed in the 1940's on log retaining wall/structures failed in late 2003. The road would be repaired by removing the old road fill material and reconstructing the road prism by using riprap and crushed rock to form a foundation on which structural backfill would be constructed. Stabilization techniques would be used to protect the stabilized fill from erosion. All of the construction would be above the ordinary high water line of the river. The park would need to conduct maintenance that has been deferred on the Dosewallips Road prior to the repair work at an estimated cost of $4,500.

Forest Plan Amendments
Selection of this alternative would include four site-specific, non-significant amendments (as defined under the NFMA) to the Forest Plan. These amendments are to certain standards and guidelines for LSR (pre-project survey requirements, protection of murrelet habitat, and neutral or beneficial requirement) and Riparian Reserves (wetland avoidance) as identified in the Record of Decision for the Northwest Forest Plan.

Alternative F – Bridge

Objective
This alternative is designed to meet the project's purpose and need, reduce impacts to the adjacent LSR as compared to Alternatives B and C, and lessen aquatic habitat and riparian function impacts by allowing a relatively normal degree of gravel recruitment by the river from the high bank.

Description
A single lane bridge, about 700 feet long spanning the washed out area, would be constructed to restore access to passenger cars, recreational vehicles, and vehicles pulling trailers. The bridge would be constructed of pre-cast spans, which would be supported by intermediate piers. There would be no scaling back of the bluff slope, but there would be clearing of danger trees for approximately 100 feet from the top of the slope, involving about 1 acre of forest within LSR.

The cost of bridge construction is estimated at $8.75 million**.** Estimated annual bridge maintenance and inspections costs would be $2,800. Estimated deferred maintenance on FSR 2610 from the washout up to the park boundary would be $15,400 initially, with long-term annual maintance estimated at $10,800.

During construction periods FSR 2610 would be closed to public access from the Forest

boundary up to the washout site to provide for public safety. Portions of FSR 2610 and previously disturbed dispersed camping areas (approximately 2 acres) near the washout would be used for construction equipment staging areas. The dispersed camping areas would be rehabilitated at the conclusion of construction activities. Rehabilitation would include soil improvement work, scattering of large wood, seeding/planting, and treatment for invasive species.

Additionally ONP and WFLHD would repair the Dosewallips Road at MP 0.85 in the vicinity of the Dosewallips Falls, at an estimated cost of $350,000. Approximately 120 feet of road that was constructed in the 1940's on log retaining wall/structures failed in late 2003. The road would be repaired by removing the old road fill material and reconstructing the road prism by using riprap and crushed rock to form a foundation on which structural backfill would be constructed. Stabilization techniques would be used to protect the stabilized fill from erosion. All of the construction would be above the ordinary high water line of the river. The park would need to conduct maintenance that has been deferred on the Dosewallips Road prior to the repair work at an estimated cost of $4,500.

Forest Plan Amendment

Selection of this alternative would include one site-specific, non-significant amendment (as defined under the NFMA) to the Forest Plan. This amendment is to a standard and guideline for Riparian Reserves (wetland avoidance) as identified in the Record of Decision for the Northwest Forest Plan.

Environmental Consequences (Comparison of Alternatives)

ISSUE	ALTERNATIVE A No Action	ALTERNATIVE B Reroute 1 Bench Emphasis	ALTERNATIVE C Reroute 2 Retaining Wall Emphasis	ALTERNATIVE F Bridge
ROAD MANAGEMENT				
Estimated Costs				
• Construction	ONF = $5,000 ONP = $0	ONF = $2,550,000 ONP = $350,000	ONF = $3,760,000 ONP = $350,000	ONF = $8,750,000 ONP = $350,000
• Annual maintenance				
o Short-term				
▪ Deferred	$0	$19,900	$19,900	$19,900
▪ 1st 2 year	$0	$33,900	$34,200	$3,900
o Long-term	$0	$11,000	$11,000	$3,900
o Bridge inspection				$1,200
User Safety	Block FSR 2610 with traffic barrier	Treat danger trees	Treat danger trees	Treat danger trees

ISSUE	ALTERNATIVE A No Action	ALTERNATIVE B Reroute 1 Bench Emphasis	ALTERNATIVE C Reroute 2 Retaining Wall Emphasis	ALTERNATIVE F Bridge
GEOTECHNICAL HAZARDS AND GEOMORPHIC PROCESSES				
• Slope stability	Natural conditions	Segment 2 has areas of pre-existing slope movement and ground water seepage. Construction of new cuts up to 60 to 80 feet high could result in potentially unstable slopes and minor landslides. Natural conditions at the high bank would continue	Same as Alt B.	Similar to Alt A in the short-term. Continued shallow slope movement on high bank until stable angle naturally achieved.
• Fluvial processes	Natural conditions	Same as Alt. A.	Same as Alt. A.	Similar to Alt A in the short-term. Reduced river effect on high bank in the long-term.
• Sediment supply	Natural conditions	Same as Alt A.	Same as Alt A.	Similar to Alt A in the short-term. Reduction in supply in the long-term.
SOIL PRODUCTIVITY	No additional road. 3.9 miles of abandoned road. 42 acres in detrimental soil condition with slow natural recovery. Erosion continuing on abandoned road. No effect to slope stability or hillslope hydrology.	0.84 mile of new road. 0.7 mile of road decommissioning. 44.7 acres in long-term detrimental conditions. Increased short-term erosion. Second highest risk of slope instability. Effects to hillslope hydrology.	0.84 mile of new road. 0.7 mile of road decommissioning. 44.1 acres in long-term detrimental conditions. Increased short-term erosion, higher than Alt. B. Highest risk of slope instability. Effects to hillslope hydrology, same as Alt. B.	700 foot long bridge. 42.0 acres in long-term detrimental conditions. Minimal surface erosion. Lowest risk of slope instability. No effect to hillslope hydrology.

ISSUE	ALTERNATIVE A No Action	ALTERNATIVE B Reroute 1 Bench Emphasis	ALTERNATIVE C Reroute 2 Retaining Wall Emphasis	ALTERNATIVE F Bridge
AQUATIC HABITAT (Matrix Indicators: Project Scale/Watershed Scale)				
Temperature	M/M	M/M	M/M	M/M
Sediment	D/M	D (tribs) M (Dose)/M	D (tribs) M (Dose)/M	D/M
Large Woody Debris	M/M	D/M	D/M	M/M
Pool Freq and Quality	M/M	M/M	M/M	M/M
Off-channel Habitat	M/M	D/M	D/M	M/M
Width/Depth Ratio	M/M	M/M	M/M	M/M
Streambank Condition	M/M	M/M	M/M	D/M
Drainage Network	M/M	D/M	D/M	M/M
Road Density/Location	M/M	M/M	M/M	M/M
Function of Riparian Reserves	M/M	D/M	D/M	M/M
Puget Sound Chinook	No Effect	NLAA	NLAA	LAA
Chinook Critical Habitat	No Effect	NLAA	NLAA	LAA
Puget Sound Steelhead	No Effect	NLAA	NLAA	NLAA
Hood Canal summer chum	No Effect	NLAA	NLAA	NLAA
Summer chum Critical Habitat	No Effect	NLAA	NLAA	NLAA
Coastal Puget Sound bull trout	No Effect	NLAA	NLAA	NLAA

(M)aintain = project may affect indicator, but impact is neutral.
(D)egrade = project is likely to have a negative impact on the habitat indicator.
Tribs = tributaries

NLAA = Not Likely to Adversely Affect determination as made under the Endangered Species Act (ESA)
LAA = Likely to Adversely Affect determination as made under the ESA

ISSUE	ALTERNATIVE A No Action	ALTERNATIVE B Reroute 1 Bench Emphasis	ALTERNATIVE C Reroute 2 Retaining Wall Emphasis	ALTERNATIVE F Bridge
TERRESTRIAL HABITAT				
Northern Spotted Owl (NSO)	No habitat impact No Effect	Remove 7.1 acres suitable habitat (one activity center below habitat threshold); LAA	Remove 6.5 acres suitable habitat (one activity center below habitat threshold); LAA	Degrade 1 acre suitable habitat (one activity center below habitat threshold); 2.5 acres noise disturbance LAA
NSO Critical Habitat	No habitat impact No Effect	Remove 7.1 acres constituent element (nesting, roosting, foraging, or dispersal habitat) LAA	Remove 6.5 acres constituent element LAA	Degrade 1 acre constituent element LAA
Marbled Murrelet	No habitat impact No Effect	Remove 7.1 acres suitable habitat; 15.7 acres noise disturbance LAA	Remove 6.5 acres suitable habitat; 15.7 acres noise disturbance LAA	Degrade 1 acre suitable habitat; 2.5 acres noise disturbance LAA
MM Critical Habitat	No habitat impact No Effect	Remove 7.1 acres, constituent element LAA	Remove 6.5 acres, constituent element LAA	Degrade 1 acre of constituent element LAA

ISSUE	ALTERNATIVE A No Action	ALTERNATIVE B Reroute 1 Bench Emphasis	ALTERNATIVE C Reroute 2 Retaining Wall Emphasis	ALTERNATIVE F Bridge
BOTANICAL SPECIES AND HABITAT				
Vascular plants	No risk to species viability or a trend toward Federal listing	Same as Alt A	Same as Alt A	Same as Alt A
Bryophytes	No risk to species viability or a trend toward Federal listing	Same as Alt A	Same as Alt A	Same as Alt A
Fungi	No risk to species viability or a trend toward Federal listing	May impact species or habitat, very low likelihood of risk to species viability or trend toward Federal listing	Same as Alt B	Same as Alt A
Lichens	No risk to species viability or a trend toward Federal listing	Same as Alt A	Same as Alt A	Same as Alt A
ACCESS AND RECREATION	Non-motorized access only beyond washout on FSR 2610. Maintains non-motorized trail experience in non-wilderness area. Campgrounds remain closed	Access restored to pre-washout conditions. Easier access to ONP for elderly & small children, persons with disabilities, and day visitors. Campgrounds open.	Same as Alt. B.	Same as Alt. B.
Deferred maintenance and start-up costs	park = $0 Forest = $0	park = $17,600 Forest = $162,000	park = $17,600 Forest = $162,000	park = $17,600 Forest = $162,000

ISSUE	ALTERNATIVE A No Action	ALTERNATIVE B Reroute 1 Bench Emphasis	ALTERNATIVE C Reroute 2 Retaining Wall Emphasis	ALTERNATIVE F Bridge
WILDERNESS	No effect.	Minor short-term effects to solitude (noise) and unconfined recreation during construction. No long-term effects.	Same as Alt. B.	Same as Alt. B.
SOCIAL/ECONOMIC	Continued reduced income for local service businesses. Present Value of Discounted Costs (PVDC): Forest = $5,000. park = NA.	Increased income for local service businesses. Dosewallips area again a visitor destination attraction. PVDC: Forest = $3,116,300. park = $330,100.	Social same as Alt. B. PVDC: Forest = $4,329,100. park = $330,100.	Social same as Alt. B. PVDC: Forest = $9,095,000. park = $330,100.
INVASIVE SPECIES	Minimal manual control of existing populations. No control of new infestations.	Newly exposed ground and imported rocks and soil susceptible to invasive plant colonization. Positive results in prevention of invasive plant spread and treatment of current and new infestations	Same as Alt B	Same as Alt B
VISUAL QUALITY	No change, long-term vegetative recovery of high bank	FS Visual Quality Objective (VQO) of retention met	Same as Alt B	FS VQO of partial retention met

ISSUE	ALTERNATIVE A No Action	ALTERNATIVE B Reroute 1 Bench Emphasis	ALTERNATIVE C Reroute 2 Retaining Wall Emphasis	ALTERNATIVE F Bridge
CLIMATE TRENDS AND STREAM FLOWS	No added concerns or costs if stream flows increase	Same as Alt A	Same as Alt A	Bridge would be designed for expected streamflow.
SOUNDSCAPES	No adverse impact	Short-term, moderately adverse impacts to soundscapes. Would be consistent with park management planning efforts.	Same as Alt B	Same as Alt B
PARK OPERATIONS	Continued deterioration of trails and facilities. Increase flight time for air support to trail maintenance and search and rescue operations.	Improved maintenance of trails, reduced time and funding requirements. Improved search and rescue operations.	Same as Alt B	Same as Alt B
WETLANDS AND WATERS OF THE U.S.	No effect	0.019 acre impacted, no net loss	0.020 acre impacted, no net loss	0.016 acre impacted, no net loss Placement of piers in the river and riprap for abutment stabilization could alter river channel in the future.
ESTIMATED IMPLEMENTATION COMPLETE (assumes ROD signed in Summer 2009)	2009	2012	2012	2012
FOREST PLAN AMENDMENTS	None	4 Terrestrial, 1 Aquatic	3 Terrestrial, 1 Aquatic	1 Aquatic

Mitigation Measures and Management Requirements

The proposed action includes mitigation measures and management requirements that have been established in order to minimize adverse effects. These are listed in the DEIS in Chapter 2, with one set common to the reroute alternatives and another set common to the river floodplain alternative.

Measures and requirements include:

- vegetation - emphasizing prevention of the spread of invasive plants;
- watershed - designed to protect water quality;
- fish and wildlife – designed to minimize effects to aquatic and terrestrial species and habitat;
- cultural resources – providing protection for previously unidentified cultural properties.

Monitoring

Implementation monitoring would be conducted as part of all construction activities. Effectiveness monitoring would include observations of construction sites, aquatic sites, wetland sites, and mitigation areas. This monitoring would be done during the first winter after implementation, during periodic road inspections, and while inspecting for invasive species.

CHAPTER 1 – PURPOSE OF AND NEED FOR ACTION

Introduction

The Dosewallips Road Washout Project (DRWP) addresses conditions created by a storm in January 2002 which washed away a portion of Forest Service Road (FSR) 2610. Subsequent storms also damaged a portion of Olympic National Park's (ONP's or park's) Dosewallips Road about 4 miles west of the damage on FSR 2610. Reestablishing road access is needed to restore motorized access to developed recreation facilities on both the Olympic National Forest (ONF, FS or Forest) and ONP thereby meeting Forest objectives and desired conditions as identified in the Olympic National Forest Land and Resource Management Plan (1990) and park goals and mission. This draft environmental impact statement (DEIS) assesses three alternatives for reestablishing road access on FSR 2610, with the proposed repair to Dosewallips Road in the park being consistent with each of the alternatives. The ONF of the U.S. Forest Service and Western Federal Lands Highway Division (WFLHD) of the Federal Highway Administration (FHWA) are co-lead agencies in the preparation of this DEIS, and the ONP is a cooperating agency. Collectively all three are referred to as the Agencies.

Document Structure

Olympic National Forest and WFLHD, in cooperation with ONP, have prepared this Environmental Impact Statement (EIS) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws, regulations, and policies. These include, but are not limited to the regulations of the Council of Environmental Quality (40 Code of Federal Regulations (CFR) 1500), National Park Service Director's Order – 12, Conservation Planning, Environmental Impact Analysis and Decision Making, and the other laws listed in Chapter 3 of this DEIS under *Compliance with Other Laws, Regulations, and Policies*. This EIS discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives.

This EIS will provide the analysis and supporting rational for each agency Responsible Official to make a decision concerning their authority, documented in separate decision documents (called Record of Decisions [ROD]). ONF, WFLHD, and ONP personnel have worked on this EIS. While the intent was to produce a seamless document, due to subtle differences in each agency's analysis requirements there are sections of this EIS which are only pertinent to one agency. An example would be the park requirement to analyze potential effects to determine if actions would impair park resources. These differences are noted as they occur throughout the document.

The document is organized into four chapters:

- *Chapter 1. Purpose and Need for Action:* The chapter includes information on the history of the project proposal, the purpose of and need for the project, and the Agencies' proposal for achieving that purpose and need. This section also describes how the public was informed of the proposal and their responses.
- *Chapter 2. Alternatives, including the Proposed Action:* This chapter provides a more detailed description of the Agencies' proposed action as well as alternative methods for achieving the stated purpose and need. These alternatives were framed based on issues raised by the public and other agencies. This chapter also contains a description of alternatives

considered but eliminated, mitigation measures, and a summary table of the environmental consequences associated with each alternative.

- *Chapter 3. Affected Environment and Environmental Consequences*: This chapter describes the affected environment and environmental effects of implementing the alternatives. The analyses are organized by the issues identified in Chapter 1.
- *Chapter 4. Supporting Information:* This chapter provides a list of preparers, distribution lists for the EIS, glossary, abbreviations, references, and index.

Additional documentation, including more detailed resource specialist reports, may be found in the project analysis file located at Olympic National Forest headquarters in Olympia, Washington.

Agency Responsibility and Funding

The ONF and WFLHD are co-lead agencies, and the ONP is a cooperating agency, in addressing National Environmental Policy Act (NEPA) compliance for proposed road work and in the preparation of this DEIS. The ONF and ONP have a shared land management responsibility regarding the road access provided by FSR 2610 and the park's Dosewallips Road. These roads help both agencies meet goals and management strategies. Successful completion of this EIS is mutually beneficial because it would assist both parties in meeting legal/jurisdictional obligations in an environmentally sound manner and would foster interagency consistency.

The proposed repair of the washout along FSR 2610 is being developed as part of the Emergency Relief for Federally Owned Roads (ERFO) category of the FHWA Federal Lands Highway Program, which is financed by the Federal Highway Trust Fund. At this time there is no anticipated funding for needed repairs on the Dosewallips Road within the ONP, but the ONP may seek ERFO funding for the proposed repair at mile post (MP) 0.85 near the Dosewallips Falls.

Project Location

The project areas (includes both damaged sites) are located in Jefferson County, Washington. The first damaged site is located on the Hood Canal Ranger District of the Olympic National Forest (Figure 1). Proposed ONF activities at this site are located along Forest Service Road (FSR) 2610 about 10 miles west of Highway 101 and Brinnon, Washington. This site location is at about milepost (MP) 3.1, which indicates it is 3.1 miles up FSR 2610 from the Forest boundary (Figure 2). The project area is bounded on the north by the Buckhorn Wilderness, on the south by The Brothers Wilderness, and is within the Dosewallips Key Watershed (74,400 acres) as identified in the Northwest Forest Plan Record of Decision (USDA/USDI 1994). The legal description is Township 26 North, Range 3 West, Sections 16 and 17. About 4 miles west of the damage on FSR 2610 is the other damaged area, which is on ONP land located along Dosewallips Road. Its legal description is Township 26 North, Range 4 West, Sections 23 and 24 (Figure 3).

The 14.9 mile long Dosewallips River road parallels the Dosewallips River and provides access up the Dosewallips River valley (Figure 4). The road begins at Highway 101 near Brinnon, Washington and ends at ONP Dosewallips Ranger Station and campground. It passes through Jefferson County, ONF, and ONP jurisdictions.

- The initial 6.8 miles are designated CR 2500 and is a two-lane paved road managed by Jefferson County.
- The next 6.4 miles (designated FSR 2610) are managed by ONF. It is a single-lane road surfaced with crushed aggregate up to Elkhorn Campground (currently maintained for passenger cars), and crushed aggregate and an improved native material surface beyond the campground to ONP boundary (was maintained for high clearance vehicles).
- The last 1.7 miles are managed by ONP and is narrow with an improved native material surface.

Figure 1: Vicinity Map

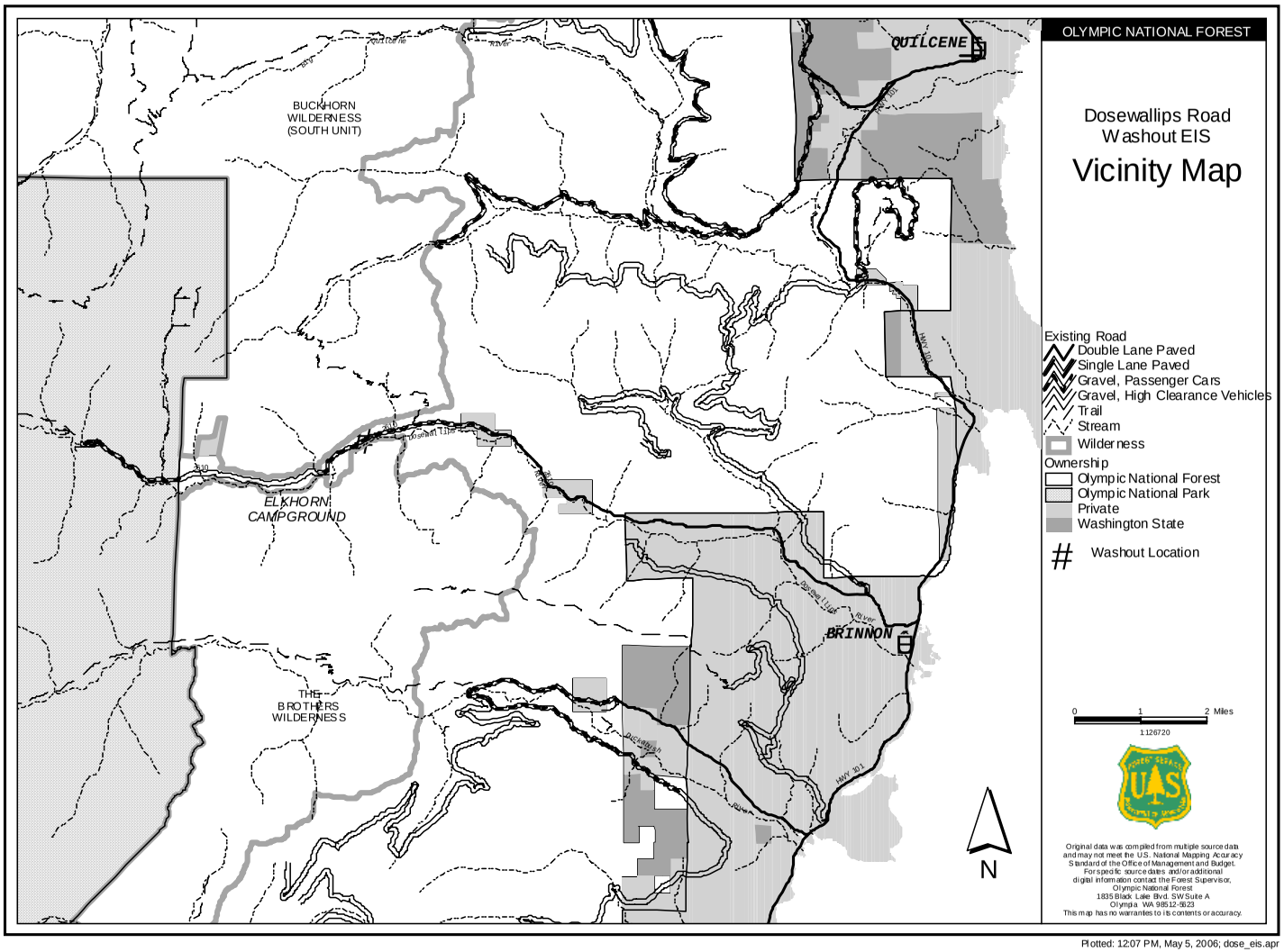

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Figure 2: Washout site showing river, FSR 2610, and proposed reroute

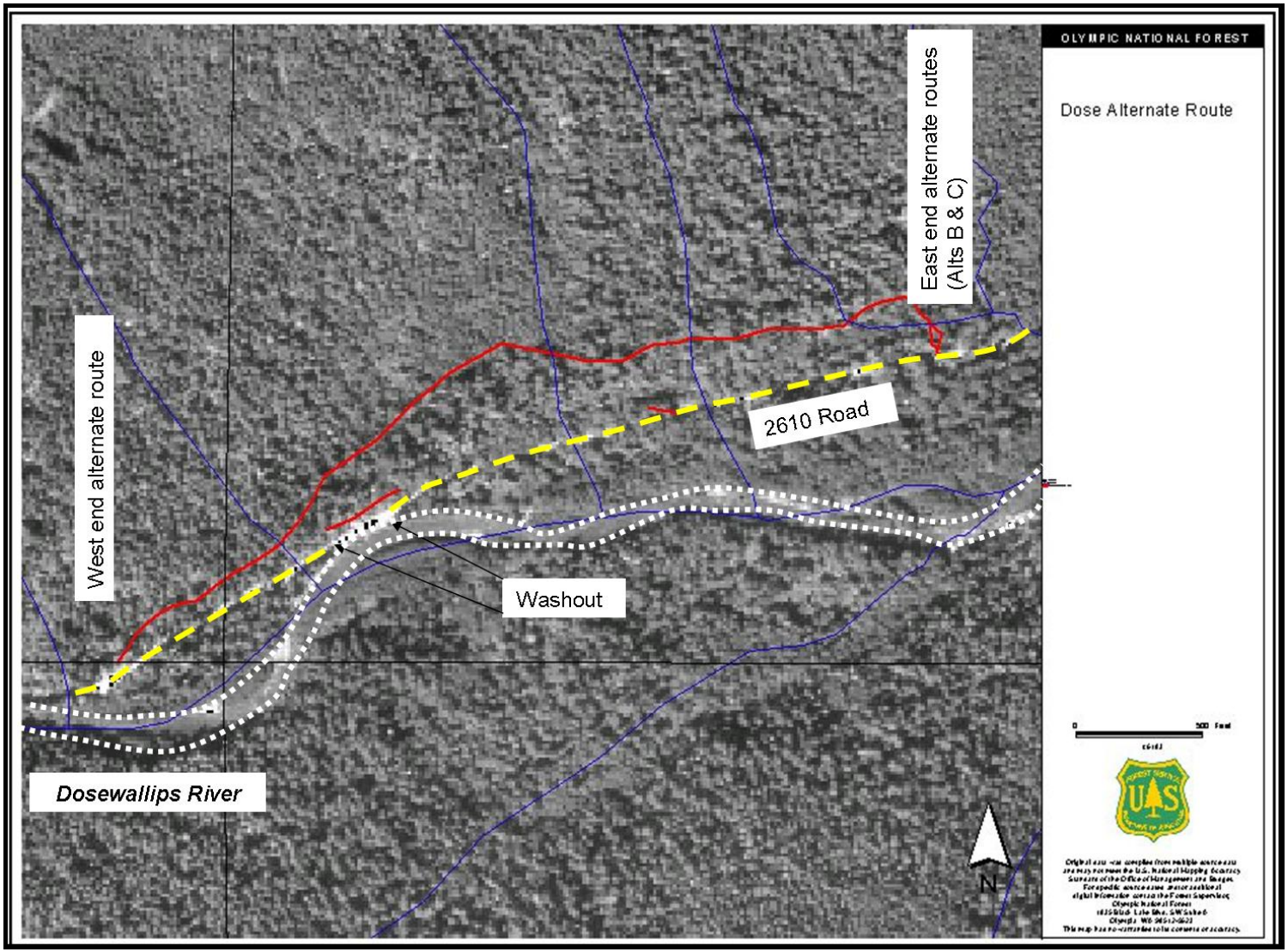


Figure 3: Location of ONP facilities and proposed activity area

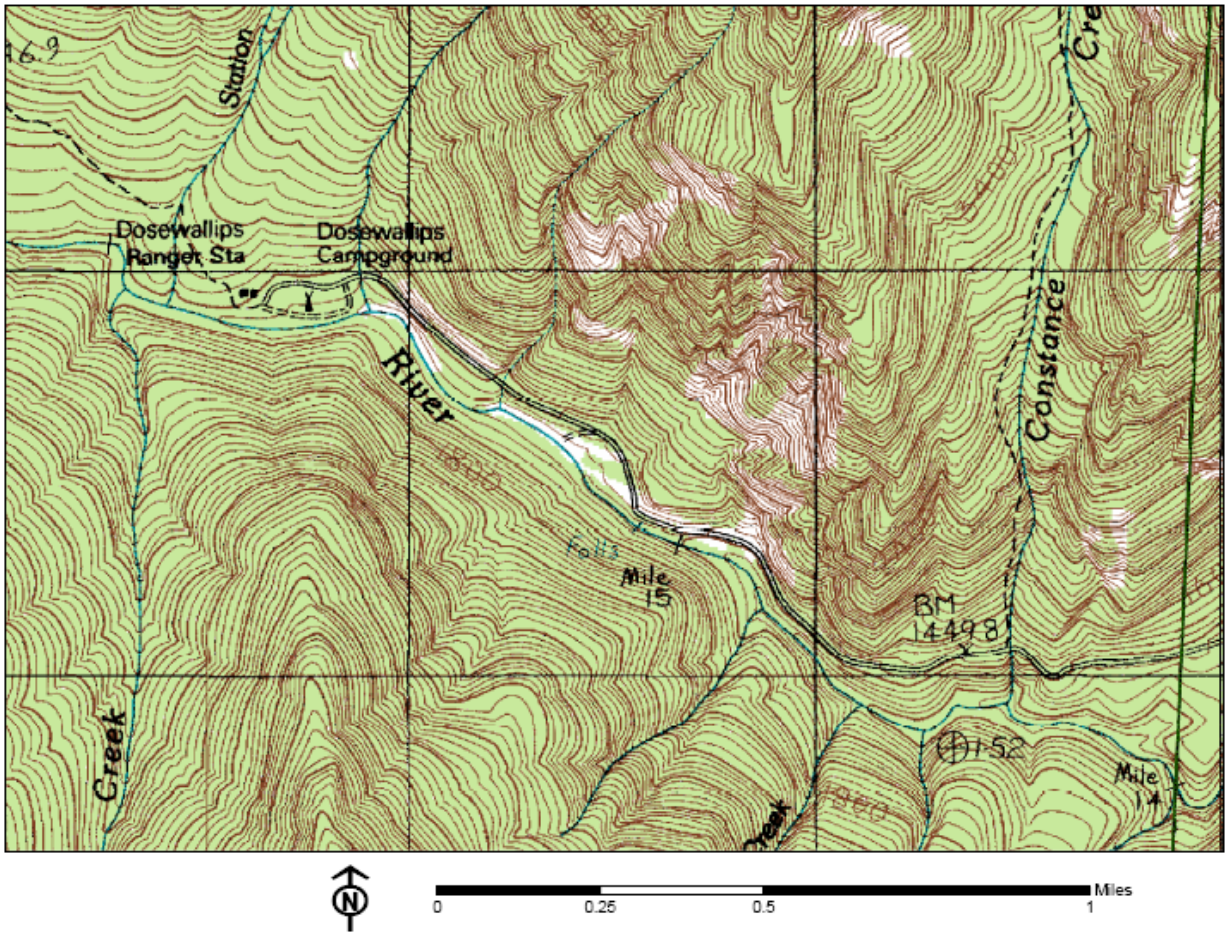
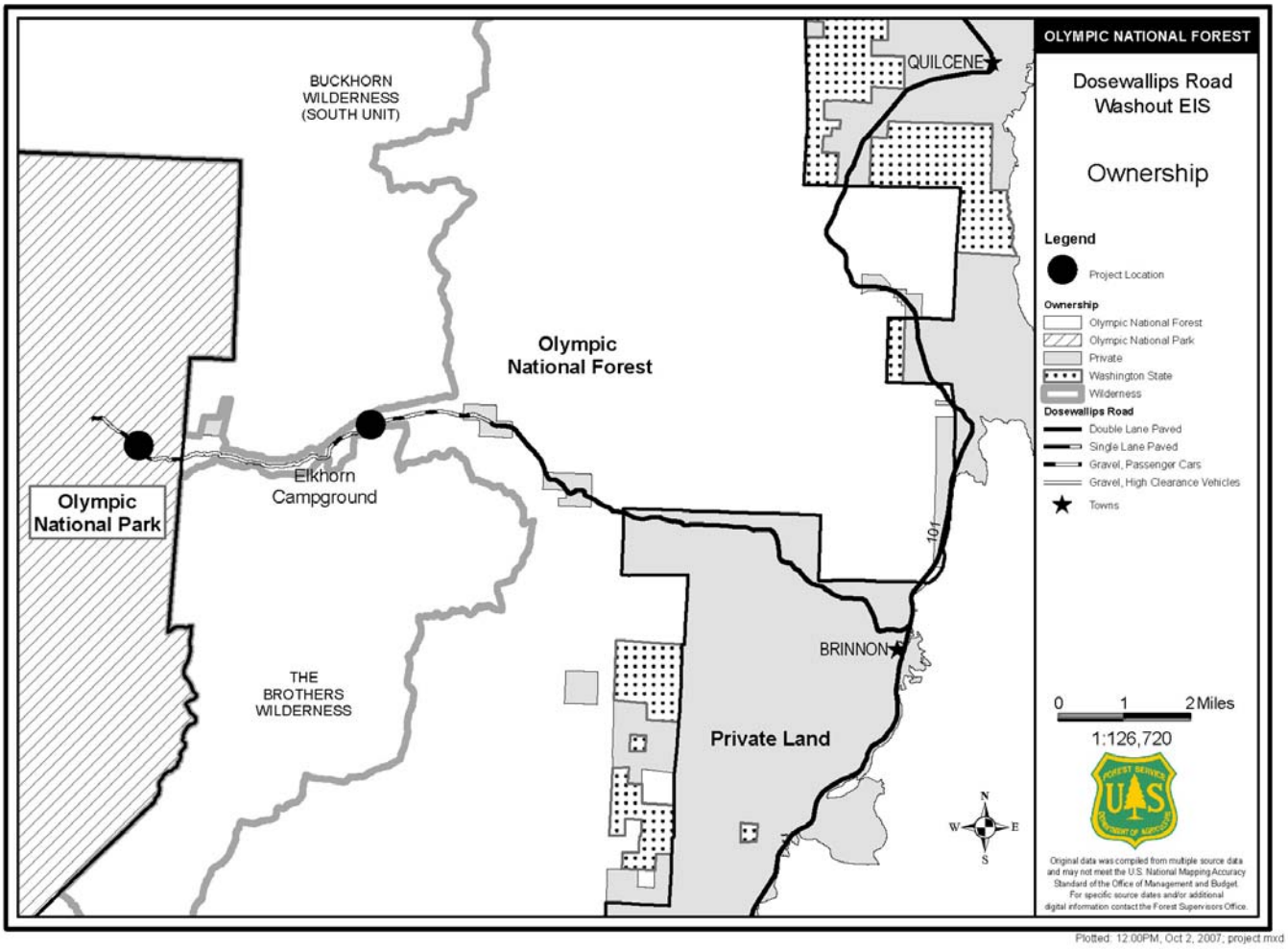


Figure 4: Dosewallips Road and land ownership



Background

During a storm in January 2002 approximately 320 feet of FSR 2610 washed away. The washout site has been surveyed and measured a number of times (2004, 2006, and 2007) since the washout. This monitoring indicates that the outside bend of the river at the washout continues to progress into the bank (lateral shift) and migrate slowly downstream (translation). The change since 2002 has been about 8 to 9 feet per year laterally with a 10 to 15 feet per year downstream translation. The end result is the washout has increased in length to about 510 feet as measured in December 2007 and further into the hill (Figures 5 and 6). The washout cut off road access to approximately 5 miles of FS and ONP roads which had provided access to the ONF Elkhorn Campground and the ONP Dosewallips Ranger Station, campground, and several trailheads. FSR 2610 and the Dosewallips Road provide one of two motorized access portals into ONP on the east side of the Olympic peninsula.

FSR 2610 is a single lane road with turnouts, surfaced with aggregate (crushed rock). This road up to Elkhorn Campground, which includes the washout section, is maintained for passenger cars (FS maintenance level 3)[1]. Prior to the washout it had also provided access to Elkhorn Campground for vehicles pulling trailers and recreational vehicles (RVs). In 2001 approximately 1900 people used campsites at Elkhorn.

Figure 5: FSR 2610 washout area looking north from end of the road (spring 2006)

[1] Maintenance Level 3 – This is a FS designation and means the road is open to public travel and is maintained for passenger car use.

In May 2002 the Forest Service prepared an environmental assessment (EA) to analyze management alternatives to address the conditions created by the washout. Based on a need for additional information, the EA was revised in February 2003. After a public comment period on the February 2003 EA, a decision was made in March 2004 to reestablish road access via a reroute located upslope and north of the washout. This decision was subsequently withdrawn to complete a more detailed analysis, which is documented in this draft environmental impact statement (DEIS).

Figure 6: Washout on FSR 2610 looking toward the north (late 2007)

In late 2003 about 120 feet of the Dosewallips Road in the ONP at MP 0.85 (0.85 miles from the park boundary and about 4 miles from the washout on FSR 2610) near the Dosewallips Falls sustained damage when log retaining walls failed (Figure 7). These cedar log retaining structures were constructed in the 1940's along a very steep area of the exposed bedrock side channel and supported the outbound lane of the road. Failure of the retaining structures resulted in slumping of the road fill material (Figure 8).

Figure 7: ONP Dosewallips Road at MP 0.85

The Dosewallips Road is an extension of FSR 2610 that dead-ends in the park. It is a single lane road with turnouts, surfaced with aggregate, and is maintained at park primitive road standards. A steep section of the road in the vicinity of the road failure is not recommended for large RVs and vehicles pulling trailers. Prior to the washout and road failure it had provided access to the Dosewallips Campgound, Ranger Station, and to a major cross-park trailhead for two trails (the Main Fork and West Fork Dosewallips trails). Lake Constance and Constance Pass trails are also in this area. This is where the road dead-ends in the park and the site where most motorists who travel over FSR 2610 and Dosewallips Road are destined to visit as it is the entrance into the designated ONP wilderness areas. In 1999 approximately 4300 vehicles used the Dosewallips Road annually, and in 2001 use levels were at about 200 vehicles per day (counted in both directions). The road also provided motorized access for park trail maintenance operations on the east side of ONP and a helicopter search and rescue base located near the campground.

Figure 8: Retaining structure failure

Purpose and Need for Action

The purpose and need is defined by the Council on Environmental Quality's Regulations as the underlying purpose and need to which an agency is responding. It discusses the relationship between the existing condition and the desired condition (described by agency goals and objectives).

Existing Condition

FSR 2610 has washed out (Figure 9) at about MP 3.1, and the ONP Dosewallips Road at MP 0.85 beyond the park boundary is damaged and nearly impassible due to a failure of the road's log structure retaining wall. These two roads had provided motorized access to both ONF and ONP recreational facilities along the Dosewallips River, including the Dosewallips Campground and trailhead where the Dosewallips Road dead-ends in ONP. For the park in particular, motorized access had facilitated single day use, provided trailhead access for multi-day hikes, and allowed park visitors who were unable to walk long distances an opportunity to visit a more remote area of the park.

Figure 9: High bank at the washout in November 2007

Desired Condition

The desired condition is to restore public and administrative motorized access to pre-washout standards on FSR 2610 and ONP Dosewallips Road to existing FS and ONP recreational facilities along the Dosewallips River. Access for passenger cars, vehicles pulling trailers, and RVs would be provided to Elkhorn Campground, with passenger car access to Dosewallips Campground, Ranger Station, and trailheads.

Project Purpose

Based on the established need as identified by the diffence between the existing and desired conditions for FSR 2610 and Dosewallips Road, the purpose of this project is to reestablish road access on FSR 2610 and Dosewallips Road to ONF and ONP recreational facilities.

This project is consistent with direction in the 1990 ONF Land and Resource Management Plan (Forest Plan), as amended (including proposed project specific non-significant amendments). The Forest Plan established management prescription *A3 Developed Recreation Sites and Administrative Sites* for the Elkhorn Campground area. This management prescription is dependent on the road access provided by FSR 2610. The Forest Plan also identified this site for reconstruction/expansion to meet the projected increase in demand for developed campgrounds (USDA 1990a). The Northwest Forest Plan amendment (USDA/USDI 1994) also provides management direction for the project area, identifying the area as Late-Successional Reserve and

Riparian Reserve. This direction envisions that existing uses and developments will remain as maintenance of existing facilities is expected to have less effect on current old-growth conditions than development of new facilities.

The park's road system, in this case the Dosewallips Road, is managed to facilitate accomplishment of park purpose, significance, and mission. Park roads are intended to enhance visitor experience while providing safe and efficient accomodation of park visitiors and to serve essential management access needs. Roads are both a means and an end for visitors – they enable one visitor to reach a desired goal, for another they are the goal. FSR 2610 and ONP Dosewallips Road help meet the ONP mission as they provide one of the two motorized access points on the east side of the park. The roads provide access for a more primitive recreational experience for park visitors than those found at the more developed sites with road access elsewhere in the park. This assists the park in meeting its goal of providing a wide range of recreational opportunities.

Proposed Action

A proposed action is a proposal to authorize, recommend, or implement an action to meet a specific purpose and need. It is formed at that stage in the development of an action when agencies; in this case the ONF, WFLHD, and ONP; have goals and are actively preparing to make a decision on one or more alternative means to accomplish those goals (40 CFR 1508.23). It is a starting point from which to help focus identification of issues and alternatives. The proposed action is separate from the "preferred alternative" and "environmentally preferred alternative". The preferred alternative is the alternative which the agency believes would fulfill its statutory mission and responsibilities, giving consideration to economic, technical, and other factors. A preferred alternative will not be identified in this document but will be in the Final EIS. The environmentally preferred alternative is that alternative which will promote the national environmental policy as expressed in NEPA's Section 101 and will not be identified in this document but will be in the Final EIS.

The FS and WFLHD propose to meet the primary purpose and need by restoring road access on FSR 2610 and Dosewallips Road to the access condition which existed prior to the storm events. Initially the proposed action was to rebuild FSR 2610 through the washout area with a low-water crossing, which was formerally Alternative E. However Alternative E was dropped from futher consideration, and now the proposed action is Alternative B (as described in the revised Notice of Intent published in the Federal Register on May 11, 2007). With Alternative B, FSR 2610 would be rerouted along the hillslope above and to the north of the washout to restore access for passenger cars, recreational vehicles, and vehicles pulling trailers. Approximately 0.84 mile of single lane road with turnouts would be constructed using standard construction methods. At the damaged site on Dosewallips Road, approximately 120 feet of road would be repaired and reconstructed to current road standards. A retaining wall would be constructed, and no in-stream work would be required.

Should Alternative B be selected, then the ONF would also need to include a proposal for non-significant Forest Plan amendments, which would waive compliance for this project with certain standards and guidelines for Late-Successional Reserves and Riparian Reserves as identifed in the Record of Decision for the Northwest Forest.

The proposed action is described in more detail in Chapter 2 under Alternative B.

Decision Framework

As a result of this EIS, the FS and FHWA responsible officials (Olympic National Forest Supervisor and WFLHD Division Engineer) will decide whether and how road access on FSR 2610 will be restored and what management requirements, mitigation measures, and monitoring requirements to include as part of the project. The FS will also determine what if any Forest Plan amendments will be required. The decision will include a statement regarding consistency with the Forest Plan and other laws and regulations.

National Park Service (NPS) and FHWA responsible officials (Regional Director, Pacific West Region and WFLHD Division Engineer) will make a decision on restoring road access on the park's Dosewallips Road, which will include any mitigation measures, and management and monitoring requirements. This decision will include a determination on impairment.

Forest Service Management Direction

This EIS is tiered to the Olympic National Forest Land and Resource Management Plan Final Environmental Impact Statement (FEIS) and Record of Decision (ROD) approved July 17, 1990, (USDA 1990b) as amended. A major amendment includes the FSEIS on Management of Habitat of Late-Successional and Old-Growth Related Species Within the Range of the Northern Spotted Owl, as adopted and modified by the April 1994 Record of Decision (1994 NWFP ROD) (USDA/USDI 1994), which provides additional standards and guidelines (commonly known as the Northwest Forest Plan). Northwest Forest Plan documents, including the Record of Decision and Standards and Guidelines, are available on the internet at http://www.reo.gov.

This EIS incorporates by reference the following documents:

- Olympic National Forest Land and Resource Management Plan (Forest Plan) (USDA 1990a). The Forest Plan guides all natural resource management activities and establishes management standards and guidelines.
- Dosewallips Watershed Analysis (USDA 1999). The purpose of this analysis is to develop and document a scientifically based understanding of the ecological structures, functions, processes and interactions occurring within the watershed.
- Hood Canal North Late Successional Reserve Assessment (USDA 1996). This assessment examines the historic and current uses, vegetative conditions, and late-successional forest associated species within the late successional reserve (LSR), as well as identifying appropriate treatments to achieve desired conditions. The Assessment determined that continued recreation use and operation of developed campgrounds (including Elkhorn) within the LSR would not interfere with accomplishment of LSR objectives.
- Olympic National Forest Access and Travel Management Plan (ATM) (USDA 2003). The objective of this planning process was to develop a framework for managing the Forest's present road system in a safe and environmentally sound manner in the context of substantially reduced road maintenance funding. This plan provides the starting point for moving toward a smaller, more affordable road network, and informs future analyses and decisions regarding management of the Forest's road system.
- Geomorphic Processes and Habitat Conditions Along the Dosewallips River in the Vicinity of the Washout on US Forest Service Road 2610 (Cenderelli et al. 2003). This

document summarizes geomorphic characteristics, processes, and aquatic habitat conditions along the Dosewallips River in the vicinity of the washout.

- Dosewallips Road Washout – Choosing by Advantages (CBA) Analysis (USDA 2005a). This is a decision making system or process which bases decisions on the importance of the advantages between alternatives (see following discussion for a more detailed description).
- Council on Environmental Quality (CEQ) Memo – Guidance on the Consideration of Past Actions in Cumulative Effects Analysis (CEQ 2005).
- Dosewallips Road Washout analysis file – contains specialist reports and other technical documentation used to support the analysis and conclusions in this EIS.

A Choosing by Advantages (CBA) Analysis was completed in early May 2005 for this project by a team of Forest Service and park specialists. Forest Supervisor Dale Hom requested this analysis as a means to provide additional insights into the project apart from the NEPA process. This decision making process is based on the importance of advantages and results in recommendations based on a comparison of the advantages between the alternatives. Factors, elements, or components to consider in making the recommendations were identified for the project. The relative advantage each alternative had in addressing these factors was used to make overall recommendations. Results of this analysis provide another source of information for the decision to be made on this project.

The lands within the Forest Service analysis area are allocated to a number of management areas identified in the Forest Plan, as amended. These allocations are briefly described below and shown in figures 10 and 11. Note that these figures were based on the Forest's hydrologic database which has not been updated to reflect the current geospatial relationship between FSR 2610 and the Dosewallips River. See Figure 2 for a true representation of river and road locations. For a more detailed description of each allocation refer to the Forest Plan.

The 1994 ROD (USDA/USDI 1994) incorporates seven land allocations (three of which are found in the project area: Congressionally Reserved Areas, Late-Successional Reserve, and Riparian Reserve) which amend the allocations described in the 1990 Forest Plan. There is considerable overlay among some allocations, and more than one set of standards and guidelines apply (such as Riparian Reserve requirements within a Late Successional Reserve). In addition, standards and guidelines and land allocations in the 1990 Forest Plan not directly superseded remain in effect, and where these standards and guidelines are more restrictive or provide greater benefits to late-successional forest related species than do those of the 1994 ROD, the 1990 standards and guidelines apply.

Congressionally Reserved Areas – These areas include lands with congressional designations that normally preclude timber harvest, such as Wildernesses, Wild and Scenic Rivers, and National Monuments. Management of these lands follows direction written in applicable legislation or plans. Management Prescription B1 in the Forest Plan (USDA 1990a) applies to Olympic National Forest lands classified as Wilderness in the 1984 Washington Wilderness Act and later adjusted in the 1986 Forest/park boundary changes. The primary goal is to preserve and protect in perpetuity the primeval character and influence of Wilderness.

There are two Wilderness areas near the project area. The Buckhorn Wilderness area is to the north and The Brothers Wilderness area is to the south. No project activities are proposed within Wilderness.

Late-Successional Reserves - Late-Successional Reserves (LSR) are identified with an objective to protect and enhance conditions of late-successional and old-growth forest ecosystems, which serve as habitat for late-successional and old-growth related species, including the northern spotted owl. Road construction in LSR for silviculture, salvage, and other activities is not generally recommended unless potential benefits exceed the costs of habitat impairment.

The project area is located within the Hood Canal North LSR.

Riparian Reserves - Riparian Reserves (RR) are portions of watersheds where riparian-dependent resources receive primary emphasis and where special standards and guidelines apply. As a general rule standards and guidelines for Riparian Reserves prohibit or regulate activities in Riparian Reserves that retard or prevent attainment of the Aquatic Conservation Strategy (ACS) objectives. Riparian Reserves include those portions of a watershed required for maintaining hydrologic, geomorphic, and ecological processes that directly affect standing and flowing waterbodies such as lakes and ponds, wetlands, streams, stream processes, and fish habitats. Riparian Reserves occur at the margins of standing and flowing water, intermittent stream channels, ephemeral ponds, and wetlands. They generally parallel the stream network but also include other areas necessary for maintaining hydraulic, geomorphic, and ecological processes.

For fish-bearing streams, riparian reserves consist of the stream and the area on each side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of the riparian vegetation, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance (600 feet total, including both sides of the stream channel), whichever is greatest. The two differing criteria for nonfish-bearing streams is only one site-potential tree height is used and the slope distance is reduced to 150 feet.

The interdisciplinary team considered the entire FS project area as Riparian Reserve, although as mapped, a portion of the terrace area in the reroute alternatives is outside the RR area.

Key Watershed – Key Watersheds overlay portions of other land allocations designated under the Northwest Forest Plan and place additional management requirements on activities in these areas. As one of the four components of the Aquatic Conservation Strategy they form a system of large refugia comprising watersheds that are crucial to at-risk fish species and stocks, and provide high quality water. Tier 1 (Aquatic Conservation Emphasis) Key Watersheds contribute directly to conservation of at-risk anadromous salmonid, bull trout, and resident fish species.

The Dosewallips watershed is designated as a Tier 1 Key Watershed. The majority of the watershed, 92 percent, is in federal ownership. Ownership by acreages are: ONP – 47,200, ONF – 21,600, and state/private – 5,600.

A1B Undeveloped Recreation (Motorized) – The primary goal of this management area is to provide a variety of undeveloped recreation opportunities in areas characterized by a predominantly natural or natural-appearing environment in a Semi-Primitive setting where motorized use may be permitted. Facilities should be kept to a minimum but provided when needed for access, resource protection, safety, and habitat improvement.

This management area is primarily found just north of the road proposed in the reroute alternatives (a small section of the east end of the road reroute proposal is within this allocation), and in areas along FSR 2610 upstream of the washout.

A2 Scenic – The primary goal of this management area is to manage specific landscapes in such a manner that their scenic values are protected, maintained, and/or enhanced as viewed from major travel routes, use areas, or water bodies.

This management area is found at the end of FSR 2610040 (a short spur road off FSR 2610 upstream of the washout), approximately one quarter mile southwest of the project area.

A3 Developed Recreation Sites and Administrative Sites – The primary goal of this management area is to provide readily accessible, appropriately designed facilities for concentrated use by people seeking a convenient recreational experience, employees performing duties, and visitors seeking information.

This management prescription is found at the Forest's Elkhorn Campground, located off FSR 2610 about 1 mile past the washout. FSR 2610-050 accesses the campground.

A4BN River Corridors – Natural Management Rivers - The primary goal of this management area is to retain the inherent values of these rivers and to provide a variety of outdoor recreation opportunities in a pleasing scenic environment while maintaining or enhancing wildlife and fish habitat. Some evidence of timber harvest and housing may be visible, but the shorelines are generally undeveloped. The forest along the riverbanks generally appears natural when viewed from the river. The rivers are accessed in places by roads. Roads may reach and occasionally bridge rivers.

The west ends of the proposed road reroutes are within this management area allocation. Additionally it is found along the Dosewallips River upstream and downstream of the project area.

C3 Bald Eagle Management Areas – The primary goal of this management area is to provide sufficient habitat for nesting and wintering bald eagles so as to expedite their removal from the Federal and State threatened or endangered species lists. Additional goals are to: 1) provide a long-term natural gene pool of all species, plant and animal, found in this ecosystem; 2) provide an area to study this type of ecosystem; and 3) provide for aesthetic needs.

The washout area and majority of Forest Service proposed activities occur within this management area allocation.

E1 Timber Management – The primary goal of this management area is to produce timber on a long-term sustained yield basis.

This management area allocation is found down river of the project area, approximately one half mile to the southeast.

F2 Riparian Areas – The primary goal is to protect, manage, or improve the unique values of riparian areas for wildlife and fish habitat, and water quality.

This management allocation is not mapped but consists of the zone extending 200 feet on each side of a streamcourse or other water body.

Inventoried Roadless Area (IRA) – The area directly south of the Dosewallips River and east of The Brothers Wilderness lies within the Jupiter Ridge IRA. Management of IRAs is currently governed by the 2001 Roadless Area Conservation Rule (USDA 2001). All activities associated with the proposed action and all other alternatives considered in this assessment would occur well outside the Jupiter Ridge IRA (the nearest boundary is approximately one quarter mile southeast of proposed activities) and thus would have no effect on its roadless characteristics.

Roads Analysis - Forest Service Manual 7712.15 provides that decisions made after January 12, 2002, must be informed by a roads analysis unless the Responsible Official determines that such an analysis is not needed. This EIS analysis is informed by the Forest's Road Management Strategy and the Hood Canal District Access and Travel Management Plan, which in combination, form the Forest's roads analysis.

Figure 10: Forest Plan allocations

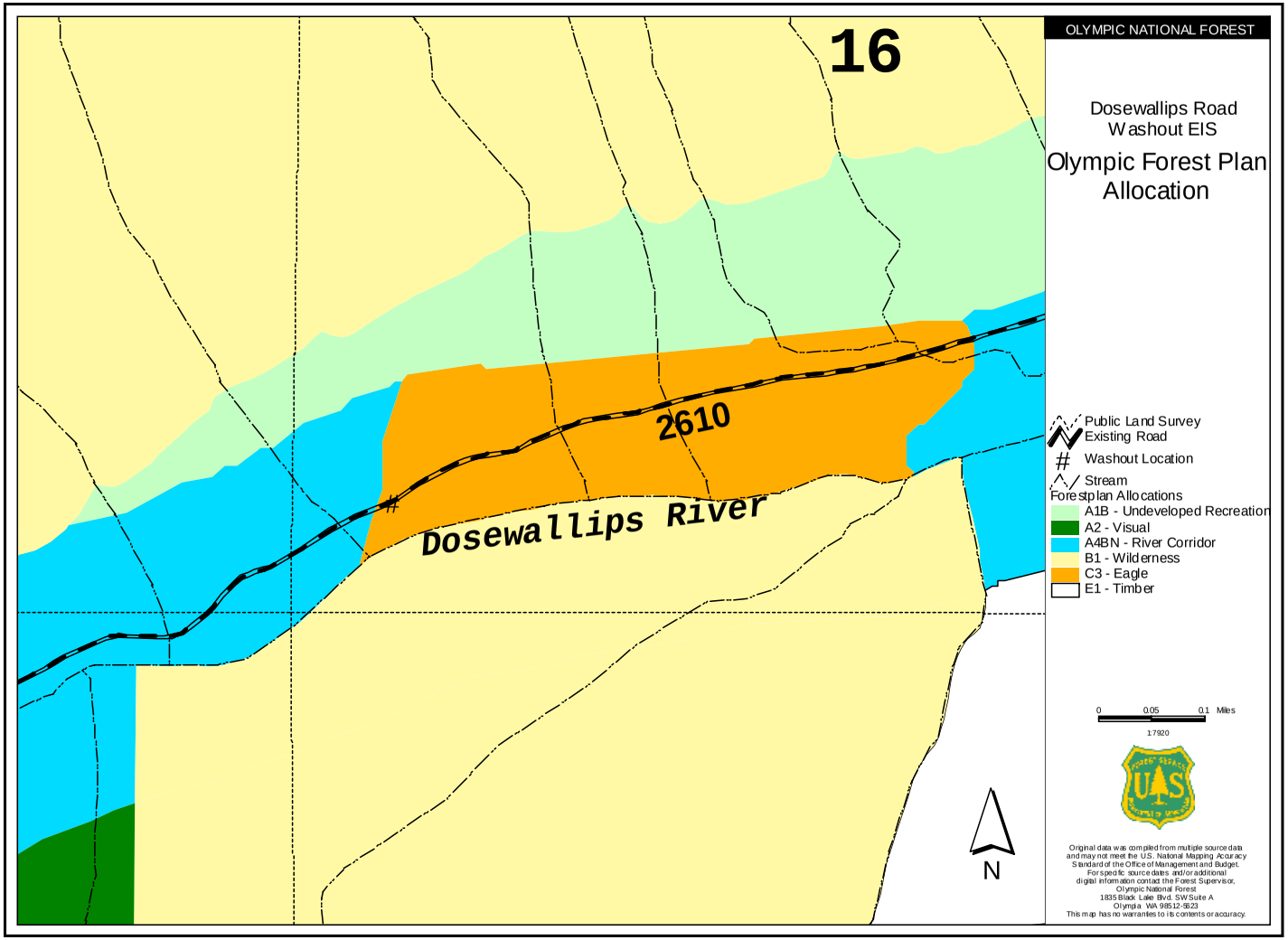


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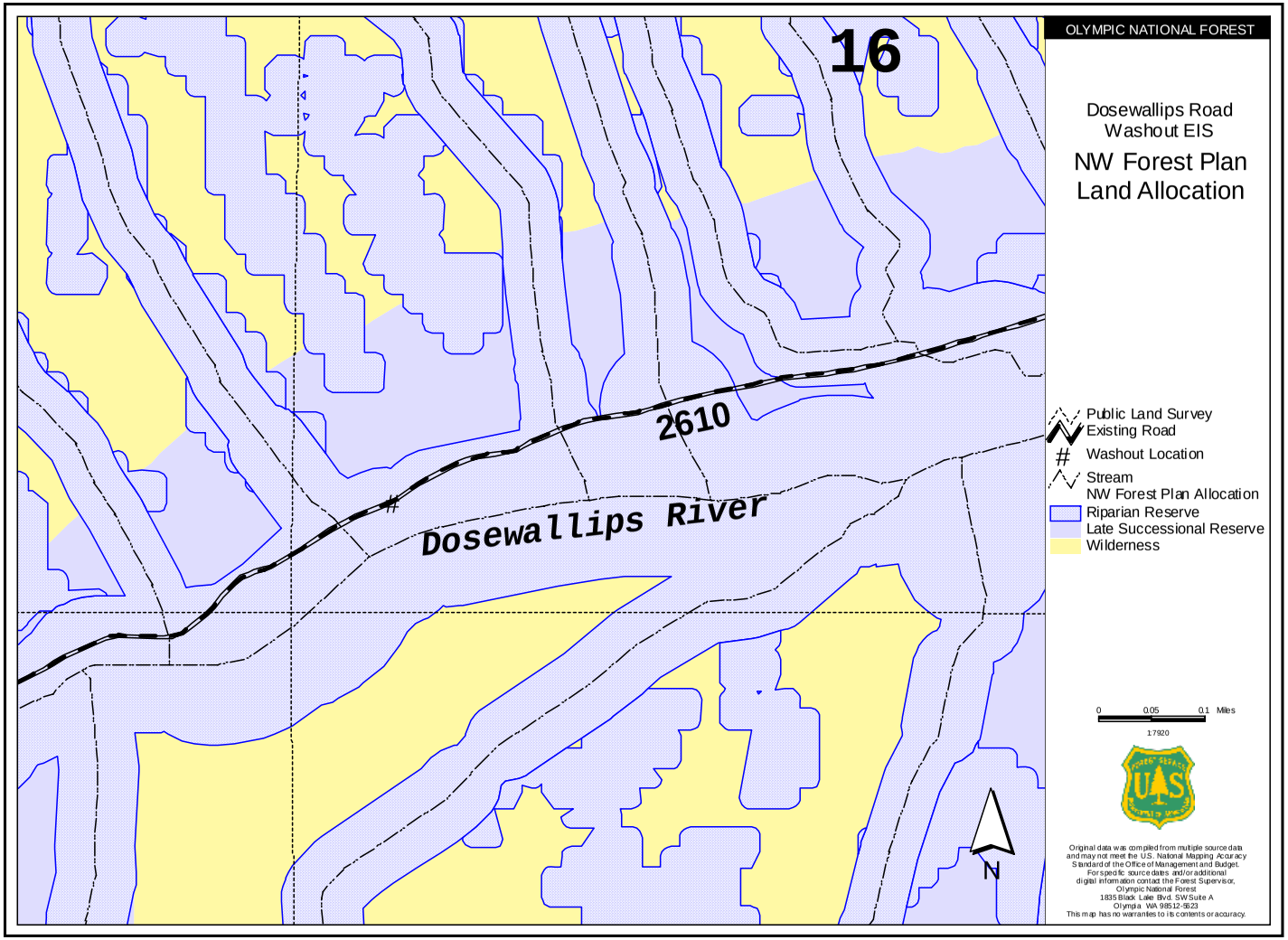
Figure 11: NW Forest Plan allocations



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ONP Management Direction

Park activities are directed by the following two management documents.

1) Olympic National Park Master Plan (ONP 1976). This plan outlines park purposes to preserve, protect, and interpret, for the enjoyment and benefit of the American people. The plan integrates park actions into the natural environment of ONP. Established goals related to access have also been addressed in this master plan.
2) Olympic National Park Statement for Management (ONP 1996). This document includes information regarding the park's purpose, the natural and cultural resources found in the park and their significance, the legislative history, and the jurisdiction over ONP and the surrounding areas of the peninsula.

ONP is currently developing a general management plan (GMP). The draft GMP was released for public review from June 15 to September 30, 2006. The park anticipates final completion of the GMP in 2008. The GMP will evaluate existing and future potential road access objectives and alternatives for ONP, including the Dosewallips area. While the ONP has not selected an alternative for the GMP, the proposed action is consistent with ONP's preferred alternative identified in their draft plan. Until the GMP is finalized the park operates under the existing management strategy as defined in the management documents described above.

Public Involvement

To keep the public informed about this project and help identify project related issues, a number of public involvement strategies have been used over the life of this project, since the damage occurred to FSR 2610 in 2002. All comments received from the initial scoping conducted in March 2002 through those submitted on this EIS have been included in the analysis file and have been considered during this current analysis.

Project scoping initially began with a scoping letter sent to interested publics and local, state, and federal government agencies on March 22, 2002. On May 30, 2002, the initial environmental assessment (EA) was made available for public comment. Additionally an open house was held at the Hood Canal Ranger District Office in Quilcene on June 18, 2002. The project was also listed in the Forest's quarterly Schedule of Proposed Actions (SOPA). After the public comment period for the 2002 EA, further studies resulted in additional information becoming available.

The additional information was analyzed in a revision of the 2002 EA. The revised EA was completed and made available for public comment on February 27, 2003, through a letter sent to the project mailing list, legal notice in the newspaper of record, and news releases. A decision to reestablish road access via an upslope reroute was made on March 22, 2004. This decision was announced through letters sent to the project mailing list, legal notice in the newspaper of record, and a news release. This decision was subsequently withdrawn in order to complete additional analysis, documented in this EIS.

A Notice of Intent (NOI) to prepare an EIS for this project was published in the Federal Register on August 12, 2005. Minor corrections to the NOI (location clarification and park email address) were published in the Federal Register on August 26, 2005. The notice asked that comments on the proposed action be received within 30 days following publication of the notice. A revised

NOI was published on May 11, 2007 to notify the public of a change in the proposed action as well as a delay in when the draft EIS would be completed. In addition, as part of the public involvement process, the Forest mailed 267 scoping letters on August 16, 2005, to interested publics and local, state, and federal government agencies. There was also a news release for the project, and it has been included in the Forest's quarterly SOPA. Over 100 comments on the proposed action were received and considered in the development of this DEIS.

Tribal Consultation

The FS has been conducting on-going consultation with tribal governments throughout the development of this project in recognition of their government to government relationship with them. There have been letters to tribal governments and personal contacts by the Hood Canal District Ranger with representatives of the Jamestown S'Klallam, Port Gamble S'Klallam, Lower Elwha Klallam, and Skokomish Tribes concerning this project. Tribal resource specialists have been invited to and have attended interdisciplinary team (IDT) meetings for this EIS. Tribal concerns included that a road decommissioning-convert to trail option was not fully considered in this analysis, as well as concerns about potential impacts to river and old-growth resources.

Issues

In addition to issues identified by the Agencies, comments from the public, other agencies, and tribes were used to identify issues concerning the proposed action that are truly important to the action and thus deserving of study. The identified issues are also being used to aid in distinquishing and comparing the alternatives. The final decision will be based on a comparison of the respective alternative's ability to address the identified issues as well as the overall purpose and need for the proposed action.

Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council of Environmental Quality (CEQ) NEPA regulations explain this delineation in 40 CFR 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec 1506.3)…". A list of non-significant issues and reasons why they were found non-significant may be found later in this chapter.

Issues for Detailed Study

Road Management

The proposed action would have short-term construction and long-term maintenance costs, and user safety is an important consideration.

Indicators: Construction costs.
Maintenance costs.
User safety.

Geotechnical and Geomorphic Processes

Concerns were expressed regarding the uncertainty of geotechnical conditions along the proposed reroute alternatives for FSR 2610, especially in the area of slope stability. Also an

understanding of the geomorphic processes (those processes which create or shape land forms) is important in evaluating the alternatives and in understanding the dismissal of those alternatives which would repair FSR 2610 in the river channel approximately on the original road location along the river. Geomorphic processes have the potential to affect future structure failures and sediment (spawning gravel) supply.

Indicators: Discussion of slope stability.
Discussion of river (fluvial) processes and sediment (spawning gravel) supply.

Soil Productivity

Some concerns were expressed that newly constructed or reconstructed roads have the potential to locally reduce soil productivity and negatively impact site productivity, water quality, and aquatic habitat conditions. These and other associated management activities could result in soil compaction, surface erosion, mass wasting (such as landslides), modifications of surface and subsurface hydrology, alteration of wetland functions, and sedimentation into nearby streamcourses. Others think that these concerns can be addressed through appropriate project design and implementation of mitigation measures.

Indicators: Narrative description of the effects of activities on soil productivity, hillslope hydrology and sedimentation to streamcourses, including:

- Area in detrimental soil condition (short and long-term), loss or gain in soil productivity (quantitative), and expected surface erosion (qualitative).
- Hillslope hydrology, including possible alteration of both surface and subsurface water flows and wetland areas.

Aquatic Species and Habitat Conditions

Fish bearing streams within the project area include the Dosewallips River and an unnamed tributary located just downstream of the washout. Some are concerned that road reconstruction may alter channel dynamics, sediment delivery, and riparian conditions in these waterbodies. They think the proposed action could affect the amount and quality of spawning and rearing habitat for a number of anadromous fish species, including Endangered Species Act (ESA) listed Chinook salmon. Others think that road access can be restored in an environmentally acceptable manner and that effects to aquatic habitat can be kept to acceptable levels through project design and mitigation measures.

Indicator: Narrative description incorporating selected indicators taken from the National Marine Fisheries Service (NMFS) “Matrix of Pathway and Indicators”, which include: sediment, large woody debris, pool frequency and quality, off-channel habitat, width/depth ratio, streambank condition, drainage network increase, road density and location, temperature, and riparian reserve function.

Terrestrial Species and Habitat

Some are concerned that proposed activities may affect Threatened or Endangered (T&E) species; FS Sensitive species; Management Indicator Species (MIS); Species of Concern; the habitat functions of Late-Successional Reserves; or the functions of marbled murrelet and northern spotted owl critical habitat units. Others think that road access can be restored in an

environmentally acceptable manner, and the effects to terrestrial wildlife and habitat can be kept to acceptable levels through project design and mitigation measures.

Indicators: Narrative description of effects and effect determinations to the above mentioned species groups and habitats.
Amount of late-successional reserve acres removed through road construction.

Botanical Species and Habitat

Concerns were expressed that project activities have the potential to affect botanical species and habitat.

Indicator: Degree of effects to FS Sensitive botanical species and habitat.

Invasive Plants

There are existing populations of invasive plants in the project area. Road construction activities resulting in the exposure of mineral soil, create conditions favorable to the spread of invasive plants.

Indicators: Areas of newly exposed soil.
Presence of existing invasive species.

Access and Recreation Use

There are concerns with reestablishing the road and thereby allowing motorized access past the washout area. Some think that non-motorized access past the washout area provides opportunities to enjoy the features of the area (river corridor and adjacent wilderness areas) in a quieter and more slow-paced manner. They think the relatively easy walk on the road past the washout provides a valuable, low-elevation hiking opportunity. Others believe it is important to provide road access past the washout in order to provide access to all users and not restrict visitation to those physically able or having the time to make the walk past the washout. They want everyone to be able to experience the more remote Forest and park areas that exists past the washout.

Indicator: Narrative discussion of recreation uses.
Deferred maintenance and start-up costs.

Wilderness

Project activity is proposed within a narrow corridor between the Buckhorn and The Brothers Wildernesses. While no activities are proposed within the Wilderness areas themselves, there could be indirect impacts to Wilderness values.

Indicator: Degree of effect to Wilderness character.

Social/Economic

Some have expressed concerns with respect to the social and economic effects of on-going restricted access past the washout to the communities along Highway 101 in the vicinity of the Dosewallips River. They think that road access to Forest and park recreational facilities past the washout are an important aspect of the local and southern Jefferson County economies. Others

think that the economic impacts of the restricted access are overstated and that reopening the road would cost too much.

Indicator: Narrative description of the connection between road access and local businesses, and a qualitative measure of economic efficiency expressed as present value of discounted costs.

Visual Quality (specific to ONF)
Proposed activities could affect the visual quality of the project area.

Indicator: Degree of effect to Visual Quality Objectives (VQO).

Climate Change
Concerns were expressed regarding the potential for increasing stream flow conditions as a result of climate trends and how this would relate to the risk of future road washouts.

Indicator: Risk of structure failure associated with high stream flows.

Soundscapes (specific to ONP)
A National Park Service (NPS) policy states that the NPS will strive to preserve the natural quiet and natural sounds associated with the physical and biological resources of parks. The noise associated with the proposed repair on ONP land could temporarily adversely affect park resources by modifying or intruding upon the natural soundscape.

Indicator: Degree of effect of noise associated with park project activities.

Park Operations (specific to ONP)
Park operations refer to the quality and effectiveness of their facilities. For the proposed project, an issue was developed regarding the park's ability to maintain the Dosewallips Road in order to adequately protect and preserve vital resources, maintain existing facilities and trails in the Dosewallips area, and provide for a successful visitor experience.

Indicator: Degree of effect on the park's ability to maintain facilities.

Non-significant Issues

Private Land Access
The New Elkhorn Group of Mining Claims, eighty one acres of private land, is located upriver from the washout near the park boundary, about ¼ mile north of FSR 2610. The legal description is T.26N., R.04W., Sections 13 and 24. There are no roads directly accessing these claims, and FSR 2610 had provided the closest road access to the claims. One of the claimants responded during the comment period on the 2003 EA with a request for road access along FSR 2610. No comments from claimants were received during the EIS scoping period.

The right of reasonable access for purposes of prospecting, locating, and mining is provided by statute. Reasonable access must be in accordance with Forest Service rules and regulations while not preventing lawful mineral activities or causing undue hardship on miners. Mining activity on these claims has been limited in recent years, and details of any future activities have not been presented to the Forest Service (as in a Plan of Operations). Access to the claims is currently

provided by foot or pack-stock, and this is considered a sufficient level of access to support current activities. If the level of activity changes, future access needs would need to be considered at that time. At this time a decision on access is not considered "ripe" in a NEPA sense and will not be part of this decision.

Increased Drug Activity

A concern was raised about increased illegal drug activity on National Forest System Land in the Dosewallips River area related to the decreased traffic (both Forest Service and public) associated with the limited access.

Forest Service law enforcement personnel reported that although law enforcement activity in the Dosewallips area has been down since the washout, there is no indication of an increase in illegal drug use associated with the limited access.

Unmanaged Garbage and Human Waste

A concern was raised about possible health impacts to down river residents due to unmanaged recreation use along the Dosewallips River at and upriver of the washout area. Sanitation facilities at both the Forest Service and park campgrounds have been closed since the washout occurred.

Recreation beyond the washout area has been limited to activities which can be supported by non-motorized access. This has reduced the numbers of people using the area from what occurred with motorized access. Forest and park personnel have not observed levels of improperly disposed garbage or human waste which would pose a health concern for down river residents.

Dosewallips Road in Wrong Location

Some respondents indicated their belief that the entire Dosewallips River road is in the wrong location to support the ecological objectives of the Aquatic Conservation Strategy and assist in the recovery of threatened salmon. Some expressed concerns that due to the road's location in relation to the river there is potential for future washouts in locations other than the washout which is the subject of this analysis.

The issue of the entire road's location is beyond the scope of this project and would need to be considered in a separate analysis which focused on this issue.

Dosewallips Road is Dangerous

A concern was expressed that the unpaved portion of the Dosewallips River road is a terrible road for most vehicles and is very dangerous and dusty.

The Forest Service and park maintain their respective portions of the Dosewallips River road to meet management needs and provide for public safety. Road maintenance levels were established prior to the washout and would continue to be implemented if a decision is made to reestablish road access. A change in the maintenance level for the road is beyond the scope of this project and would need to be considered in a separate analysis which focused on this issue.

Oil Availability and Fuel Costs

Some respondents stated that the EIS should consider the reality of the decline of oil availability and the cost of fuel to keep vehicles running as part of this project's decision.

This issue is beyond the scope of this project.

Obesity and Public Health
A statement was made that Americans are dying of obesity and they need to walk and hike, and that this should be considered while making a decision on this project.

This issue is beyond the scope of this project.

Eliminate Reconstruction of Washout Prone Roads
A suggestion was made that the Olympic National Forest Plan be amended to eliminate the reconstruction of non-critical roadways that are prone to washouts.

This issue is beyond the scope of this project.

Consider Recreation Use in the Watershed
A respondent suggested that the EIS consider the larger picture of recreation use in the entire Dosewallips watershed.

This issue was considered to a degree as part of the cumulative effects analysis for the recreation resource, but a full study and consideration of recreation use in the watershed is beyond the scope of this project.

Project Prioritization and Funding
A concern was expressed that there are many other projects whose importance exceeds the need to reestablish road access on FSR 2610, and funds spent for road access would be much better spent on salmon recovery and other vital work.

The issue of prioritizing Forest and park projects and funding is beyond the scope of this project.

CHAPTER 2 - ALTERNATIVES

Introduction

This chapter describes and compares the alternatives considered for the repair of the washout on FSR 2610 and damaged fill on the Dosewallips Road. It includes a description of each alternative considered and presents them in a comparative form, displaying the differences between each alternative and providing a clear distinction for public review and comment, and for a subsequent decision by the Responsible Officials. Topics discussed in this chapter include:

- The process used to develop the alternatives.
- A description of alternatives considered but dismissied from detailed study (including the rationale for elimination).
- A description of alternatives considered in detail.
- Management requirements.
- A monitoring plan for implementation and effectiveness of the eventual decision.
- A comparison of the alternatives considered in detail.

Alternative Development

The proposed action was developed to address the purpose and need for action in the project areas. Public comments on the proposed action were encouraged through a scoping letter, Notice of Intent in the Federal Register, and the ONF's Schedule of Proposed Actions (SOPA). Responses to these scoping efforts as well as comments received during previous NEPA analyses for this project were used to identify issues or concerns regarding the proposed action.

Five build alternatives were originally developed to satisfy the purpose and need for the project for the washout on FSR 2610, while there is only one alternative for repairing the damaged fill of the Dosewallips Road at MP 0.85 within ONP. As subsequently explained, two of these alternatives have been dismissed from further consideration. The interdisciplinary team (IDT) preliminarily evaluated each alternative in terms of its ability to meet the project's purpose and need, its feasibility, and its impacts to resources and issues developed during scoping.

National Environmental Policy Act regulations require that federal agencies identify a preferred alternative or alternatives in the DEIS if one or more exists after detailed review of the analyses of the potential environmental consequences. As previously stated in Chapter 1, a preferred alternative has not been identified at this time. The environmentally preferred alternative has also not been identified in this DEIS.

Alternatives Considered but Eliminated

The NEPA requires federal agencies to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail. The Agencies' discussions and public comments received in response to the Proposed Action provided suggestions for alternative methods of addressing the conditions created by the washout on FSR 2610 and the damaged fill on the Dosewallips Road. The Agencies considered these alternatives and eliminated the following from detailed consideration

along with rationale for their dismissal.

Alternatives Evaluated in Detail but Eliminated from Consideration

Although Alternatives D and E were evaluated in detail by the IDT, they were eventually eliminated from futher consideration. In a December 20, 2006, interagency meeting the Agency executives considered the results of the IDT alternative evaluations and scoping input from National Oceanic Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS). NMFS stated serious concerns about replacing the washed-out road into the Dosewallips River channel, as this potential placement could result in a serious long-term affect so great as to jeopardize the continued existence of the Puget Sound Chinook salmon Evolutionary Significant Unit (ESU). Based on their review the Agency executives determined that the two alternatives (Alternatives D and E) which propose establishing the road bed into the river channel have unacceptable environmental impacts and will be dismissed from further consideration. A more complete description of these alternatives can be found in Appendix A, and a detailed analysis can be found in Appendix B and project specialist reports.

Replace-in-Kind – Formerally Alternative D

This alternative would reestablish road access in the washout area as close to the preexisting conditions as possible. It would be designed to meet the project's purpose and need, minimize impacts to terrestrial habitats by avoiding the clearing associated with road construction in LSR, and minimize construction costs.

A single lane road about 500 feet in length would be reconstructed similar to what existed prior to the washout. It would provide access for passenger cars, recreational vehicles, and vehicles pulling trailers. The horizontal alignment would swing into the hillside as much as possible without undercutting the slope while also providing sufficient catchment area at the base of the slope to accommodate bank sloughing and ravel. Near the upstream portion of the washout the road fill would occupy about one-half of the existing bankfull channel width. The bluff slope would be laid back to a slope angle of 1 horizontal:1 vertical (1h:1v) to create a more stable slope. This would require moving the top of the slope back about 60 feet and removing about 0.7 acre of ground. There would be clearing of danger trees for approximately 100 feet from the top of the laid back slope, involving about 1 acre of forest within LSR. Road bank protection (most likely in the form of rip rap) would extend along the new construction area and approaches for a distance of about 680 feet.

This alternative would also include mitigation to compensate for the impacts to the Dosewallips River and the fish it supports. Approximately five log complexes would be constructed in the river near the project area. These complexes would be designed to: (a) dissipate the increased flow energy that would be translated downstream from the project site, (b) redirect flow toward the south stream bank at the mid-level terrace to encourage channel migration in that direction and possible recruitment of spawning gravels and large wood from a high terrace, and (c) create cover, rearing, and spawning habitat.

Additionally the Dosewallips Road at milepost 0.85 would be repaired. This section of road is in the vicinity of the Dosewallips Falls. Approximately 120 feet of road that was constructed in the 1940's on log retaining wall/structures failed in late 2003. The road would be repaired by

removing the old road fill material and reconstructing the road prism by using riprap and crushed rock to form a foundation on which structural backfill would be constructed. Stabilization techniques would be used to protect the stabilized fill from erosion. All of the construction would be above the ordinary high water line of the river.

The cost of road construction was estimated in early 2006 at $1.72 million (costs have not been updated to 2008 values).

This alternative would include site-specific, non-significant amendments to the Forest Plan. These amendments are associated with Aquatic Conservation Strategy (ACS) objectives and management direction for Key Watersheds.

Low-water Revetment – Formerally Alternative E

This alternative would reestablish road access in the washout area as close to the preexisting location as possible with a low-water revetment. It would be designed to meet the project's purpose and need, minimize impacts to terrestrial habitats by avoiding the clearing associated with road construction in LSR, and minimize construction costs. As compared to Alternative D it would also lessen aquatic habitat and riparian function impacts by reducing the reconstruced road's encroachment into the river, thereby allowing some gravel recruitment from the high bank.

About 500 feet of single land road would be reconstucted. It would provide seasonal access for passenger cars, recreational vehicles, and vehicles pulling trailers. The horizontal alignment would be similar to former Alternative D and would swing into the hillside as much as possible without undercutting the slope, while also providing sufficient catchment at the base of the slope to accommodate bank sloughing and ravel. In the area close to the upstream portion of the washout the road fill would occupy about one-third of the existing bankfull channel width. There would be no scaling back of the bluff slope, but there would be clearing of danger trees for approximately 100 feet from the top of the slope, involving about 1 acre of forest within LSR.

The height of the roadway surface would be at a grade to minimize the road's footprint while meeting design criteria for a 10-year flood (Q10). The design would be such that the road would be overtopped by the river during moderately large flood events, such as a 10-year flood. This alternative also would have long-term road maintenance needs due to slope ravel and repairs to the road's surface after flood events.

Additionally the Dosewallips Road at milepost 0.85 would be repaired. This section of road is in the vicinity of the Dosewallips Falls. Approximately 120 feet of road that was constructed in the 1940's on log retaining wall/structures failed in late 2003. The road would be repaired by removing the old road fill material and reconstructing the road prism by using riprap and crushed rock to form a foundation on which structural backfill would be constructed. Stabilization techniques would be used to protect the stabilized fill from erosion. All of the construction would be above the ordinary high water line of the river.

The cost of road construction was estimated in early 2006 at $1.40 million (costs have not been updated to 2008 values).

This alternative would include site-specific, non-significant amendments to the Forest Plan.

These amendments are associated with Aquatic Conservation Strategy (ACS) objectives and management direction for Key Watersheds.

Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives, and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail. IDT discussions and public comments received in response to the Proposed Action provided suggestions for alternative methods of addressing the conditions created by the washout. The IDT considered these alternatives and eliminated the following from detailed consideration. The rationale for their dismissal is included.

Alternatives to the Repair of FSR 2610

Southern Road
Road access to ONF and ONP recreational facilities would be established on the south side of the river by utilizing FSR 2610-010 (Six Mile bridge road) and FSR 2610-012 and constructing a connector road to FSR 2610-040 (Ten Mile bridge road). This route was proposed as an alternative to reestablishing road access on the north side of the river and the resource impacts associated with reconstructing on the north side. Reconnaissance of the proposed south side route was conducted in November 2004. Based on that field review this alternative was eliminated from detailed consideration for the following reasons: (a) the route would cross The Brothers Wilderness (a Wilderness boundary adjustment would require congressional approval), (b) it would be longer than the reroutes on the north side of the river (2 miles new construction and 2.5 miles reconstruction), (c) the route crosses areas of very steep ground and cliff line, and (d) the route crosses tree stands of late-successional character that are not near existing roads and therefore are of higher quality than the late-successional stands that would be crossed by the two reroute alternatives considered in detail.

Eight Percent Grade Reroute
The washed out section of FSR 2610 would be reconstructed above the washout site along an 8 percent grade, which would facilitate easier access for large recreational vehicles. This alternative was eliminated from detailed consideration for the following reasons: (a) an 8 percent slope road would require construction of approximately 50 percent more road than the reroute alternatives and would encroach on the Buckhorn Wilderness, (b) vehicles would still have to negotiate the existing 18 percent grade to reach the facilities in the park (the park does not recommend large recreational vehicles or vehicles pulling trailers use this section of road), and (c) an improvement to the previous road condition would not qualify for ERFO funding.

Wetland Avoidance
This alternative would relocate FSR 2610 above and north of the current washout site with an alignment that would avoid impacts to the wetlands located adjacent to FSR 2610 east of the washout. This alternative was eliminated from detailed consideration because: the reroute would have been longer with a greater impact on late successional reserve habitat, and more of the reroute would have been on steep and potentially unstable slopes.

Decommission FSR 2610 and Convert to Trail
This alternative would decommission both FSR 2610 and the park's Dosewallips Road upriver of the washout and convert these roads to non-motorized trails. With this as the main theme,

several variations were suggested which included building a new ONF campground and ONP campground and ranger station facilities downriver of the washout and constructing a new trail network to tie into the existing trail system. While the decommission/convert to trail alternative was considered in the 2003 EA, it was eliminated from detailed consideration in this analysis because it would not meet the project's purpose and need of restoring road access for motorized vehicles to the ONF and ONP lands and recreational facilities.

Footbridge
The footbridge would be constructed to replace the washed out section of FSR 2610, and a shuttle system would be used to transport visitors to Elkhorn Campground and park facilities. This alternative was eliminated from detailed consideration because it would not meet the project's purpose and need of restoring road access for motorized vehicles on FSR 2610 and the park's Dosewallips Road to the ONF and ONP lands and recreational facilities.

Light Traffic Bridge
A proposal was suggested to construct a bridge over the washout area that would be suitable for use by vehicles such as wheelchairs, all terrain vehicles (ATVs), and light pick-ups (to be used for administrative purposes). This alternative was eliminated from detailed consideration because it would not meet the project's purpose and need of restoring road access for motorized vehicles on FSR 2610 and the park's Dosewallips Road to access both ONF and ONP lands and recreational facilities.

Private Land Purchase
A suggestion was made to include the purchase of private land in the lower Dosewallips River valley and the decommissioning of roads within these areas as part of the alternatives. This proposal is outside the scope of the decision to be made for this project and was eliminated from detailed consideration.

Reroute Alternatives with LSR/AMA Exchange Forest Plan Amendment
A variation of the two reroute alternatives (Alternatives B and C) was considered which proposed a Forest Plan amendment to redesignate a block of Adaptive Management Area (AMA) Forest Plan allocation to LSR to mitigate the removal of LSR habitat under the reroute alternatives. A potentially suitable stand of AMA was identified near Mt. Turner, to the east of the project area, but after a field visit to the stand the proposal was eliminated from detailed consideration because the stand does not have similar high quality biological and physical features as compared to the area of LSR affected by the reroute alternatives.

Alternative to the Repair of Dosewallips Road at MP 0.85

Bypass
A suggestion was made to construct a bypass uphill of the failed section of road away from the Dosewallips River. This proposal was eliminated from detailed consideration because the side slope is extremely steep and rocky, and the road would need to be constructed on a very steep grade, about 18 percent. The financial cost of this option would be too high, and the environmental impacts would be unnecessarily severe to restore this section of road.

Alternatives Considered in Detail

Alternative A - No Action

Objective
This alternative allows current geological processes, including the continued deterioration of FSR 2610 and Dosewallips Road to continue with the associated risks and benefits. This alternative provides a baseline for comparison with other alternatives.

Description
The No Action alternative is required by NEPA. In this document the No Action alternative means that the proposed project would not take place at this time. It is designed to represent the existing condition.

Motorized access on FSR 2610 would end at or near the washout. Only measures to provide for public safety at the washout site would be implemented, such as blocking FSR 2610 to prevent a vehicle from plunging into the river. The road would be blocked with a traffic barrier such as a jersey barrier and would be signed to warn motorists of the road closure. Similarly the park's failed section of the Dosewallips Road near the Dosewallips Falls would not be repaired.

The estimated cost for this alternative is $5,000.

Current FS management plans would continue to guide management of the project area on ONF lands. Existing uses, such as parking along the edge of the road near the washout and in the adjacent dispersed camping area, would continue. The Elkhorn Campground would remain closed and would not be maintained.

On ONP lands, the park's Dosewallips Campground and restrooms would also remain closed. The ranger station and quarters would continue to be closed or possibly converted to a backcountry site.

A future decision likely would be needed to determine appropriate management of the Forest and park roads and recreational facilities located beyond the washout.

Forest Plan Amendment
Selection of the No Action alternative would not require a site-specific non-significant amendment (as defined under the NFMA) to the Forest Plan.

Alternative B – Reroute 1 Bench Emphasis

Objective
This alternative is designed to meet the project's purpose and need by rerouting FSR 2610 past the washout site out of the river floodplain utilizing standard road construction techniques. This alternative was developed to minimize impacts to aquatic habitat and riparian function that would otherwise occur by allowing gravel recruitment from the high bank by the river.

Description

FSR 2610 would be rerouted along the hillslope above and to the north of the washout (Figure 12); to restore access for passenger cars, recreational vehicles, and vehicles pulling trailers. Approximately 0.84 mile of single lane road with a 14-foot road surface and turnouts would be constructed to maintenance level 3 standards using standard construction methods. Construction would occur over a 3-year period. Standard construction methods involve trying to balance cuts and fills, with no particular emphasis on minimizing the foot print of cleared area. The preliminary design indicates there would be more excavation (cut) than embankment (fill) so the excess material would be hauled off-site to an approved disposal area[5]. An estimated 17,000 cubic yards of excess material would be hauled on FSR 2610 and County Road 2500 to Highway 101 and then to an approved disposal site. Construction would involve the clearing of about 7.1 acres designated as Late-Successional Reserve (LSR) in the Forest Plan[6]. Most of the route (about 95 percent) would be new road construction, with the remaining 5 percent following the alignment of an old timber harvest spur road. The road would have sustained grades up to a maximum of about 10 percent. Danger trees would be removed from within 100 feet of the top of cut or toe of fill.

New road cuts with vertical heights in excess of 50 feet and slope distances from the ditch to the top of cut of 60 to 80 feet or more would be required. Some of the cuts would be located in alluvial fans or old landslide features that would be susceptible to slope instability following construction. Springs and seepage areas exist in some locations along the proposed alignment. To ensure these areas don’t cause failure to the road, future slope stabilization measures such as rock buttresses, flattened slopes, retaining walls, and horizontal drain systems may be required to drain groundwater and stabilize unstable slopes and landslides resulting from the excavation of new cuts. Geotechnical drilling would occur following clearing and pioneering construction in order to determine appropriate stabilization measures.

The estimated cost of this reroute is $2.55 million. An additional cost estimate included in this estimate is the additional maintenance needed on FSR 2610 from the Forest boundary to the reroute location due to the increased road wear associated with the disposal of excess excavation, estimated at $18,500. Other estimated costs associated with this alternative are the deferred maintenance on FSR 2610 past the reroute to the Forest boundary, estimated at $15,400; the estimated maintenance costs for the reroute itself for the first two years ($33,900) and then $2,000 annually; and the annual maintenance on FSR 2610 past the washout to the Forest boundary, estimated at $10,800.

For purposes of description the reroute can be broken into 6 segments (Figure 13), based on differences in terrain or geomorphic (landform) types. The segments and approximate lengths are defined as follows progressing from east to west.

- Segment 1 – Would be about 450 feet long and would cross flat to gently sloping terrain from the existing road to the base of the hillslope. This segment would cross an unnamed tributary to Gamm Creek, a tributary to the Dosewallips River.

[5] Disposal sites have not been identified. All ancillary areas such as material sources, waste sites, and staging areas that are not within the project area would either be a licensed commercial site or a site approved for such uses. If non-commercial sites were utilized then the use of such sites would need to demonstrate no effects to protected cultural sites, wetlands and waters of the U.S., and ESA listed threatened and endangered species.

[6] The quantities and estimates are based on a very preliminary survey.

- Segment 2 – Would be about 1750 feet long and would begin to climb the slope with grades up to 10 percent with steep sideslopes (80 to 100 percent). This segment contains small streams and seeps and signs of past slope movements. The lower portion of this segment would have the largest cuts and fills.
- Segment 3 – Would be about 420 feet long and begins where the sideslopes flatten, and partially occupies the route of an old logging spur. The reroute road grade is about 6 percent.
- Segment 4 – Would be about 470 feet long and crosses a flat to gently sloping bench that is about 110 feet above river level.
- Segment 5 – Would be about 780 feet long. It would descend off the bench at about a 10 percent grade with steep sideslopes (80 to 100 percent) to the base of the sideslope.
- Segment 6 – Would be about 220 feet long and crosses a gently sloping area on a lower terrace surface. It rejoins FSR 2610 about 800 feet upstream of the washout.

The proposed reroute alignment was originally established on the ground with flagging and survey stakes as part of the preliminary design conducted by WFLHD. Based on the washout site survey conducted in December 2007 the proposed alignment as staked has been slightly adjusted toward the north, away from the upper edge of the washout to provide for an adequate hazard set-back. This change only affected segments 3 and 4 which occur on the relatively gentle sloping topography above the steep grades and away from the areas with potential slope stability problems.

During construction FSR 2610 would be closed to the public from the Forest boundary up to the washout site to provide for public safety. Portions of FSR 2610 and previously disturbed dispersed camping areas (approximately 2 acres) near the washout would be used for construction equipment staging areas. The dispersed camping areas would be rehabilitated at the conclusion of construction activities. Rehabilitation would include soil improvement work, possibly wetland mitigation, scattering of large wood, seeding/planting, and treatment for invasive species.

A wood use plan would be developed to insure the best use of the trees removed during construction activities. Trees would be tipped instead of cut when possible as stems with root wads attached are more suitable for restoration projects. The FS would give priority use for these downed trees for future restoration and enhancement uses such as instream large woody debris (LWD) structures, terrestrial coarse woody debris, and tribal uses. Additional uses may include road decommissioning rehabilitation and repair of the park's Dosewallips Road. Trees in excess to these uses may be sold.

About 0.7 mile of FSR 2610, located on either side of the washout to the take off points for the reroute, would be decommissioned. The section of road to be decommissioned is in the riparian area but not within the active (100-year) floodplain (see Figure 30). Decommissioning the section of road upstream of the washout would involve removal of drainage structures and the fill in draws and drainage pathways, but it is possible that not all of the fill that is present would be removed. The surfacing would be removed, the roadbed would be ripped or otherwise de-compacted, and it would be replanted with appropriate native, woody vegetation. Decommissioning the section of road downstream of the washout would involve removal of drainage structures and the roadfill to an extent to facilitate wetland restoration.

Additionally ONP and WFLHD would repair the Dosewallips Road at MP 0.85 in the vicinity of

the Dosewallips Falls, at an estimated cost of $350,000. The construction would take 1 year to complete and would begin after access was restored on FSR 2610. Approximately 120 feet of road that was constructed in the 1940's on log retaining wall/structures failed in late 2003. The road would be repaired by removing the old road fill material and reconstructing the road prism by using riprap and crushed rock to form a foundation on which structural backfill would be constructed. Stabilization techniques would be used to protect the stabilized fill from erosion. All of the construction would be above the ordinary high water line of the river. The park would need to conduct maintenance that has been deferred on the Dosewallips Road prior to the repair work at an estimated cost of $4,500.

Forest Plan Amendments

Selection of this alternative would include site-specific, non-significant amendments (as defined under the NFMA) to the Forest Plan. The following amendments are associated with certain standards and guidelines for LSR and RR as identified in the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (referred to as the NWFP ROD), which amended the ONF's Forest Plan.

1. A NWFP ROD (C-10) standard and guideline for LSR requires preproject surveys of marbled murrelet habitat according to protocol, which currently equates to 2 years of surveys, to assure that no marbled murrelet nests exist in areas planned for timber harvest. In lieu of completing the required surveys the Forest has assumed occupancy of the project area by murrelets. A proposed amendment would waive this standard and guideline to complete murrelet surveys in the project area for this specific project.

2. A NWFP ROD (C-10) standard and guideline for LSR requires that if murrelet occupancy is documented (or in the case of this project assumed), all contiguous existing and recruitment habitat for murrelets within a 0.5 mile radius will be protected. Some existing murrelet habitat would be removed under this alternative so a proposed amendment would waive this standard and guideline to protect all contiguous existing and recruitment habitat in the project area for this specific project.

Figure 12: Alternatives B and C reroute

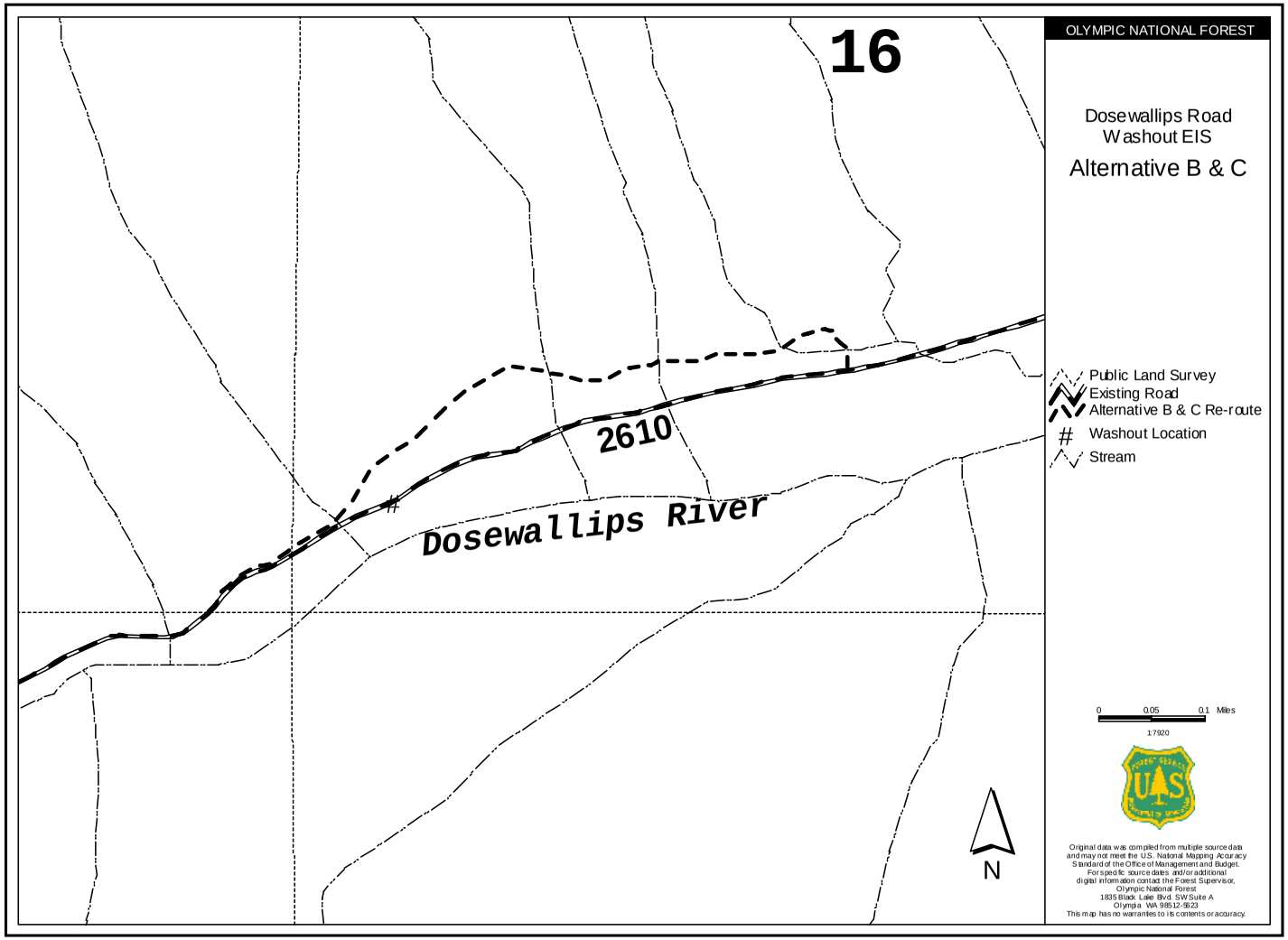

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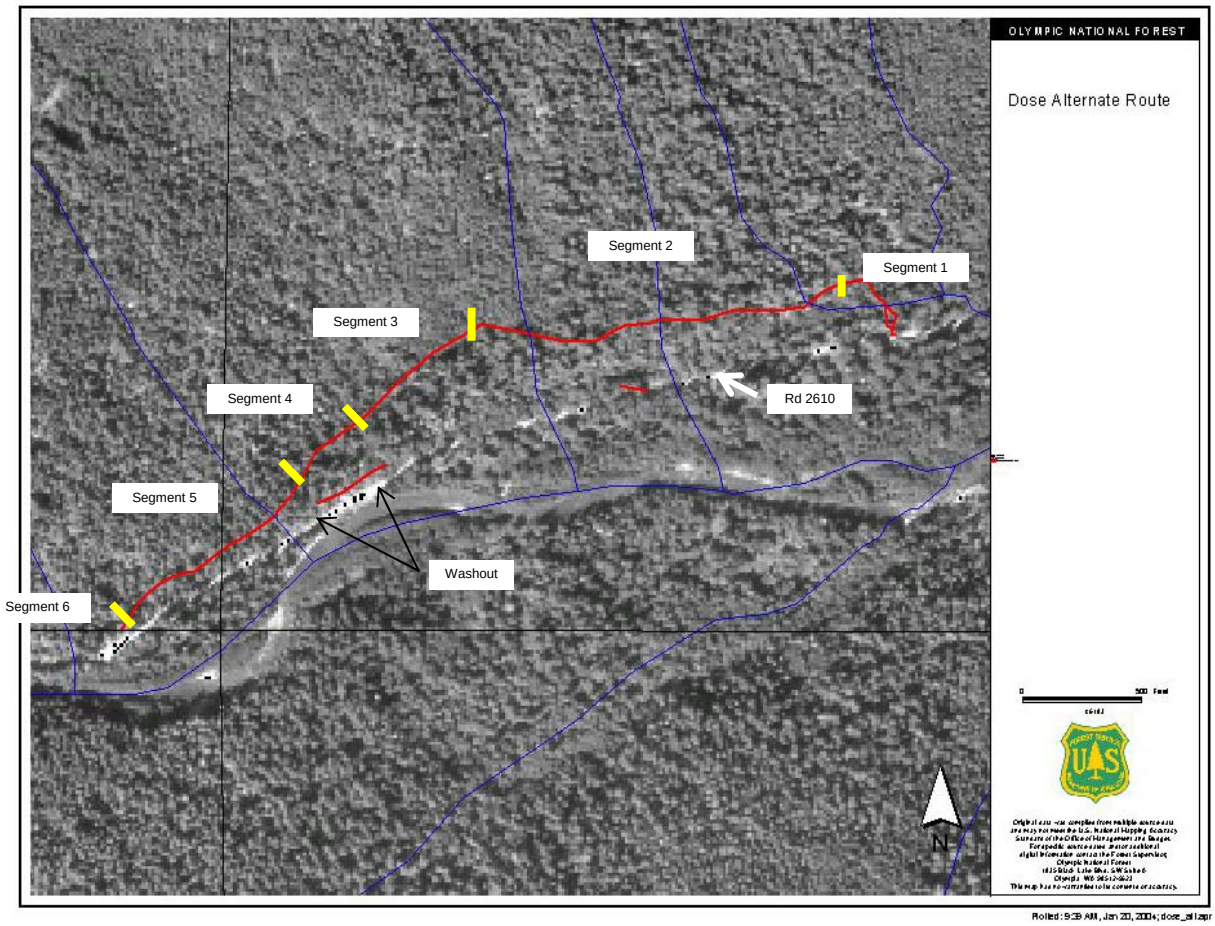
Figure 13: Reroute segments



3. A NWFP ROD (C-16) standard and guideline requires as a general guideline that nonsilvicultural activities located inside LSR be neutral or beneficial to the creation and maintenance of late-successional habitat. This alternative proposes the removal of about 7.1 acres of late-successional habitat in LSR. A proposed amendment would waive the guideline that nonsilvicultural activities inside LSR be neutral or beneficial to the creation and maintenance of late-successional habitat in the project area for this specific project.

4. A NWFP ROD (C-16) standard and guideline requires that if new roads are necessary in LSR, that they be designed to minimize adverse impacts. This alternative would use standard road construction techniques and there would be no particular effort to minimize the removal of LSR habitat. Consequently a proposed amendment would waive this standard and guideline to minimize adverse impacts in the project area for this specific project.

5. A NWFP ROD (C-32) standard and guideline for RR requires avoiding wetlands entirely when constructing new roads. This alternative would directly impact about 0.019 acre of

wetlands. A proposed amendment would waive this standard and guideline to avoid wetlands entirely in the project area for this specific project.

Alternative C – Reroute 2 Retaining Wall Emphasis

Objective

This alternative is designed to meet the project's purpose and need by rerouting FSR 2610 past the washout site out of the river floodplain. Instead of using standard construction practices as described for Alternative B, this alternative would narrow the road's footprint to limit the amount of clearing and excavation needed for the proposed construction. This alternative was also developed to minimize impacts to aquatic habitat and riparian function that would otherwise occur with eliminated Alternatives D and E by allowing gravel recruitment from the high bank by the river.

Description

This alternative would generally follow the same alignment as proposed under Alternative B (Figure 12), however there would be some slight shifts in grade and horizontal alignment to reduce the road's footprint on the landscape.

FSR 2610 would be rerouted along the hillslope above and to the north of the washout to restore access for passenger cars, recreational vehicles, and vehicles pulling trailers. Approximately 0.84 mile of single lane road with a 14-foot road surface and turnouts would be constructed to maintenance level 3 standards. Construction would occur over a 3-year period. Use of measures such as retaining walls and reinforced fills would be used where possible to minimize the cleared area. About 6.5 acres designated as LSR in the Forest Plan would be cleared, about 8 percent less disturbance than Alternative B. The preliminary design indicates the embankment volume would be about 8 times the amount of excavation, therefore material would have to be obtained and hauled to the project site from an approved materials source. An estimated 33,800 cubic yards of borrow material would be hauled on FSR 2610 and County Road 2500 from Highway 101, from an approved borrow site[7]. Most of the route (about 95 percent) would be new road construction, with the remaining 5 percent following the alignment of an old timber harvest spur road. The road would have sustained grades up to a maximum of about 10 percent. Danger trees would be removed from within 100 feet of the top of cut or toe of fill.

The preliminary design indicates that some retaining walls would be up to 33 feet high. These walls would require temporary shoring nearly as high as the walls themselves to allow construction to occur within the road prism. Extensive drainage systems could be needed to drain subsurface water from the slopes behind and beneath the retaining walls for slope stability. Geotechnical drilling would occur following clearing and pioneering construction in order to determine appropriate stabilization measures.

The estimated cost of this reroute is $3.76 million. An additional cost estimate included in this estimate is the additional maintenance needed on FSR 2610 from the Forest boundary to the reroute location due to the increased road wear associated with the disposal of excess excavation, estimated at $18,500. Other estimated costs associated with this alternative are the deferred maintenance on FSR 2610 past the reroute to the Forest boundary, estimated at $15,400; the

[7] The quantities and estimates developed are very preliminary and not entirely based on complete survey data. As the NEPA process progresses, resource and survey data will be refined.

estimated maintenance costs for the reroute itself for the first two years ($34,200) and then $2,000 annually; and the annual maintenance on FSR 2610 past the washout to the Forest boundary, estimated at $10,800.

Similar to Alternative B for purposes of description the reroute can be broken into 6 segments (Figure 13), based on differences in terrain or geomorphic (landform) types. The segments and approximate lengths are defined as follows progressing from east to west:

- Segment 1 – Would be about 450 feet long and would cross flat to gently sloping terrain from the existing road to the base of the hillslope. This segment would cross an unnamed tributary to Gamm Creek, a tributary to the Dosewallips River.
- Segment 2 – Would be about 1750 feet long and would begin to climb the slope with grades up to 10 percent with steep sideslopes (80 to 100 percent). This segment contains small streams and seeps and signs of past slope movements. The upper portion of this segment would have the largest cuts and fills.
- Segment 3 – Would be about 420 feet long and begins where the sideslopes flatten, and partially occupies the route of an old logging spur. The reroute road grade is about 6 percent.
- Segment 4 – Would be about 470 feet long and crosses a flat to gently sloping bench that is about 110 feet above river level.
- Segment 5 – Would be about 780 feet long. It would descend off the bench at about a 10 percent grade with steep sideslopes (80 to 100 percent) to the base of the sideslope.
- Segment 6 – Would be about 220 feet long and crosses a gently sloping area on a lower terrace surface. It rejoins FSR 2610 about 800 feet upstream of the washout.

The proposed reroute alignment was originally established on the ground with flagging and survey stakes as part of the preliminary design conducted by WFLHD. Based on the washout site survey conducted in December 2007 the proposed alignment has been slightly adjusted toward the north, away from the upper edge of the washout to provide for an adequate hazard set-back. This change only affected segments 3 and 4 which occur on the relatively gentle sloping topography above the steep grades and away from the areas with potential slope stability problems.

FSR 2610 would be closed during construction to the public from the Forest boundary up to the washout site to provide for public safety. Portions of FSR 2610 and previously disturbed dispersed camping areas (approximately 2 acres) near the washout would be used for construction equipment staging areas. The dispersed camping areas would be rehabilitated at the conclusion of construction activities. Rehabilitation would include soil improvement work, possibly wetland mitigation, scattering of large wood, seeding/planting, and treatment for invasive species.

A wood use plan would be developed to insure the best use of the trees removed during construction activities. Trees would be tipped instead of cut when possible as stems with root wads attached are more suitable for restoration projects. The FS would give priority use for these downed trees for restoration and enhancement uses such as instream large woody debris structures, terrestrial coarse woody debris, and tribal uses. Additional uses may include road decommissioning rehabilitation and repair of the park’s Dosewallips Road. Trees in excess to these uses may be sold.

About 0.7 mile of FSR 2610, located on either side of the washout to the take off points for the reroute, would be decommissioned. The section of road to be decommissioned is in the riparian area, but not within the active (100 year) floodplain (see Figure 30). Decommissioning the section of road upstream of the washout would involve removal of drainage structures and the fill in draws and drainage pathways, but it is possible that not all of the fill that is present would be removed. The surfacing would be removed, the roadbed would be ripped or otherwise de-compacted and it would be replanted with appropriate native, woody vegetation. Decommissioning the section of road downstream of the washout would involve removal of drainage structures and the roadfill to an extent to facilitate wetland restoration.

Additionally ONP and WFLHD would repair the Dosewallips Road at MP 0.85 in the vicinity of the Dosewallips Falls, at an estimated cost of $350,000. The construction would take 1 year to complete and would begin after access was restored on FSR 2610. Approximately 120 feet of road that was constructed in the 1940's on log retaining wall/structures failed in late 2003. The road would be repaired by removing the old road fill material and reconstructing the road prism by using riprap and crushed rock to form a foundation on which structural backfill would be constructed. Stabilization techniques would be used to protect the stabilized fill from erosion. All of the construction would be above the ordinary high water line of the river. The park would need to conduct maintenance that has been deferred on the Dosewallips Road prior to the repair work at an estimated cost of $4,500.

Forest Plan Amendments

Selection of this alternative would include site-specific, non-significant amendments (as defined under the NFMA) to the Forest Plan. The following amendments are associated with certain standards and guidelines for LSR and RR as identified in the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (referred to as the NWFP ROD), which amended the Olympic's Forest Plan.

1. The NWFP ROD (C-10) requires preproject surveys of marbled murrelet habitat according to protocol which currently equates to 2 years of surveys to assure that no marbled murrelet nests exist in areas planned for timber harvest. In lieu of completing the required surveys the Forest has assumed occupancy of the project area by murrelets. A proposed amendment would waive the requirement to complete murrelet surveys in the project area for this specific project.

2. The NWFP ROD (C-10) requires that if murrelet occupancy is documented (or in the case of this project assumed), all contiguous existing and recruitment habitat for murrelets within a 0.5 mile radius will be protected. Some existing murrelet habitat would be removed under this alternative so a proposed amendment would waive the requirement to protect all contiguous existing and recruitment habitat in the project area for this specific project.

3. The NWFP ROD (C-16) requires as a general guideline that nonsilvicultural activities located inside LSR be neutral or beneficial to the creation and maintenance of late-successional habitat. This alternative proposes the removal of about 6.5 acres of late-successional habitat in LSR. A proposed amendment would waive the guideline that nonsilvicultural activities inside LSR be neutral or beneficial to the creation and maintenance of late-successional habitat in the project area for this specific project.

4. A NWFP ROD (C-32) standard and guideline for RR requires avoiding wetlands entirely when constructing new roads. This alternative would directly impact about 0.020 acre of wetlands. A proposed amendment would waive this standard and guideline to avoid wetlands entirely in the project area for this specific project.

Mitigation Measures and Management Requirements Common to Reroute Alternatives

All mitigation measures shall be required if Alternative B or C is selected and are applicable to ONF and ONP actions unless noted.

Vegetation: Mitigation measures in this section include standards set forth in the October 2005 Record of Decision for the Pacific Northwest Region Invasive Plant Program: *Preventing and Managing Invasive Plants Final Environmental Impact Statement* (USDA 2005b).

- Prior to mobilization, all construction equipment would be required to be cleaned before being brought into National Forest System Lands (NFSL) and ONP lands.
- Certified weed-free straw and/or mulch would be used as needed. If State certified straw and/or mulch is not available, proposed sources would need to be certified weed-free using the North American Weed Free Forage Program standards or a similar certification process.
- Any proposed gravel, fill, sand stockpiles, quarry and borrow material sites would need to be inspected for invasive plants before use and transport. Infected sources would require treatment before any use of pit material. Only gravel, fill sand, and rock that are judged to be weed free by the Forest weed specialists would be used.
- As part of the design, there would be an inventory of weed infestations and a prioritization plan for treatment in the project area and access routes.
- Consultation with Forest invasive plant specialists would be required prior to any ground-disturbing activities that would be conducted in areas with high concentrations of invasive plants. The design and construction would incorporate invasive plant prevention practices as appropriate.
- Assessment of the area would occur to assess if there would be timely natural regeneration of the native plant community. Otherwise native plant materials would be used for revegetation for restoration and rehabilitation where timely natural regeneration of the native plant community is not likely to occur. This management requirement would not apply to park actions.

Watershed:

- General and applicable specific project provisions would be incorporated as found in appendix A of the Memorandum of Understanding between the Washington State Department of Fish and Wildlife and USDA Forest Service, Pacific Northwest Region regarding Hydraulic Projects Conducted by the USDA Forest Service, Pacific Northwest Region (USDA/WDFW 2005).
- Slope instability would likely be encountered. Design measures would be implemented to retain the unstable slopes along the route, including use of structures that provide for adequate drainage. To the extent possible, the road and its turnouts would be designed to

avoid and minimize placement of large amounts of fill material on steep slopes to provide for stability and reduce the impacts of soil movement.

- Where road and road turnouts would be constructed on slopes steeper than 40 percent, and where the vertical height of cut or fill would exceed five (5) feet, design measures would be incorporated to stabilize cuts and fills. Retaining structures shall be incorporated into the design as needed.
- Road design would use measures (such as porous fill material and fabrics) to minimize the effects to natural groundwater hydrology. Best management practices (BMPs) would be used to minimize sedimentation and contamination of road materials into the permanently and seasonally wet soils. Sidecasting of loose material in riparian areas during construction or maintenance activities would be prohibited.
- The design would include sufficient road drainage structures and energy dissipation devices to provide adequate conveyance of water bodies and release of water pressure.
- Surface erosion and sedimentation from road construction activities into streamcourses would be minimized through the use of appropriate erosion control devices (i.e. straw bales, filter fences, etc.). Erosion control seeding and fertilization would be used where appropriate on all areas of exposed mineral soils as soon as possible when soil moisture levels permit. No fertilization would occur within 50 feet of streamcourses and wetlands. No fertilization in the park and erosion control seeding would use park approved sterile mixed grass seed.
- Hydromulch would be used on new cut and fillslopes where appropriate.
- The FS would apply best management practices for road maintenance upon completion of the repairs by keeping culverts and ditches open and free of cutslope sloughing and other debris and keeping all elements of the drainage system functioning properly. Maintenance shall especially be kept current in areas of instability with drainage problems.
- All new culverts would be designed to sufficiently pass 100-year flows and debris. All attempts would be made to match grade of culvert bed with existing stream bed.
- The design and construction would be conducted to minimize disruption to natural hydrologic flow paths, including streamflow, surface, and subsurface flow.
- The road would be designed to provide a drainage system that minimizes the concentration of water, and that drains water away from potentially unstable channels and hillslopes.
- Construction activities within or adjacent to perennial streams would be conducted during summer low-flow season. Erosion control measures would be developed in the design and later applied in construction and maintenance procedures to limit sediment delivery to streams from the road surface.
- Earthwork activities for road construction including access ways, ditches, and stream culverts shall be completed during the dry season.
- Wherever road construction occurs within riparian areas, erosion control measures would be installed prior to the normal heavy rainfall period.
- Areas of standing water would be drained from road. Water would be directed so that it disperses onto the ground and not into streams or other waterbodies.
- A geotechnical engineer or soil scientist would be consulted prior to modifying any of the project design criteria that could impact slope stability or water quality.
- The road would be designed to avoid wetlands to the greatest extent possible. Where wetlands cannot be avoided, measures would be used to minimize impacts. Impacts that cannot be avoided would be mitigated.

- A spill prevention plan would need to be prepared prior to any construction activity. Hazardous spill clean-up materials would be required on the project site.
- Any machinery maintenance involving potential contaminants (fuel, oil, hydraulic fluid, etc) would occur at an approved site or greater than 100 feet from wetlands, waterbodies, or stream channels.
- Prior to starting work each day, all machinery would be checked for leaks (fuel, oil, hydraulic fluid, etc), and all necessary repairs would be made.
- There may be some construction activities that will take place outside the construction limits that will require ground disturbance, occupation, clearing, or could result in some environmental impacts. Such activities may be material extraction, material wasting, water retrieval, staging, etc. These activities will take place at either commercial or non-commercial sources. Commercial sources are established, have provided material to public and private entities on a regular basis over the last two years, have appropriate state and local permits, and do not require expansion outside their currently established and permitted area. Should a non-commercial source be used, use of the area (a) will not affect properties on or eligible for listing to the National Register of Historic Places; (b) have no effect on species or habitat listed as threatened or endangered under the Endangered Species Act (ESA); and (c) not encroach into waters of the U.S. or wetlands protected under Executive Order 11990.

Fish and Wildlife:

- Operating periods for project activities would be followed as described below. See "Type of Disturbance and Operating Period for Dosewallips Washout by Alternative" chart in Wildlife Report for additional detail. Any exceptions to these operating periods will require future consultation with US Fish and Wildlife Service for threatened and endangered species.
-

Type of Disturbance/Activity	Operating Period
Blasts greater than 2 pounds	Aug 6 – Feb 28
Blasts less than or equal to 2 pounds	Aug 6 – Feb 28
Impact pile drivers, jackhammers, or Rock drills	Aug 6 – Feb 28
Large-size helicopters (Sikorsky type)	Aug 6 – Feb 28
Heavy equipment, motorized tools	July 16 – Feb 28
Chainsaws felling trees	Oct 1 – Feb 28
Chainsaws down wood	Aug 6 – Feb 28
Instream work	July 16 – Aug 31

- A plan would be prepared to address the removal of trees greater than or equal to 21 inches diameter breast height (dbh) and logs (live or dead, standing or down) that would need to be moved for construction activities. This plan would also include the use of these trees and logs. This plan would include the location and placement of all logs in the project area, consistent with the list and priorities noted in the wood plan reference in the alternative descriptions.
- During construction, strict garbage control measures would be used to prevent scavengers (e.g. crows), which are predators on murrelet nests, from being attracted to the project area. No food scraps would be discarded or fed to wildlife.
- Culverts in fish-bearing streams would be designed, installed, and maintained to provide

fish passage for all fish species and all their life stages that are likely to be encountered at the crossings.

- All in-stream or riparian work will occur between July 16 and August 31. Pending weather conditions and concurrence with WDFW and NOAA Fisheries instream work window may be extended. Any variance of the work period or soil disturbing activities would also be in compliance with the terms and conditions provided by the Biological Opinions as a result of Endangered Species Act consultation.
- Construction would be conducted between two hours after sunrise and two hours before sunset when such work includes the use of equipment which produces noise above 92 decibels (such as chainsaws, heavy equipment, and helicopters) and would occur between April 1 and September 15.
- Tree removal within suitable habitat for northern spotted owl and marbled murrelet for road construction would occur between October 1 and February 28 (outside the entire breeding season for marbled murrelets and spotted owls).
- Trees identified as danger trees (having the potential for or imminent danger to roadway traffic), which need to be felled to provide a safe working environment, may be felled year round. During the nesting season of the northern spotted owl and marbled murrelet (March 1 to September 30), and bald eagle (January 1 – August 31), any trees that are considered danger trees within suitable habitat and potential nesting trees for these species may be felled, but a wildlife biologist would need to be consulted prior to felling of the tree to perform a visual inspection to determine if the tree/area is used for nesting by murrelets, spotted owls, or bald eagles.
- The road would be constructed to minimize impacts to adjacent late-successional forest habitat by falling trees away from the habitat if it is possible and safe to do so.

Cultural Resources:

- An appropriate heritage resource inventory has been conducted and no properties potentially eligible for the National Register of Historic Places (NRHP) have been located. These alternatives will have no effect on any properties on or eligible to the NRHP. In the event that previously unidentified cultural resources are located during implementation of one of these alternatives, the work shall cease until the heritage sites are evaluated by the heritage resource specialist and the Forest and FHWA fulfills its consultation requirements in accordance with 36 CFR Part 800.11. If newly discovered properties are found to be on or eligible to the NRHP, appropriate protective and mitigation measures would be implemented to comply with the NHPA.

Alternative F – Bridge

Objective

This alternative was developed to meet the project's purpose and need and minimize impacts to terrestrial habitats and soil productivity by avoiding the clearing associated with road construction in LSR as compared to Alternatives B and C. This alternative lessens impacts to aquatic habitat and riparian function impacts by allowing gravel recruitment from the high bank by the river.

Description

A 14-foot wide single lane bridge, about 700 feet long spanning the washout, would be constructed. Construction would occur over a 3-year period. It would restore access to passenger cars, recreational vehicles, and vehicles pulling trailers. The bridge would likely be constructed

of pre-cast spans and would be supported by about 5 to 7 intermediate piers (Figure 14). Pier foundations would be constructed below the bottom of the river at a depth sufficient to avoid damage or failure due to scour. Bridge alignment would be essentially straight. Construction of approaches (estimated to be about 50 feet long) at both ends of the bridge may involve minor adjustments in the existing vertical and horizontal road alignment and include the construction of turnouts. Approaches would require some clearing of vegetation. The bridge abutments would require bank protection (rip-rap). The downstream abutment would be constructed about 100 feet east of the washout to establish it in a more secure location in relation to the meander bend of the river. This would involve digging a trench and armoring the area with large rock. The existing roadway and ground between the downstream abutment and the washout would be left in place to erode in response to natural river conditions. There would be no scaling back of the bluff slope but there would be clearing of danger trees for approximately 100 feet from the top of the slope, involving about 1 acre of forest within LSR[8].

Bridge construction would involve the following:

- Temporary road construction at either end of the washout to provide construction equipment access to the riverbed. Temporary roads would be decommissioned at the end of the construction season.
- Geotechnical drilling adjacent to the washout to properly design the bridge foundation.
- Construction of a temporary road built from clean rock in the river channel to provide access to pier drilling equipment. The temporary road would be removed at the end of the construction season.
- Driving foundation piles or drilling vertical shafts into the riverbed. A de-watering plan would detail disposal of waste water generated from drilling.
- Concrete forming of bridge piers and placement of superstructure spans.
- Construction of bridge approaches.

The cost of bridge construction is estimated at $8.75 million**.** Additional construction cost estimates are associated with additional maintenance needed on FSR 2610 from the Forest boundary to the bridge location due to the increased road wear associated with construction traffic, estimated at $7,700. Other estimated maintenance costs include the deferred maintenance on FSR 2610 past the bridge to the Forest boundary, estimated at $15,400; the estimated annual maintenance cost for the bridge itself at $1,600 annually; and an annual bridge inspection cost of $1,200. Bridge maintenance includes the removal of large wood which racks up against the bridge piers when such wood inhibits gravel recruitment from the high bank or affects bridge performance, estimated at $2,300 annually. Annual maintenance on FSR 2610 past the washout to the Forest boundary would also be needed, estimated at $10,800.

FSR 2610 would be closed during construction periods to public access from the Forest boundary up to the washout site to provide for public safety. Portions of FSR 2610 and previously disturbed dispersed camping areas (approximately 2 acres) near the washout would be used for construction equipment staging areas. The dispersed camping areas would be rehabilitated at the conclusion of construction activities. Rehabilitation would include soil improvement work, possibly wetland mitigation, scattering of large wood, seeding/planting, and treatment for invasive species.

[8] The quantities and estimates are based on a very preliminary survey.

A wood use plan would be developed to insure the best use of the trees removed during construction activities. Trees would be tipped instead of cut when possible as stems with root wads attached are more suitable for restoration projects. The FS would give priority use for these downed trees for restoration and enhancement uses such as instream large woody debris structures, terrestrial coarse woody debris, and tribal uses. Additional uses may include road decommissioning rehabilitation and repair of the park's Dosewallips Road. Trees in excess to these uses may be sold.

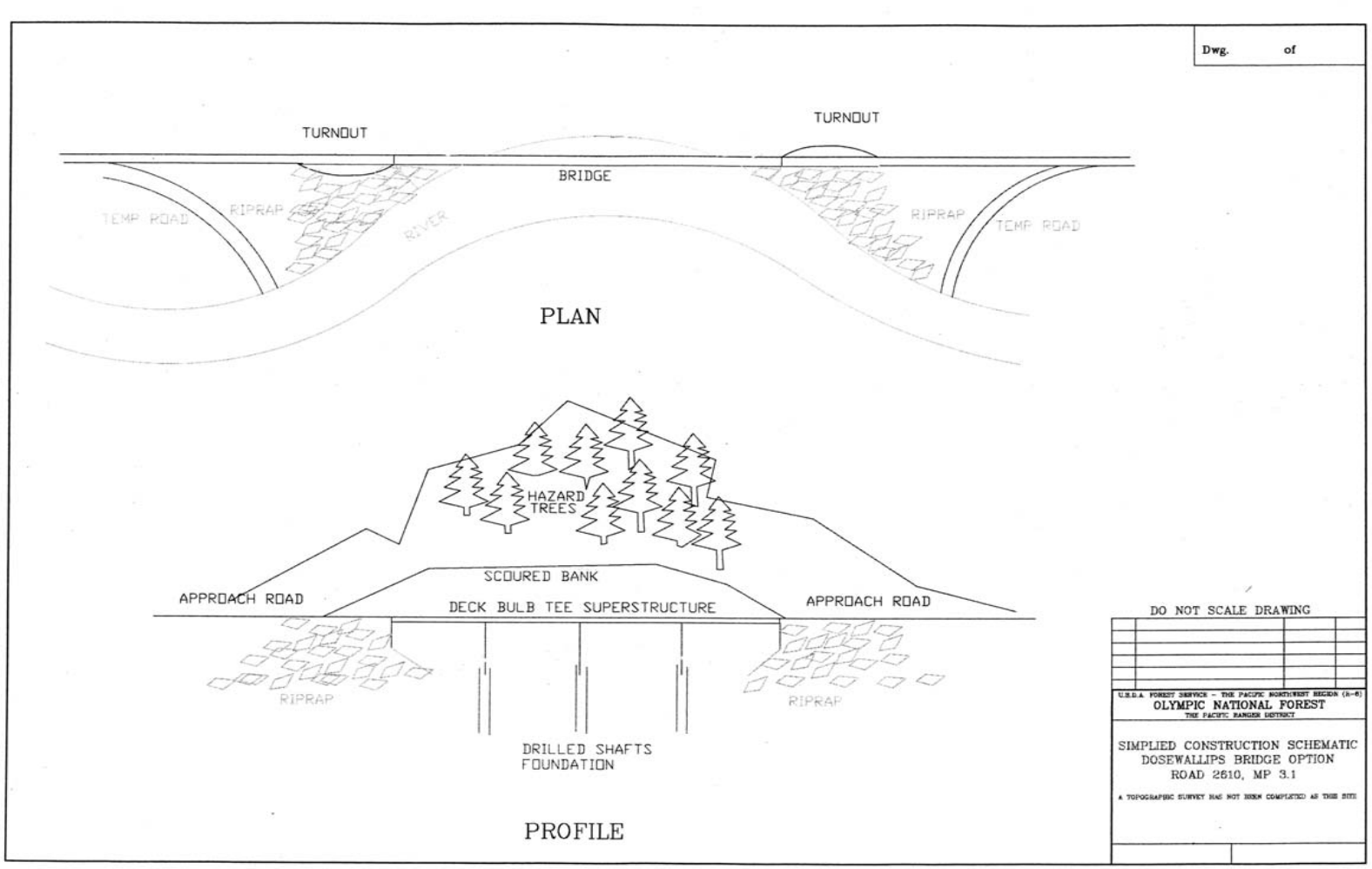
Additionally ONP and WFLHD would repair the Dosewallips Road at MP 0.85 in the vicinity of the Dosewallips Falls, at an estimated cost of $350,000. The construction would take 1 year to complete and would begin after access was restored on FSR 2610. Approximately 120 feet of road that was constructed in the 1940's on log retaining wall/structures failed in late 2003. The road would be repaired by removing the old road fill material and reconstructing the road prism by using riprap and crushed rock to form a foundation on which structural backfill would be constructed. Stabilization techniques would be used to protect the stabilized fill from erosion. All of the construction would be above the ordinary high water line of the river. The park would need to conduct maintenance that has been deferred on the Dosewallips Road prior to the repair work at an estimated cost of $4,500.

Forest Plan Amendment

Selection of this alternative would include a site-specific non-significant amendment (as defined under the NFMA) to the Forest Plan. The following amendment is associated with RR standards and guidelines as identified in the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (referred to as the NWFP ROD), which amended the Olympic's Forest Plan.

1. A NWFP ROD (C-32) standard and guideline for RR requires avoiding wetlands entirely when constructing new roads. This alternative would directly impact about 0.016 acre of wetlands. A proposed amendment would waive this standard and guideline to avoid wetlands entirely in the project area for this specific project.

Figure 14: Alternative F Bridge



Mitigation Measures and Management Requirements for Alternative F - Bridge

All mitigation measures shall be required if Alternative F is selected and are applicable to ONF and ONP actions unless noted.

Vegetation: Mitigation measures in this section include standards set forth in the October 2005 Record of Decision for the Pacific Northwest Region Invasive Plant Program: *Preventing and Managing Invasive Plants Final Environmental Impact Statement* (USDA 2005b).

- Prior to mobilization, all construction equipment would be required to be cleaned before being brought into National Forest System Lands (NFSL) and ONP lands.
- Certified weed-free straw and/or mulch would be used as needed. If State certified straw and/or mulch is not available, proposed sources would need to be certified weed-free using the North American Weed Free Forage Program standards or a similar certification process.
- Any proposed gravel, fill, sand stockpiles, quarry and borrow material sites would need to be inspected for invasive plants before use and transport. Infected sources would require treatment before any use of pit material. Only gravel, fill sand, and rock that are judged to be weed free by the Forest weed specialists would be used.
- As part of the design, there would be an inventory of weed infestations and a prioritization plan for treatment in the project area and access routes.
- Consultation with Forest invasive plant specialists would be required prior to any ground-disturbing activities that would be conducted in areas with high concentrations of invasive plants. The design and construction would incorporate invasive plant prevention practices as appropriate.
- Assessment of the area would occur to determine if there would be timely natural regeneration of the native plant community. Otherwise native plant materials would be used for revegetation for restoration and rehabilitation where timely natural regeneration of the native plant community is not likely to occur. This management requirement would not apply to park actions.

Watershed:

- Equipment operating instream would use applicable best management practices for operations in and around water and would fully comply with all applicable regulations.
- Construction activities in or adjacent to perennial streams would be primarily conducted during summer low-flow season. Erosion control measures would be developed in the design and later applied in construction and maintenance procedures to limit sediment delivery to streams from the road surface.
- Wherever road construction occurs within riparian areas, erosion control measures would be required to be installed prior to the normal heavy rainfall period.
- General and applicable specific project provisions would be incorporated as found in appendix A of the Memorandum of Understanding between the Washington State Department of Fish and Wildlife and USDA Forest Service, Pacific Northwest Region regarding Hydraulic Projects Conducted by the USDA Forest Service, Pacific Northwest Region (USDA/WDFW 2005).
- Surface erosion and sedimentation from road construction activities into streamcourses would be minimized through the use of appropriate erosion control devices (i.e. straw bales, filter fences, etc.). Erosion control seeding and fertilization would be used where

appropriate on all areas of exposed mineral soils as soon as possible when soil moisture levels permit. No fertilization would occur within 50 feet of stream-courses. No fertilization would occur within 50 feet of streamcourses and wetlands. No fertilization in the park and erosion control seeding would use park approved sterile mixed grass seed.

- The FS would conduct road maintenance activities upon completion of construction to ensure all elements of the drainage system functioning properly, including ditches, culverts, and the running surface. Maintenance especially would be kept current in areas of instability with drainage problems. Best management practices will be followed.
- A soil scientist would be consulted prior to modifying any of the project design criteria that could impact the aquatic environment.
- A spill prevention plan would need to be prepared prior to any construction activity. Hazardous spill clean-up materials would be required on the project site.
- Any machinery maintenance involving potential contaminants (fuel, oil, hydraulic fluid, etc) would occur at an approved site or greater than 100 feet from wetlands, waterbodies, or stream channels.
- Prior to starting work each day, all machinery would be checked for leaks (fuel, oil, hydraulic fluid, etc), and all necessary repairs would be made.
- Heavy equipment operating in the river channel would use vegetable oil replacement for hydraulic fluid.
- There may be some construction activities that will take place outside the construction limits that will require ground disturbance, occupation, clearing, or could result in some environmental impacts. Such activities may be material extraction, material wasting, water retrieval, staging, etc. These activities will take place at either commercial or non-commercial sources. Commercial sources are established, have provided material to public and private entities on a regular basis over the last two years, have appropriate state and local permits, and do not require expansion outside their currently established and permitted area. Should a non-commercial source be used, use of the area (a) will not affect properties on or eligible for listing to the National Register of Historic Places; (b) have no effect on species or habitat listed as threatened or endangered under the Endangered Species Act (ESA); and (c) not encroach into waters of the U.S. or wetlands protected under Executive Order 11990.

Fish and Wildlife: To minimize the impact of the reconstructed road on fluvial processes, reduce the risk of the road to a future failure, and improve channel function the following recommendations shall be included in the design for the reconstructed road if Alternative F is selected:

- Operating periods for project activities would be followed as described below. See “Type of Disturbance and Operating Period for Dosewallips Washout by Alternative” chart in Wildlife Report for additional detail. Any exceptions to these operating periods would require consultation with the US Fish and Wildlife Service and NOAA NMFS for threatened and endangered species.

Type of Disturbance/Activity	Operating Period
Blasts greater than 2 pounds	July 1 – Feb 28
Blasts less than or equal to 2 pounds	July 1 – Feb 28
Impact pile drivers, jackhammers, or Rock drills	
General project and park work	Aug 6 – Feb 28
Bridge work	July 1 – Feb 28
Heavy equipment, motorized tools	July 1 – Feb 28
Chainsaws felling trees	Oct 1 – Feb 28
Chainsaws down wood	Aug 6 – Feb 28
Instream work	July 1 – Oct 15

- A plan would be prepared to address the removal of trees greater than or equal to 21 inches diameter breast height (dbh) and logs (live or dead, standing or down) that would need to be moved for construction activities. This plan would also include the use of these trees and logs. This plan would include the location and placement of all logs in the project area, consistent with the list and priorities noted in the wood plan reference in the alternative descriptions.
- During construction, strict garbage control measures would be used to prevent scavengers (e.g. crows), which are predators on murrelet nests, from being attracted to the project area. No food scraps will be discarded or fed to wildlife.
- Tree removal within suitable habitat for northern spotted owl and marbled murrelet for road construction would occur between October 1 and February 28 (outside the entire breeding season for marbled murrelets and spotted owls).
- All in-stream or riparian work will occur between July 1 and October 15. Any variance of the work period or soil disturbing activities would also be in compliance with the terms and conditions provided by the Biological Opinions as a result of Endangered Species Act consultations.
- It would be required to have a specific, approved dewatering and erosion control plan to minimize sediment laden waters from entering the river and to prevent fish from entering the work area.
- There would be no disposal of excess project materials within the bankfull channel of the river.
- Erosion control methods would be used to minimize silt-laden water from entering the stream. These may include but are not limited to straw bales, silt fencing, filter fabric, temporary sediment ponds, and/or immediate mulching of exposed areas.
- If wet weather conditions during project operations generate and transport sediment above anticipated levels to the stream channel, operations would be ceased until the weather conditions improve, unless delaying operations would increase the risk of adverse resource impacts.
- All erosion control measures would be installed prior to all ground disturbing activities where runoff has the potential to drain into stream channels or other waterbodies. An approved plan for erosion control would be required prior to seasonal shut downs. Within one year after ground-disturbing activities are complete, disturbed streambanks would be planted with woody vegetation. Native species would be used for permanent revegetation.

- The riprap material used in the instream reconstruction would be clean and free of loose dirt and soil material.
- Construction would be conducted between two hours after sunrise and two hours before sunset when such work includes the use of equipment which produces noise above 92 decibels (such as chainsaws, heavy equipment, and helicopters) and would occur between April 1 and September 15.
- Trees identified as danger trees, which need to be felled to provide a safe working environment, may be felled year round. During the nesting season of the northern spotted owl and marbled murrelet (March 1 to September 30) and bald eagle (January 1 – August 31) any trees that are considered danger trees within suitable habitat and potential nesting trees for these species may be felled, but a wildlife biologist would be consulted prior to felling of the tree to perform a visual inspection to determine if the tree/area is used for nesting by murrelets, spotted owls, or bald eagles.
- A fish biologist would be consulted prior to modifying any of the project design criteria that could impact aquatic resources.
- When moving large wood off the bridge piers efforts would be made to minimize cutting up the wood. The intent would be to move large intact pieces of wood downstream off the piers.

Cultural Resources:

- An appropriate heritage resource inventory has been conducted and no properties potentially eligible for the National Register of Historic Places (NRHP) have been located. This alternative will have no effect on any historic properties. In the event that previously unidentified cultural resources are located during implementation of this alternative, the work shall cease until the heritage sites are evaluated by the heritage resource specialist and the Forest and FHWA fulfills its consultation requirements in accordance with 36 CFR Part 800.11. If newly discovered properties are found to be on or eligible to the NRHP appropriate protective and mitigation measures would be implemented to comply with the NHPA.

Monitoring Common to All Action Alternatives

The following implementation and effectiveness monitoring is recommended. Monitoring observations would be documented with copies provided to District staff and planning personnel. Depending on available funding, some of the effectiveness monitoring may not be conducted.

Implementation:

- Before a contract would be awarded for the selected alternative, the contract would be reviewed to ensure all commitments contained in the NEPA document, consultations, and permits are covered in the contract.

Effectiveness:

- The construction site and adjacent and downstream channels would be observed during the first winter after implementation. This monitoring would be tiered to the Forest Monitoring Plan, Aquatic Resource section.
- To reduce the potential for road failure, upon completion the ONF and ONP would visit the roads periodically, especially after major storm events to determine what measures are necessary to stabilize road conditions.

- Inspection for the invasion of noxious weeds would be conducted for at least two years after project completion.

Comparison of Alternatives

Table 1: Alternative summary comparison

ISSUE	ALTERNATIVE A No Action	ALTERNATIVE B Reroute 1 Bench Emphasis	ALTERNATIVE C Reroute 2 Retaining Wall Emphasis	ALTERNATIVE F Bridge
ROAD MANAGEMENT				
Estimated Costs				
• Construction	ONF = $5,000 ONP = $0	ONF = $2,550,000 ONP = $350,000	ONF = $3,760,000 ONP = $350,000	ONF = $8,750,000 ONP = $350,000
• Annual maintenance				
o Short-term				
▪ Deferred	$0	$19,900	$19,900	$19,900
▪ 1st 2 year	$0	$33,900	$34,200	$3,900
o Long-term	$0	$11,000	$11,000	$3,900
o Bridge inspection				$1,200
User Safety	Block FSR 2610 with traffic barrier	Treat danger trees	Treat danger trees	Treat danger trees

ISSUE	ALTERNATIVE A No Action	ALTERNATIVE B Reroute 1 Bench Emphasis	ALTERNATIVE C Reroute 2 Retaining Wall Emphasis	ALTERNATIVE F Bridge
GEOTECHNICAL HAZARDS AND GEOMORPHIC PROCESSES				
• Slope stability	Natural conditions	Segment 2 has areas of pre-existing slope movement and groundwater seepage. Construction of new cuts up to 60 to 80 feet high could result in potentially unstable slopes and minor landslides. Natural conditions at the high bank.	Same as Alt B.	Similar to Alt A in the short-term. Long-term – Continued shallow slope movement on high bank until stable angle naturally achieved.
• Fluvial processes	Natural conditions	Same as Alt. A.	Same as Alt. A.	Similar to Alt A in the short-term. Reduced river effect on high bank in the long-term.
• Sediment supply	Natural conditions	Same as Alt A.	Same as Alt A.	Similar to Alt A in the short-term. Reduction in supply in the long-term.
SOIL PRODUCTIVITY	No additional road. 3.9 miles of abandoned road. 42 acres in detrimental soil condition, slow natural recovery. Erosion continuing on abandoned road. No effect to slope stability or hillslope hydrology.	0.84 miles new road. 0.7 miles road decommissioning. 44.7 acres in long-term detrimental conditions. Increased short-term erosion. Second highest risk of slope instability. Effects to hillslope hydrology.	0.84 miles new road. 0.7 miles road decommissioning. 44.1 acres in long-term detrimental conditions. Increased short-term erosion, higher than Alt. B. Highest risk of slope instability. Effects to hillslope hydrology, same as Alt. B.	700 foot long bridge. 42.0 acres in long-term detrimental conditions. Minimal surface erosion. Lowest risk of slope instability. No effect to hillslope hydrology.

ISSUE	ALTERNATIVE A No Action	ALTERNATIVE B Reroute 1 Bench Emphasis	ALTERNATIVE C Reroute 2 Retaining Wall Emphasis	ALTERNATIVE F Bridge
AQUATIC HABITAT (Matrix Indicators: Project Scale/Watershed Scale)				
Temperature	M/M	M/M	M/M	M/M
Sediment	D/M	D (tribs) M (Dose)/M	D (tribs) M (Dose)/M	D/M
Large Woody Debris	M/M	D/M	D/M	M/M
Pool Freq and Quality	M/M	M/M	M/M	M/M
Off-channel Habitat	M/M	D/M	D/M	M/M
Width/Depth Ratio	M/M	M/M	M/M	M/M
Streambank Condition	M/M	M/M	M/M	D/M
Drainage Network	M/M	D/M	D/M	M/M
Road Density/Location	M/M	M/M	M/M	M/M
Function of Riparian Reserves	M/M	D/M	D/M	M/M
Puget Sound Chinook	No Effect	NLAA	NLAA	LAA
Chinook Critical Habitat	No Effect	NLAA	NLAA	LAA
Puget Sound Steelhead	No Effect	NLAA	NLAA	NLAA
Hood Canal summer chum	No Effect	NLAA	NLAA	NLAA
Summer chum Critical Habitat	No Effect	NLAA	NLAA	NLAA
Coastal Puget Sound bull trout	No Effect	NLAA	NLAA	NLAA

(M)aintain = project may affect indicator, but impact is neutral.
(D)egrade = project is likely to have a negative impact on the habitat indicator.

NLAA = Not Likely to Adversely Affect
LAA = Likely to Adversely Affect

ISSUE	ALTERNATIVE A No Action	ALTERNATIVE B Reroute 1 Bench Emphasis	ALTERNATIVE C Reroute 2 Retaining Wall Emphasis	ALTERNATIVE F Bridge
TERRESTRIAL HABITAT				
N. Spotted Owl	No habitat impact No Effect	Remove 7.1 acres suitable habitat (one activity center below habitat threshold); LAA	Remove 6.5 acres suitable habitat (one activity center below habitat threshold); LAA	Degrade 1 acre suitable habitat (one activity center below habitat threshold); 2.5 acres noise disturbance LAA
NSO Critical Habitat	No habitat impact No Effect	Remove 7.1 acres constituent element (nesting, roosting, foraging, or dispersal habitat) LAA	Remove 6.5 acres constituent element LAA	Degrade 1 acre constituent element LAA
Marbled Murrelet	No habitat impact No Effect	Remove 7.1 acres suitable habitat; 15.7 acres noise disturbance LAA	Remove 6.5 acres suitable habitat; 15.7 acres noise disturbance LAA	Degrade 1 acre suitable habitat; 2.5 acres noise disturbance LAA
MM Critical Habitat	No habitat impact No Effect	Remove 7.1 acres, constituent element LAA	Remove 6.5 acres, constituent element LAA	Degrade 1 acre of constituent element LAA
BOTANICAL SPECIES AND HABITAT				
Vascular plants	No risk to species viability or a trend toward Federal listing	Same as Alt A	Same as Alt A	Same as Alt A
Bryophytes	No risk to species viability or a trend toward Federal listing	Same as Alt A	Same as Alt A	Same as Alt A
Fungi	No risk to species viability or a trend toward Federal listing	May impact species or habitat, very low likelihood of risk to species viability or trend toward Federal listing	Same as Alt B	Same as Alt A
Lichens	No risk to species viability or a trend toward Federal listing	Same as Alt A	Same as Alt A	Same as Alt A

ISSUE	ALTERNATIVE A No Action	ALTERNATIVE B Reroute 1 Bench Emphasis	ALTERNATIVE C Reroute 2 Retaining Wall Emphasis	ALTERNATIVE F Bridge
ACCESS AND RECREATION Deferred maintenance and start-up costs	Non-motorized access only. Maintains non-motorized trail experience in non-wilderness area. Campgrounds remain closed park = $0 Forest = $0	Access restored to pre-washout conditions. Easier access for elderly, persons with disabilities, and day visitors. Campgrounds open. park = $17,600 Forest = $162,000	Same as Alt. B. park = $17,600 Forest = $162,000	Same as Alt. B. park = $17,600 Forest = $162,000
WILDERNESS	No effect.	Minor short-term effects to solitude and unconfined recreation during construction. No long-term effects.	Same as Alt. B.	Same as Alt. B.
SOCIAL/ECONOMIC	Continued reduced income for local service businesses. Present Value of Discounted Costs (PVDC): Forest = $5,000. park = NA.	Increased income for local service businesses. Dosewallips area again a visitor destination attraction. PVDC: Forest = $3,116,300. park = $330,100.	Social same as Alt. B. PVDC: Forest = $4,329,100. park = $330,100.	Social same as Alt. B. PVDC: Forest = $9,095,000. park = $330,100.
INVASIVE SPECIES	Minimal manual control of existing populations. No control of new infestations.	Newly exposed ground susceptible to invasive plant colonization. Positive results in prevention of invasive plant spread and treatment of current and new infestations.	Same as Alt B	Same as Alt B
VISUAL QUALITY (ONF only)	No change, long-term vegetative recovery of high bank	Visual Quality Objective (VQO) of retention met	Visual Quality Objective (VQO) of retention met	Visual Quality Objective (VQO) of partial retention met

ISSUE	ALTERNATIVE A No Action	ALTERNATIVE B Reroute 1 Bench Emphasis	ALTERNATIVE C Reroute 2 Retaining Wall Emphasis	ALTERNATIVE F Bridge
CLIMATE TRENDS AND STREAM FLOWS	No added concerns or costs if stream flows increase	Same as Alt A	Same as Alt A	Bridge would be designed for expected streamflow.
SOUNDSCAPES	No adverse impact	Short-term, moderately adverse impacts to soundscapes. Would be consistent with park purpose and zoning.	Same as Alt B	Same as Alt B
PARK OPERATIONS	Continued deterioration of trails and facilities. Increase flight time for air support to trail maintenance and search and rescue operations.	Improved maintenance of trails, reduced time and funding requirements. Improved search and rescue operations.	Same as Alt B	Same as Alt B
WETLANDS AND WATERS OF THE U.S.	No effect	0.019 acre impacted, no net loss	0.020 acre impacted, no net loss	0.016 acre impacted, no net loss Placement of piers in the river and riprap for abutment stabilization could alter river channel in the future.
IMPLEMENTATION COMPLETE (assumes ROD signed in Fall 2008)	2009	2012	2012	2012
FOREST PLAN AMENDMENTS	None	4 Terrestrial, 1 Aquatic	3 Terrestrial, 1 Aquatic	1 Aquatic

Forest Plan Amendments

As previously described all action alternatives would require non-significant amendments as defined under the National Forest Management Act (NFMA) to the 1990 Olympic National Forest Land and Resource Management Plan. The need for these amendments is due to changed physical conditions, i.e. the road washout. The ONF determined that the proposed amendments would be non-significant based on criteria found in FSM 1900, Chapter 1920, Section 1926.5.

If an amendment to a Forest Plan results in "a significant change in the plan," the NFMA and its 1982 implementing regulations under which this DEIS is prepared, require that the amendment process follow the procedures used in the initial development of the plan. The 2008 Forest Service planning regulations (36 CFR 219) allow plan amendments to be made using the procedures from the 1982 planning regulations during the three-year transition period. If the proposed changes in the plan are not significant, public notification and completion of the NEPA procedures are still required (16 USC 1604 (f)(4) and 36 CFR 219.10(f)). Determining whether a plan amendment is a significant change uses different criteria than those used in evaluating significance in the NEPA process. For the NFMA requirement, the Forest Service Manual (FSM 1926.51 and .52) provides specific direction.

FSM 1926.51 – Changes to the Land Management Plan that are Not Significant. Several examples are provided in the manual of changes to the land management plan that are not significant. The applicable examples to this project and how they apply are as follows:

1. Actions that do not significantly alter the multiple-use goals and objectives for the long-term land and resource management.

The actions proposed in the action alternatives would not alter the objectives and the multiple-use goals of the Olympic Land and Resource Management Plan as amended by the Northwest Forest Plan. The purpose of these alternatives is to facilitate achieving those goals and objectives. These alternatives will continue to provide for species protection in compliance with all applicable laws and regulations, while providing for other forest management priorities.

3. Minor changes in standards and guidelines.

The proposed forest plan amendments would waive specified standards and guidelines added to the Forest Plan by the Northwest Forest Plan amendment. These changes would be specific to the Dosewallips project area and would apply only for this specific project. These proposed amendments would not significantly change the key elements of the underlying strategy or standards and guidelines. Waiving the specified standards and guidelines would be a relatively minor change because the Northwest Forest Plan is an ecosystem-based approach that relies primarily on a system of reserves and standards and guidelines to accomplish its primary objectives.

FSM 1926.52 – Changes to the Land Management Plan that are Significant. The following examples indicate circumstances that may cause a significant change to a land management plan. A brief discussion of why these examples do not apply to this project follows each example.

1. Changes that would significantly alter the long-term relationship between levels of multiple-use goods and services originally projected (36 CFR 219.10(e)).

The changes proposed by the action alternatives would help achieve, not alter, the relationship between the levels of multiple-use goods and services originally projected. The Forest Plan identified the Elkhorn Campground as a developed recreation site, to provide both for existing developed recreation use and an expected increase in demand for developed recreation sites by reconstruction/expansion of the campground.

2. Changes that may have an important effect on the entire land management plan or affect land and resources throughout a large portion of the planning area during the planning period.

The changes proposed by the action alternatives are specific to the Dosewallips Road Washout Project area. These changes only apply to a very small portion (about 7 acres out of a total of 632,000 acres) of the Olympic National Forest. Also as previously stated the changes do not affect the key elements of the underlying strategy or standards and guidelines.

The proposed amendments involve plan components established in the 1994 NWFP ROD. The implementation section of the ROD (E-18) states “Changes or adjustments to these standards and guidelines may be made through amendments to those plans [Forest Plans] required by regulations as described above. The authority to change or amend those plans remains as specified in applicable regulations. The amendments will be reviewed by the Regional Interagency Executive Committee to assure consistency with the objectives of these standards and guidelines”. A review by the Regional Interagency Executive Committee will be conducted prior to the Olympic National Forest Supervisor signing a ROD for this proposed project.

Environmentally Preferred Alternative

The environmentally preferred alternative is defined as “the alternative that will best promote the national environmental policy as expressed in section 101(b) of the National Environmental Policy Act.” Basically the environmentally preferred alternative would cause the least damage to the biological and physical environment and best protect, preserve, and enhance historic, cultural, and natural resources.

The environmental consequences of the alternatives as analyzed (as documented in Chapter 3 of this document), will be used to help evaluate how well the goals stated in section 101 of the National Environmental Policy Act are met by the alternatives. The Agency Responsible Officials will identify the environmentally preferred alternative at the time the Final EIS is prepared.

The goals established by section 101 are listed below.

1) Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;

2) Ensure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings;

3) Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;

4) Preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice;

5) Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities; and

6) Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Introduction

This chapter presents the scientific and analytical basis for comparison of the alternatives displayed in Chapter 2. Probable effects of implementing each alternative are disclosed for the affected resources. The effects analysis area varies in size depending on which resource is being considered and generally exceeds the immediate project area, for some resources it encompasses the 5th field Dosewallips watershed[9].

The probable effects described include direct, indirect, and cumulative effects. The ONP proposed activities are approximately four air miles from the area where the ONF proposed activities would occur. Due to this geographic separation direct and indirect effects are discussed separately for effects of ONP and ONF activities. Since the park proposed action is common to all action alternatives for the proposed repair on FSR 2610, the direct/indirect effects discussions for all action alternatives for the park action are at the end of each issue discussion. Cumulative effects are combined in one discussion, covering both ONF and ONP actions. The chapter is organized according to the issues presented in Chapter 1 and concludes by addressing the disclosures specifically required by Federal statutes and Executive Orders.

As this EIS has been prepared by specialists from the ONF, WFLHD, and ONP; and each agency have unique regulation and policy requirements; some terminology and analysis needs are specific to each agency. These agency specific differences are noted throughout this chapter.

Information supporting the analysis in this chapter may be found in resource specialist reports contained in the project's analysis file. Individual specialist reports are referenced at the beginning of each resource discussion.

Cumulative Effects

According to the Council of Environmental Quality (CEQ) NEPA regulations, "cumulative impact" is the impact on the environment which results from the increased impact of the action when added to other past, present, and reasonable foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions (40 CFR 1508.7). This project's cumulative effects analysis was guided by the June 24, 2005 CEQ Memorandum "Guidance on the Consideration of Past Actions in Cumulative Effects Analysis", which provides guidance on the extent Federal agencies are required to analyze the environmental effects of past actions (CEQ 2005).

Early in the analysis process the project IDT identified past, present, and reasonably foreseeable future actions that might result in cumulative impacts with the proposed action. Only those past actions that the IDT considered to still be having impacts on resources potentially affected by the

[9] The 5th field Dosewallips watershed includes encompasses the entire Dosewallips River drainage, from its headwaters in the park to the where it enter Hood Canal near Brinnon, Washington.

Dosewallips Road Washout project are included in this analysis. Each resource area considered different mixes of these actions, depending on the cumulative effects boundary for the resource area and the resource affected. Only those past, present, and reasonably foreseeable actions which overlap the geographic analysis boundary for each particular resource are considered, and only if those other actions have or are expected to have overlapping effects with the Dosewallips Road Washout project. Some past projects may still be having effects which result in cumulative effects associated with a particular resource, but not another.

Past

- Timber harvest (both Forest Service and private).
- Wildland fire (1919, 1926).
- Construction of a by-pass trail around the washout.
- Use and maintenance of Elkhorn Campground.
- Use and maintenance of Olympic National Park facilities.
- Use and maintenance of roads beyond the washout.
- Road decommissioning (10.1 miles in last 10 years)
- Jefferson County bank stabilization project involving placement of riprap along 170 feet of Dosewallips River bank at RM 1.9. Also included planting of native vegetation.
- Washington Trout – Project along lower Dosewallips River which removed 1,000 feet of dike and restored 40 acres of salt marsh. Also planted native trees and shrubs on 5 acres.
- Fall 2006/Winter & Spring 2007 closure of motorized access to ONP Staircase (FSR 24).
- Road repair on FSR 2610000 at MP 1.9 near Case Creek. This included installing a larger culvert and improving road drainage.

Present

- Current use of Elkhorn Campground.
- Current use of Olympic National Park facilities.
- Trail system accessed by FSR 2610.
- Use and maintenance of transportation system up to the washout.
- Dispersed camping along the Dosewallips River.
- Harvest of second growth timber and associated road construction on private land in the Mt. Jupiter and Dosewallips Road area (about 150 acres).
- Closure of FSR 24 to all public access since November 1, 2007. FSR 24 is the main access point for the Staircase area of the Olympic National Park.

Future

- Placement of large woody debris (LWD) in the Dosewallips River and riparian area.
- Road decommissioning on FSR 2610-012 from MP 0.7 to 2.7, about 2.0 miles.
- Jackson Thinning Project (about 1,000 acres of commercial thinning – primarily cable and helicopter logging, and 3 miles of temporary road construction in the Rocky Brook subwatershed).
- Future treatment of danger trees along the transportation system.
- Forest Service road maintenance of FSR 2610.
- Watershed restoration project involving rehabilitation of dispersed camping areas on National Forest System land adjacent to the Dosewallips River.
- Washington Trout – Project will install up to 6 log jams along the lower Dosewallips River.

- Dosewallips Floodplain acquisition project – Project plans the acquisition of about 93 acres (0.75 miles of river length) of riparian and floodplain habitat 1.5 miles above the river's mouth.
- Olympic National Park resumption of road and facility maintenance.
- Implementation of the ONP's new General Management Plan (GMP).
- Private land timber harvest and road construction (about 200 acres).
- Pleasant Harbor Marina and Golf Resort, a 250 acre development planned at Pleasant Harbor about three miles south of Brinnon.

ONP Methodology, Assumptions, and Definitions (applies only to ONP effects discussions)

Impacts are evaluated based on the most current and comprehensive scientific and social data available. Overall the ONP based these impact analyses and conclusions on the review of existing literature and ONP studies, information provided by experts at the park and other agencies, professional judgment and park staff insights, and input from interested public. Impacts can be beneficial or adverse. Beneficial impacts would improve resource conditions while adverse impacts would deplete or negatively alter resources.

There are several terms used within the park's environmental consequences sections to assess the impacts of each alternative on each impact topic. Unless otherwise stated the standard definitions for these terms are:

Negligible - the impact is at the lower level of detection; no measurable change would occur.

Minor - the impact is slight but detectable; a small change would occur over the life of the project.

Moderate - the impact is readily apparent; a measurable change would occur and could result in a small but permanent change.

Major - the impact is severe, resulting in a permanent measurable change.

Impairment - the impact would harm the entire integrity of the resource or value whose conservation is key to the cultural or natural integrity of the recreation area or is a resource or value needed to fulfill a specific purpose identified in the park's enabling legislation.

Localized Impact - the impact occurs in a specific site or area, to individual wildlife, or the wildlife group. When comparing changes to existing conditions, the impacts are only detectable in the localized area.

Short-term - the impact occurs only during or immediately after the actual management or project activity.

Long-term - the impact could occur for an extended period of time after the management or project activity has been completed. The impact could take several years or more.

Direct – an effect that is caused by an action that occurs at the same time and in the same place.

Indirect – an effect that is caused by an action that is later in time or farther removed in distance but is still reasonably foreseeable.

Impairment of Park Resources and Values (only applies to ONP resources)

In addition to determining the environmental consequences of the proposed action and alternatives, NPS *Management Policies* (2006) and *Director's Order-12* (2001) require analysis of potential effects to determine if actions would impair park resources. The fundamental purpose of the National Park System, established by the *Organic Act* and reaffirmed by the *General Authorities Act*, as amended, begins with a mandate to conserve park resources and values. NPS managers must seek ways to avoid or minimize to the greatest degree practicable, adversely impacting park resources and values. Congress has given NPS managers discretion, however, to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park so long as the impact does not constitute impairment of the affected resources and values.

The prohibited impairment is an impact that would, in the professional judgment of the responsible NPS manager, harm the integrity of park resources or values, including opportunities that would otherwise be present for the enjoyment of those resources or values. An impact would be more likely to constitute impairment to the extent that it has a major or severe adverse effect upon a resource or value whose conservation is:

- Necessary to fulfill specific park purposes identified in the establishing legislation or proclamation of the park;
- Key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or, is
- Identified as a goal in the park's general management plan or other relevant NPS planning documents.

An impact would be less likely to constitute an impairment to the extent that it is an unavoidable result, which cannot be reasonably further mitigated of an action necessary to preserve or restore the integrity of park resources or values.

A determination on impairment is made in the "Conclusion" section of all natural resource impact topics of this document as they relate to Olympic National Park. Impairment statements are not required for recreational values/visitor experience or heath and safety topics or for those resources located outside Olympic National Park on U.S. Forest Service administered lands.

Environmental Impact Analysis

Road Management (Road Management Report, December 2005 with updates in 2008)

Introduction

Dosewallips River Road History
In the late 1880s settlers started locating up the Dosewallips River valley. Early transportation up the valley was by trail. The Dosewallips River Road was established by County order in January 1892 for a distance of about eight miles on the north side of the river (Bailey 1997). Early maps of the area indicate the road stopping just past Gamm Creek around 1893, with it being extended up past the current washout location sometime during the period 1910 -1926 (ibid). The road provided motorized access to the Elkhorn Campground location in about 1932 (Bailey pers comm). During the late 1930s and 1940s the Civilian Conservation Corps extended the road up into the park to the Dosewallips Campground location.

Affected Environment

Olympic National Forest
FSR 2610 extends approximately 3.3 miles beyond the washout and terminates at the entrance to Olympic National Park. There are two local roads that branch off from FRS 2610 upstream of the washout. The first, FSR 2610040, is about 0.5 mile in length and is located just downstream of Elkhorn Campground. It is drivable to about MP 0.25 where a culvert has been removed from an unnamed stream crossing. It was constructed for timber management purposes and includes a bridge across the Dosewallips River. The second local road is FSR 2610050, a short loop road accessing Elkhorn Campground. All roads are single lane, surfaced with aggregate.

None of these roads have received annual maintenance since the washout in January of 2002. In many places there is vegetation such as small red alder trees growing in the roadway and ditch. Ditches and culvert inlets have accumulated sediment and are in need of cleaning. In other places runoff has washed away sections of aggregate surfacing.

The current or operational maintenance level for FSR 2610 up to Elkhorn Campground is for passenger cars (maintenance level 3), changing to high clearance vehicles past the campground (maintenance level 2). The proposed long-term management (objective road management) is to provide access for passenger cars on the complete length of FSR 2610 as well as on FSR 2610050. The objective for FSR 2610040 is maintenance level 2, high clearance vehicles. The proposed long-term management of these roads has been determined through the Forest's roads analysis or road management strategy (RMS) and the Access and Travel Management Strategy (ATM).

Olympic National Park
The 1.7-mile Dosewallips River road begins at the end of FSR 2610 and ends at the Dosewallips Ranger Station, campground, and trailheads. The road is unpaved and very narrow in places, and is maintained at park primitive road standards. One portion of the road is very steep (18 percent slope) and is not recommended for large RV's and vehicles pulling trailers. Prior to the washout it was generally open year round and only closed due to weather conditions. Annual maintenance has not been possible since the 2002 washout on FSR 2610.

Environmental Consequences

Olympic National Forest - Introduction

The alternatives being considered occupy one of two basic locations, a hillslope location and a river margin location. While exact alignments will be subject to the final design, information from surveys and designs as well as additional site reconnaissance allows for reasonable comparative cost estimates.

This section includes costs of construction and maintenance of the alternatives and the implications for user safety. Costs primarily address four areas: 1) cost of construction, 2) cost of maintenance during construction of the three miles of FSR 2610 leading to the washout, 3) cost of annual maintenance along the new section of road, and 4) the cost of maintaining the approximate 3.3 miles of FSR 2610 beyond the washout.

All estimates are for comparative purposes only, actual costs would be developed with final alternative design. Because of the uncertainty of subsurface conditions costs would be expected to fluctuate as additional information is available. Uncertainty usually results in higher final costs and increases could be expected. Hazards, uncertainty, and potential changes would be most likely along portions of Segment 2 of the reroute alternatives, which is about 40 percent of the length of the reroute. However preliminary surveys and site reconnaissance allow for reasonable estimates of cost.

The most likely conditions to be encountered that could result in higher costs are: 1) encountering material of lower quality than expected which would require haul off-site to a disposal area, 2) encountering unsuitable foundation conditions requiring higher walls or changes in design during construction, 3) slope instability conditions such as high groundwater tables and weak soil or rock that require more complex stabilization designs including the possible need to shore excavations for worker safety, and 4) lower quality material, springs, and seepage areas in cut slopes requiring laying the slope back further than anticipated and constructing rock buttresses, installing horizontal drain systems, or combinations of slope stabilization methods which might result in additional excess material to be hauled to disposal sites.

If lower quality material is encountered either during excavation or cutslope construction it would likely be localized. The steepness of the ground and the presence of shallow groundwater suggest that the soil is shallow and relatively strong material (weathered bedrock or glacial till) is present in the subsurface.

Other potential costs are more speculative and associated with risk; for example the cost of major reconstruction due to the washout migrating upstream or downstream on the bridge alternative or the cost of repairing a slope failure (landslide, etc.) on one of the re-route alternatives. Estimating these costs is too speculative and dependant on the magnitude of the problem if one develops.

Alternative A - No Action

Direct/Indirect Effects

Olympic National Forest

This alternative does not meet the purpose and need of this analysis in that road access would not be provided to the recreational facilities beyond the washout. No provisions would be made for parking or turnaround locations near the washout beyond what is already available.

Costs
This alternative would likely cost less than $5,000 depending on the road closure device specified. No additional costs for road construction, reconstruction or annual road maintenance would be expected or planned with this alternative.

User Safety
A more permanent road closure device would be installed at the washout for user safety.

Olympic National Park

Costs
Conditions on the Dosewallips Road would not change. There would be no reconstruction or maintenance, and no costs incurred.

User Safety
Vehicle traffic would not be able to access the damaged road area and as such there would be no effects to user safety.

Cumulative Effects

In comparison to the action alternatives the cost of this alternative to ONF is minor which would allow Forest road funding resources to be used in other areas on the Forest. As there are no ONP road construction or maintenance costs associated with this alternative, park road funding resources would be available to be used in other areas of the park.

Alternative B - Reroute 1 Bench Emphasis

Direct/Indirect Effects

Olympic National Forest
The road would be constructed and managed to a standard consistent with the rest of FSR 2610; that is a 14-foot wide, single lane road designed for maintenance level 3, suitable for passenger vehicles. Compared to the original location and the bridge alternative, this alternative would involve a long section of new construction with wide clearing limits. It would be about 0.84 mile in length or more than 6 times as long as Alternative F.

Costs
This route traverses steep ground and would be constructed at a steep grade, as such it would be costly in terms of initial construction costs and annual maintenance costs. The anticipated earthwork is substantial with large cuts and fills and little opportunity to adjust alignment to reduce that earthwork.

The annual maintenance costs and frequency would be expected to be fairly high initially (short-term) because of the large cutslopes and steep grades. Big cuts on steep slopes suggest that some slope erosion should be anticipated at least initially, and keeping the drainage system (ditches and culvert inlets) open and functioning is expected to require frequent maintenance if failures of the drainage system are to be prevented. The sections with steep grades have a higher potential

for road surface and fillslope erosion and drainage diversion than flatter roadway sections should the drainage system plug. Over time this cost and impact tends to go down as vegetation is established and a more stable slope angle develops (repose) in the cutslope.

Table 2: Alternative B cost estimates

Item	Cost	Term	Estimated duration
Construction	$2,550,000	NA	NA
Annual Maintenance, New	$33,900/yr	short	First 2 years
Annual maintenance, Life	$2,000/yr	long	After 2-yrs – life of project
Annual maintenance beyond washout, Life	$10,800/yr	long	Life of project

NA = Not Applicable

User Safety
This alternative would provide for user safety equal to or exceeding existing conditions found along FSR 2610 before the washout in terms of road design and maintenance standards. Danger trees along the newly constructed road would be removed.

Alternative C – Reroute 2 Retaining Wall Emphasis

Direct/Indirect Effects

Olympic National Forest
This route would essentially be in the same location as Alternative B, with a similar length.

Costs
Adjustments would be made in the horizontal and vertical alignment in order to reduce the foot print or clearing limits of the route compared to Alternative B. Because of the steep sideslopes and grade limitations there would be limited ability to make these adjustments. Adjustments would be primarily with the use of retaining walls and slope reinforcements, which would increase construction and short-term maintenance costs. Construction maintenance costs would also be higher due to the increased haul of embankment material along FSR 2610.

Table 3: Alternative C cost estimates

Item	Cost	Term	Estimated duration
Construction	$3,760,000	NA	NA
Annual Maintenance, New	$34,200/yr	short	First 2 years
Annual maintenance, Life	$2,000/yr	long	After 2-yr – life of project
Annual maintenance beyond washout, Life	$10,800/yr	long	Life of project

NA = Not Applicable

User Safety
User safety would be the same as for Alternative B

Alternative F - Bridge

Direct/Indirect Effects

Olympic National Forest
The alignment would be essentially straight between the upstream and downstream ends of FSR 2610 at the washout. The height would be expected to be at or near the elevation of the upstream end of the road, well above the level of the predicted 100 year flood.

Costs
Construction and maintenance costs are estimated in Table 4. An additional expense is that bridges and major structures are subject to inspection by a certified bridge inspection team every 2 years, and bridge maintenance would be conducted to meet health and safety requirements of the Highway Safety Act. This is the only alternative that would affect additional inventory, tracking, and workload in this regard.

Table 4: Alternative F cost estimates

Item	Cost	Term	Estimated duration
Construction	$8,750,000	NA	Design life (50 yr)
Annual Maintenance, New & Life	$3,900/yr	Short, long (same)	Life of project
Bridge insp. maintenance	$1,200/yr	long	Life of project
Annual maintenance beyond washout, Life	$10,800/yr	long	Life of project

NA = Not Applicable

User Safety
There are no unusual concerns. Danger trees along the top of the slope would be removed.

Alternatives B, C, and F – All Action Alternatives

Direct/Indirect Effects

Olympic National Park
Costs
Construction costs would be the same for all action alternatives and are estimated to be $350,000. Deferred road maintenance costs are likewise the same for all action alternatives and are estimated to be $4,500.

User Safety
These alternatives would provide for user safety equal to or exceeding existing conditions in terms of road design and maintenance standards found along the Dosewallips Road before the road became damaged. Danger trees along the newly repaired road would be removed.

Cumulative Effects

Use of ONF road funds for any of the action alternatives would reduce the overall total road funds available to perform other road work on the Forest. The alternatives with higher expenses would have a greater impact in this regard. Use of ONP road funds on the Dosewallips Road

would reduce the overall total road funds available to perform other road work on the park.

Geotechnical and Geomorphic Processes (Geotechnical and Geomorphic Processes Reports, January 2006 with updates in 2008; and Soils Report, January 2006 with updates in 2008)

Introduction

Olympic National Forest
The alternatives being considered can be placed into two general road alignment categories: 1) approximating the original road location along the river, and 2) bypassing the river margin and routing up the hill and around the washout to the north. These are referred to as river margin and hillslope alignments respectively. While geomorphic processes are of a larger concern for the river margin alternative and geotechnical processes are more important for the hillslope alignments, they are combined in this section to give a more complete understanding of all geological processes occurring in the project area.

The Affected Environment discussion includes a basic description of geomorphic processes (processes which create or shape land forms). An understanding of these concepts is important in understanding the environmental consequences of the alternatives, particularly Alternative F. It is also important in understanding the analysis presented in Appendix B which describes the environmental consequences of former Alternatives D (Replace-in-kind) and E (Low-water Revetment), which were dropped from consideration.

Alternative F (bridge alternative), which approximates the original road location along the river is affected by river (fluvial) processes as well as the processes associated with the long-term evolution and stabilization of the high bank (eroded bluff) at the washout. For the purposes of this document the high bank at the washout refers to the bare slope at the washout that has enlarged over time as river erosion, undercutting, and slope instability has progressed. Other terms such as bluff slope or eroded face of the high terrace have been used in discussion of this site, all are intended to describe the same feature. The photographs used in this section were provided by Shelly Ament and Jay Moore of the Washington Department of Wildlife.

The Affected Environment section also provides the geotechnical basis for addressing issues raised by the public through comments and appeal points on the 2003 EA regarding the uncertainty of geologic or geotechnical conditions along the proposed hillslope alignment, particularly in the area of slope stability. Since the EA analysis additional geotechnical reconnaissance has been conducted along the proposed route and the hillslope alignment has been surveyed and staked. Additional site reconnaissance included further surface examination of deposits, topography, slope stability features, and seeps and springs. No subsurface investigation was conducted because drilling would be costly and would create environmental

impacts such as clearing large trees and creating temporary access roads. It was judged premature to incur these impacts prior to committing to one of these re-route alternatives as geophysical investigations were not expected to provide sufficient information in light of their associated environmental impacts.

Information used to develop preliminary designs for the reroute alternatives included making assumptions about subsurface conditions and geologic hazards (in this case slope stability). The available survey provided detailed information about topography and geometric design (horizontal and vertical alignment, size and geometry of cuts and fills, and volume of earthwork). This information along with the additional site reconnaissance allows for reasonable assessments of potential impacts.

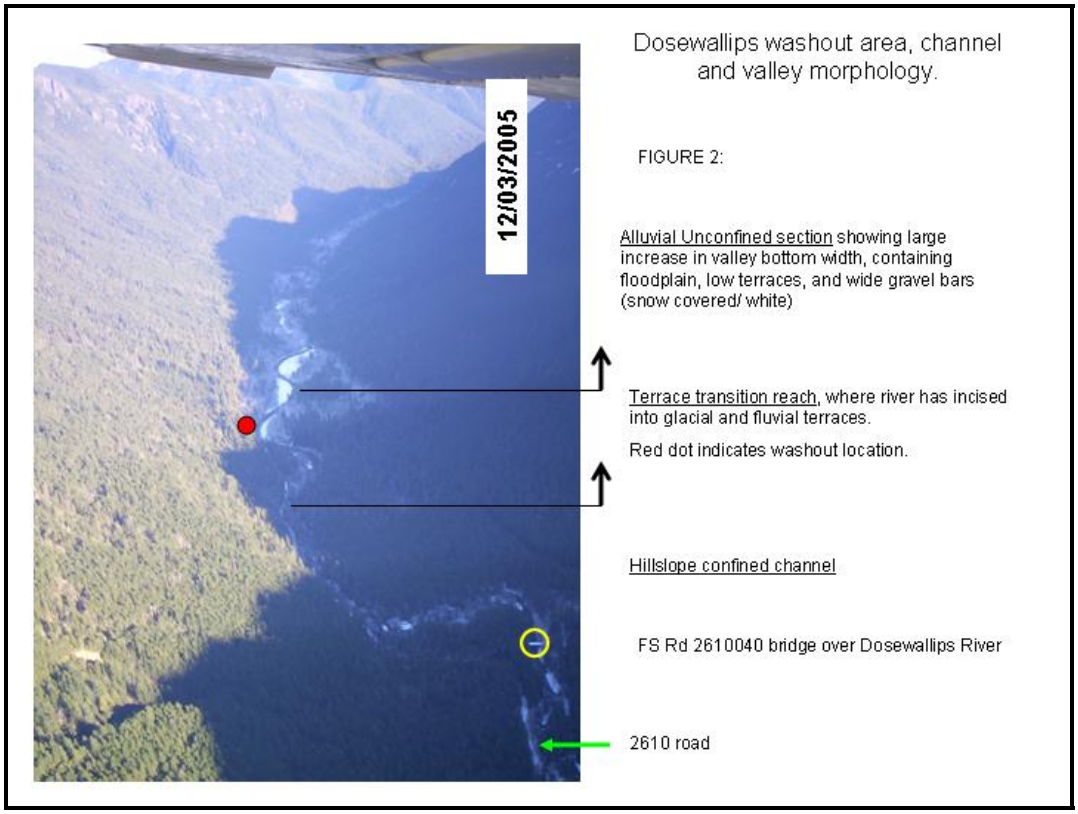
Olympic National Park
The National Park Service portion of the project is located on the existing road near the Dosewallips Falls. The road grade near the site is approximately 18 percent, the side slope is extremely steep and rocky, and the toe of the existing crib/fill areas is approximately 30 feet below the road and directly adjacent to the river cascades. The falls have remained in their current channel since at least the 1930s and 40s, when the road was constructed. The roadway is not typically impacted by the falls, except during periods of extreme flooding. However heavy rains can erode the embankments above the walls causing the log cribbing to deteriorate over time.

Affected Environment

Olympic National Forest
The Reach Analysis
Much of the information regarding geomorphic conditions at and adjacent to the washout site was developed during investigations conducted in 2002 and 2003. This information is documented in Cenderelli, et al. (2003), *Geomorphic Processes and Habitat Conditions along the Dosewallips River in the Vicinity of the Washout on US Forest Service Road 2610.* This constitutes the documentation of what is most frequently referred to as the reach analysis or reach assessment. The primary objectives of that assessment were to: 1) develop appropriate mitigation for the preferred alternative proposed in the 2002 EA that replaced the road in the original location, 2) refine the assessment of long-term and off-site impacts for documentation in the 2002 EA, and 3) provide more detailed information for the aquatic biological assessment (BA).

Key findings included: 1) the trend in channel migration, 2) the recognition of the unique geomorphic setting at the washout location, and 3) the link between sediment supply at and adjacent to the washout and the important salmonid habitat just downstream. The washout occurs in a transition zone between a fairly steep bedrock controlled canyon reach extending upstream at least to the National Park boundary and the unconfined alluvial reach just downstream of the washout. (Figure 15 shows an aerial view.)

Figure 15: Washout location aerial view



The upstream reach, referred to as the hillslope confined channel or section, is characterized as being a high energy environment with comparatively low sediment supply. This means that the sediment supply is limited relative to sediment transport capacity. Fluvial (stream) and glacial terraces and associated bank erosion were not observed in this section (air photo examination only).

The terrace transition reach is a short section, extending from 1300 feet upstream of the washout to 850 feet downstream of the washout. Glacial and fluvial terraces confine the channel along the outside of bends. There is a high degree of interaction between the bank and the channel, and sediment supply is high and is dominated by gravel sizes in the range preferred by spawning salmonids. The entire reach is contained within two meander bends and the washout is located near the apex of the downstream bend. The largest (discrete) sources of sediment supply within the terrace transition reach are from erosion of the high banks at the outside of the two meander bends located at and upstream of the washout. These sites also contain the deposits with a large percentage of gravel of preferred spawning size. The large gravel bars downstream in the alluvial unconfined reach are storage sites for these deposits. They are snow covered and show up as bright white in Figure 15.

The alluvial unconfined section or reach is immediately downstream. Here the valley bottom is wide, confinement is reduced, the high terrace structures disappear, and the stream gradient decreases. The combination of high sediment supply upstream and decreased gradient

downstream favors deposition of sediment. At this point in the channel network sediment supply exceeds transport capacity (the reach becomes transport limited). This is the area where in-channel habitat conditions are complex and habitat is considered excellent. This combination of factors and conditions is unique in the upper watershed.

Trends in channel migration

The historic air photo assessment conducted during the Reach Analysis indicates that the trend since 1939 has been toward increasing sinuosity at the washout location. At the washout the river meander bend has progressed toward and then into the bank, resulting in road washout and erosion of the high bank. It is assumed that this trend, which has been consistent in the past but at a variable rate, will continue. Observations in the winter of 2007 indicate that the area of erosion and the amount of exposed (unvegetated) high bank has increased since the initial road washout in January of 2002.

It is typically expected that meanders migrate downstream over time (TRB, National Cooperative Highway Research Program, Report 533, Handbook for Predicting Stream Meander Migration, 2004). As this occurs, at some point in time the high bank will no longer be at the outside of the meander bend and the high bank will be abandoned as a source of gravel. When this will occur is unknown, but it is expected to be longer than 50 years, the commonly assumed design life of many transportation structures on similar forest roads in the area.

Figure 16 shows the washout site in 2005 with the 1939 channel position approximately located. Note that from 1939 to 2005, the trend of channel migration and meander development includes both extension (lateral shifting) and translation (downstream migration).

Figure 16: Historic migration zone

Dosewallips washout area, Historical Migration Zone (HMZ)

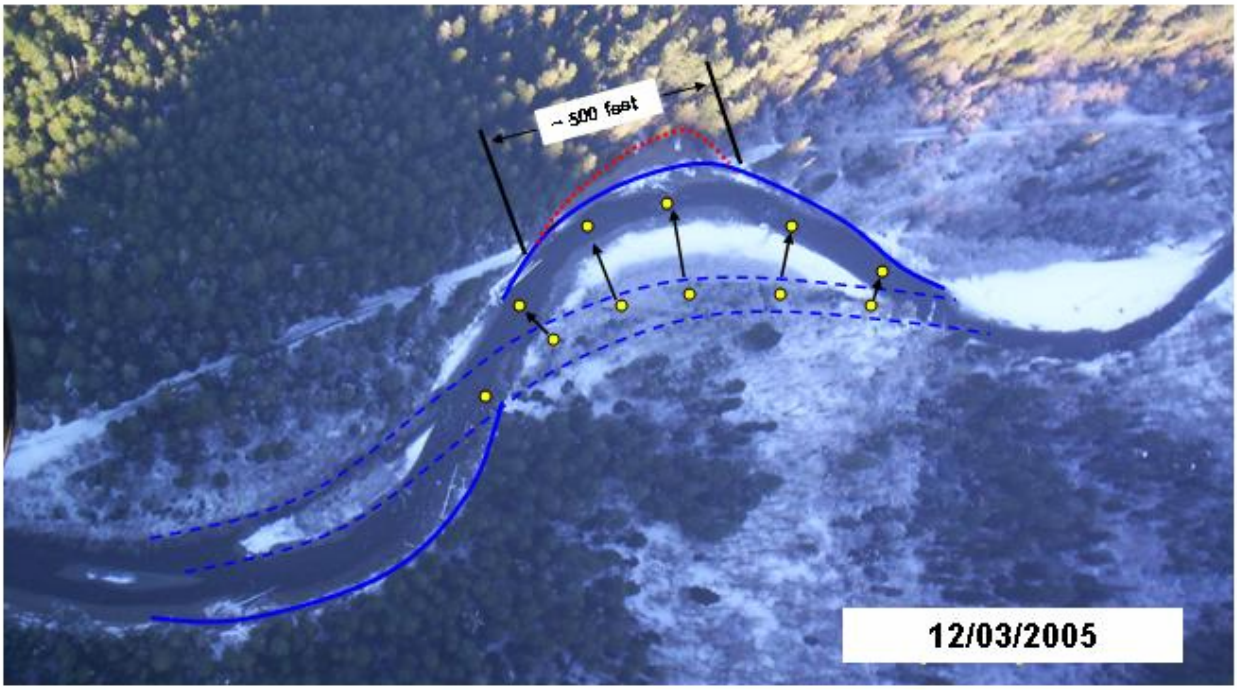


FIGURE 14: Air photo of washout site taken 12/03/2005. Dashed blue line shows the approximate location of the 1939 channel. Yellow dots and black arrows indicate direction of movement. Movement is pronounced extension (lateral or outward) with associated (downstream) translation. Movement near the apex of the bend appears to be about 280 feet. Washout area and high bank erosion is outlined in red.

Note that photo was not taken vertically and measurements are only rough approximations. Washout length was measured in the field, 10/18/2005, distance measurements are relative to this dimension.

Sediment supply and variability over time

Sediment supply from the terrace areas and delivery (response) to the low gradient segments downstream was judged from aerial photography from 1939 through 2002. The position of the channel relative to the banks (terrace faces), the appearance or amount of raw bank, and the size of gravel bars (un-vegetated channel margin) were primary indicators. Not surprisingly the trend in active bank erosion, channel response (wider gravel bars), and flood history are related and they varied over time throughout the period of photo record.

The pattern of erosion and downstream response or deposition (increases in gravel bar size) is episodic. This suggests that in some years, when banks are active, sediment deposition (and bar size) is at a maximum. Such conditions are present now and appear to have also been prevalent in 1962. Channel narrowing and vegetated bars prevailed in the late 1960's through the 1970's, and again in the 1990's. (Cenderelli et al. 2003, Table C3-1, and Figure C3-1) In 1982 the channel had shifted to the road at the washout site, and road maintenance engineers recalled having placed riprap at this location to avoid and prevent further washout. It seems reasonable to expect that in years when sediment supply is low (or limited), transport capacity is sufficient to move the smaller sediment sizes in the bed, and the bed becomes coarser (becoming cobble

dominated).

This cyclic or episodic nature of sediment supply and downstream response suggests in-stream habitat conditions downstream also vary through time. It is assumed that they are at their best during and following periods when sediment supply (of gravel) is high. Presumably the volume of gravel stored on bars and in the channel is high and channel splitting and potential wood delivery is also at the high end of the natural range at these times. During extreme flood periods, there is likely sufficient sediment supply from upstream and habitat conditions are also good at this time. However when the channel is armored sediment supply is reduced. Under these conditions a large supply of sediment just upstream is cut-off (as it had been from 1982 until the washout in 2002), and it is expected that in-channel habitat has reduced complexity and coarser substrate.

The assumption is that when the washout area is armored, habitat quality downstream is more likely to be at the lower end of the spectrum and will be in that condition more often. However armoring at the washout may not have a significant effect on the total range of habitat conditions exhibited in the channel downstream (in periods of low sediment supply or long intervals between floods the channel downstream is probably also at the low end of the range). There is also an expected lag between sediment supply and the response in habitat conditions downstream; large inputs in sediment may result in several years of changed (improved) habitat conditions downstream. Long-term or persistent change downstream is expected to be much more important than the absolute magnitude of change. The magnitude of change is expected to remain within the historic range of channel conditions. The frequency, or period of time when habitat quality is high, is expected to change and will be reduced if sediment supply from the high bank is eliminated.

Our interpretation is that when either of the two existing high banks are not actively supplying sediment to the channel (either by armoring, abandonment or any other process), the habitat conditions in the channel downstream are in a lower quality state. There is likely an exception to this in years immediately following large floods, when sediment is supplied from multiple alternative sources in the watershed. Furthermore, with the armor in place from at least the 1980's until the 2002 washout it is likely that habitat conditions were lower (quality) than they otherwise would have been. Conditions since the washout (2002) have included continuous bank activity with the river running against the accumulated deposits at the base of the slope. In other words there has been a period of high sediment supply since the washout. Current conditions reflect high sediment supply and high quality in-stream habitat.

Slope evolution at the washout

Stability of shoreline slopes such as the one along the washout area is actively changing or evolving through processes of erosion at the toe, followed by adjustments of the slope as it strives to achieve a stable angle or slope configuration. Evaluating hazard and stability in the long-term involves recognizing both the rate of change of bluff slope recession and predicting the long-term stable slope angle (Edil and Vallejo, 1980).

The rate of river erosion at the toe of the slope at the washout currently exceeds the rate of slope adjustment that tends to produce a stable angle. This has maintained a steep and active (eroding) high bank at the washout. Even if river erosion ceases the slope will continue to adjust. So far, shallow slides and falls have been the primary mechanisms of slope adjustment, and no large or

deep-seated slumps or slides have been observed.

Established vegetation has been used as an indicator of stable slope conditions. Slope angles on vegetated slopes near the washout were measured in the range of 100 percent (45 degrees; geotechnical cross section C) to 80 percent (39 degrees; FHWA survey). This suggests that slopes in this material that have established woody vegetation are stable up to the range of 80 to 100 percent (39 to 45 degrees). However bare slopes in this range are not expected to be stable, and a substantial amount of adjustment should be expected for slopes exceeding these angles. The un-vegetated and active slopes that currently exist at the washout have been measured in the range of 60 to 77 degrees indicating that this slope will continue to be unstable until stable slope angles are achieved.

Once recession or river migration has (been) halted, projecting a slope angle of 100 percent or less from the base of the slope provides an estimate of the long-term slope profile. Slopes steeper than this are expected to erode and remain active until the stable slope configuration is reached.

Slope recession and erosion since the washout has been measured in one location at geotechnical Cross Section A (Shelmerdine, 2/4/2002; 9/7/04; 10/18/05; and 12/11/2007). During this time the river has shifted into the hill, eroding the toe of the slope into the hill about 55 feet over 5 years. During this same period the apex of the high bank has shifted about 65 feet downstream. Because this represents the change associated with adjustments of the river planform (the shape of the river as seen in map or air photo view), the loss of the hardened bank associated with the former road, and includes three major flood events it may not reflect future long-term rates of bank recession. Hardening the toe by placing riprap would prevent further recession at the toe, and sediment supply would be limited to slope adjustments that tend toward a stable angle in the long-term. Most observed slope movements have been rather small in scale and result from collapse, falls, and topples rather than larger scale slides or slumps.

Slope Stability

Slope stability of the project area can be differentiated based upon landforms. The outwash plain occurs along the existing road prism between the Dosewallips River and the steeper toeslopes north of the existing road location. In general it is a stable landscape with no recent evidence of landslides or other mass failure activity. The edges of these landforms however form terraces and high streambanks which are susceptible to failures from the river undercutting the base of these slopes. This is evidenced by the existing large bank failure area at the washout (approximately 500 feet wide by slope distance of 150 feet high). This site has expanded in size since 2002, most notably after an October 2003 large storm event.

The glacial valley landform (steep toeslope and footslope) occurs in the vicinity above the existing road in the area of the proposed reroutes. It has been rated as medium for natural landslide potential and high for management response to road construction. This landform contains numerous small streams that are pocketed with springs. There are several indicators of historic deep seated and shallow rapid land movements in this area, notably Segment 2 of the proposed reroute upslope and east of the washout. Evidence of dormant deep seated landsliding and historic shallow rapid landsliding was observed along this segment in several areas. This landsliding was observed on steep slopes near convergent drainages, major slope breaks, and seep areas.

The terrace bench portion of the glacial valley landform has been rated as low for natural and management landslide potential. Slopes range from 5 to 10 percent and soils are well drained. No evidence of slope instability was observed. However areas of debris fans exist at the upslope margin of this landform, deposited from landsliding and debris or snow avalanches originating in the glacial troughwall landform.

The glacial troughwall landforms are located above the glacial valley and are found in the mid to upper mountain slopes and ridgetop area. They have a high potential for natural and management-related landsliding, especially in areas of dissected mountain headwalls and convergent zones. Slopes range from 35 to greater than 90 percent. Avalanche and debris chutes are common on this landscape. No management activities are being considered in this landform, but it does influence the glacial valley landform due to the inherent instability and contribution of materials downslope and downstream.

River erosion and flow around bends
Erosion at the toe of the slope by the river is particularly effective along the outside of bends. Several components are at work that would affect or would be affected by construction of a riprap bank along the channel edge.

The velocity (energy) and resultant shear stress initiating erosion is typically highest near the channel bottom where the flow is deep and along the outside of bends where the flow is spiraling and very effective in eroding the bank and the toe of the slope. This spiral flow or secondary circulation around bends is effective in selectively eroding along the outside of the bend, while depositing material along the inside of the bend. This is a process by which point bars are constructed and would be a primary mechanism for supply of gravels along the inside of the meander bend and at the pool tail at the washout (both are identified salmonid spawning areas).

Assumptions used in identifying downstream effects
Two primary assumptions were used in estimating influences, effects, and consequences of alternatives:

1. The recent trend (since 1939) toward lateral channel shifting into the hillside will continue.
2. Large and obvious sources of sediment close to response reaches play a more significant role in the character of the river bed (and spawning habitat) immediately downstream than sites that are not large and obvious and much further away. The identified response reach just downstream of the washout is a storage site for in-channel sediment (spawning gravel) that is linked to high quality aquatic habitat and is an important spawning site. A high supply of gravels from the terrace transition reach (including the washout area), combined with decrease in channel gradient, suggests that sediment transport capacity is limited relative to sediment supply and consequently sediment is stored here.

Olympic National Park
The Dosewallips River Reach analysis did not include the NPS portion of the project. Therefore detailed information is not available for the geomorphic processes affecting the NPS road.

The area is generally a stable landscape under natural conditions. The fill slope for the Dosewallips Road in the immediate vicinity of the road failure has been unstable since the 2003

failure of the retaining wall structure. There are a series of three log crib walls supporting an approximately 300-foot section of roadway above Dosewallips Falls. The log cribbing deteriorated on one portion of the roadway in 1993, primarily due to heavy rains eroding the embankment. Geotech exploration occurred at the falls site in 1994 to determine the options for reconstruction. The results showed that there was not bedrock at the project site, just large boulders. Reconstruction of the one of the log crib walls occurred in 1994. The other two walls had no problems at that time. However during the 2003 storm event the two lower retaining walls failed, creating road instability and slumping.

Environmental Consequences

Alternative A - No Action

Direct/Indirect Effects

Olympic National Forest
The area is generally a stable landscape under natural conditions. No direct or indirect effects are likely associated with no action. The likelihood of increased mass wasting within the area is low. Site reconnaissance did not identify any major mass wasting concerns that would impact the road beyond the washout. Much of the road is full bench constructed in stable rock and glacial till. The potential exists for isolated, natural shallow landsliding in the areas of glacial deposits in the valley bottom or valley side slope, particularly within dissected areas with significant groundwater in the soil profiles. These would likely occur in the mid to upper slopes above FSR 2610. Slope instability would continue on the high bank at the washout, especially through streambank undercutting by the river. This failure would likely remain unstable for 10 to 50 years, with rock topple and raveling continuing to occur. Additional small streambank failures may also occur in the vicinity, most notably Elkhorn campsites located directly adjacent to the Dosewallips River.

Geomorphic processes at the washout site, including river and slope processes, would function naturally. As in the current situation, the washout would continue to expand and increase the sediment supply (spawning gravels) as has occurred at this site in recent years.

Olympic National Park
At the road failure site there is little chance of catastrophic failure, however the road surface could potentially erode and deteriorate fairly rapidly due to frequent storms, both from upslope and downslope erosion. Geomorphic processes at the failure site, including slope processes, would function naturally. The road surface could potentially further erode and deteriorate.

Cumulative Effects

No cumulative effects associated with slope stability are anticipated with this alternative. Effects to slope stability of this alternative would be negligible and would not interact with impacts to slope stability associated with any past, present, or reasonably foreseeable future activity in the watershed. There would be beneficial cumulative effects to the supply of spawning gravel sized sediment as the sediment continuing to be supplied at the washout would add to the sediment supply associated with future in-river restoration projects.

Alternatives B and C – Reroute Alternatives

Direct/Indirect Effects

Olympic National Forest
Effects to slope stability along the reroute can be placed into one of two categories: 1) slope movements associated with steep ground construction (cut and fill slopes) and 2) historic or pre-existing slope movements. For the purposes of this discussion, the term slope movement includes the range of mass wasting or unstable slope features (slumps, slides, flows, etc.) without suggesting that the mechanism of failure is known.

Slope movements associated with steep ground construction are often associated with undercutting or removing the lateral support at the base of a slope, placing fill on a slope that is too steep, loading a slope by placing too much weight on it, or by diverting drainage onto susceptible locations. Effects to slope stability are most prominent on two sections of the reroutes due to steep sideslopes along segment 2, a 1750-foot long section on the east portion of the reroute; and segment 5, the 750-foot long section on the west portion of the reroute. Topography and materials are relatively uniform along Segment 5 and the issues along this segment are primarily with construction on steep ground rather than encountering pre-existing slope movements.

Alternative B would have the second highest risk of slope instability (Alternative C would be slightly higher) of the action alternatives. Along Segment 2 historic shallow landsliding and dormant deep-seated mass movement are evident. Steep slope angles, unstable soils, and considerable surface and subsurface water flows are factors that make this location susceptible to instability. Slope failures within the cutslopes would likely compromise the road drainage system. Such blockages, culvert plugging, or diversion are a common cause of road-related instability and resulting watershed impacts. The potential for the cutslopes to expand in size upslope somewhat beyond the designed top of cut is high, at least in some localized areas in segments 2 and 5.

Most effects to slope stability associated with construction should be addressed and mitigated through design. A range of techniques including controlled compaction, slope reinforcement or retaining wall construction, and modifying cutslope angles to stable configurations would likely be implemented. The extent that these techniques would be used would be an element of the final design. Some small scale (less than 1,000 sq. ft) shallow slides would likely occur in cutslope locations. They would be expected to occur during or in the first few years following construction and would likely be confined to the road prism. This would be an added cost for road maintenance of this route, and cleanup would be important for keeping the road drainage system functioning.

Effects to pre-historic or pre-existing slope movements are limited to Segment 2 on the east portion of the route. The additional field reconnaissance since the earlier EA was prepared found no active ground breaks (cracks, etc.) that would indicate recently active slope movement. Small

deep-seated mass movement would be a possibility, although unlikely due to mitigations recommended in Chapter 2. This movement could result from undercutting unstable slopes, altering surface water, or placement of large amounts of soil material. In several places along this segment the terrain suggests pre-historic debris flow and slope movement activity. It is likely slope instability would be encountered that would require some special design considerations in a 1300 foot long segment (primarily in Segment 2). Potential effects in this section would be expected to be mitigated with relatively standard design and construction practices. The potential for this kind of movement is unknown at this time and is considered less likely than shallow instability.

Slope processes at the high bank would continue in a natural condition as in Alternative A.

In terms of fluvial processes and sediment supply (spawning gravel) the primary advantage of these alternatives is that the location would be disconnected from the Dosewallips River. The terrain between the alignment and the river would provide a buffer that is well vegetated. With regards to the geomorphic processes discussed above, there are no predicted effects to sediment supply (spawning gravels) and fluvial processes in the Dosewallips River under these alternatives.

Alternative F - Bridge

Direct/Indirect Effects

Olympic National Forest

This alternative spans the washout area with a bridge and would allow river and slope processes to operate without the influences of extensive bank hardening and rock armor. Slope stability processes would continue under near natural conditions. The risk of slope instability under Alternative F would be lower than other action alternatives. The road would be located on a stable landform, with the exception of the existing streambank failure. There would be limited riprap armor at the upstream and downstream bridge abutments (estimated to cover 50 to 75 feet on each end) and this would eliminate the river's lateral erosive process on the bank at these locations. In the upstream area construction of riprap to armor the abutments would limit the amount of river induced erosion at the base of the slope and slow recession. This would allow the natural shallow slope movements of ravel, collapse of blocks, and erosion of individual particles to lead to eventual stabilization of the slope in this location in the long-term. Deep-seated, large-scale, or particularly active slope instability has not been observed in the area. Locating the downstream abutment about 100 feet from the current downstream end of the washout would not eliminate the river's lateral erosive process on the downstream portion of the high bank.

This alternative would allow the river to flow along the bank and allow erosion at the toe of the slope with the associated sediment (spawning gravels) supply. The majority of the high bank would be subject to natural slope stability processes as described under Alternative A, as modified by the intermediate bridge piers which would deflect some of the river's flow into the bank and some away. The presence of piers in the channel would split flow locally, deflecting some flow into the bank and some away with some scour around piers. This would result in a more irregular bank line and more complexity along the channel margin. It is not clear how it would affect sediment supply, but it is expected to be similar to Alternative A. Flow around the piers would result in local scour and deposition on the channel bed. The bridge location at the

outside of the bend would put it into a relatively high energy environment and in a location where mobile large wood in the channel would likely be swept along the bank and against the piers. Wood would be expected to catch and rack up onto the piers in this location. Wood would be removed from the piers if it became an impediment to the production of spawning gravels from the high bank. This alternative results in the greatest channel complexity and the highest in-channel variability of any alternative (including the no action). As discussed in more detail in the aquatics species and habitat conditions section of this document this would be a benefit by creating high quality, complex fish habitat.

Local and downstream sediment supply would be expected to approximate the no action alternative: erosion, sediment supply, and high bank recession would continue at the site. The migration of the meander bend downstream would be accommodated because the downstream abutment would be located about 100 feet downstream of the current downstream end of the washout. This would allow the natural downstream regression of the high bank to continue.

No wood would be removed from the channel. Wood would be allowed to accumulate on and around the bridge piers. However, when and if this wood is determined to be a hazard to the bridge structure or is interfering with the natural sediment production from the high bank to an extent that aquatic objectives are not being achieved, it would be removed from the bridge piers and redistributed in the adjacent river channel. Large pieces of wood would be kept intact as much as possible.

Alternatives B, C, and F - All Action Alternatives

Direct/Indirect Effects

Olympic National Park

The planning team based the impact analysis and the conclusions for possible impacts to geological resources on the on-site inspection of known and potential geological resources within the park (project area), review of existing literature, studies and information provided by experts in the National Park Service and other agencies, and park staff insights and professional judgment. Where possible map locations of geological resources were compared with locations of proposed developments and modifications of existing facilities. Predictions about short- and long-term site impacts were based on previous studies of impacts to geological resources from similar projects and recent scientific data; there are no short term impacts to geological resources, all impacts are long term. The thresholds of change for the intensity of an impact are defined as follows:

Impact Intensity	Impact Description
Negligible	The action would result in a change to a natural physical resource, but the change would be so small that it would not be of any measurable or perceptible consequence.
Minor	The action would result in a change to a natural physical resource, but the change would be small and localized and of little consequence.
Moderate	The action could result in a change to a natural physical resource; the change would be measurable and of consequence.
Major	An action that would result in a noticeable change to a natural physical resource; the change would be measurable and result in a severely adverse or major beneficial

	impact.
Duration: **Short-term –** There are no short-term impacts to geological resources. **Long-term –** All impacts to geological resources would be long-term.	

The project would result in improved slope stability along the road at the Dosewallips Falls site, and reduced erosion in the long-term. Best management practices during project work would reduce the potential for runoff and erosion. However natural processes would not be allowed to occur, resulting in long-term adverse impacts to the geomorphological processes at the project site. Since the site is small and localized, it would result in minor adverse effects.

Cumulative Effects

In terms of slope stability there is no overlap in space or time with any of the proposed activities and past, present, and reasonably foreseeable future activities identified for this area. Project effects are minor and in terms of slope stability are localized to the project area where there are no effects due to past, present, and reasonably foreseeable activities. Consequently there are no cumulative effects associated with slope stability for any of the action alternatives. Project effects to sediment supply (spawning gravels) are minor and would result in a beneficial cumulative effect to the supply of spawning gravel sized sediment as the sediment continuing to be supplied at the washout would add to the sediment supply associated with future in-river restoration projects.

Soil Productivity (Soils Report, January 2006 with updates in 2008)

Affected Environment

Olympic National Forest
Soil Productivity
Soil productivity (long-term) is the inherent potential of the ecosystem to produce a certain level of vegetation and associated processes such as water, wildlife, and clean air indefinitely into the future. Fixed components influencing soil productivity include local climate, topographic features, and soil type. Components affecting productivity that can be changed include: soil volume, porosity, water availability, chemistry, and biology.

Processes known to cause the greatest adverse effects on soil physical, chemical, and biological properties associated with the types of proposed management activities include the following: soil compaction, displacement, surface erosion, mass wasting, alterations to surface and subsurface water flows, and sedimentation. Direct effects to the soils include compaction (new road construction) and displacement. Surface erosion, mass wasting, sedimentation, changes in hillslope hydrology, and soil biology usually occur as indirect effects.

The majority of the soils in the analysis area are susceptible to compaction due to the properties of the surface and subsurface horizons (0 to 15 inches deep). Specific properties include an inherently low bulk density, low percentage of rock fragments, and high available water holding

capacity.

The soils of the Dosewallips Road Washout Draft EIS project area have been studied, mapped and described (USDA 2000b). A soils map for the planning area is available in the Dosewallips Road Washout Draft EIS analysis file. This inventory, which meets the standards of the National Cooperative Soil Survey, describes soil map units, their individual components, and provides interpretive information on soil use and management.

The Dosewallips Road project area includes three main soil types:

- Soils that are moderately deep (20 to 40 inches) to a cemented till layer. These are moderately well drained soils that formed in colluvium over dense glacial till. These soils are located in the glacial valley landform along the potential re-reroute location above the existing washout.

- Soils that are moderately deep to basalt. These soils are well drained that formed in colluvium from marine basalt. These soils are located in the glacial troughwall landform, primarily located in the Buckhorn Wilderness area, upslope of the existing road and possible re-route locations.

- Soils that are very deep (greater than 60 inches). These can be somewhat excessively drained soils that formed in glacial outwash and fluvial deposits in glacial valleys. These soils are found mostly in the vicinity of the existing road location.

Overall the forest soils in the project area have a low potential for natural surface erosion. This is because they tend to have generally high natural porosity, high infiltration rates, high water storage potential, and are usually fully occupied with vegetation and surface litter. When disturbed the floodplain and lower terrace landforms remain low for surface erosion potential, primarily due to the gentle slopes and the properties described above. Soils found on glacial valleys and troughwall landforms, located on steeper, dissected slopes (40 to 100 percent) have a high potential for surface erosion because of the slopes, finer soil textures, and subsurface water.

Existing surface erosion within the project area is mainly confined to the steep streambanks adjacent to the Dosewallips River including the washout, where unstable soils are continuing to be undercut by stream processes. Since 2003 the washout area has widened in size about 200 feet. The erosion and sedimentation associated with the road fill on FSR 2610 is considered management-related, while the streambank erosion and sedimentation is considered natural.

The unpaved road surfaces, trails, and dispersed recreation sites in the activity area are also existing surface erosion sites but are small in size and not considered to be significant. Sedimentation does occur, although considered minor due to relatively flat terrain and vegetative buffers which act as filters to coarse and fine sediment.

Overall soil productivity is high in the Dosewallips project and planning area. Regional and Forest Plan Standards and Guidelines state that "…detrimental soil conditions should not exceed 20 percent of the total acreage within the activity area." The majority of the area surrounding the washout, re-reroute location, and the upper watershed is in a pristine condition as much of the land is undeveloped, being designated as wilderness or within the Olympic National Park.

Consequently the soils have not been impacted and are well within the standards and detrimental soil conditions are estimated to be less than 5 percent.

Hillslope Hydrology
Hillslope hydrology has a significant influence in the planning area because of the long slope lengths extending from the northern ridgetop (5,000 feet elevation) of this major glacial valley, extending to the floodplain (500 feet elevation). This sizable drainage area conveys a significant amount of surface and subsurface water throughout these landforms before entering the Dosewallips River system. The glacial troughwall area comprising approximately 85 percent of the planning area has a rapid runoff rate and low groundwater storage capacity, due to the steepness of slope and shallow soils.

The glacial valley landform, especially the terrace bench located above the washout, receives and stores large volumes of water transmitted from both surface and subsurface flows from the troughwall landform above. These glacial soils have a high water holding capacity, storing and releasing groundwater to the wetlands, streams, and river below. Some soils located on this landform have a dense glacial till layer, which transmit water laterally due to the slow permeability of this layer. These soils are unable to store as much water as evidenced by frequent seeps, springs, and small streams. This condition exists primarily in the area along Segment 2 of the proposed re-route alternatives.

There are 14 streamcourses that are potentially affected in the project area. These include eight Order 1 and two Order 2 streams which intersect the glacial valley sideslope landform, originating in the glacial troughwall. These streams are high gradient (greater than 20 percent) above the terrace bench. Streams become low gradient (2 to 5 percent) on the terrace, and then are greater than 20 percent until they enter the unnamed low gradient perennial tributary to Gamm Creek north of FSR 2610. This unnamed tributary supports cutthroat trout and coho salmon juveniles (lower reach). Refer to the Aquatic Species and Habitat Conditions section for further discussion of this streamcourse.

A series of small wetlands exist at the base of the glacial valley on the outwash plain and are adjacent to FSR 2610. These wetlands were likely created or enlarged with the construction of FSR 2610 which affected the surface and subsurface hydrology of this depressional area. These wetlands do support hydrophitic vegetation and hydric soils. Soils appear to be wet through most of the year as indicated by mottling in the upper 12 inches of the soil profile.

Environmental Consequences

Alternative A – No Action

Direct/Indirect Effects

Olympic National Forest
Soil Productivity
There would be no direct increase in detrimental soil conditions that would negatively affect soil productivity if this alternative were implemented. The reduction of motorized vehicles and the change in the type and amount of recreation use would improve soil productivity within the planning area beyond the washout, although very slowly (up to 50 years into the future).

The soil impacts from past activities (i.e. roads, campgrounds) beyond the washout would continue to slowly lessen and conditions would improve as compacted soils continue to develop and recover through natural physical and biological processes. The establishment of alder and other pioneer species would ameliorate soil compaction through root mass expansion, and development of ground cover, organic matter, and litter layer. Soil fauna and microbe activity would also gradually improve. These processes would occur very slowly over a period of up to 50 years.

Hillslope Hydrology
Under Alternative A there would be no direct effects on hillslope hydrology since no road construction or reconstruction would occur. Indirect effects of no action would primarily be related to the slow deterioration of FSR 2610 and the Dosewallips Road beyond the washout, approximately 5 miles in total, due to the lack of road maintenance. Culverts located at stream crossings may eventually become plugged or fail due to metal fatigue. This may result in fill washouts and stream diversions. This road has numerous relatively small stream crossing fills, less than 300 cubic yards each. Streamcourse diversions would cause surface and gully erosion. Large pulses of coarse and fine sediment, followed by minor chronic sedimentation into the Dosewallips River, would be expected until these erosion sites become stabilized. Most notably the Bull Elk Creek bridge crossing is vulnerable to a diversion due to its location at the base of a debris fan. A diversion here could possibly result in re-routing of the channel and significant gullying before it reaches the Dosewallips River, approximately 800 feet away. Overall, at the watershed scale, the potential erosion and sediment inputs described above would not be distinguishable.

Cumulative Effects

The cumulative effects area includes the entire Dosewallips watershed. The positive and negative effects include a combination of the management actions that occur on private, National Forest System (NFS) lands, and Olympic National Park lands.

The Dosewallips Watershed Analysis identified and described the negative effects of erosion and sedimentation and the impacts from past management activities on aquatic habitat conditions. These resources are currently recovering from those past effects.

Existing and foreseeable management activities on private lands that have adverse impacts to soil productivity would continue. On-going activities include but are not limited to the following: timber harvesting and road construction, agricultural uses, infrastructure development, dispersed recreation and other off-road vehicle use.

Road decommissioning activities on the Forest (approximately 10.1 miles of road in the last 10 years and 2.0 miles planned) have reduced the amount of soil in a detrimental condition.

Activities planned on the Forest include approximately 1,000 acres being planned for commercial thinning along with construction of 3 miles of temporary road associated with the Jackson Timber Sale, lower in the watershed (Rocky Brook subwatershed). These activities would result in the temporary increase in detrimental soil conditions, erosion, and alteration of hillslope hydrology. Short-term sedimentation into Rocky Brook and the Dosewallips River is expected to be minor due to riparian protection buffers and numerous mitigation measures

designed to keep soil impacts and erosion low.

Overall the activity area is estimated to have less than 5 percent in a detrimental soil condition, well within the standard of 20 percent. This includes the following areas that are currently in a detrimental condition and total about 39 acres in size:

- 17 acres - Dosewallips road beyond washout (5.0 miles of road)
- 6 acres - Elkhorn Campground
- 8 acres – Dosewallips campground
- 8 acres - trails, skid trails, unauthorized trails, dispersed recreation sites

Because the magnitude of effects of the No Action alternative are anticipated to be minor and not discernable at a watershed scale, and the effects of any past, present, or reasonably foreseeable activities are located well downriver from the project's activity area there would not be any cumulative effects.

Alternative B - Reroute 1 Bench Emphasis

Direct/Indirect Effects

Olympic National Forest
Soil Productivity
Under Alternative B soil productivity would be reduced more than the other action alternatives. Detrimental soil conditions expected from this action would include long-term compaction, displacement, and surface erosion. The physical soil conditions such as water infiltration, porosity, organic matter, and biological factors would be affected.

Associated with this action approximately 7.1 acres would be removed from the productive land base as a result of the new road construction. This is a long-term, irreversible detrimental condition. However approximately 1.4 acres (0.7 mile) of the existing FSR 2610 within the immediate riparian zone adjacent to the Dosewallips River would be decommissioned. This would result in the long-term improvement (10 to 20 years) of soil productivity as a result of the soil decompaction and revegetation treatments. Overall there would be a net increase in long-term detrimental soil conditions of 5.7 acres.

Indirect effects of Alternative B would result in additional soil erosion and loss of productivity of cutslopes and fillslopes until ground cover vegetation is well established. Surface erosion (sheet, rill) would increase in the short-term (1 to 2 years) due to the area of new disturbances, but slopes should be stabilized after 2 years. This erosion would likely be highest on cutslopes, fillslopes, and road surfaces on Segments 2 and 5 where cutslope angles would be steep and high, and road grades are estimated at 10 percent. In addition, erosion on other new disturbances (other new road segments, road decommissioning segments, and road maintenance beyond the washout) would be likely until vegetation becomes established on these bare soil areas. Numerous watershed mitigations are included in project design to reduce the amount and extent of soil erosion and sedimentation, especially those specifically designed to minimize surface erosion including sediment prevention structures. Erosion control seeding and fertilization would be required where appropriate on all areas of exposed mineral soils as soon as possible. No fertilization would occur within 50 feet of a live stream and wetlands. Hydromulching would

occur on bare soil areas that are determined to be a concern for erosion and sedimentation. Other watershed mitigations that would minimize surface erosion are listed in the watershed section of the mitigation measures and management requirements section of Chapter 2 of this document. Gully erosion may also occur at culvert outlets of new culvert installations along segments 2 and 5, but would be expected to be minor due to mitigations measures identified in Chapter 2 of this document.

Road construction may result in formation of gullies and deposition of shallow-rapid mass wasting. This would potentially impact vegetation and soils on the slope, the unnamed tributary streamcourses along Segments 1 and 2, and the wetlands in the area. Most material would likely be deposited and held in storage on the floodplain or wetlands and low terrace below. Toward the east end of the reroute such movements of materials would likely reach the unnamed tributary to Gamm Creek. Most of the coarse material would likely remain in storage where deposited while sand and fine sediment could be transported to the Dosewallips River via the unnamed tributary.

Hillslope Hydrology

New road construction under Alternative B would intersect 14 streamcourses, including one unnamed tributary to Gamm Creek that supports resident and anadromous fish. Alterations of surface and interception of subsurface water flows, seeps, and springs are also likely as a result of road construction, especially on Segments 2 and 3. In addition, affects to shallow groundwater flow and seasonal saturation, and its impacts to riparian function are also likely, but the extent and magnitude are unknown. There is the potential to affect low flow conditions in the unnamed tributary to Gamm Creek if groundwater pathways from water storage within the riparian zone are intercepted. Mitigations that are incorporated into the design would aid in minimizing disruption and re-routing of surface and subsurface water flows.

The un-named tributary stream to Gamm Creek located in Segment 1 would be crossed by the road reroute. Mitigations designed to pass 100-year flows and limiting earthwork activities for road construction to the dry season would help to minimize disruption of flows and material, and impacts to aquatic resources. Other mitigations are also designed for this concern and include putting erosion control measures in place prior to the normal heavy rainfall period.

Two of the small wetlands that are located near the beginning of the proposed reroute may also be affected under Alternative B, mainly along Segment 1 and the beginning of Segment 2 at the toeslope location. The road location would directly impact about 0.019 acre of wetland. An indirect effect would be it could potentially alter shallow groundwater flows to the wetlands by interception of the road ditchline and culverts. This could potentially result in altering wetland function by reducing the late season water supply and reducing soil moisture. Frequent ditch relief culvert spacing and outsloping mitigations would help to reduce the negative effects of this action. There are other mitigations that would reduce the affects to this wetland, including use of straw bales and filter fences. It is expected that the majority of these wetlands would not be substantially altered hydrologically. Additionally the decommissioning of 0.5 mile of FSR 2610 as it passes through the wetlands area would compensate for any loss of wetlands due the proposed reroute. This decommissioning would likely have a neutral to beneficial effect on the existing wetlands.

Alternative C – Reroute 2 Retaining Wall Emphasis

Direct/Indirect Effects

Olympic National Forest
Soil Productivity
Under Alternative C soil productivity impacts would be 0.6 acre less than Alternative B. As a result of this new construction, approximately 6.5 acres would be removed from the productive land base, currently designated as late-successional reserve. This reduction would be approximately 8 percent less than Alternative B, achieved by the narrowing of cutslope heights and constructing retaining walls. Detrimental soil conditions expected from this action would include compaction, displacement, and surface erosion. The physical soil conditions such as water infiltration, porosity, organic matter, and biological factors would also be adversely affected. These conditions are considered to be long-term and irreversible.

In addition to this action, approximately 1.4 acres (0.7 mile) of the existing FSR 2610 would be decommissioned that is within the immediate riparian zone adjacent to the Dosewallips River. This would result in the long-term improvement (10 to 20 years) of soil productivity, through decompaction and revegetation treatments. Overall there would be a net increase in long-term detrimental soil condition of 5.1 acres.

The indirect effects of Alternative C would result in additional surface erosion and loss of productivity of cutslopes and fillslopes until ground cover vegetation is well established, primarily along Segments 2 and 5. The cutslope angles are much steeper than the design in Alternative B and would tend to ravel and erode more and over a longer time period. This would result in an increase in the potential of road water diversions due to plugging of culverts and road ditchline. This would last until cut and fillslopes stabilize with vegetation in about 2 to 3 years. In addition to cutslopes and fillslopes along Segment 2 and 5, erosion on other new disturbances and decommissioning segments would be likely until vegetation becomes established on bare soil areas. Surface erosion (sheet, rill) would increase in the short-term (1 to 2 years) due to the area of new disturbances, but slopes should be stabilized after 2 years. This erosion would likely be highest on cutslopes, fillslopes, and road surfaces on Segments 2 and 5 where cutslope angles would be steep and high, and road grades estimated at 10 percent. In addition, erosion on other new disturbances (road reroute segments, road decommissioning, and road maintenance beyond the washout) are likely until vegetation becomes established on these bare soil areas. Numerous watershed mitigations are included in the project design to reduce the amount and extent of soil erosion and sedimentation, especially those specifically designed to minimize surface erosion including sediment prevention structures. Erosion control seeding and fertilization would be required where appropriate on all areas of exposed mineral soils as soon as possible. Hydromulching would occur on bare soil areas that are determined to be a concern for erosion and sedimentation. Other watershed mitigations that will minimize surface erosion are listed in the watershed section of the mitigation measures and management requirements section of Chapter 2 of this document. Gully erosion may also occur at culvert outlets of new culvert installations along segments 2 and 5, but is expected to be minor due to mitigations measures identified in Chapter 2 of this document.

Consequences of the road construction may include the formation of gullies and deposition of shallow-rapid mass wasting. This would potentially impact vegetation and soils on the slope, the streamcourses along Segments 1 and 2, and the wetlands in the area. Most material would likely

be deposited and held in storage on the floodplain or wetlands and low terrace below. Toward the east end such movements of materials would likely reach the unnamed tributary to Gamm Creek. Most of the coarse material would likely remain in storage where deposited, while sand and fine sediment could be transported to the Dosewallips River via the unnamed tributary.

Hillslope Hydrology
New road construction under Alternative C would intersect ten streamcourses, including one unnamed tributary to Gamm Creek that supports resident and anadromous fish. Alterations of surface and interception of subsurface water flows, seeps, and springs would also be likely as a result of road construction, especially on Segments 2 and 3. In addition, affects to shallow groundwater flow and seasonal saturation, and its impacts to riparian function would also be likely, but the extent and magnitude are unknown. There is the potential to affect low flow conditions in the unnamed tributary to Gamm Creek if groundwater pathways from water storage within the riparian zone are intercepted. Mitigations that are incorporated into the design would aid in minimizing disruption and re-routing of surface and subsurface water flows.

The un-named tributary stream to Gamm Creek located in Segment 1 would be crossed by the road reroute. Mitigations designed to pass 100-year flows and earthwork activities for road construction limited to the dry season would help to minimize disruption of flows and material, and impacts to aquatic resources. Other mitigations are also designed for this concern and include putting erosion control measures in place prior to the normal heavy rainfall period.

Two of the small wetlands that are located near the beginning of the proposed reroute may also be affected under Alternative C, mainly along Segment 1 and the beginning of Segment 2 at the toeslope location. The road location would directly impact about 0.020 acre of wetland. An indirect effect would be that it could potentially alter shallow groundwater flows to the wetlands by interception of the road ditchline and culverts. This could potentially result in altering wetland function by reducing the late season water supply and reducing soil moisture. Frequent ditch relief culvert spacing and outsloping would help to reduce the negative effects of this action. There are other mitigations that would reduce the affects to this wetland, including use of straw bales and filter fences. It is expected that the majority of these wetlands would not be substantially altered hydrologically. Additionally the decommissioning of 0.5 mile of FSR 2610 as it passes through the wetlands area would compensate for any loss of wetlands due the proposed reroute. This decommissioning would likely have a neutral to beneficial effect on the existing wetlands.

Alternative F - Bridge

Direct/Indirect Effects

Olympic National Forest
Soil Productivity
Under Alternative F soil productivity and other watershed impacts would be lower than the other action alternatives (B and C). As a result of the bridge construction across the washout area there would no new acreage removed from the productive land base. There would be construction for the bridge approaches but this activity would occur in the already disturbed area within the existing road prism. Detrimental soil conditions expected from this action would mainly result from short-term surface erosion and soil displacement associated with the

construction of the temporary road needed to construct the bridge and piers.

The indirect effects with soil productivity under Alternative F would be minor. Construction of a bridge across the washout area would only minimally disturb the streambank failure, for the most part allowing natural erosion processes to continue to occur, depositing gravels into the Dosewallips River.

Mitigation measures identified in Chapter 2 for this alternative are designed so that surface erosion and sedimentation would be minimized.

Hillslope Hydrology
Road reconstruction under Alternative F would result in no effects to the existing hillslope hydrology. Surface runoff and subsurface flows would remain the same. Some surface water interception would likely be associated with re-establishing the ditchlines on both sides of the washout

A wetland located near the bridge approach on the downstream side would be affected under Alternative F. The bridge location would directly impact about 0.016 acre of wetland. It is expected that the majority of this wetland would not be substantially altered hydrologically. Proposed mitigations would reduce temporary impacts to the wetland and mitigate unavoidable permanent impacts.

Alternatives B, C, and F – All Action Alternatives

Direct/Indirect Effects

Olympic National Park
Predictions about short- and long-term site impacts were based on previous projects with similar soils and recent studies. The thresholds of change for the intensity of an impact are defined as follows:

Impact Intensity	Impact Description
Negligible	Soils would not be affected or the effects to soils would be below or at the lower levels of detection. Any effects to soils would be slight.
Minor	The effects to soils would be detectable. Effects to soil area would be small. Mitigation may be needed to offset adverse effects and would be relatively simple to implement and likely be successful.
Moderate	The effect on soil would be readily apparent and result in a change to the soil character over a relatively wide area. Mitigation measures would be necessary to offset adverse effects and likely be successful.
Major	The effect on soil would be readily apparent and substantially change the character of the soils over a large area in and out of the park. Mitigation measures to offset adverse effects would be needed, extensive, and their success could not be guaranteed.
Duration: **Short-term –** Recovers in less than 3 years.	

Long-term – Takes more than 3 years to recover.

Since the project work occurs on a road and adjacent rock bank, there is low soil productivity currently in the area and there would be only negligible effects to soil productivity from project work.

Also due to the location of proposed activities on the slope and the limited scale there would only be only negligible effects to hillslope hydrology from project work.

Cumulative Effects

The cumulative watershed effects area includes the entire Dosewallips watershed. The positive and negative effects include a combination of the management actions that occur on private, Olympic National Park, and National Forest System (NFS) lands, along with natural occurrences. The Dosewallips Watershed Analysis identified and described the negative effects of erosion and sedimentation and the impacts from past management activities on aquatic habitat conditions. These resources are currently recovering from the past effects. Other detrimental conditions would remain in the watershed, comprised mainly of compacted surfaces (roading, developed and dispersed recreation sites).

Foreseeable management activities on National Forest lands include the Jackson Timber Sale and two miles of road decommissioning (FSR 2610-012). The timber sale would commercially thin approximately 1,000 acres and construct 3 miles of temporary road in the Rocky Brook subwatershed. Temporary roads would be decommissioned after use. These foreseeable actions would result in short-term sediment impacts associated with temporary road building and log haul, however they are anticipated to be relatively minor.

Other on-going and foreseeable activities on private lands include, but are not limited to the following: timber harvesting and road construction; agricultural uses; infrastructure development; dispersed recreation and off-road vehicle use. Implementation of all of these on-going and foreseeable off-site activities would occur several miles below the FSR 2610 washout.

All of the activities described above would result in additional detrimental soil conditions (both short and long-term), that would reduce soil productivity. Overall acres in a detrimental condition would be within Regional and Forest standards for soil quality. Within the upper watershed this is not considered to be significant and would remain well below the Regional and Forest Standards for soil quality, with a cumulative total of 44.7 acres for Alternative B, 44.1 acres for Alternative C, and 39.0 acres for Alternative F in a detrimental condition. This includes the additional areas that are currently in a long-term detrimental condition:

- 17 acres of Dosewallips road beyond washout (5.0 miles of road)
- 6 acres - Elkhorn Campground
- 8 acres – Dosewallips campground
- 8 acres trails, skid trails, unauthorized trails, dispersed recreation sites

Effects to soil productivity of past, present, and reasonably foreseeable activities in the Dosewallips watershed are described under the previous Olympic National Forest effects discussion. Since these effects are negligible or occur a substantial distance below the proposed work site near the Dosewallips Falls, cumulative effects to soil productivity would be negligible, and would not result in substantial cumulative impacts to the resource or affect the ability of the resource to sustain itself.

Aquatic Species and Habitat Conditions (Aquatic Specialist Report, February 2006; including edits made in 2007 and 2008)

Introduction

The Dosewallips River is one of the largest watersheds draining the east side of the Olympic Peninsula into Hood Canal. It contains abundant high quality habitat for a variety of anadromous salmonids, including three stocks that are listed as threatened under the Endangered Species Act.

Anadromous fish habitat extends from the estuary upstream to an impassible falls at approximately River Mile 15.4 (Figure 17). Because of the trellis-type drainage pattern within the watershed almost all the anadromous fish habitat is within the mainstem of the Dosewallips River. There is very little tributary habitat for anadromous fish.

Above River Mile 14.5 the entire watershed lies within Olympic National Park and is largely undisturbed. From River Mile 14.5 to River Mile 6 the Dosewallips River flows predominately through National Forest System lands. Aquatic conditions within this reach are also relatively good. The washout on FSR 2610 is approximately at River Mile 10.75. There is little evidence of past timber sale activity along the mainstem on National Forest System lands. FSR 2610 parallels the river along the north bank throughout the entire length of National Forest ownership, but there is a substantial riparian buffer between the road and the river except for a couple of places where the road impinges on the stream channel. Two Forest Service campgrounds were constructed along the mainstem of the Dosewallips River at approximately River Mile 10 (Steelhead Campground) and River Mile 12 (Elkhorn Campground). Both of these sites utilized riprap and/or gabions to stabilize streambanks adjacent to the campground areas. The Steelhead Campground was permanently closed in the early 1990's. It and Elkhorn Campground (since the washout) are used for dispersed camping.

Below River Mile 6 the Dosewallips River is predominately bounded by private lands. Bank stabilization, diking, removal of riparian vegetation, and other developments have substantially impacted aquatic habitat conditions within this reach.

The Dosewallips River is designated as a Key Watershed in the Forest Plan. There is an emphasis on protection and restoration of aquatic habitat on federal lands within the watershed. The Dosewallips is also designated as a Tier I watershed in the Hood Canal Coordinating Council's Salmon Habitat Recovery Strategy for Hood Canal. Tier I watersheds are considered to be the most important areas based on regional importance (Forest Service Region 6), significance to ESA listed fish stocks, and Salmonid Stock Inventory (SaSI) stocks listed as critical and depressed (Hood Canal Coordinating Council, 2001).

A reach scale analysis was conducted by the Olympic National Forest in 2003 to gain more information on the potential effects of rebuilding the road in place (Cenderelli et al. 2003). The primary area evaluated in that analysis included a 0.5-mile section of river extending approximately ¼ mile above the washout site to ¼ mile below the washout site. This is referred to as the project reach. A detailed assessment of the flow conditions, stream channel, bed and bank materials, and sediment supply was conducted through this section. A less detailed

reconnaissance-level assessment that extended a few miles upstream and downstream of the washout site was also done as part of the analysis. For a detailed discussion of analysis methods, results, and interpretations, refer to the Reach Analysis document.

Figure 17: Dosewallips Falls at RM 15.4

Three main geomorphic stream types are present within the project area. They are: 1) a hillslope-confined section upstream of the washout, 2) a terrace transition section throughout the project reach, and 3) an alluvial unconfined section immediately downstream. Each is described previously in the Geotechnical and Geomorphologic Processes section of this chapter.

The terrace transition section is unique, both in the characteristics of sediment supplied and the erosion processes involved. The series of high and intermediate terraces are not found anywhere else between Olympic National Park boundary upstream and the bedrock controlled channel approximately 3 miles downstream of the project area. The terraces are composed of sorted mixtures of sand, gravels, cobbles, and boulders with very little fine (silt and clay) materials. Gravel is the dominant size class contained in all of the high and intermediate height terraces, although several areas have significant boulder, cobble, or sand lenses. Much of the coarse sediment supplied to the channel from the large glacial terraces in this area is readily transported

to the alluvial unconfined segment immediately downstream.

Aerial photos from 1939 through 1998 show how dynamic the river channel is within the terrace transition section. The channel has shifted locations, changed sinuosity, and undergone multiple cycles of widening and narrowing over the years. The distance between FSR 2610 and the Dosewallips River in the vicinity of the washout has decreased over the years indicating that the stream is actively migrating to the north, toward the road. In the 1982 aerial photograph the low, vegetated terrace between FSR 2610 and the Dosewallips River is no longer present, and the apex of the meander is located immediately adjacent to the road. As the channel location shifted and the river began to encroach upon the road corridor, riprap was placed to stabilize the streambank and protect the road. The riprap prevented the stream meander from extending to the north and into the high bank at the washout site as it likely would have done under natural conditions. The storm of 2002 that washed out FSR 2610 removed the riprap stabilizing the bank and extended the stream meander into the large glacial terrace at the current washout. Channel changes associated with the 2002 storm have increased the area of eroding glacial terrace streambank and the estimated sediment supply from within the terrace transition segment by about 20 percent over pre-storm conditions.

Affected Environment

Fish Habitat

In the immediate vicinity of the washout the Dosewallips River consists of alternating pools and riffles with an occasional small rapid present in riffles where boulders have accumulated. Overflow channels and/or side channels are present along the inner bend of the meander bends adjacent to point bars. Channel-bed sediments consist primarily of cobble-sized particles and secondarily of pebble- and boulder-sized particles. The channel gradient ranges between 1 and 4 percent. While the high terrace and bank provide an excellent source for spawning size gravel the high energy of this reach limits the amount of spawning gravel retained. Some spawning habitat is present, especially in the pool tailouts, in side channels and behind boulders and obstructions. Chinook salmon, coho salmon, pink salmon, and steelhead trout have all been observed spawning within the immediate project area.

The low gradient response reaches within the unconfined alluvial segment immediately downstream of the project area contain numerous split channels, log jams, spawning areas, and deep pools. These areas provide extremely high quality fish habitat. The Steelhead Campground reach, which begins shortly below the washout appears to be one of three alluvial valley segments that are disproportionately important as salmon spawning and rearing areas in the Dosewallips watershed (Labbe et al. 2005). The Steelhead Campground reach is also considered to be one of the most healthy, dynamic river-floodplain systems in the watershed.

Washington Department of Fish and Wildlife spawning surveys have identified three primary spawning areas for Chinook within the Dosewallips River. The two reaches downstream of the washout, which are within and downstream of the Steelhead Campground reach from River Mile 10.75 to 9.75 and from River Mile 9.0 to river Mile 8.0, typically have by far the greatest number of redds each year for Chinook. These same two reaches are also important to steelhead and in some years contain the majority of spawning within the river. (Figures 18, 19, and 20; Chinook and steelhead redd maps) (personal communication Thom Johnson, 2005).

Habitat functions are described and analyzed in this document using indicators from the "Matrix of Pathway and Indicators" taken from the 1996 NMFS document, "Making Endangered Species Act Determinations of Effects for Individual or Grouped Actions at the Watershed Scale". The baseline conditions described here were identified at the watershed scale in the Dosewallips Watershed Analysis (USDA 1999) as being in one of three condition levels. These levels are: properly functioning (indicator maintains strong and significant populations that are interconnected and promote recovery of proposed or listed species or critical habitat), functioning at risk (indicator provides for persistence of species but in more isolated populations and may not promote recovery), and not properly functioning (indicator provides for maintenance of species at low persistence levels and active restoration is needed). Indicators used in this analysis are as follows.

Sediment – The term sediment is used in two contexts in this document. Sediment can be "good" as in a source for spawning gravels as from geomorphic processes, and it can be "bad" as in fine sediment resulting from road related activities. While sediment is not considered a significant factor in the upper reaches as they are subject to more natural conditions the lower portions of the watershed would be more subject to sediment generated from bank erosion due to the Dosewallips road, stream side development, and lowland harvesting. The baseline condition is functioning at risk.

Large Woody Debris – The concentration of large woody debris (LWD) may have been sporadic over the last two centuries. Today's LWD loading is likely affected by stream side logging and in recent decades logs were routinely taken out of the river for water diversion concerns or financial opportunities. The baseline condition is functioning at risk.

Pool Frequency and Quality – While pool creation is dominated by boulders above the six mile bridge, LWD is the major structure below this point. Due to the lack of LWD in the lower river the baseline condition is functioning at risk.

Off-channel Habitat – The glacial nature of the Dosewallips valley provides few low gradient tributaries which offer off-channel overwintering habitat, consequently there is a lack of this type of habitat. The baseline condition is functioning at risk.

Width/Depth Ratio – Information on this indicator is unknown at the watershed scale and it was not evaluated.

Streambank Condition – Due to the riprapped bank at the Elkhorn Campground and bank protection projects along private lands the baseline condition is functioning at risk.

Drainage Network Increase – Primarily due to the extensive roading in the Rocky Brook subwatershed the baseline condition is functioning at risk.

Road Density & Location – The Dosewallips River Road runs along the river and in places constricts the river. Additionally the extensive roading in the Rocky Brook drainage also affects the aquatic system. The baseline condition is functioning at risk.

Temperature – The Dosewallips is known for its cold water and water temperature

measurements have been within standards throughout most of the river. The baseline condition is properly functioning.

Function of Riparian Reserve – Given that the Dosewallips River Road is entirely within the riparian reserve and little protection is afforded in the lowlands the baseline condition is functioning at risk.

Figure 18: Chinook spawning sites

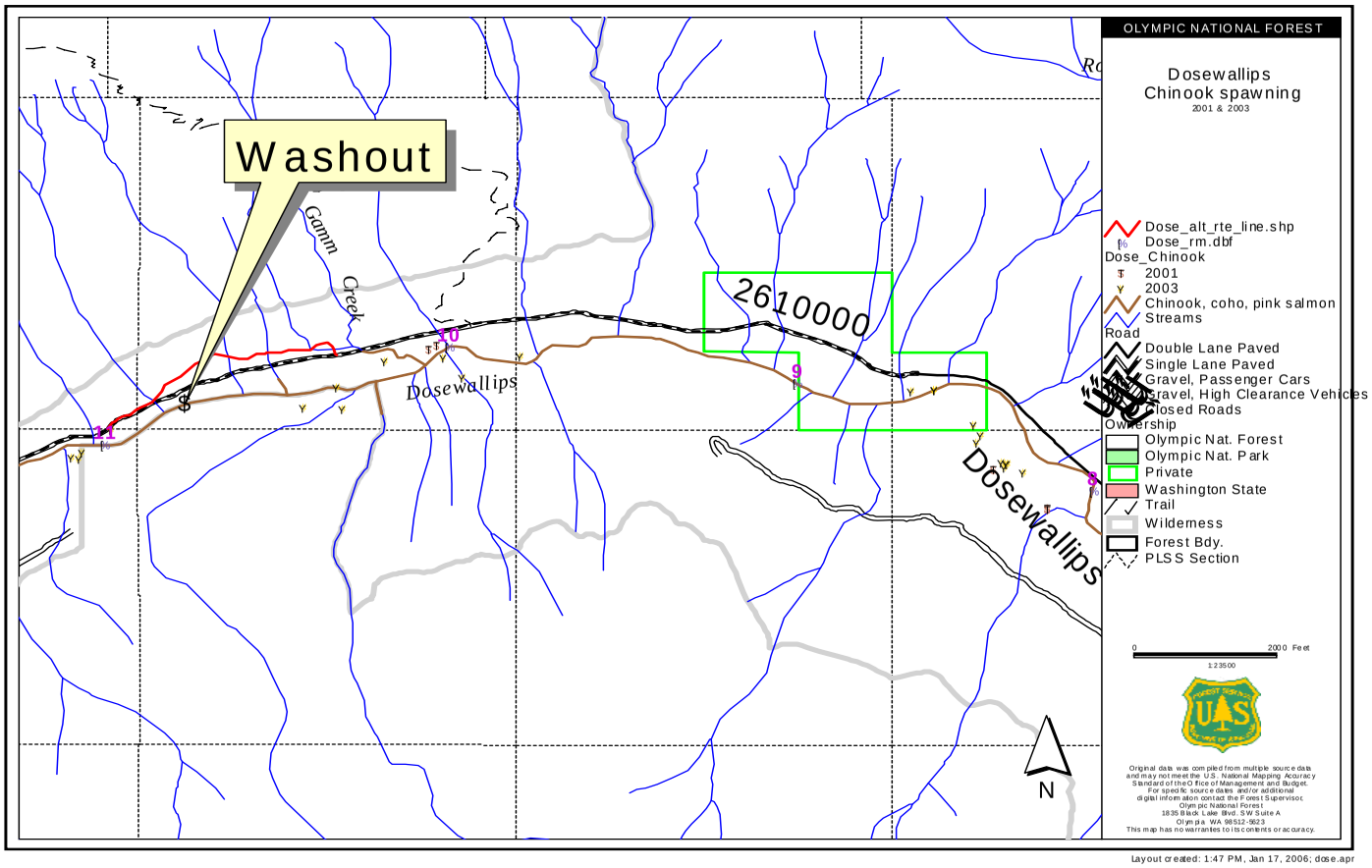


Figure 19: Steelhead spawning sites

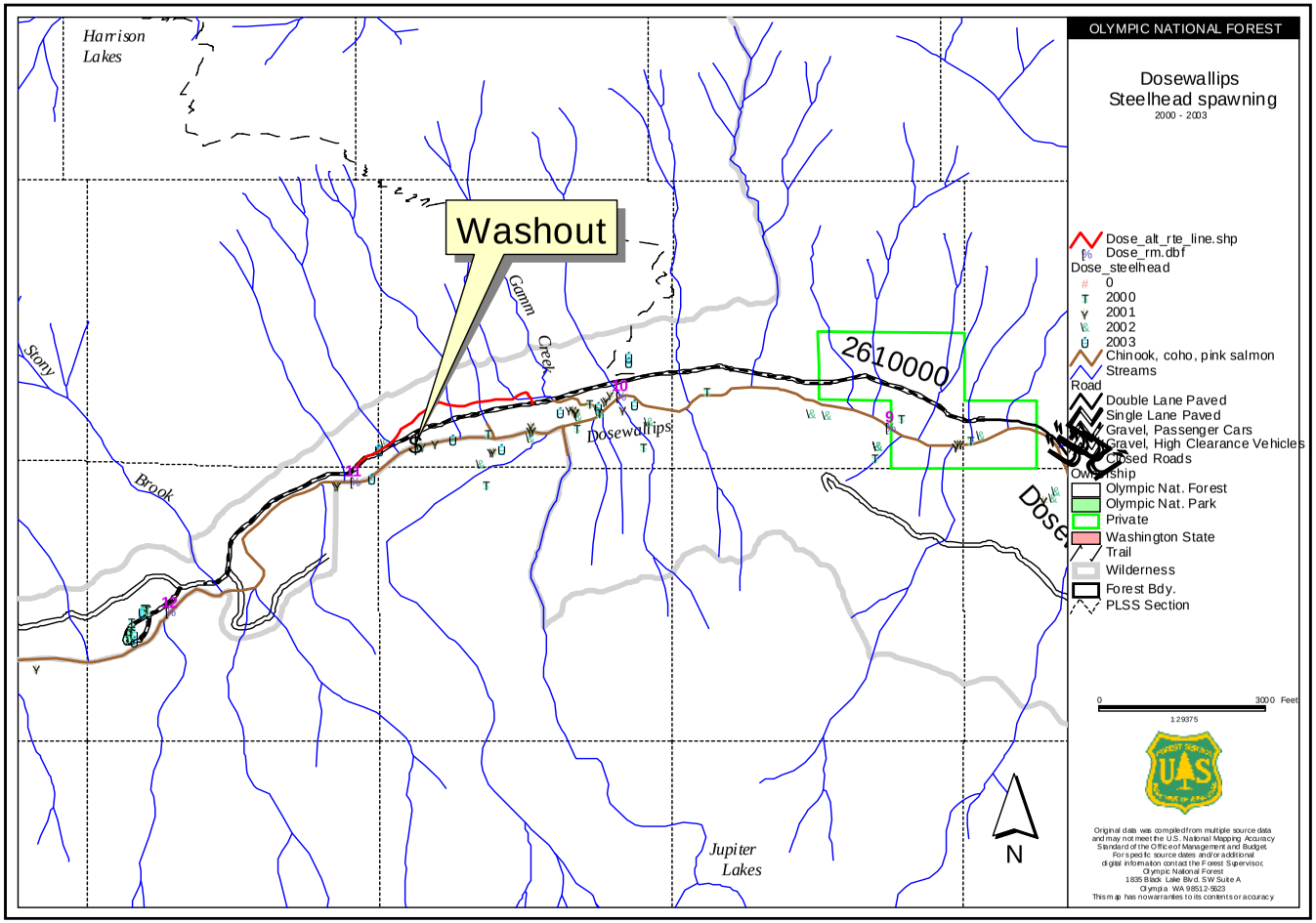
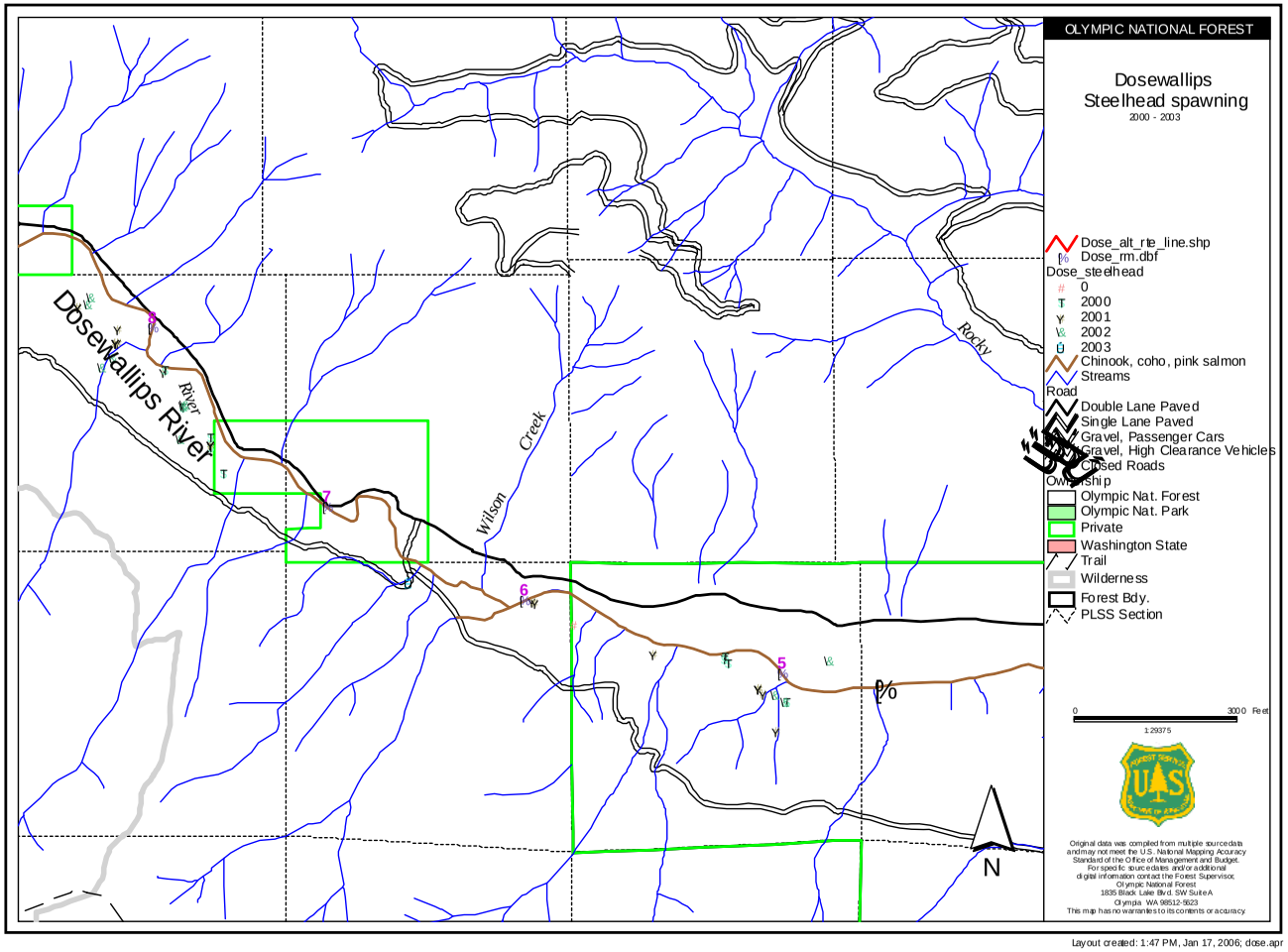


Figure 20: Steelhead spawning sites (below washout)



Fish Populations
Anadromous fish distribution extends up to Dosewallips Falls, just upstream of the Olympic National Park boundary at approximately River Mile (RM) 15.4 just below the falls.

Anadromous fish species present in the Dosewallips Watershed include Chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), summer and fall chum salmon (*O. keta*), pink salmon (*O. gorbuscha*), winter and summer steelhead trout (*O. mykiss*), sea-run cutthroat trout (*O. clarkii*), and bull trout (*Salvelinus confluentus*). Chinook salmon, coho salmon, pink salmon, steelhead trout, and cutthroat trout spawn and rear within the project area. Coho spawn mostly downstream of the project area in side and braided channel areas. Summer and fall chum are present within the lower reaches of the Dosewallips Watershed well outside the project area. Bull trout have been documented in the lower river but have never been observed in the vicinity of the project area. Salmonids present in the Dosewallips River, their stock status, and their potential presence within the project area are listed within Table 5.

Table 5: Dosewallips salmonids

Species	Stock Status	Spawning Migration	Spawning	Rearing	FS Sensitive Species	Within Project Area
Chinook summer/fall	Threatened[1]	mid-July thru Oct	Sept thru Oct	Jan thru July	No	Yes
Coho	Unknown[2]	mid-Aug thru Dec	Oct thru mid-Jan	Year round	Yes	Yes
Pink	Depressed[2]	mid-July thru mid Oct	Sept thru Oct	Out migration after emergence	No	Yes
Steelhead trout winter	Threatened[5], Depressed[2]	Nov-May	mid-Dec thru June	Year round	No	Yes
Steelhead trout summer	Threatened[5], Unknown[2]	Apr thru Oct	Jan thru Feb	Year round	No	Yes
Coastal cutthroat trout	Unknown[4]	July thru Mar	Jan thru Mar	Year round	Yes	Yes
Chum summer	Threatened[1]	Aug thru mid-Oct	mid-Sept thru mid-Oct	Out migration after emergence	No	No
Chum late fall	Healthy[2]	mid-Nov thru early Jan	late Nov thru early Jan	Out migration after emergence	Yes	No
Bull trout	Threatened[3]	Sept thru Oct	late-Sept. thru Nov	Year round	No	No

[1]NMFS, 1999
[2]SaSI, 2002
[3]USFWS, 1999
[4]SaSI, 2000

[5]NOAA NMFS, 2007
Healthy – A stock of fish experiencing production levels consistent with its available habitat and within the natural variations in survival for the stock.
Depressed – A stock of fish whose production is below expected levels based on available habitat and natural variations in survival rates, but above the level where permanent damage to the stock is likely.
Unknown – Stocks where there is insufficient information to identify stock status with confidence.

Chinook Salmon

The Dosewallips Chinook salmon population was listed as Threatened under the Endangered Species Act (ESA) in 1999 (NMFS 1999a). The Dosewallips population is part of the Puget Sound Chinook Evolutionarily Significant Unit (ESU). The ESU encompasses all naturally spawned runs of Chinook salmon that occur below impassable natural barriers in the Puget Sound region from the North Fork Nooksack River in northeastern Puget Sound to the Elwha River on the Olympic Peninsula, including the Dosewallips River basin in the park.

The Dosewallips summer/fall Chinook population is grouped into the Mid-Hood Canal Management Unit by Washington State Department of Fish and Wildlife. The Mid-Hood Canal stock also includes the Hamma Hamma and Duckabush River Chinook populations. In 2002 the Washington State Salmonid Stock Inventory (SaSI) rated the stock status as “Critical” because of chronically low escapement (low number of returning fish that spawned) (SaSI 2002).

The mid-Hood Canal Chinook population is considered to be a mixed stock, meaning individuals originated from a mix of native and introduced non-native stocks. Production is categorized as composite which means the stock is sustained by both wild and artificial production. It is assumed that many of the naturally-spawning Chinook in the Dosewallips River in recent years have been strays from local hatcheries and/or were adults returning from hatchery fry released into the Hamma Hamma, Duckabush, and Dosewallips Rivers (SaSI 2002).

The Puget Sound Technical Recovery Team (TRT) has identified the Dosewallips as one of 22 individual Chinook populations within the Puget Sound ESU. They consider the Dosewallips to be the core population of the mid-Hood Canal area which includes the Duckabush, Hamma Hamma, and Dosewallips Rivers. At an average of only about 40 returning spawners per year over the past five years the Dosewallips Chinook population is the smallest of all 22 populations within the Puget Sound ESU (Shared Strategy for Puget Sound 2005).

Annual Chinook natural spawner escapements in the Dosewallips River have ranged from 0 to 87 fish (Table 6). Chinook escapement in the Dosewallips River for the year 2005 was 10 fish (personal communication T. Johnson). In 2002 a Chinook redd was observed just downstream of the road washout site.

Table 6: Chinook spawning escapement

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Total	76	0	0	58	54	29	45	43	87	80	10

An Ecosystem Diagnosis Treatment (EDT) model was run in 2005 to estimate the number of adult Chinook spawners that the current habitat in the Dosewallips could support. Based on the model potential abundance for the Dosewallips River without harvest is approximately 1240 (personal communication T. Johnson). Annual escapements have been well below that, indicating that spawning habitat in the river may be underutilized.

Chinook distribution in the Dosewallips River extends to the Dosewallips Falls at river mile (RM) 15.4, just upstream of Olympic National Park boundary. Summer/fall-run Chinook in this system spawn from late August through October (PNPTC 1995). Inter-gravel development of the fry is normally completed by the end of February and emergence from the gravel follows closely thereafter. The majority of fry rear in the river for about three months with the majority out-migration occurring in late March to late June during the high spring freshets (WDF 1975).

The vast majority of Chinook spawning in the Dosewallips watershed occurs in the upper anadromous reaches of the river on National Forest System lands (personal communication T. Johnson). Spawning in the lower watershed is difficult to record due to the presence of chum and pink (in odd years) that are in the river at the same time. There are three primary spawning areas: 1) from the washout upstream to Elkhorn Campground (RM 10.75 – 12); 2) from the washout downstream to the old Steelhead Campground (RM 9.75 – 10.75); and 3) below Steelhead Campground (RM 8.0-9.0). The two spawning reaches below the washout typically have by far the greatest number of Chinook redds each year, see figure 18 - Chinook redd map (personal communication T. Johnson).

Habitat factors limiting recovery of Chinook salmon in the Dosewallips River as identified in the Draft Puget Sound Salmon Recovery Plan include: loss of channel, side channels, and floodway from levee construction, bank hardening, and splash dams; loss of in-channel wood; and loss of estuarine and marsh habitat from levee construction and filling (Shared Strategy for Puget Sound 2005).

Coho Salmon

Coho salmon in the Dosewallips watershed are a part of the Puget Sound/Strait of Georgia Coho ESU. In 1995 NMFS evaluated this stock and determined that this ESU was “Not Warranted” for listing (NMFS 1995). In 2004 the Puget Sound/Strait of Georgia Coho were classified as a “Species of Concern” by the NMFS (NMFS 2004). WDFW rates the Dosewallips coho population as “Unknown” due to a poor data set (SaSI 2002). It is a mixed stock with wild production. Sum-of-season cumulative fish-days for coho in Rocky Brook Creek index are shown in Table 7 (SaSI 2002).

Table 7: Coho fish-days

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002
Fish-	No	503	No	No	0	No	70	541	526

days	data		data	data		data			

Most spawning takes place in the lower 12 miles of the mainstem Dosewallips River and in side channels and small tributaries. In fall 2002 several coho were observed spawning in the side channel opposite the washout site (Shelmerdine, personal communication).

Pink Salmon

The Dosewallips River is part of the Odd Year Pink ESU. In 1995 NMFS evaluated this stock and determined that this ESU was "Not Warranted" for listing (NMFS 1995b). In the 2002 SaSI the Dosewallips pink population was rated as "Depressed" due to chronically low escapements and a short-term severe decline in 1997 and 1999. This is a native stock with wild production. Natural spawning escapement of pink salmon in the Dosewallips River is shown in Table 8 (SaSI 2002 and T. Johnson).

Table 8: Pink spawning escapement

Year	1991	1993	1995	1997	1999	2001	2003	2005
Total	8200	17316	19034	1954	2903	20175	17707	14,800

Most pink salmon spawning takes place in the lower seven miles of the mainstem Dosewallips River, however, pinks have been reported to spawn as far upstream as RM 11.

Steelhead Trout

Dosewallips steelhead populations fall within the Puget Sound Steelhead Distinct Population Segment (DPS). In 2007 NMFS evaluated this stock and listed the Puget Sound Steelhead DPS as threatened (NMFS 2007). Dosewallips Winter Steelhead have been rated as "Depressed" based on chronically low escapements (SaSI. 2002).

Results from annual spawning surveys for winter steelhead are shown in Table 9 (SaSI 2002). Most spawning takes place in the lower 12 miles of the Dosewallips River in similar areas as Chinook spawning (personal communication T. Johnson). The two spawning reaches below the washout are important to steelhead and in some years may also contain the majority of spawning within the river. (Figures 19 and 20 – Steelhead spawning redd map) (personal communication T. Johnson). The Dosewallips Falls create an anadromous fish barrier so steelhead are not present in the river at the location of the proposed park activities.

Table 9: Winter steelhead escapement

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003
Total	79	55	60	49	99	78	89	52	96

Summer steelhead in the Dosewallips still remains a data gap. Stock status is "Unknown" (SaSI 2002). Escapement is not monitored nor has an escapement goal been identified. Spawning takes places in the upper anadromous reaches of the Dosewallips River, but specific spawning locations are unknown.

Coastal Cutthroat Trout

Few data exist concerning historical and present abundance of coastal cutthroat trout in the Dosewallips River. WDFW lumps the Dosewallips coastal cutthroat trout population into the West Hood Canal coastal cutthroat stock complex which encompasses the Skokomish River up north to Shine Creek. Stock status was rated as "Unknown" in the 2000 SaSI. Escapement is not monitored nor has an escapement goal been identified. Coastal cutthroat trout in this complex are native and sustained by wild production.

Summer-run Chum Salmon

The Dosewallips summer chum salmon was listed as Threatened under the Endangered Species Act (ESA) in 1999 (NMFS 1999b). The Dosewallips summer chum population is part of the Hood Canal Summer-Run Chum ESU as designated by NMFS. This ESU includes summer-run chum salmon populations in Hood Canal and in Discovery and Sequim Bays on the Strait of Juan de Fuca. Distinctive life-history and genetic traits were the most important factors in identifying this ESU (Johnson et. al. 1997). Genetic analysis has shown that Dosewallips summer chum are genetically distinct from all other Washington chum stocks (Phelps et al. 1995).

Summer chum population data only extends back to 1972 for the Dosewallips River. Natural spawning escapements have been highly variable (Table 10, SaSI 2002 and T. Johnson). During the 1970's most escapements were over 1,000 spawners, some years were over 3,000. Escapement decreased during the 1980's to less than 100 spawners in some years and several hundred in other years. In 1995 and 1996 escapement rose to almost 3,000 and 7,000, respectively, then declined again in 1997 to under 100 fish. Summer-run chum stocks in the Dosewallips River are a native stock with wild production. Stock status is considered "Depressed" due to chronically low escapement (WDFW et. al. 2002).

Table 10: Summer chum escapement

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Total	225	2,787	6,976	47	336	351	1260	990	1627	7066	11,549	2,658

Summer-run chum stocks spawn from late August through late October. They emerge from the gravel from February through May. Out-migration begins in March and continues through April (WDFW et. al 2000). Natural barriers and high stream gradients limit summer chum to the lower 4.3 miles of the Dosewallips and most spawning occurs below RM 2.5, off the National Forest.

Fall Chum

Fall chum in the Dosewallips River are part of the Puget Sound/Strait of Georgia Chum ESU. This ESU was evaluated by NMFS in 1998 and was determined "Not Warranted" for federal listing (NMFS 1998). WDFW rates the Dosewallips Fall Chum population as "Healthy" (SaSI 2002). This is a native stock with wild production. Most of the fall chum spawning takes place in the lower mile of the Dosewallips River, off the National Forest. Natural spawning escapement of late fall chum in the Dosewallips River is shown

in Table 11 (SaSI 2002 and T. Johnson).

Table 11: Late fall chum escapement

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Total	1556	3028	1000	2302	753	163	1852	838	248	2073

Bull Trout

Bull trout on the Olympic Peninsula were listed as "Threatened" under the Endangered Species Act (ESA) in 1999 (USFWS 1999). Bull trout in the Dosewallips River are part of the Coastal Puget Sound Bull Trout Distinct Population Segment (DPS) as designated by the USFWS**.** There is one recently documented account of bull trout being caught by anglers in the lower Dosewallips River and there are no documented observations of bull trout in the Dosewallips River above that point. ONP fisheries crews did not detect any bull trout in the upper Dosewallips inside the park during fish inventory work in 2002. They surveyed 10 tributaries and 7 sites along the main stem river and only observed brook trout and rainbow trout. The Dosewallips estuary and anadromous zone of the Dosewallips River are considered to be potential Forage, Migration, and Over-wintering habitat for bull trout, however a self-sustaining population of bull trout does not exist in the watershed (USFWS 2004).

Federally Listed Threatened Fish

Puget Sound Chinook, Puget Sound steelhead and Hood Canal summer chum have been listed as Threatened by the National Marine Fisheries Service and are present in the Dosewallips River. Critical Habitat for Puget Sound Chinook and Hood Canal summer chum has also been designated by NMFS. Critical habitat for Puget Sound Steelhead will be designated in the future.

Bull trout have been listed as Threatened by the U.S Fish & Wildlife (USFWS). There is not a self sustaining population of bull trout in the Dosewallips River, however the estuary and anadromous zone of the river are classified as potential Forage, Migration, and Over-wintering habitat. Critical habitat for bull trout has been designated by the USFWS. It encompasses private and state lands on the lower Dosewallips but does not include Olympic National Forest lands.

Essential Fish Habitat

Essential Fish Habitat (EFH) has been designated by NMFS within the Dosewallips watershed under the Magnuson-Stevens Fishery Conservation and Management Act (NMFS 2002). EFH includes all Chinook, coho, and pink salmon habitat, which is the entire anadromous zone in the Dosewallips up to the barrier falls at RM 15.4.

Sensitive Fish Species

Fish species on the Forest Service Region 6 Sensitive Species List that occur within the Dosewallips watershed are: Puget Sound/Strait of Georgia Coho, Puget Sound/Strait of Georgia Chum, and Puget Sound Coastal Cutthroat Trout. Only Puget Sound/Strait of Georgia Coho and Puget Sound Coastal Cutthroat Trout are found with the project area.

Environmental Consequences

Olympic National Forest
The proposed alternatives were analyzed from the selected habitat function indicators (see Affected Environment section for a description) to assess potential environmental effects based on existing conditions at the project and watershed scales (summarized in Table 12). The ratings of these indicators show relative change to the baseline and display if the action would have a beneficial, neutral, or negative impact on the habitat indicator. Within this analysis short-term effects are considered impacts related to the construction phase and 1 year after. Impacts after one year were considered long-term effects. Additionally, effects to Forest Service Sensitive fish species, threatened fish species and critical habitat, and essential fish habitat are discussed.

Olympic National Park
Fish and their habitat are evaluated using the following impact intensities. The thresholds of change for the intensity of an impact to aquatic species and habitat are defined as follows:

Impact Intensity	Intensity Description
Negligible	There would be no observable or measurable impacts to native species, their habitats, or the natural processes sustaining them. Impacts would be well within natural fluctuations.
Minor	Impacts would be detectable, short-term, and they would not be expected to be outside the natural range of variability of native species' populations, their habitats, or the natural processes sustaining them. Mitigation measures, if needed to offset adverse effects, would be simple and successful.
Moderate	Breeding animals of concern are present; animals are present during particularly vulnerable life-stages, such as migration or juvenile stages; mortality or interference with activities necessary for survival can be expected on an occasional basis, but is not expected to threaten the continued existence of the species in the park unit. Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, short-term, and they could be outside the natural range of variability. Mitigation measures, if needed to offset adverse effects, would be extensive and likely successful.
Major	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, long-term, and they would be expected to be outside the natural range of variability. Key ecosystem processes might be disrupted. Loss of habitat might affect the viability of at least some native species. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed.

Impacts would be considered short-term if the aquatic species recovered in less than one year. Impacts would be considered long-term if aquatic species recovery takes more than one year.

Alternative A - No Action

Direct/Indirect Effects

Olympic National Forest
Sediment
Source of spawning gravels and channel function
Prior to 2002 aquatic habitat in the Dosewallips River adjacent to the proposed project area was in a degraded condition due to the presence of FSR 2610 and the associated streambank armoring. The channel was constrained by riprap. Gravel recruitment and large wood recruitment from the high bank had been precluded by bank stabilization. Riparian vegetation was minimal or non-existent between the river and the road corridor within the project area. The Dosewallips Watershed Analysis recognized the issues created by FSR 2610 along the Dosewallips River corridor and rated both road density/location and riparian condition as "At Risk" (USDA 1999)**.**

The January 2002 flood removed the riprap and the road. The stream meander expanded laterally into the high bank, recruiting large quantities of gravel and large wood. Although prior stream survey information is not available it appears that spawning habitat, off-channel habitat, and channel complexity have all improved as a result of the flood and road washout. Aquatic habitat conditions in the Dosewallips River within the proposed project area are currently well on their way to recovery toward natural conditions.

Implementation of this alternative would allow natural channel migration processes to continue in the vicinity of the washout. Continued channel migration and continued erosion of the high bank at the washout site would provide substantial inputs of coarse sediment and woody debris to the stream channel over time. These processes are especially important in this location because of the amount of gravel potentially available, the limited gravel supplies available in adjacent stream reaches, the link between sediment supply and fish habitat, and the high quality and importance of fish habitat immediately downstream of the washout site.

As described under the Introduction section and detailed in the Reach Analysis (Cenderelli et. al 2003), the project area is unique in its ability to contribute substantial quantities of coarse sediments to this portion of the Dosewallips River. Potential coarse sediment inputs into the Dosewallips River are limited in the approximately 5-mile hillslope-confined reach immediately above the project area and in the approximately 3-mile alluvial unconfined reach immediately below the project area. The short terrace transition reach, which includes the washout site provides an abundance of potential spawning gravel to the system because of the high glacial terraces immediately adjacent to the stream channel. The glacial terraces, especially the high bank at the washout site, also contain a high proportion of spawning gravel-size material. Based on an analysis of the volume of eroding streambanks and the composition of the streambank materials the Reach Analysis concluded that approximately 41 percent of spawning gravels supplied to the channel within the project area originated from the eroding high bank at the washout

site (Cenderelli et. al 2003).

Spawning and Rearing Habitat within the Project Area

Episodic inputs of coarse sediment and large wood are recognized as an important aspect of creating and maintaining complex high quality fish habitat (Reeves et al. 1995). The large inputs of coarse sediment and large wood into the Dosewallips River from channel migration and erosion processes at the washout site are critical in developing and maintaining the high quality spawning and rearing habitat in the reach immediately downstream of the washout. A key assumption implicit in this analysis is that a large source of coarse sediment and wood immediately upstream from a key habitat area is more important to maintaining that habitat than smaller sources of coarse sediment and wood further away from the site.

The high quality complex habitat that extends from the washout approximately 1 mile downstream to the old Steelhead Campground is extremely important from a watershed context. This reach is one of three alluvial valley segments that are disproportionately important as salmon spawning and rearing areas in the Dosewallips watershed (Labbe et al. 2005). It is also one of the three primary spawning areas for Chinook and steelhead within the Dosewallips watershed.

How much gravel the bank erosion of the high bank at the washout would ultimately contribute to the stream channel, the timing and amount of sediment inputs, and how long the stream channel would continue to erode the glacial terrace are all unknown. The stream channel would likely continue to be dynamic in the vicinity of the washout and alter both its location and shape in response to large flood events. The rate of bank erosion along the outer bank at the washout site would probably decline over time as trees fall into the channel from the upper terrace and naturally stabilize the bank. There is no indication that the stream channel will naturally shift locations away from the washout site within the near future. Sediment inputs from the washout site would likely continue to be episodic (pulses) rather than a continuous steady input over the long-term.

Turbidity and Fine Sediment

The existing road system upstream from the washout site would gradually deteriorate due to lack of maintenance. There could be some adverse impacts to the Dosewallips River due to sediment generated from road failures and subsequent erosion of the drainage system, but adverse impacts are anticipated to be minor. Site reconnaissance did not identify any major mass wasting concerns. Much of the road was built using full bench construction in rock. Eventually a few small fills could deteriorate to the point of slope failure. A number of stream crossings exist, but these are generally small, less than 1000 cubic yards each, and are not expected to produce large or catastrophic failures. The impact would more likely be a relatively long-term deterioration of the road and the associated drainage structures with chronic small erosion inputs to stream channels (see Soils section for additional discussion).

The largest potential adverse impact from the lack of road maintenance and the subsequent deterioration of FSR 2610 would be the Bull Elk Creek bridge crossing. Due to the high sediment load of the stream channel there is the potential of the stream being

diverted out of the stream channel and re-routed onto the road. This would substantially increase the amount of both fine and coarse sediment carried into the mainstem of the Dosewallips until a new stream channel developed and stabilized. Potential adverse impacts would be limited because Bull Elk Creek is in the hillslope-confined reach upstream near Olympic National Park boundary and well upstream from the primary Chinook or steelhead spawning areas,.

Overall at the project scale this alternative would have a negative impact (degrade) on this habitat indicator. At the watershed scale effects of increased sediment input to the Dosewallips River due to lack of maintenance and deterioration of the FSR 2610 above the washout would be small and would likely be indistinguishable from natural background levels (maintain).

Large Woody Debris
Natural recruitment of large wood would be allowed to continue at the washout thus maintaining this indicator. This indicator would be maintained at both the project and watershed scales.

Pool Frequency and Quality
Natural processes would be allowed to continue at the washout thus maintaining this indicator at both the project and watershed scales.

Off-Channel Habitat
This alternative would not affect off-channel habitat and would maintain this indicator at both the project and watershed scales.

Width/Depth Ratio
This alternative would allow the river channel to migrate. The stream channel geometry would be allowed to evolve naturally thus maintaining this indicator at both the project and watershed scales.

Streambank Condition
Natural processes would be allowed to continue at the washout thus maintaining this indicator at both the project and watershed scales.

Drainage Network Increase
Alternative A would not affect this indicator and would maintain it at both the project and watershed scales.

Road Density and Location
Road density would not change under this alternative, the road beyond the washout would still exist and would not be decommissioned. The road would not be built in the main channel of the Dosewallips River. This indicator would be maintained at both the project and watershed scales.

Temperature

Alternative A would not affect stream temperature and would maintain this indicator at both the project and watershed scales.

Riparian Reserve Function
Natural processes would be allowed to continue at the washout thus maintaining this indicator at both the project and watershed scales.

Sensitive Fish Species
This alternative would likely benefit Puget Sound/Strait of Georgia Coho and Puget Sound Coastal Cutthroat Trout by creating or maintaining high quality, complex spawning and rearing habitat at the washout site and in the reach immediately below the washout.

Threatened Fish and Critical Habitat
Under ESA effects determination this alternative would have no effect on Puget Sound Steelhead, Puget Sound Chinook, Hood Canal summer chum, and Coastal Puget Sound bull trout. Puget Sound Chinook and Hood Canal summer chum Critical Habitat would also have a no effect determination.

Essential Fish Habitat
This alternative would have no effect on EFH, which includes Chinook, coho, and pink salmon habitat.

Summary
This alternative would provide the greatest benefit and have the least adverse impacts to aquatic resources of all the alternatives.

Olympic National Park
Impacts from the existing conditions are negligible and would be due primarily to run off and sedimentation from the existing road at the Dosewallips Falls site. This sedimentation can enter the Dosewallips River and create temporary spikes in turbidity, temporarily impacting fish habitat downstream and resulting in negligible to minor, short-term adverse impacts to fisheries resources.

Conclusion
There would be no impairment to this resource from the no action alternative.

Cumulative Effects

Although the Dosewallips watershed is considered one of the more relatively intact watersheds in the Puget Sound it is considered to have impaired ecological integrity (Frissell et at. 2000). Past and present activities in the watershed that have had a lasting detrimental affect on fish habitat include: timber harvest, splash dam operations, road building, bank hardening, LWD removal, dike construction, dispersed recreation, and conversion of floodplain to pasture land and residential development. Impacts to fish habitat occur on a gradient within the watershed. The magnitude and frequency of

impacts as identified above to fish habitat are greater lower in the watershed, and as you move up river fish habitat and the processes affecting habitat are less impaired.

Inputs of fine sediments could increase somewhat as a result of the lack of road maintenance of the FSR 2610 above the washout and the subsequent deterioration of the road and the associated drainage structures, but additional sediment inputs would likely be small and would likely be indistinguishable from natural background levels below the washout site.

Foreseeable activities on National Forest System lands include the Jackson Timber Sale, which would commercially thin approximately 1000 acres and construct 3 miles of temporary road in the Rocky Brook subwatershed. There would be short-term sediment impacts associated with temporary road building and log haul, however they are anticipated to be relatively minor. Any effects would occur well downstream from the FSR 2610 washout and would not interact with effects of this alternative so there would be no cumulative impacts.

Maintenance of FSR 2610 below the washout would continue. There are a number of areas along the road where the river and road are adjacent to each other and the riprap and other bank stabilization measures at these points would continue to be maintained over time. These activities would occur well downstream from the washout and would not interact with effects of this alternative so no cumulative impacts are anticipated.

Past ONP road and facility construction and maintenance has modified the amount of impervious or hard packed surface in the developed area of the park and likely changed the area drainage patterns slightly. Under this alternative there would be no future road maintenance. If road maintenance does not occur there is the potential for increased run-off and erosion due to filled ditches and plugged culverts. This could result in adverse, temporary to long-term impacts to fisheries resources from decreased water quality, resulting in minor adverse impacts. By doing nothing, run off is expected to continue, but it would be small and likely not contribute to decreased water quality in the Dosewallips River. Therefore there would be no cumulative effects to water quality from park actions proposed under the no action alternative.

Existing and foreseeable non-Federal activities in the lower Dosewallips watershed include timber sales, road construction, bank hardening, dike construction, LWD removal, and the conversion of floodplain to pasture lands and residential development. Assuming population increases in the lower watershed and population densities rise, these future private and state actions will persist and will likely increase, thus exacerbating the adverse effects on salmonid habitat within the lower watershed. Because these activities would occur well downstream from the washout and would not interact with effects of this alternative no cumulative impacts are anticipated.

Over the past 10 years approximately 10.1 miles of road have been decommissioned on National Forest System lands within the Dosewallips watershed. Two miles of existing roads are planned to be decommissioned on National Forest System lands within the next

several years. In addition there have been several positive efforts made to improve salmonid habitat in the lower watershed by local environmental groups, tribal, state and county governments. Projects such as levee removal, placing large wood, land acquisition and conservation easements to protect high value floodplain and riparian areas have been accomplished and are underway.

Implementing Alternative A would add to salmon habitat recovery efforts which have already been completed or are underway in the watershed. Allowing natural channel migration and erosion processes to continue at the washout site would allow natural restoration of stream habitat at the washout site. It would also help maintain the complex, high quality, and extremely important spawning and rearing habitat that currently exists in the reach immediately below the washout.

Forest Plan Amendments

Olympic National Forest
This alternative is consistent with Forest Plan standards and guidelines and as such no site-specific, non-significant Forest Plan amendments to these standards and guidelines are proposed.

Alternative B - Reroute 1 Bench Emphasis

Direct/Indirect Effects

Olympic National Forest
Sediment
Source of spawning gravels and channel function
The effects of Alternative B to this aspect of the sediment indicator would essentially be the same as the effects previously described for Alternative A.

Spawning and Rearing Habitat within the Project Area
The effects of Alternative B to this aspect of the sediment indicator would essentially be the same as the effects previously described for Alternative A.

Turbidity and Fine Sediment
There would be some unavoidable short-term sediment inputs into the non-fish bearing streams and to the small unnamed coho rearing tributary to Gamm Creek coming off the hillslope during the construction of the new road under this alternative. Adverse impacts related to increased fine sediments during road construction are anticipated to be minor. Conducting earth moving construction activities during the summer and following standard de-watering and erosion control mitigation measures would minimize the amount of fine sediment entering streamcourses. Potential sediment impacts from road construction are anticipated to be unobservable after 1-2 years, when the fill and cutslopes stabilize and revegetate.

There is some potential to increase long-term chronic delivery of fine sediment to the Dosewallips River from erosion of the cut and fill slopes, and potential mass movements

along road segment 2. Segment 2 of the new road would cross steep, unstable soils, with frequent wet undefined seep areas. Sheet and rill surface erosion off the new cutslopes and fillslopes in these segments would also generate additional fine sediments for several years until the bare soils revegetate. Fine sediments generated from segment 2 would be routed to the unnamed coho rearing tributary and eventually into the Dosewallips River. Negative impacts of sediment and turbidity to fish utilizing the unnamed tributary would range from gill trauma, avoidance/displacement, and disruption of feeding behavior. Fine sediment would settle out and not be readily transported or flushed downstream because of the low gradient and wetland characteristics of the unnamed tributary. Potential long-term sediment impacts from chronic erosion or mass wasting would be limited to the small unnamed coho rearing tributary. Because of its much larger size and its greater ability to transport sediment, fine sediment impacts would not be observable in the mainstem of the Dosewallips River.

Overall at the project scale this alternative would have a negative impact (degrade) on this habitat indicator for the first and second order perennial streams. There would be a neutral impact to the mainstem of the Dosewallips River and at the watershed scale.

Large Wood Debris
Under Alternative B a number of large conifer trees, 36 inch in diameter and greater, would be removed in order for the new road to be built. Few, if any, of the trees to be removed would likely reach the mainstem of the Dosewallips River if they were to fall down naturally. Large wood recruitment into the Dosewallips River would not be affected.

A few of the trees to be removed would have the potential of falling into the unnamed coho rearing tributary and becoming instream wood if they were left to fall naturally. Due to the small size of the tributary it would be highly unlikely for any of the downed trees to be transported to the mainstem of the Dosewallips River. The potential loss of large wood in the small rearing tributary due to clearing for the new road would be more than offset in the overall watershed context by the continued input of large wood into the mainstem Dosewallips at the washout site that would be maintained by this alternative.

Overall this indicator would be degraded at the project scale and maintained at the watershed scale.

Large trees such as the trees that would be removed to build the new road are critical to successful large wood stream restoration projects, but they are often difficult to find and expensive to acquire. Under this alternative the trees removed to construct the new road would be made available for large wood restoration projects. Having a source of large wood available adjacent to the Dosewallips River would make future large wood stream restoration projects much more feasible.

Pool Frequency and Quality
Alternative B would allow natural pool formation and habitat processes to continue at the washout site and would maintain the high quality, complex rearing habitat immediately

downstream of the project area. This indicator would be maintained at both the project and watershed scale.

Off-Channel Habitat
The glacial nature of the Dosewallips valley provides few low gradient tributaries for overwintering, and off-channel habitat is limited within the anadromous portion of the river (USDA Dosewallips baseline 1999). Road construction in segments 1 and 2 has the potential to alter the hydrology of the unnamed coho rearing tributary by intercepting and rerouting groundwater that feeds the springs and seeps that contribute flow to this stream. Groundwater in the hillslope above the tributary would be captured by the cutslopes and road drainage ditches. Some of the water would be routed off-site into the numerous stream channels. Some of the water would be returned to the forest floor downslope of the road prism. The transport efficiency of the groundwater in the hillslope above the tributary would likely increase somewhat – meaning the water would likely run off faster, thus affecting water storage capacity. The quantity of groundwater in the hillslope could also be reduced if it is captured and routed off site. These changes would impact the hydrology of the small tributary by drying up some of the springs and seeps that feed the stream or causing some of them to go intermittent during the dryer summer season.

Potential adverse impacts to groundwater and the hydrology of the tributary would be minimized by utilizing permeable road fill materials where possible and installing frequent ditch relief pipes.

The magnitude of the potential change in the hydrology of the small coho and cutthroat rearing tributary is unknown. The usefulness or capacity of the tributary to provide off-channel rearing habitat would likely be reduced somewhat, especially during the summer low flow period. Approximately 450 feet along the unnamed tributary would be affected. Substantial impacts are not anticipated.

For the above reasons this indicator is rated as degrade at the project scale but since these effects would be localized to the project area this indicator would be maintained at the watershed scale.

Width/Depth Ratio
This alternative would maintain the natural channel migration and habitat forming processes within the Dosewallips River. Stream channel dimensions, width/depth ratios, and pool/riffle sequences would be allowed to evolve naturally. This indicator would be maintained at both the project and watershed scales.

Streambank Condition
This alternative would maintain the natural channel migration and erosion processes within the Dosewallips River. In the area of the washout the river channel would be allowed to naturally erode the outer high bank and provide inputs of coarse sediment and large wood to the river. This indicator would be maintained at both the project and watershed scales.

Drainage Network Increase
Constructing 0.84 mile of new road through sometimes steep and wet soils would require substantial road ditches to meet drainage needs. Cutslopes and road ditches would intercept surface runoff and groundwater. There would be some potential to create new first order channels at the outlet of ditch relief pipes in wet and unstable areas. There would also be some potential for water in road ditches to be routed directly into some of the many first and second order tributaries which currently exist on the hillslope.

Potential adverse changes due to capturing and routing water in road ditches would be minimized by utilizing permeable road fill materials where possible, installing frequent ditch relief pipes, locating ditch relief pipes so that they discharge onto the forest floor rather than into established stream channels, and armoring relief pipe outlets to prevent erosion.

The magnitude of the potential change due to capturing and routing water in road ditches would likely be small and limited to the immediate project area. The most obvious changes would likely occur within the small coho rearing Gamm Creek tributary downslope of road segments 1 and 2. These are discussed in the previous Off-Channel Habitat section.

For the above reasons this indicator is rated as degrade at the project scale but since these effects would be localized to the project area this indicator would be maintained at the watershed scale.

Road Density and Location
This alternative would construct 0.84 mile of new road and decommission 0.7 mile of existing road, for a net increase of 0.14 mile. Affects to road density would be minimal. Current road densities in both the Upper and Middle Dosewallips subwatersheds are low, with 0.2 mile/sq. mile and 0.6 mile/sq. mile respectively. No adverse impacts are anticipated from the minor increase in road density. This indicator would be maintained at both the project and watershed scales.

Temperature
The lower portion of the Dosewallips River from River Mile 0 to River Mile 0.7 is designated as a water quality impaired 303d listed waterbody due to elevated water temperatures (Washington State 303d list, 2004). There are no 303(d) listed stream segments upstream on National Forest or National Park lands.

Trees along the new road alignment shade first and second order streams and help maintain cool temperatures in these waterbodies. The small number of shade trees that would be removed at the individual stream crossings and the short distances involved on each stream would not measurably affect stream temperatures in the first and second order tributaries within the project area or in the Dosewallips River. This alternative would have no measurable effect on water temperatures in the lower watershed.

This indicator would be maintained at both the project and watershed scales.

Riparian Reserve Function
This alternative would create adverse impacts to the Riparian Reserves. The majority of the project area is within Riparian Reserve. Approximately 7.1 acres of Riparian Reserve would be cleared to construct the new road. Segments of the new 0.84 mile reroute road would be constructed in steep, wet, and unstable soils. Substantial areas of new road cuts and fills would be created. A number of large conifer trees, 36 inch in diameter breast height (DBH) and greater would be cut down in order to build the road. This indicator would be degraded at the project scale.

However 0.7 mile of the existing FSR 2610 that is within the immediate riparian zone adjacent to the Dosewallips River would be decommissioned. This would result in the long-term improvement of soil production, through ripping, decompaction, and revegetation treatments.

This alternative would maintain all of the watershed-scale aquatic processes and functions of riparian reserves within the project area. In particular, it would maintain the natural channel migration and erosion processes along the mainstem of the Dosewallips River at the washout site. These are extremely important because of the unique geomorphologic characteristics of the washout site and the influence of coarse sediment and large wood from the washout site on maintaining the productive fish habitat immediately downstream.

There would be minor adverse impacts to fine sediment and surface flow dynamics in the small non-fish bearing tributaries draining the hillside and in large wood recruitment and hydrology within the unnamed coho rearing tributary. All of these impacts would be small and would be limited to the immediate project area. They would not tend to affect the overall functioning of the riparian reserve within the Dosewallips watershed. This indicator would be maintained at the watershed scale.

Sensitive Fish Species
This alternative may impact individuals or habitat for Puget Sound/Strait of Georgia Coho and Puget Sound Coastal Cutthroat Trout but it will not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species.

Threatened Fish and Critical Habitat
This alternative “may affect, and is not likely to adversely affect” Puget Sound Steelhead, Puget Sound Chinook, Hood Canal summer chum, and Coastal Puget Sound bull trout. Puget Sound Chinook and Hood Canal summer chum Critical Habitat would also have a “may affect, and is not likely to adversely affect” determination. Coordination with US Fish and Wildlife Service and National Marine Fisheries Service has been on-going throughout the development of this project. These preliminary determinations are based in part on feed-back from the federal regulatory agencies.

Essential Fish Habitat
Alternative B would adversely affect EFH (Chinook, coho, and pink salmon habitat)

because of the unavoidable sediment delivery to the unnamed coho tributary from segment 2 of the new road construction. Sediment effects would gradually diminish as bare soils at cut and fillslopes revegetate and stabilize, see previous Sediment section.

Summary
Alternative B would allow the natural stream channel migration and erosion processes to continue at the washout site. The washout site would continue to provide substantial inputs of coarse sediments and large wood into the Dosewallips River. Spawning and rearing habitat at the washout site would continue to develop and the important Chinook and steelhead spawning habitat and high quality, complex rearing habitat immediately below the washout site would be maintained. The new road would have a substantial buffer between the road and the mainstem of the Dosewallips River so riparian conditions and functions along the mainstem of the river would not be impacted.

Alternative B would have somewhat greater adverse impacts than the No Action Alternative because the new road construction associated with this alternative would remove riparian vegetation and place road fill along a 450 feet reach of a small coho and cutthroat rearing stream. This alternative would also install a new fish passage culvert in the tributary. Road construction along the wet slopes above the small stream and wetland area would have the potential to route water away from existing springs and seeps and change the hydrology of this off-channel rearing habitat.

Adverse impacts due to increased sedimentation, removal of riparian vegetation, and changes in hydrology would be both short and long-term however they would be limited in magnitude and extent. None of the potential adverse effects created by Alternative B would be observable beyond the immediate project area. Potential adverse effects from Alternative B would be more than offset by the positive aspects (as compared to locating the road in the river bottom) of maintaining the natural channel migration and erosion processes in the mainstem of the Dosewallips River and maintaining a substantial vegetated buffer between the river and the new road as compared to the in-river action alternative.

Cumulative Effects

Although the Dosewallips watershed is considered one of the more relatively intact watersheds in the Puget Sound it is considered to have impaired ecological integrity (Frissell et at. 2000). Past and present activities in the watershed that have had a lasting detrimental affect on fish habitat include: timber harvest, splash dam operations, road building, bank hardening, LWD removal, dike construction, dispersed recreation, and conversion of floodplain to pasture land and residential development. Impacts to fish habitat occur on a gradient within the watershed. The magnitude and frequency of negative impacts as identified above to fish habitat would be greater in the lower reaches of the watershed. In the upper reaches of the river fish habitat and the processes affecting habitat would be less impaired.

Inputs of fine sediments into the small hillslope tributaries and into the small coho rearing

tributary within the project area could increase somewhat as a result of constructing the new reroute. These additional inputs are likely to be small and localized within the project area. Fine sediment levels in the mainstem of the Dosewallips River would be indistinguishable from natural background levels below the washout therefore no discernable cumulative impacts are anticipated.

Foreseeable activities on National Forest System lands include the Jackson Timber Sale, which would commercially thin approximately 1,000 acres and construct 3 miles of temporary road in the Rocky Brook subwatershed. There would be short-term sediment impacts associated with temporary road building and log haul, however they are anticipated to be relatively minor. Any effects would occur well downstream from the 2610 washout and would not interact with project effects so there would be no cumulative impacts.

Maintenance of FSR 2610 below the washout would continue. There are a number of areas along the road where the river and road are adjacent to each other and the riprap and other bank stabilization measures at these points would continue to be maintained over time. These activities would occur well downstream from the washout and would not interact with project effects so no cumulative impacts are anticipated.

Existing and foreseeable non-Federal activities in the lower Dosewallips watershed include timber sales, road construction, bank hardening, dike construction, LWD removal, and the conversion of floodplain to pasture lands and residential development. Assuming population increases in the lower watershed and population densities rise, these future private and state actions will persist and will likely increase, thus exacerbating the adverse effects on salmonid habitat within the lower watershed. Because these activities would occur well downstream from the washout and would not interact with project effects no cumulative impacts are anticipated.

With the reopening of the road beyond the washout a larger area of bank hardening would be maintained in Alternative B (as in all the other action alternatives) than in Alternative A, with riprap associated with portions of the added 5 miles of road beyond the washout and the two campgrounds. Maintenance of these hard points maintains a degraded fish habitat condition but as there is no overlap of effects to this aspect of fish habitat with this alternative there would be no cumulative impacts.

Past road and facility construction by the park has modified the amount of impervious or hard packed surface in the developed area of the park and likely changed the area drainage patterns slightly. Under this alternative, with the reopening of the road, park operations and road maintenance would be reinstituted. These activities would be confined to the existing road and developed area and could create negligible adverse impacts to fisheries resources from road maintenance activities such as grading, and facility operation and use. This work could improve drainage as culverts are cleaned and ditches are cleared, resulting in beneficial, indirect effects to fisheries resources from decreased run off and improved water quality. Overall, the cumulative effects to fisheries resources would be negligible to minor, short-term, and both beneficial and adverse.

Over the past 10 years, approximately 10.1 miles of road have been decommissioned on National Forest System lands within the Dosewallips watershed. Two miles of existing roads are planned to be decommissioned on National Forest System lands within the next several years. In addition there have been several positive efforts made to improve salmonid habitat in the lower watershed by local environmental groups, tribal, state and county governments. Projects such as levee removal, placing large wood, land acquisition and conservation easements to protect high value floodplain and riparian areas have been accomplished and are underway.

Implementing Alternative B would add to salmon habitat recovery efforts which have already been completed or are underway in the watershed. Allowing natural channel migration and erosion processes to continue at the washout site would allow natural restoration of stream habitat at the washout site. It would also help maintain the complex, high quality, and extremely important spawning and rearing habitat that currently exists in the reach immediately below the washout. Utilizing the large trees that would need to be removed to construct the road as a source of large wood for stream restoration projects would make these types of projects more feasible on both National Forest lands and on State and private lands within the watershed.

Overall several habitat indicators would be degraded at the project scale but there would not be a change in the baseline watershed indicator rating. Because the magnitude of effects are anticipated to be small, intermittent, and not rise to the level of affecting resident and anadromous fish populations across the watershed. The incremental impacts from this project when added to the impacts of the previously mentioned past, present, and reasonably foreseeable actions would not result in substantial cumulative impacts to the resource, or affect the ability of the resource to sustain itself.

Forest Plan Amendments

Olympic National Forest
This alternative would not meet the Riparian Reserves standards and guidelines requirement for avoiding wetlands entirely when constructing new roads. This alternative would directly impact about 0.019 acre of wetlands. The proposed Forest Plan amendment would waive this standard and guideline to avoid wetlands entirely in the project area for this specific project, and allow this alternative to be consistent with the Forest Plan. The impact of this amendment is mitigated by activities which restore or enhance wetlands/riparian areas. The impacts of waiving this standard and guideline are disclosed in various sections of this chapter, particularly the Wetlands section. Additionally there are proposed Forest Plan amendments to terrestrial based standards and guidelines (see Terrestrial Species and Habitat section of this chapter for details).

Alternative C – Reroute 2 Retaining Wall Emphasis

Direct/Indirect Effects

Olympic National Forest
All Matrix Indicators
The effects of Alternative C to the aquatic environment would essentially be identical to the effects created by Alternative B, with a minor difference with regard to sediment.

Due to the over steepened fill and cutslopes primarily in segment 2 associated with road construction there would be a longer time for bare soils to revegetate and stabilize. This would result in a longer period of time (2-3 years) than Alternative B that sediment would be delivered to the unnamed coho tributary (see Soils section). The overall differences between Alternative B and Alternative C would be minor. At the project scale this alternative would have a negative impact (degrade) on this habitat indicator for the first and second order perennial streams. There would be a neutral impact to the mainstem Dosewallips River and at the watershed scale.

Sensitive Fish Species
The effects of Alternative C on Puget Sound/Strait of Georgia Coho, Puget Sound/Strait of Georgia Chum, and Puget Sound Coastal Cutthroat Trout would be identical to the effects created by Alternative B.

Threatened Fish and Critical Habitat
ESA determinations for Puget Sound Steelhead, Puget Sound Chinook, Hood Canal summer chum, and Coastal Puget Sound bull trout are the same as for Alternative B. Puget Sound Chinook and Hood Canal summer chum Critical Habitat determinations are the same as for Alternative B. Coordination with US Fish and Wildlife Service and National Marine Fisheries Service has been on-going throughout the development of this project. These preliminary determinations are based in part on feed-back from the federal regulatory agencies.

Essential Fish Habitat
Affects to EFH would be similar to Alternative B, however adverse affects would persist longer as bare soils at cut and fillslopes would take longer to revegetate and stabilize.

Summary
Alternative C would have similar impacts on the aquatic environment as described for Alternative B.

Cumulative Effects

The cumulative effects of Alternative C to the aquatic environment would be similar to the cumulative effects created by Alternative B.

Forest Plan Amendments

Olympic National Forest
This alternative would not meet the Riparian Reserves standards and guidelines requirement for avoiding wetlands entirely when constructing new roads. This alternative

would directly impact about 0.020 acre of wetlands. The proposed Forest Plan amendment would waive this standard and guideline to avoid wetlands entirely in the project area for this specific project, and allow this alternative to be consistent with the Forest Plan. The impact of this amendment is mitigated by activities which restore or enhance wetlands/riparian areas. The impacts of waiving this standard and guideline are disclosed in various sections of this chapter, particularly the Wetlands section. Additionally there are proposed Forest Plan amendments to terrestrial based standards and guidelines (see Terrestrial Species and Habitat section of this chapter for details).

Alternative F – Bridge

Direct/Indirect Effects

Olympic National Forest
Sediment
Source of spawning gravels and channel function
Under the bridge alternative most of the natural stream channel migration and erosion processes would be allowed to continue at the washout site. Although riprap would be placed along the upstream and downstream bridge approaches, 80 to 90 percent of the high bank would still be allowed to erode and contribute coarse sediments to the Dosewallips River.

Spawning and Rearing Habitat within the project area
The high quality spawning and rearing habitat immediately downstream of the washout would be maintained.

Turbidity and Fine Sediment Input
Constructing the bridge would create some substantial local inputs of fine sediment and turbidity into the Dosewallips River. Most of the fine sediment inputs associated with the project would occur during the instream water diversion activities, excavation for the bridge piers, temporary road crossings, and placement of riprap along bridge approaches. Turbidity and sediment inputs would be locally severe during these activities. These inputs would generally be short-term during specific construction activities and would disappear quickly once those construction activities ended. While the input of fine sediments into the river would be unavoidable, the required best management practices would minimize impacts. Some additional streambed disturbance and generation of fine sediments and turbidity would be anticipated for at least one year as the streambed changes in response to the channel alterations.

Fine sediment generated in the Dosewallips River from construction activities would likely settle out within a short distance. Based on field experience with other construction projects deposition of fine sediments would be unlikely to be observable more than a few thousand feet below the project area.

Negative impacts of sediment and turbidity to fish immediately downstream of the project area during the instream construction would range from gill trauma, avoidance/displacement, and disruption of feeding behavior. Additionally the increased level of fine sediment generated during the in-channel construction work could reduce spawning, incubation, and rearing success, within and immediately downstream of the project area for a short period. However the gradient, stream velocity, and discharge of Dosewallips River are sufficient to flush fines out of the system rather quickly. The newly deposited sediments would be remobilized rapidly by high water flows during the fall and winter. At most, observable fine sediment deposition within the project area from construction activities would be unlikely after a few years. At a watershed scale the amount of sediment generated by this project would be indistinguishable in relation to the

high levels of natural sediment carried by the river during typical frequent storm events.

Because the Dosewallips River is relatively swift and there are few substantial tributaries the turbidity created during construction activities would likely remain in suspension for long distances. There would be a potential for short-term increases in turbidity to be observed down into the lower watershed.

The in-stream work would occur during summer and fall from July 1 to October 15. This expanded in-stream work window is needed in order to complete in-river work in one year versus having aquatic impacts over two years. Because of this extended instream work window there would potential direct impacts to migrating and spawning Chinook, coho and pink salmon. Additionally juvenile coho, steelhead, cutthroat trout would be present in the river during the instream construction period. The above mentioned fish species have the potential to be impacted by the turbidity and fine sediment generated from the instream construction. Actual adverse impacts would depend on the magnitude and duration of the sediment and turbidity releases and the distance of the fish from the project area.

Overall at the project scale this alternative would have a negative impact (degrade) on this habitat indicator and there would be a neutral impact to the mainstem Dosewallips River at the watershed scale.

Large Woody Debris
Under this alternative the high bank would continue to erode. Large wood that gets caught up along the piers of the bridge would be moved off the piers as necessary in order to maintain structural bridge integrity and continue the ability of the river to erode the high bank. Large wood moved downstream off the piers would be left intact as much as operationally possible, minimizing cutting up of large wood pieces, thus preventing loss of LWD to the river. This indicator would be maintained at the project and watershed scale.

Pool Frequency and Quality
Scour would occur around the piers, however pools would lack cover and complexity. Pool frequency would increase in the project area but the quality of habitat would be low. In general, this would have a neutral effect to fish habitat. This indicator would be maintained at the project and watershed scale.

Off-Channel Habitat
This alternative would not affect off-channel habitat and would be maintained at both the project and watershed scales.

Width/Depth Ratio
For the most part this alternative would allow the river channel to migrate. The stream channel geometry would be allowed to evolve naturally. The only exception would be at the bridge approaches that would be protected by riprap.

Streambank Condition
A small area of the high bank would be hardened with riprap to protect the approaches of the bridge. Eighty to ninety percent of the bank would be allowed to erode. At the project scale this indicator would be rated as degrade, although effects would not be observable at the watershed scale and rated as maintained.

Drainage Network Increase
Alternative F would not affect this indicator and would be maintained at both the project and watershed scales.

Road Density and Location
The amount of road (in the form of a bridge) added to the subwatershed road mileage total in this alternative is so small that it would not change the road density within the subwatershed. This indicator would be maintained at both the project and watershed scale.

Temperature
Alternative F would not affect this indicator and would be maintained at both the project and watershed scales.

Riparian Reserve Function
Localized disturbance to soil and vegetation would occur during project construction however this would be limited in extent and would be expected to recover rapidly. The primary function of the riparian area at the washout is for large wood recruitment. Natural erosion processes which are the mechanism for large wood input into the river would more-or-less be allowed to continue. This indicator would be rated as maintain for both project and watershed scales.

Sensitive Fish Species
The determination to Sensitive fish species, Puget Sound/Strait of Georgia Coho and Puget Sound Coastal Cutthroat Trout found within the project area as related to this alternative would be “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”.

Threatened Fish and Critical Habitat
This alternative “may affect, and is likely to adversely affect” Puget Sound Steelhead, Puget Sound Chinook, and Critical Habitat for Puget Sound Chinook. For Hood Canal summer chum, and its associated critical habitat, and Coastal Puget Sound bull trout this alterative “may affect, and is not likely to adversely affect”. Coordination with US Fish and Wildlife Service and National Marine Fisheries Service has been on-going throughout the development of this project. These preliminary determinations are based in part on feed-back from the federal regulatory agencies.

Essential Fish Habitat
Alternative F would adversely affect EFH because of the short-term sediment and

turbidity impacts associated with the instream construction phase to Chinook, coho, and pink habitat in the mainstem Dosewallips River (see previous Sediment section).

Summary
This alternative would have greater impacts on the aquatic environment than Alternatives B and C. While armoring the bridge approaches would preclude some erosion processes the high bank at the washout would for the most part be allowed to erode and supply spawning gravels to the channel. To a degree large wood would be allowed to rack up along the piers of the bridge and create deep pools and complex fish habitat.

Cumulative Effects

Although the Dosewallips watershed is considered one of the more relatively intact watersheds in the Puget Sound, it is considered to have impaired ecological integrity (Frissell et at. 2000). Past and present activities in the watershed that have had a lasting detrimental affect on fish habitat include: timber harvest, splash dam operations, road building, bank hardening, LWD removal, dike construction, dispersed recreation, and conversion of floodplain to pasture land and residential development. Impacts to fish habitat occur on a gradient within the watershed. The magnitude and frequency of negative impacts as identified above to fish habitat would be greater in the lower reaches of the watershed. In the upper reaches of the river fish habitat and the processes affecting habitat would be less impaired.

Foreseeable activities on National Forest System lands include the Jackson Timber Sale, which would commercially thin approximately 1,000 acres and construct 3 miles of temporary road in the Rocky Brook subwatershed. There would be short-term sediment impacts associated with temporary road building and log haul however they are anticipated to be relatively minor. Any effects would occur well downstream from the 2610 washout and would not interact with project effects so there would be no cumulative impacts.

Maintenance of FSR 2610 below the washout would continue. There are a number of areas along the road where the river and road are adjacent to each other and the riprap and other bank stabilization measures at these points would continue to be maintained over time. In addition to the numerous bank stabilization projects lower in the watershed there is the riprap associated with the 5 miles of road beyond the washout and the two campgrounds. With the reopening of the road beyond the washout a larger area of bank hardening would be maintained in Alternative F (as in all the other action alternatives) than in Alternative A. Alternative F would potentially add to some cumulative adverse effects to fish habitat within the watershed.

Existing and foreseeable non-Federal activities in the lower Dosewallips watershed include timber sales, road construction, bank hardening, dike construction, LWD removal, and the conversion of floodplain to pasture lands and residential development. Assuming population increases in the lower watershed and population densities rise, these future private and state actions will persist and will likely increase, thus

exacerbating the adverse effects on salmonid habitat within the lower watershed. Because these activities occur well downstream from the washout and would not interact with project effects no cumulative impacts are anticipated.

Past road and facility construction by the park has modified the amount of impervious or hard packed surface in the developed area of the park and likely changed the area drainage patterns slightly. Under this alternative, with the reopening of the road, park operations and road maintenance would be reinstituted. These activities would be confined to the existing road and developed area and could create negligible adverse impacts to fisheries resources from road maintenance activities such as grading, and facility operation and use. This work could improve drainage as culverts are cleaned and ditches are cleared, resulting in beneficial, indirect effects to fisheries resources from decreased run off and improved water quality. Overall the cumulative effects to fisheries resources would be negligible to minor, short-term, and both beneficial and adverse.

Over the past 10 years approximately 10.1 miles of road have been decommissioned on National Forest System lands within the Dosewallips watershed. Two miles of existing roads are planned to be decommissioned on National Forest System lands within the next several years. Additionally there have been several positive efforts made to improve salmonid habitat in the lower watershed by local environmental groups, tribal, state and county governments. Projects such as levee removal, placing large wood, land acquisition and conservation easements to protect high value floodplain and riparian areas have been accomplished and are underway. The beneficial effects of these projects along with the project's beneficial effect to LWD and pool frequency and quality would result in a beneficial cumulative impact.

Turbidity caused during the construction period has the potential to be observed in the lower watershed. When viewed at a larger scale activities at the washout which result in turbidity in the upper watershed affect conditions downstream. However effects (both in terms of sediment and turbidity) of the proposed project would be small in magnitude and not be substantial. There would be a small if any overlap with activities in the lower watershed. In comparing cumulative effects of the other alternatives, this alternative would have a relatively minor impact to fish habitat. Overall while several habitat indicators would be degraded at the project scale there would not be a change in the baseline watershed indicator rating. Because the magnitude of effects are anticipated to be small, intermittent, and not rise to the level of affecting resident and anadromous fish populations across the watershed. The incremental impacts from this project when added to the impacts of the previously mentioned past, present, and reasonably foreseeable actions would not result in substantial cumulative impacts to the resource, or affect the ability of the resource to sustain itself.

Forest Plan Amendments

Olympic National Forest

This alternative would not meet the Riparian Reserves standards and guidelines requirement for avoiding wetlands entirely when constructing new roads. This alternative would directly impact about 0.016 acre of wetlands. The proposed Forest Plan amendment would waive this standard and guideline to avoid wetlands entirely in the project area for this specific project, and allow this alternative to be consistent with the Forest Plan. The impact of this amendment is mitigated by activities which restore or enhance wetlands/riparian areas. The impacts of waiving this standard and guideline are disclosed in various sections of this chapter, particularly the Wetlands section.

Table 12: NMFS matrix indicators

	Effects of the Proposed Alternatives (Project Scale)				Effects of the Proposed Alternatives (Watershed Scale)				Environmental Baseline (Watershed scale)		
Indicator	Alt. A	Alt. B	Alt. C	Alt. F	Alt. A	Alt. B	Alt. C	Alt. F	Properly Functioning	At Risk	Not Properly Functioning
Sediment	D	D*/ M**	D*/ M**	D	M	M	M	M		X	
Large Woody Debris	M	D	D	M	M	M	M	M		X	
Pool Frequency and Quality	M	M	M	M	M	M	M	M		X	
Off-channel Habitat	M	D	D	M	M	M	M	M		X	
Width/Depth Ratio	M	M	M	M	M	M	M	M	Unknown		
Streambank Condition	M	M	M	D	M	M	M	M		X	
Drainage Network Increase	M	D	D	M	M	M	M	M		X	
Road Density & Location	M	M	M	M	M	M	M	M		X	
Temperature	M	M	M	M	M	M	M	M	X		
Function of Riparian Reserves	M	D	D	M	M	M	M	M		X	

(M)aintain = project may affect indicator, but impact is neutral.
(D)egrade = project is likely to have a negative impact on the habitat indicator.
* = first and second order streams coming off the hillslope
** = mainstem of Dosewallips River

Alternatives B, C and F – All Action Alternatives

Direct/Indirect Effects

Olympic National Park
The park lands and the main project site near the Dosewallips Falls are high up in the watershed (about at River Mile 15) and well above the area where Puget Sound Chinook or Puget Sound Steelhead issues occur. Hood Canal summer chum are located primarily in the lower river only, well outside of the park. Therefore there would be no direct effects to these species from proposed project work. There would be no effect to bull trout since they do not occur in the upper Dosewallips River (Brenkman 2004).

The primary issues at the construction site relate to indirect effects as a result of the potential to expand the footprint of the road at the project site. The project design would assure that the footprint of the roadway would not be expanded more than its previous width of 22 feet. All work would occur above the river, outside the floodplain.

Another issue is the potential for sedimentation, both from construction and storm water runoff, retention, and sediment transport once the road segment is completed. Scheduling the project work to occur during the summer (August/September) reduces the potential for sedimentation because it is drier and there is less run-off. However after construction in the long-term there would be beneficial effects from reducing the potential for sedimentation through design and project mitigation. Ideas include using rock piles in the ditchlines to slow the water down and capture silt, and/or to utilize a retention area.

The project work, scheduled around the fish work windows, would be designed within the same or smaller footprint and would likely improve storm water runoff and would result in negligible to minor, indirect, short- and long-term impacts to the fisheries resources, and a NLAA determination by NMFS due to indirect effects associated with the potential for sedimentation and runoff. The deferred road maintenance that would occur on the roadway to open the 1.7-mile stretch of NPS road would not impact fisheries resources or water resources since they are minor and would occur away from the river.

The improved road segment at the falls could result in a beneficial effect over the no action if drainage is improved and sedimentation is reduced.

Conclusion
Because this alternative would result in negligible to minor impacts to fisheries resources, there would be no impairment of this resource.

Terrestrial Species and Habitat (Terrestrial Habitat Analysis Report, January/February 2006 with March 2008 edits)

Introduction

Terrestrial wildlife habitats in the Dosewallips washout project area include old growth or late-successional coniferous forests, younger disturbed forests, and riparian habitats. These habitats provide cover, breeding sites, and forage for a variety of birds, mammals, amphibians, and invertebrates.

The ONF project area is within a Late-Successional Reserve (LSR) designated in the Olympic Forest Plan with the objective of protecting and enhancing conditions of late-successional and old growth forest ecosystems. The proposed project falls within a late-successional forest over 500 years in age containing numerous large old growth trees. In 2003, the diameter-at-breast-height (dbh) of 131 dominant trees in the stand were measured. The average dbh was 39 inches and the largest was 78 inches. Forty-six of the trees were very large (over 50 inches dbh).

Suitable habitat for 2 federally threatened bird species and 12 animal species identified as Sensitive or other rare or uncommon species (one bird, two mammals, three amphibians, and six mollusks) exists in the ONF project area. In addition, habitat is present for five Management Indicator Species (or species groups) designated in the Olympic National Forest Land and Resource Management Plan (USDA 1990a) and four species of concern identified by the U.S. Fish and Wildlife Service (USDI 2003b).

The ONP project area contains suitable habitat for two federally threatened bird species, two Washington Department of Fish and Wildlife species of concern, and species known as endemic to ONP.

This section will address the current habitat condition and species assessment for the above listed species. Only information specific to this project was included in this EIS. The Terrestrial Habitat Analysis for this project contains more general information on these species, such as range and habitat descriptions and life histories. The project area was defined as the immediate area of all action alternative project work. However the entire 5th field Dosewallips watershed was examined for the potential impact analysis.

Affected Environment

Federal Threatened and Endangered Species

Suitable habitat is present in the ONF project area for two species listed as threatened under the Endangered Species Act, the marbled murrelet and northern spotted owl (Table 13); with suitable habitat present in the ONP project area for marbled murrelet and northern spotted owl. Proposed ONF activities are within Critical Habitat Units for the marbled murrelet (CHU WA-06a) and northern spotted owl (CHU WA-49). Based on a review (January 2006 and August 2007 review of Threatened and Endangered list) of species sightings and habitats, no other threatened or endangered terrestrial animal

species has the potential of occurring in or near the project area.

Table 13: ONF ESA listed wildlife species

Common Name	Scientific Name	Federal Status	Habitat Present in Project Area	Documented Sightings
Marbled Murrelet	*Bachyramphus marmoratus*	Threatened	yes	in watershed
Northern Spotted Owl	*Strix occidentalis caurina*	Threatened	yes	in watershed

Marbled Murrelet (*Bachyramphus marmoratus)*

Status

The marbled murrelet was federally listed as a threatened species in Washington, Oregon and California in 1992 (USFWS 1992). The primary reason for the listing was extensive harvest of late-successional and old growth forests which provide nesting habitat. Since listing the 5-Year Status Review (McShane *et al.* 2004) was completed which assembled the best available scientific information on the marbled murrelet. The report concluded that the marbled murrelet population is declining in the listed area of Washington, Oregon, and California.

More thorough discussion on life history, habitat, taxonomy, and ecology of the marbled murrelet are found in the Status Review (McShane *et al.* 2004), the Final Rule designating the marbled murrelet as a threatened species (USFWS 1992), the recovery plan for the marbled murrelet (USFWS 1997), and *Ecology and Conservation of the Marbled Murrelet (*Ralph et al. 1995).

Six Conservation Zones were outlined in the Marbled Murrelet Recovery Plan (USFWS 1997). The Dosewallips Washout ONF project is in Conservation Zone 1 (Puget Sound). Lands considered essential for the recovery of the species in Zone 1 include any suitable habitat within an LSR. The Dosewallips washout project area is located within the North Hood Canal LSR (RW-105). Recent demographic modeling indicates that the marbled murrelet population is declining in all conservation zones (McShane *et al.* 2004).

The Northwest Forest Plan 10-year monitoring report provided the first estimates of the amount and distribution of marbled murrelet potential nesting habitat using consistent baseline data in the Forest Plan area. The report estimated that the amount of potential marbled murrelet nesting habitat on the Olympic Peninsula is lower than previously thought.

Project Area

The Dosewallips watershed contains 22,586 acres of marbled murrelet habitat (29 percent of watershed) (USDA 1999). Of the 22,586 acres of suitable habitat, 9,745 acres (43 percent) are in Olympic National Forest, with 12,790 acres in Olympic National Park (57 percent). Suitable habitat is available in large contiguous tracts in the upper watershed. The suitable habitat in the middle Dosewallips and Rocky Brook has been fragmented by

timber harvest and by fires. In the lower Dosewallips watershed suitable habitat is virtually non-existent due to timber harvest, agriculture, and urbanization.

The state priority species database (WDFW database) contains no detections of marbled murrelets near the ONF or the ONP project areas. The nearest documented marbled murrelet detection to the washout site is located 2.7 miles away in the Big Quilcene River watershed. Protocol-level surveys have not been done in the project area to determine marbled murrelet occupancy. However, it is reasonable to assume that marbled murrelet occupy the project area. Suitable nesting habitat for the marbled murrelet occurs in the Dosewallips washout project area and in the forests surrounding the project. Marbled murrelet occupancy has been confirmed in the Dosewallips watershed. Surveys conducted in 1999 and 2000 found marbled murrelet occupancy at the Dosewallips campground in Olympic National Park. Radar studies have detected marbled murrelets at the mouth of the Dosewallips River (Cooper et al. 2001). Marbled murrelet occupancy was also confirmed in the adjacent watershed, the Big Quilcene River, when surveys were conducted in the mid 1990's.

The ONP's Dosewallips area is considered murrelet habitat. Murrelets occur within all the major drainages below about 3,000 feet in elevation within the park. Habitat considered suitable for murrelet occupation includes forested areas to 3,500 feet on the east side of the park and to 3,000 feet on the west side of the park, including the Sol Duc and Skokomish drainages. Even though there are no recent surveys the NPS assumes occupancy.

Designated Critical Habitat for the Marbled Murrelet

Status

The U.S. Fish and Wildlife Service designated critical habitat for the marbled murrelet in 1996 (USFWS 1996). Critical habitat serves to identify lands that are considered essential for the conservation of the listed species. The Service identified two habitat features, referred to as primary constituent elements, associated with the terrestrial environment that support the requirements for nesting, roosting, and other normal behaviors. The primary constituent elements include: (1) individual trees with potential nesting platforms and (2) forested areas within 0.5 mile of individual trees with potential nesting platforms and a canopy height of at least one-half the site-potential tree height.

Project Area

The ONF Dosewallips washout project area is within Critical Habitat Unit WA-06-a (East Olympic Peninsula). Although much of the CHU is fragmented, large blocks of old-growth forest are present in the CHU, especially in the upper watersheds. The CHU is 71,600 acres in size. Forty percent of the CHU is suitable habitat, or about 26,640 acres. Large blocks of suitable habitat are also present in adjacent Olympic National Park. Any suitable marbled murrelet habitat in this area is considered essential (USDI 1996) to the recovery of the species (in a Critical Habitat Unit and Conservation Zone 1).

The project is located near the southwestern edge of CHU WA-06-a, close to wilderness areas and Olympic National Park (neither which are included as designated critical habitat). Both constituent elements of critical habitat are present in the project area.

Northern Spotted Owl (*Strix occidentalis caurina*)

Status

The northern spotted owl was listed as federally threatened throughout its range "due to loss and adverse modification of suitable habitat as a result of timber harvesting and exacerbated by catastrophic events such as fire, volcanic eruption, and wind storms" (U.S. Fish and Wildlife Service 1990b). Since listing, a status report (SEI 2004) and review (USFWS 2004) were completed to determine if the species warrant change in federal status. The review concluded at this time that the species still warrants listing as threatened under the ESA. In May 2007 the U.S. Fish and Wildlife Service released a draft recovery plan for the northern spotted owl that identified actions needed to stop the owl's decline, reduce threats, and return the species to a stable population (USFWS 2007).

More thorough discussion on life history, habitat, taxonomy, and ecology of the northern spotted owl are found in the draft recovery plan, the 1987 and 1990 U.S. Fish and Wildlife Status Reviews, the Interagency Scientific Committee Report (Thomas et al. 1990), the Forest Ecosystem Management Assessment Team Report (Thomas and Raphael 1993), the Final Rule designating the spotted owl as a threatened species (U.S. Fish and Wildlife Service 1990), and the Scientific Evaluation of the Status of the Northern Spotted Owl (Courtney et al. 2004).

Project Area

Suitable and dispersal habitat available to the northern spotted owl is fragmented in many of the watersheds on the Olympic National Forest, predominately related to past timber harvest of old growth forest. Olympic National Park contains the most contiguous spotted owl habitat in the Olympic Peninsula. The Dosewallips watershed is one of the largest watersheds in the Hood Canal. The upper 60 percent of the watershed is undeveloped and protected within Olympic National Park, while the middle 30 percent of the basin is within the Olympic National Forest. In general, this portion is in a relatively pristine natural condition. The lower 10 percent of the watershed is in private ownership where use is dominated by pasture land, residential development, and intensive forest management. The Dosewallips watershed contains 22,586 acres of late successional/old growth forest (29 percent of the watershed) (USDA 1999). Of the 22,586 acres of suitable habitat, 43 percent are managed by the Olympic National Forest and 12,790 acres are managed by Olympic National Park (57 percent).

Habitat for the northern spotted owl exists adjacent to the washout, along the Dosewallips River Road, and the campgrounds and facilities within the watershed on both National Forest System and National Park lands. Both suitable habitat (nesting, roosting, foraging) and dispersal habitat is present within the project area for the northern spotted owl to utilize throughout the year. Habitat quality varies in the project area from late successional habitat with standing live and dead trees providing suitable nesting structure and numerous downed logs and snags that provide good habitat for prey species, to riparian forest that may provide roosting opportunities, to single layer canopy forest which may function as dispersal habitat.

Northern spotted owls have large home ranges containing extensive acreage of old growth forest to meet their habitat needs. There is extensive suitable habitat for spotted owls in the park, primarily in lower elevations of major drainages. Spotted owl habitat is similar to that for marbled murrelets but extends to higher elevations in the park. One concern is the trend of lower elevation areas increasingly being used by barred owls, a competitor of the spotted owl, rather than spotted owls.

There have been no northern spotted owl surveys completed specifically related to the Dosewallips project on either the National Forest System or National Park land within the project area. Northern spotted owl surveys have been conducted in the Dosewallips drainage since the late 1980s, with the Olympic Demography Study and Olympic National Park Demography Study doing annual surveys in recent times. The surveys are completed to protocol as outlined by the demography studies. The survey efforts from the Olympic Demography Study do not adequately cover the project area to consider the project area as having complete surveys to the established protocol. The Olympic Demography Study does not survey for barred owls, but incidental sightings are documented. Barred owls are known to inhabit the Dosewallips drainage although no barred owls have been detected in the project area.

Based on radio telemetry data (Thomas et al. 1990) the U.S. Fish and Wildlife Service estimated median annual home range size for the spotted owl by province throughout the range of the spotted owl. On the Olympic Peninsula the home range is based on a 2.7-mile radius circle (14,271 acres) of which the established threshold for the activity center is to have 40 percent of its home range to have at least 5,862 acres of suitable habitat. The Service also uses a 0.7 mile radius circle which delineates the area most heavily used (core area) by spotted owls during the nesting season. Within the core area at least 500 acres of suitable habitat should be present.

From the Olympic Demography Study two activity centers which have been surveyed annually have their 2.7-mile home range overlap within the ONF Dosewallips project area. However surveys for the spotted owl specific to the project area were not conducted to determine occupancy.

The first and closest to the project area, designated #160, has been surveyed for the last nine years. Records indicate the last occupancy of either a single bird or pair was in 2000. The last year a pair of owls was confirmed at this site was 1995, no birds have been located in the last six years (Olympic Demography Study 2005). The activity center's core area is not within the project area boundary. This activity center has 5,888 acres of suitable habitat (nesting, roosting, foraging) within its home range. This activity center is currently considered to be at above the habitat threshold.

The second activity center, a site designated as #24, also has its 2.7-mile home range within the project area, and its core area is about 1.25 miles from the project area boundary. The activity center has been surveyed for about 17 years. The last detection of a northern spotted owl from this activity center was in 1995, with no birds being found

during the last five survey seasons (Olympic Demography Study 2005). This activity center has 5,502 acres of suitable habitat (nesting, roosting, foraging) within its home range. The established threshold for an activity center with 40 percent of its home range is to have 5,862 acres of suitable habitat. This activity center is currently considered below the habitat threshold by 360 acres.

The ONP's Dosewallips area is suitable habitat for northern spotted owls, and there is an owl site located approximately 0.5 mile away from the Dosewallips Falls project site near the ranger station.

Designated Critical Habitat for Northern Spotted Owl

Status

As required by the Endangered Species Act the U.S. Fish and Wildlife Service has designated critical habitat for the northern spotted owl. Critical habitat for the spotted owl was designated on January 15, 1992 (U.S. Fish and Wildlife Service, 1992a) on National Forest System lands outside congressionally designated wilderness. In June 2007 the U.S. Fish and Wildlife Service issued a proposal to revise the existing designation of critical habitat for the northern spotted owl (USFWS 2007). The conservation principles in developing critical habitat are to: develop and maintain large contiguous blocks of habitat to support multiple reproducing pairs of owls, minimize fragmentation and edge effect to improve habitat quality, minimize distance to facilitate dispersal among blocks of breeding habitat, and to maintain range-wide distribution of habitat to facilitate recovery (Thomas et al. 1990). Critical habitat are lands needed for the eventual recovery and delisting of a species. Critical habitat will not in itself lead to the recovery of the species but is one of several measures available to contribute to species conservation (CFR, Vol 157, no. 10).

Suitable spotted owl habitat include older forests characterized by a multi-layered canopy dominated by large overstory trees; moderate to high canopy closure; a high incidence of trees with large cavities and other types of deformities; numerous large snags; an abundance of large, dead wood on the ground; and open space within and below the upper canopy for owls to fly (Thomas et al., 1990; U.S. Fish and Wildlife Service, 1990a). On the Olympic Peninsula, tree species used in nesting include western hemlock, Douglas-fir, western red cedar, Pacific silver fir, and grand fir; with 78 percent of nests found in live trees and 22 percent in snags (side or top cavities more often used in the eastern side of the Olympic Peninsula (Forsman and Giese 1997). Foraging habitat varies across the range of the owl and contains attributes similar to nesting and roosting habitat, but may also include more open fragmented habitat. The northern flying squirrel and bushy tailed woodrat are usually the predominant prey.

Project Area

The ONF Dosewallips washout project area and vicinity are within designated Critical Habitat Unit (CHU) WA-49. The CHU is 69,207 acres in size of which 25,579 acres (37 percent) are suitable habitat and 20,822 acres (30 percent) is in dispersal habitat. Eighty percent of the CHU is within Late-Successional Reserve. If the proposed revision of critical habitat becomes final, the project area still would be within designated critical habitat.

CHU WA-49 is primarily located in the Dungeness/Graywolf /Quilcene watersheds to the north of the Dosewallips watershed. The Tunnel Creek and Rocky Brook drainages connect the CHU to the Dosewallips watershed. The CHU runs along the Dosewallips River until it meets the national park. The 'cherry stem' of the CHU that is bound by Olympic National Park and adjacent wilderness is the location of the project area. The wilderness and Olympic National Park are not included in designation of critical habitat for the species since they considered as protected contributor ownerships for the long-term recovery of the species.

Forest Service Sensitive Species and Other Rare or Uncommon Species

Species identified by the USFWS as "candidates" for listing under the ESA and meeting the Forest Service criteria for protection are included on the Regional Forester's Sensitive Species Lists. Sensitive Species are those given special management considerations to ensure their continued viability on National Forest lands.

There are 16 animal species found on the Olympic National Forest that are included in the Region's "Special Status/Sensitive Species Program" or are considered as other rare or uncommon species that are known or suspected to occur on the Olympic National Forest (Table 14). Based on a review of habitats and species sightings 12 species have the potential to occur in the Dosewallips washout project area. These species include one bird, two mammals, three amphibians and six mollusk species and are discussed below. Four species are not likely to occur in the project area because their habitats are not present. These include the peregrine falcon (which needs cliffs or rock outcrops for nesting habitat), the common loon (which nests and forages on inland lakes), the Mazama pocket gopher (Olympic) (which occurs in open vegetation habitats such as lowland prairies and high elevation meadows), and one terrestrial mollusk species the Hoko vertigo snail (range is only in northwest Clallam County).

Table 14: ONF Sensitive (S) and other rare or uncommon wildlife species (RU)

Common Name	Scientific Name	Status	Habitat Present In Project Area	Documented Sightings
Terrestrial Mollusks				
Puget Oregonian (snail)	*Cryptomastix devia*	S	yes	no
Burrington's Jumping Slug	*Hemphillia burringtoni*	S	yes	no
Warty Jumping Slug	*Hemphillia glandulosa*	S	yes	yes
Malone's Jumping Slug	*Hemphillia malonei*	S	yes	no
Blue-gray Taildropper Slug	*Prophysaon coeruleum*	S	yes	no
Hoko Vertigo (snail)	*Vertigo n. sp.*	S	no	no
Evening field slug	*Deroceras hesperium*	RU	yes	no
Amphibians				
Van Dyke's Salamander	*Plethodon vandykei*	S	yes	no
Cope's Giant Salamander	*Dicamptodon copei*	S	yes	no
Olympic Torrent Salamander	*Rhyacotriton olympicus*	S	yes	in watershed
Mammals				
Townsend's Big-Eared Bat	*Corynorhinus townsendii*	S	yes	no
Pacific Fisher	*Martes pennanti*	S	yes	no, extirpated*
Mazama Pocket Gopher, Olympic	*Thomomys mazama melanops*	S	no	no
Birds				
Bald Eagle	*Haliaeetus leucocephalus*	S	yes	yes
Common Loon	*Gavia immer*	S	no	no
American Peregrine Falcon	*Falco peregrinus anatum*	S	no	no

*extirpated = historic populations are gone

Terrestrial Mollusks

Status

The warty jumping slug has Sensitive status. The Burrington jumping slug changed status in the 2002 Annual Species review and no longer requires pre-disturbance surveys.

Project Area

Of the seven terrestrial mollusk species listed in Table 14, five are Sensitive species and have habitat in the project area. For the sixth sensitive species, the Hoko vertigo snail, the Dosewallips road washout project is outside the range of the snail. Therefore, the Hoko vertigo is not included in this analysis.

The six species for analysis include: the Puget Oregonian snail; the Burrington, warty and Malone jumping slugs; the blue-gray taildropper slug, and the evening field slug. Habitat

for these six mollusk species include moist coniferous and hardwood forests of varying ages, with down wood, ground cover of low vegetation, shrubs, litter and debris that provide cool, moist microhabitats.

The Puget Oregonian snail is associated with hardwood shrubs and trees, including big leaf maples (*Acer macrophyllum*) and vine maple (Acer circinatum). Although one shell of the Puget Oregonian was found on the southern part of the Hood Canal District, no live animals have been discovered to date. The warty and Burrington jumping slugs may be found in a range of moist forest conditions, including coniferous and hardwood forests, from young forest stands to late-seral conditions as found in the Dosewallips project area. Both of these slugs have been found in other areas on the Forest.

Habitat for the Malone jumping slug also occurs in moist coniferous and hardwood forests, especially where dense sword fern, conifer logs, coarse wood debris, and large decaying stumps are present. The evening field slug is reported to be associated with wet meadows in forested habitats and moist surface vegetation within close proximity to perennial wetlands, spring, seeps, and riparian areas. There are no documented locations of the Malone or evening slugs on the Forest.

Mollusk surveys were completed in the Dosewallips washout project area in the spring of 2002 and the fall of 2004, according to the 2003 survey protocol (Duncan et al. 2003). No rare or uncommon mollusk species were found. One location of the Sensitive warty jumping slug was reported 200 feet away from proposed road construction routes in all of the action alternatives.

Amphibians

Van Dyke's Salamander (*Plethodon vandykei*)

Status

In addition to listing as a Sensitive Species under the Regional Forester's Sensitive Species Program the Van Dyke's salamander is a state species of concern in Washington state (WNHP 2004), and is ranked by the Washington Natural Heritage Information System as G3 (very rare or local globally) and S3 (rare or uncommon in Washington State).

Project Area

Amphibian surveys have been sporadic on the Olympic National Forest, sometimes done in conjunction with stream or fish surveys and sometimes as a specific effort. However nothing systematic has been implemented for Van Dyke's salamander. Surveys were not conducted in the Dosewallips project area. There are no mapped sightings for Van Dyke's salamander in or near the project area, however habitat does exists along many of the numerous streams within the project area.

Cope's Giant Salamander (*Dicamptodon copei*)

Status

In addition to listing as a Sensitive Species under the Regional Forester's Sensitive Species Program the Cope's giant salamander is a state species of concern in Washington State (WNHP 2004) and is ranked by the Washington Natural Heritage Information

System as G3.

Project Area
There are no known sightings of Cope's giant salamander in or near the Dosewallips project area. Surveys were not completed for the project area, however habitat for the species is within the project area.

Olympic Torrent Salamander (*Rhyacotriton olympicus*)
Status
In addition to listing as a Sensitive Species under the Regional Forester's Sensitive Species Program the Olympic torrent salamander is a federal Species of Concern under the Endangered Species Act (WNHP 2004), and designated G3 and S3 by the Washington Natural Heritage Information System as G3G4 (intermediate between rare or local and apparently secure globally) and S3S4 (intermediate between rare or uncommon and apparently secure in Washington State).

Project Area
Information on specific locations of the Olympic torrent salamander on the Olympic National Forest is limited. The streams and riparian forests of the project area provide suitable habitat for this species. There are three known sightings of Olympic torrent salamander in the middle and upper Dosewallips watershed. The sites are in three different tributaries of the Dosewallips River within 0.5 mile of the project area, two of them in the national park and one over a mile downstream of the washout. Surveys to locate the Olympic torrent salamander specific to the project area were not conducted and it is assumed that the species is present in the project area due to habitat availability.

Mammals
Townsend's Big-eared Bat (*Corynorhinus townsendii*)
Project Area
This species uses caves and human-made structures, including bridges, for hibernacula and roost sites. Individuals will also roost in cavities or areas beneath sloughing bark in large trees. There are no known sightings of Townsend's big-eared bats in the watershed. In 2005 a bridge over the Dosewallips River less than one mile upstream from the project area was surveyed for day and night roosting bats. No bats were detected at this bridge. There are no other human structures or caves suitable for bat roosting or hibernacula in the area. However the forests in and surrounding the project area contain large trees and snags suitable for bat roosting. Tree-roosting bats could potentially occur in the project area.

Pacific Fisher (*Martes pennanti*)
Status
The species was listed as a state endangered species in 1998 and was added to the list of federal candidate species in April 2004. The species is not listed as endangered or threatened by the US Fish and Wildlife Service, therefore the fisher does not receive federal protection. In 2005 a feasibility assessment based on availability of suitable habitat and habitat connectivity for reintroducing fishers to Washington, including the Olympic Peninsula, was completed by the Washington Department of Fish and Wildlife.

No known populations of fishers exist in Washington and it is thought that the species is extirpated from the state (WDFW 2005). The Washington Department of Fish and Wildlife and Olympic National Park recently complete work on an environmental analysis on the reintroduction of fisher to the Olympic Peninsula, and reintroductions of fisher have occurred in the park. While the Dosewallips watershed does contain suitable habitat in the upper reaches of the drainage including the surrounding forested lands amongst the project area, reintroduction locations do not include the Dosewallips watershed as a candidate release area.

Project Area

The project area with its greater proportion of older seral stage forested stands, lower elevation, and adjacency to the park provide habitat for the fisher. However the 2004 WDFW feasibility report identifies the western, northern, and southwest portion of Olympic National Park as having higher quality of habitat for the species. The analysis area does provide the opportunity for fisher to forage, but not the resting and denning habitat which is limited in managed forests. The adjacent Olympic National Park provides ideal landscape characteristics that could support a fisher population.

Birds

Bald Eagle (*Haliaeetus leucocephalus*)

Status

The bald eagle was listed in 1978 as a threatened species under the Endangered Species Act (USFWS 1978) but was removed from the list on August 8, 2007 (USFWS 2007). The bald eagle was added to the Regional Forester's Sensitive Species List after delisting as a threatened species. The bald eagle is also designated as a Management Indicator Species in the Olympic National Forest Land and Resource Management Plan (LRMP) (USDA 1990a). The US Fish and Wildlife Service is recommending monitoring the status of the bald eagle for twenty years after delisting (USFWS 2007).

Project Area

Suitable bald eagle nesting and winter roosting habitat exists in the Dosewallips watershed. Reports from various incidental sightings, mid-winter bald eagle surveys in the 1990's, and winter surveys conducted in 2004 and 2005 have confirmed bald eagle occurrence in the watershed. It is reasonable to assume that eagles use the Dosewallips drainage for night roosting, diurnal perching, and foraging. During winter bald eagle surveys in 2004 and 2005, eagles were observed in the early-morning (before light), indicating night roosting in the watershed. Bald eagles have also been observed near the mouth of the Dosewallips. According to the Washington State priority species database the nearest bald eagle nests are located along Hood Canal, 0.7 mile south and 1.8 miles north of the mouth of the Dosewallips River. However, no known bald eagle nesting territories are located in the main Dosewallips watershed. The watershed analysis (USDA 1999) explains eagles were more commonly seen in estuaries or the lower part of the watershed. Past surveys conducted up the Dosewallips found no nests despite the presence of suitable nesting habitat (USDA 1999, S. Ament, pers. comm. 2006).

The ONF Dosewallips washout project area contains suitable bald eagle habitat. Bald eagles use the washout project area for perching and may use the area for night roosting.

Suitable nest, roost, and perch trees occur in the project area. Eagles were observed close to the washout at River Mile 10 and 11 during winter eagle surveys in January 2004 and 2005. However, there is no confirmation of nests or communal roost sites in the project area despite eagle surveys and field reconnaissance. An aerial survey up the Dosewallips River to the washout project area by the Washington Department of Fish and Wildlife in December 2005 found no bald eagles or nests other than near the river mouth.

The ONF Dosewallips washout project is in a Bald Eagle Management Area (BEMA-200) designated in the Olympic National Forest LRMP (USDA 1990a, page IV-92-94). The goal of a BEMA is to provide sufficient habitat for nesting and wintering bald eagles so as to expedite their removal from the Federal and State threatened or endangered species lists. To achieve this goal a BEMA should contain at least two uneven-aged forest stands a minimum of 32 acres in size each (total of 64 acres). The Dosewallips BEMA is 105 acres in size of which about 55 acres are late-successional forest. About 16 acres consist of non-forest and riparian habitats along the river. The remaining 34 acres in the BEMA are early- or mid-successional forests that have been disturbed by humans or fire. About two acres in northwest corner of the BEMA were salvage logged about 35 years ago. Several dispersed campsites occur along the Dosewallips River in the southern portion of the BEMA.

Olympic National Forest Management Indicator Species

Regulations pursuant to the National Forest Management Act of 1976 require each National Forest to identify “management indicator species” (MIS) to focus management attention on a species, species group, or habitat element to improve resource production, population recovery, maintenance of population viability, or ecosystem diversity. MIS are either selected species whose welfare is believed to be an indicator of the welfare of other species using the same habitat or species whose condition can be used to assess the impacts of management actions on a particular area (Thomas 1979). Table 15 includes those species that were identified as MIS for the Olympic National Forest (USDA 1990a).

Indicator Species represent an association of animals that respond to the same set of structural habitat components. It is assumed that management which maintains or enhances the habitat of the indicator species would likewise maintain or enhance that of its association. Two MIS, the bald eagle and northern spotted owl, were previously addressed. The bald eagle is Sensitive to management in riparian areas. The northern spotted owl represents wildlife species associated with mature and older coniferous forests. The other three MIS are addressed below.

Table 15: ONF Management Indicator Species (MIS)

Management Indicator Species or Species Group	Habitat of Association	Habitat Present in Project Area
Bald Eagle	Mature forest	yes
Northern Spotted Owl	Old growth/Mature forest	yes
Columbian Black-tailed Deer/ Roosevelt Elk	Balance of cover and forage; amount of vehicle disturbance	yes
Pileated Woodpecker/ Pine Martin	Mature coniferous forest	yes
Primary Cavity Excavators	Dead and dying trees, down wood	yes

Columbian Black-tailed Deer (*Odocoileus hemionus columbianus) and* Roosevelt Elk *(Cervus canadensis roosevelti)*

Status

Columbian Black-tailed deer and Roosevelt Elk are management indicator species needing a balance of cover areas and forage openings dispersed throughout their range.

Project Area

The late-successional forests in the Dosewallips washout project area serve as optimal cover, having understory and overstory components which provide forage and snow-intercepting cover. The Dosewallips watershed contains 35,760 acres (50 percent) of forests over 200 years (USDA 1999) which is a good estimate of optimal thermal cover. However much of this is located in Olympic National Park on summer range. About 7,000 acres are on the National Forest.

Columbian black-tailed deer occur throughout the Dosewallips watershed. A small herd of Roosevelt elk resides in the lower watershed. Forty-one elk were counted in the lower watershed during an aerial survey conducted by the WDFW in December 2005. In the winter the herd ranges from the mouth of the Dosewallips up the river about six miles (USDA 1999). In the summer a portion of the herd migrates up the drainage, passing through the project area to the national park while a portion remains in the lower Dosewallips all year.

The Olympic National Forest LRMP requires that twenty percent of the area necessary for winter survival should be managed as optimal cover. Winter range is typically defined as lands less than 1500 feet elevation (USDA 1990a). By this definition the project area is in winter range. However it appears that the Dosewallips elk herd winters lower in the watershed and that the project area primarily serves as a migration area between winter and summer ranges.

Deer and elk are also indicators of vehicular harassment to wildlife populations. The Washington State Department of Fish and Wildlife (1991) recommends that road densities are kept below 1.5 miles per square mile in summer range and below 1.0 mile

per square mile in winter range. Olympic National Forest LRMP states that roads should be managed to reduce wildlife disturbance. The road density is lowest in the middle and upper watershed and highest in the lower watershed. The road density in the Dosewallips watershed is about 0.7 mile per square mile. The road density in the middle Dosewallips subwatershed where the washout project is located is currently about 0.5 mile per square mile (USDA 1999). There are no open roads in the upper Dosewallips.

Pileated Woodpecker (*Dryocopus pileatus*) and Pine Marten (*Martes americana*)

Status

The pileated woodpecker and pine marten are MIS for mature and old growth forest conditions. The marten is classified as a furbearer in Washington and appears to be rare on the Olympic Peninsula. Surveys conducted by the national park for marten from 2000 to 2002 failed to detect marten (P. Happe, Olympic NP, pers. comm.).

Project Area

The majority of the forests present in the upper Dosewallips watershed in the vicinity of the project area provide suitable habitat for pileated woodpeckers, pine marten, and the species association they represent. Signs of pileated (e.g., excavations) are present in the project area where large diameter trees are available for foraging, roosting, and denning. Recently there has been an unconfirmed sighting of a marten in the Dosewallips watershed. Within the project area the high amount of downed wood and standing dead trees would provide suitable habitat for the species, although the species is typically found at higher elevations.

Primary Cavity Excavators

Status

This MIS group represents a broad group of species associated with standing dead or partially dead trees or snags and down logs, who excavate their own nests, hence the name “primary cavity excavator” (Table 16).

Table 16: Primary cavity excavators

Primary Cavity Excavator Species Group	Habitat of Association	Habitat Present in Project Area	Presence in Watershed
Red-breasted Sapsucker	snags	yes	documented
Downy Woodpecker	snags, dead parts of live trees, down wood	yes	documented
Hairy Woodpecker	snags, dead parts of live trees, down wood	yes	documented
Three-toed Woodpecker	snags, down wood	yes	documented
Northern Flicker	snags, hollow living trees, dead parts of live trees, tree cavities	yes	documented
Pileated Woodpecker	snags, hollow living trees, dead parts of live trees, down wood	yes	documented
Black-capped Chickadee	snags, dead parts of live trees, tree cavities, down wood	yes	documented
Mountain Chickadee	snags	yes	documented
Chestnut-backed Chickadee	snags, dead parts of live trees, tree cavities	yes	documented
Red-breasted Nuthatch	snags, dead parts of live trees, tree cavities, bark	yes	documented
Northern Flying Squirrel	snags, hollow living trees, dead parts of live trees, tree cavities, down wood	yes	documented

Source: DecAID (Mellen et al. 2006). Westside Lowland Conifer-Hardwood Forest, WA Coast Wildlife Habitat Type and Larger Trees Structural Condition Class

Dead wood (standing or down) plays an important role in the overall ecosystem health, soil productivity, and numerous species' habitat. This dead wood habitat is crucial in the continuation of species that depend on snags and logs for all or parts of their life cycle. Bird and mammal species rely on dead wood for dens, nests, resting, roosting, and/or feeding on animals and organisms that use dead wood for all or parts of their life cycle. Snags come in all sizes and go through breakdown and decay processes that change them from standing hard to soft, and then left on the ground to continue decaying into soil nutrients.

Information pertaining to individual or groups of species use of dead wood can be found in the DecAID advisory tool. DecAID is a web-based advisory tool to help managers evaluate the effects of forest conditions and existing or proposed management activities on organisms that use snags and down wood. It is a summary, synthesis, and integration of published scientific literature, research data, wildlife databases, forest inventory plot information, and expert judgment and experiences. Information regarding species habitat associations with dead wood in the project area were provided from references and information provided in DecAID.

Project Area

The Dosewallips watershed and project area provides foraging, roosting, and nesting habitat for the majority of these species. At the 5th field watershed scale the landscape is dominated by stands greater than 80 years of age (53% of watershed) (USDA 1999), and assuming that much of those forested stands have not had stand manipulation (e.g., timber harvest which would have removed dead wood) the amount of standing dead and downed wood would have the density and distribution of varying size classes within the desired range. The remaining 47 percent of the watershed is non-forested or forest less than 80 years old and likely do not contain the dead wood abundance and distribution of size classes that would be at normal stand levels. Overall the watershed provides a high amount of dead wood for wildlife species dependent on such structure.

The project area contains high quality and quantity of standing dead and down wood, especially in the large diameter size classes which functions as habitat for a greater amount of wildlife species than those of smaller diameter. Many of the primary cavity excavators listed previously are using the project area during some part of their seasonal needs.

Federal Species of Concern

The following species were listed as Species of Concern (USDI 1993), a category defined as those species that might be in need of conservation action (Table 17). These actions may include periodic monitoring of populations and threats as well as possible listing as threatened or endangered. There is no legal protection for Species of Concern and the term does not necessarily mean they will be listed. Many of these Species of Concern have been surveyed for on the Olympic National Forest, either by the Forest Service PNW Research Station, Olympic National Forest, or university researchers.

Table 17: USFWS species of concern

Common Name	Scientific Name	Other Designations	Habitat Present In Project Area	Documented Sightings
Cascades Frog	*Rana cascadae*	State Monitor	no	no
Long-eared Myotis	*Myotis evotis*	State Monitor	no	no
Long-legged Myotis	*Myotis volans*	State Monitor	no	no
Makah's Copper Butterfly	*Lycaena mariposa charlottensis*	State Candidate	no	no
Northern Goshawk	*Accipiter gentilis*	State Candidate	yes	in watershed
Olive-sided Flycatcher	*Contopus cooperi*		yes	in watershed
Tailed Frog	*Ascaphus truei*		yes	yes
Western Toad	*Bufo boreas*	State Candidate	yes	no

The Cascades frog and the two *myotis* bat species are likely not present in the project area

because they occur in higher elevation habitats. Suitable habitat for the Makah's Copper Butterfly (open wetlands and prairies) also does not occur in the project area.

Northern Goshawk (*Accipiter gentilis*)

Status

The northern goshawk uses mid- to large-diameter trees for nesting and perching and requires an open flight corridor beneath the canopy to be successful in searching for food and capturing prey. Suitable nesting habitat for the northern goshawk includes mature or old coniferous forest with relatively closed canopies and multiple canopy layers. Finn et al. (2002a, b) found a higher occupancy rate on the Olympic Peninsula when shrub cover was relatively low in the stand. In a study on the Olympic Peninsula by Bloxton (2002) the dominant prey included grouse, pigeons, and Stellar's jay, with the important mammals fed upon including snowshoe hare, Douglas squirrel, and northern flying squirrel.

Project Area

Suitable goshawk habitat occurs in the Dosewallips washout project area and the species has been documented in the watershed One goshawk nest site has been found in the middle Dosewallips subwatershed about one mile from the project area (Washington State Department of Wildlife database). Goshawks have also been documented in the upper Dosewallips subwatershed in Olympic National Park. Although surveys have not been conducted in the project area it is likely that goshawks occupy the area.

Olive-sided Flycatcher (*Contopus borealis*)

Status

The olive-sided flycatcher is a long-distance, neotropical migrant that breeds throughout coniferous forest in western Washington and Oregon. Preferred habitat consists of mid- to high-elevation montane and coniferous forests, often associated with forest openings and edges. Optimal habitat for the species is natural or man-made edges and forest openings (e.g., timber harvest units, post-fire habitat, natural edges of bodies of water, or old growth forest with extensive areas of broken canopy) where tall trees and snags are present for singing and foraging perches. Various diameters of hemlock and either Pacific silver or noble firs are preferred nest trees. This species is considered the only bird species positively associated to edge habitats, landscape heterogeneity, and juxtaposition of early and late-seral habitats (Hagar et al. 1995). Presence in early successional forests appears to depend on availability of snags or live trees that provide suitable foraging and singing perches.

Project Area

Suitable habitat for the olive-sided flycatcher does exist in the project area. Olive-sided flycatchers have been observed in the watershed and could occur in the project area. Habitat for the olive-sided flycatcher could be present along the Dosewallips drainage that provides a mixture of deciduous forest and late-seral habitat.

Tailed Frog

Status

Suitable habitat for the tailed frog consists of fast cold streams with cobble or boulder

substrates at sea-level to high elevation. They can also be found along stream banks and in riparian forests. Tailed frog is vulnerable to management practices that alter the riparian or aquatic zones of streams, especially those that change the moisture regime, increase stream temperature, increase sediment load, reduce woody debris input, and change bank integrity (WA DNR 2007). Protection of the upper reaches of streams is particularly important for this species.

Project
The streams and riparian forests of the project area provide suitable habitat for this species. This species was found in the project area (one individual) on August 22, 2004.

Western Toad
Status
The western toad typically occurs in ponds and shallow lakes but also can be found near streams during dry periods. Threats to western toad include vulnerability to road traffic during adult movements to and from breeding sites in the spring and dispersal of newly metamorphosed toads away from the breeding sites in the summer and fall (WA DNR 2007). Breeding waters for western toads is usually permanent and includes wetlands, ponds, lakes, and still water off-channel habitats of rivers. Breeding sites appear to be vulnerable to successional changes in vegetation.

Project
Based on existing habitat this species could potentially occur in the project area, but there are no known sightings in the area. Western toads would likely use the wetlands in the project area.

Migratory Birds (Forest Landbirds)
Status
Executive Order (EO) 13186 signed by the President on January 10, 2001, defined the responsibility of federal agencies to protect migratory birds and their habitats. The intent of the EO was to strengthen migratory bird conservation by identifying and implementing strategies that promote conservation and minimize the take of migratory birds through consideration in land use decisions and collaboration with the US Fish and Wildlife Service (FWS). Pursuant to EO 13186 the Forest Service entered into a Memorandum of Understanding with the FWS in January 2001 with the express purpose of incorporating migratory bird habitat and population management objectives and recommendations into the agency planning processes.

The Olympic National Forest falls within the Northern Pacific Rainforest delineation of Bird Conservation Regions (BCR) identified by the North American Bird Conservation Initiative (Partners in Flight 1998). The coastal rainforest conservation region stretches from the western Gulf of Alaska south through British Columbia and the Pacific Northwest to northern California. Heavy precipitation and mild temperatures characterize its maritime climate. Forests of western hemlock and Sitka spruce in the far north dominate the region, with balsam fir, Douglas-fir, and coast redwood becoming more important farther south. Broadleaf forests are found along large mainland river drainages. High priority breeding forest birds include the northern spotted owl (*Strix*

occidentalis caurina), marbled murrelet (*Brachyramphus marmoratus*), northern goshawk (*Accipiter gentiles*), chestnut-backed chickadee (*Parus rufescens*), red-breasted sapsucker (*Sphyrapicus rubber*), and hermit warbler (*Dendroica occidentalis*). The Dosewallips project area provides habitat for these species.

Many neotropical migratory birds which migrate long distances between breeding grounds in North America and wintering grounds in Latin America are experiencing population declines in Pacific northwest forests. While many of these species occur in coniferous forest, some, such as the willow flycatcher (*Empidonax traillii*), Hammond's flycatcher (*Empidonax hammondii*), Swainson's thrush (*Catharus ustulatus*), and warbling vireo (*Vireo gilvus*), are particularly associated with hardwoods or riparian areas. Some species are associated with tall trees while others occur more in understory shrubs or in early seral habitats. In coniferous forests of Western Oregon and Washington 27 species have experienced significant recent declines (1980-1996) or long-term (1966-1996) declining trends based on Breeding Bird Surveys, while 12 species have seen significantly increased population trends (Link and Sauer 1997). The reasons for the decline vary with species. Past intensive forest management practices may have led to declines due to the loss of older forest habitats. However forest management may have led to the increase of some species due to the increase in a variety of forest seral stages across the landscape. For many species the reason behind the decline is unknown.

Hardwood stands are of particular importance as a key habitat for breeding neotropical (and winter resident) songbirds.

Project Area

Hardwood stands and mixed hardwood/conifer stands are present along the Dosewallips River. Although there have been no surveys done specifically for forest landbirds in the project area several species are likely to occupy the project area including the golden-crowned kinglet (*Regulus satrapa*), Hutton's vireo (*Vireo huttoni*), and brown creeper (*Certhia americana*).

Washington State Species of Concern (ONP)

Washington Department of Fish and Wildlife Species of Concern list includes those species listed as State Endangered, State Threatened, State Sensitive, or State Candidate, as well as species listed or proposed for listing by the U.S. Fish and Wildlife Service. Olympic National Park addresses Washington State listed species in their environmental analyses for proposed projects (Table 18).

Table 18: Washington State species of concern

Common Name	Scientific Name	Other Designations	Habitat Present In Project Area	Documented Sightings
Vaux's Swift	*Chaetura vauxi*	None	yes	no
Keen's Myotis	*Myotis keenii*	None	yes	no

Vaux's Swift

Status

Vaux's swift, a small, short-tailed swift, does not perch, rather they cling to vertical surfaces at nest and roost sites. They roost communally in cavities of hollow trees (usually broken top with vertical entrance) in old growth forests.

Project Area

The project area and surrounding forested environment contains habitat for the Vaux's swift.

Keen's Myotis

Status

Little information is known about this rarely encountered bat of the Olympic Peninsula and British Columbia pacific coast and its current population status or behavior. The species is believed to inhabit dense coniferous forests apparently roosting in tree cavities, rock crevices, and small caves (which it shares with the little brown bat). The insectivore hunts the forest edges and in openings and over ponds. Surveys for the species have been conducted on the Olympic Peninsula with minimal captures.

Project Area

Without specific information on habitat preferences by Keen's myotis it is assumed the project area has the habitat components that the species would use.

Environmental Consequences

Olympic National Park

Terrestrial species and their habitat are evaluated using the following impact intensities.

Wildlife Impact Intensity Descriptions

The thresholds of change for the intensity of an impact to wildlife are defined as follows:

Impact Intensity	Intensity Description
Negligible	There would be no observable or measurable impacts to native species, their habitats, or the natural processes sustaining them. Impacts would be well within natural fluctuations.
Minor	Impacts would be detectable, short-term, and they would not be expected to be outside the natural range of variability of native species' populations, their habitats, or the natural processes sustaining them. Mitigation measures, if needed to offset adverse effects, would be simple and successful.
Moderate	Breeding animals of concern are present; animals are present during particularly vulnerable life-stages, such as migration or juvenile stages; mortality or interference with activities necessary for survival can be expected on an occasional basis, but is not expected to threaten the continued existence of the species in the park unit. Impacts on native

	species, their habitats, or the natural processes sustaining them would be detectable, short-term, and they could be outside the natural range of variability. Mitigation measures, if needed to offset adverse effects, would be extensive and likely successful.
Major	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, long-term, and they would be expected to be outside the natural range of variability. Key ecosystem processes might be disrupted. Loss of habitat might affect the viability of at least some native species. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed.

Impacts would be considered short-term if the wildlife recovered in less than one year. Impacts would be considered long-term if wildlife recovery takes more than one year.

T&E Species Impact Intensity Descriptions
The thresholds of change for the intensity of an impact to threatened and endangered wildlife are defined as follows:

Impact Intensity	Intensity Description
Negligible	The action could result in a change to a population or individuals of a species, but the change would not be of any measurable or perceptible consequence and would be well within natural variability. This impact intensity equates to a USFWS determination of “may affect, not likely to adversely affect.”
Minor	The action could result in a change to a population or individuals of a species. The change would be measurable, but small and localized and not outside the range of natural variability. Mitigation measures, if needed, would be simple and successful. This impact intensity equates to a USFWS determination of “may affect, not likely to adversely affect.”
Moderate	Impacts on special-status species, their habitats, or the natural processes sustaining them would be detectable and occur over a large area. Breeding animals of concern are present; animals are present during particularly vulnerable life stages; mortality or interference with activities necessary for survival can be expected on an occasional basis, but is not expected to threaten the continued existence of the species in the park unit, or conservation zone. Mitigation measures would be extensive and likely successful. This impact intensity equates to a USFWS determination of “may affect, likely to adversely affect.”
Major	The action would result in a noticeable effect to viability of the population or individuals of a species. Impacts on special-status species of the natural processes sustaining them would be detectable, both in and outside of the park. Loss of habitat might affect the viability of at least some special-status species. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed. The impact intensity equates to a USFWS determination of

	"may affect, likely to jeopardize the continued existence of a species."

Impacts would be considered short-term if the species recovered in less than one year. Impacts would be considered long-term if the species takes more than one year to recover.

Alternative A - No Action

Direct/Indirect Effects

Olympic National Forest
Under this alternative no maintenance would occur on the surfaced road, campgrounds or other facilities on the National Forest or National Park land above the washout. Upstream of the washout 5 miles of road (estimated at 15 acres using the 25-foot road width) and campground areas (14 acres) would eventually fill in with vegetation. There would be no immediate effect or change on the wildlife habitats although through time the riparian hardwood and coniferous forest habitats would continue going through natural succession that would provide better habitat conditions for wildlife in the watershed. Through succession these areas would become forage for deer and elk (low vegetation), then hiding cover (shrubs and smaller trees), and eventually older forest habitats. Once conifers are established on the 29 acres of road and campground areas these areas would in the long-term become suitable for northern spotted owl, marbled murrelet, bald eagle, pileated woodpecker, cavity nesters, tree-roosting bats, terrestrial mollusks, and numerous other species that occur in older forests. Over time there would be the development of constituent elements of critical habitat for both the marbled murrelet and northern spotted owl.

There would be no increase in vehicular disturbance under this alternative. Human use of the road would continue as non-motorized. There is an expectation that non-motorized use would be at higher densities during the spring through fall which follows the typical recreational use season. The road density in the middle Dosewallips subwatershed would remain at 0.5 mi/mi^2 (prior to the washout the density was at 0.6 mi/mi^2) and in the upper Dosewallips subwatershed would remain at a road density of 0 mi/mi^2 (from 0.2 mi/mi^2 prior to washout), both in the desirable range for wildlife species.

There would be "no impact" to terrestrial Sensitive species, Management Indicator Species, species of concern, migratory birds, or any other terrestrial species.

Preliminary ESA Determinations
The implementation of this alternative would result in "no effect" determinations for the marbled murrelet and northern spotted owl. The alternative would have "no effect" determinations for designated Critical Habitat for the marbled murrelet and northern spotted owl. Coordination with US Fish and Wildlife Service has been on-going throughout the development of this project. These preliminary determinations are based in part on feed-back from the federal regulatory agencies.

Olympic National Park

Washington State Species of Concern
No direct or indirect impacts.

Cumulative Effects

Past activities that removed late-successional forest habitat in the Dosewallips watershed include fire, timber harvest, road construction, and the development of Elkhorn Campground and national park facilities. A total of 10,838 acres of regeneration timber harvest has occurred in the Dosewallips watershed on all ownerships since the 1920's. Seven fires, totaling 19,700 acres, burned in the watershed since the 1800's. These areas of fire and timber harvest are now mid-successional forest, about 20 to 135 years old. According to the watershed analysis (USDA 1999) the amount of late successional forest (forests over 200 years) remaining in the watershed is 35,760 acres (50 percent). The amount of lower elevation late-successional forests which provide marbled murrelet and spotted owl habitat is 22,586 acres (29 percent of watershed). This alternative would not add to the aggregated effects since there would be no removal of late-successional habitat in the National Forest. No thresholds (such as elk cover) would be exceeded.

Future timber harvest activities include the proposed Jackson thinning on National Forest land composed of 70 to100+ year old (mid-successional) forest including about 1,000 acres in the Rocky Brook subwatershed. This proposed sale may in the short-term degrade habitat for terrestrial mollusks, cavity nesters, and thermal cover for deer and elk. Alternative A would not add to the aggregated effects of habitat degradation and there will be no cumulative effects.

Present and past activities that disturb wildlife include using and maintaining the road system year round. There are about 116 miles road being used and maintained in the watershed. Alternative A would not add to the aggregated effects of wildlife disturbance by use of roads and campgrounds beyond the washout. The road density in the middle and upper watershed would not change and would still be relatively low, consequently there would be no cumulative negative effects.

If future planning determined that the facilities would be removed from the Dosewallips area there could be future minor to moderate adverse impacts related to the demolition and removal of the facilities and the decommissioning of the roadway. These adverse impacts relate to the potential use of heavy lift and light helicopters to transport materials and equipment to and from the project site, and noise from equipment use. A follow-up plan would be necessary to identify alternatives and analyze potential effects. Future project work would generally be scheduled to avoid the most sensitive nesting seasons for murrelets and owls, but could still result in temporary, minor adverse impacts, resulting in a may affect, not likely to adversely affect determination if the future project work was carried out during late nesting season. However since no project work would occur under this alternative there would be no cumulative effects.

Changing the base of aerial operations to a location outside of park lands (see Park Operations section) would shift the impacts related to aerial operations (noise and harassment of listed bird species) to additional areas above private and Forest Service lands, including potential habitat for northern spotted owls and marbled murrelets. There are approximately four missions a year to transport trail maintenance supplies (spring and fall), manage the backcountry privy at Mt. Constance (fall), and for search and rescue operations. Normally the trail maintenance activities and privy management are scheduled outside the breeding season for nesting birds, reducing the potential adverse effects to these species. Search and rescue operations can occur anytime and could result in moderate impacts from harassment if the flights occur during breeding season. These require emergency consultations with USFWS. These periodic park flight operations could result in minor to moderate (depending on the flight schedule) adverse impacts to murrelets and owls because the flight lines would be longer if the landing zone would be outside the park versus the location at Dosewallips. Since the No Action alternative would not result in any project work and there would be no adverse impacts, there would be no cumulative effects to listed bird species.

There would be no impairment to this resource since there would be “no effects” to listed species as a result of the No Action alternative and since there would be no effect to general wildlife there would be no impairment to this resource.

Wildlife habitat has been removed or modified in the Dosewallips by the construction of the roads and facilities. Construction in the area has been minimal and the facilities and road have been in place for years. Since this is a relatively low use and more primitive developed area the roads and facilities do not preclude the use and occupancy of most wildlife. Future activities if the road remains closed could benefit wildlife habitat through restoration. Since there would be no action and no construction under this alternative there would be no cumulative negative effects to wildlife. A total of 10.1 miles of road have been closed or decommissioned in the Dosewallips watershed in recent years. Keeping this road closed (5 additional miles) would add to the aggregated positive effects of closing roads.

Summary of Terrestrial Effects - Alternative A

There would be no immediate effect on wildlife habitats, although through time 29 acres of campground and road would fill in with vegetation, go through natural succession and eventually become suitable habitat for many forest wildlife species.

There would be no increase in vehicular disturbance to wildlife under Alternative A. This alternative would provide the greatest benefit and have the least adverse impacts to terrestrial species and habitats. There would be no effect to the federally listed northern spotted owl, marbled murrelet or their critical habitats. There would be no impact to sensitive species, management indicator species, species of concern, or other wildlife species.

Alternative B - Reroute 1 Bench Emphasis

Direct/Indirect Effects

Olympic National Forest
Introduction
Road-associated factors that affect wildlife include snag or downed log reduction; edge effects; avoidance or displacement from an area; habitat loss and fragmentation; creating a movement barrier or a route for competitors or predators; and disturbance at a specific site (Gaines *et al.* 2003). Effects of these factors include reduction in density of snags and downed logs due to their removal along roads; changes to habitat microclimate associated with the edge induced by the road or trail; spatial shifts in populations or individual animals; loss and resulting fragmentation of suitable habitat due to the establishment of roads and trails; the alteration of wildlife dispersal or other movements; a change in the environment that provide access for competitors or predators; and the displacement of individual animals from a specific location being used for reproduction or rearing young. Wildlife affected include ungulates, wide-ranging carnivores, late-successional and riparian-associated species, and cavity excavators.

Road construction results in habitat loss by converting preexisting habitats to road corridors. Some animal species are more vulnerable to habitat loss than others. Species whose habitat is limited to forest interior are particularly vulnerable to declining forest patch sizes, because smaller patches have a larger proportion of edge habitat (or forest edge), which is generally avoided by forest interior species. Removal of forest typically involves an increase in the proportional amount of edge habitat in a landscape. For species that cannot live in forest edge, this results in a disproportional decrease in amount of habitat. Mobility of a species will also dictate the ability to cope with habitat loss. Reduction in habitat quality and quantity from road corridors can influence wildlife species through displacement or avoidance of an area, or through a decrease in abundance or density of breeding (Forman and Sperling et al. 2003).

Under this alternative there would be the permanent removal of about 7.1 acres of late-successional forest habitat from road construction. Additional habitat removal may occur during construction through the removal of dead and dying trees identified as hazardous to workers. One indirect effect of edge is degradation of the adjacent forest habitat by opening up the forest to light and increasing susceptibility to wind-throw along the forest edge. A total of 14.9 acres late-successional forest habitat adjacent to the road would be degraded (amount of habitat within 100 feet of road construction).

Another indirect effect would be the potential for the spread of invasive weed species to encroach into areas currently weed-free, this would impact native plants through competition thereby affecting terrestrial wildlife habitats. The equipment used to construct the road reroute, decommission roads, or haul material could spread seeds of noxious weeds.

Federal Threatened and Endangered Species

Marbled Murrelet and Designated Critical Habitat

Direct effects of this alternative include permanently removing approximately 7.1 acres of late-successional forest habitat by constructing a road. The forest is high quality nesting habitat for the marbled murrelet, containing large trees up to 72 inch (or more) diameter at breast height with large lateral branches that would provide the structure needed for nesting. The nearest known marbled murrelet site to the washout project area is 2.7 miles away. However, without surveys to determine marbled murrelet occupancy the project area is assumed to be occupied. Management Requirements for this alternative require that suitable murrelet habitat be removed outside the breeding season (April 1 through September 15). Therefore there would be no direct mortality or injury of marbled murrelets from the tree-felling. Since marbled murrelets have high nest site fidelity, marbled murrelets occupying the forest stand likely would return and attempt to re-nest in adjacent unoccupied habitat. If unoccupied suitable habitat is not available nesting murrelets would be displaced causing them to expend more energy to locate new nest sites (USDI 1996).

Indirect effects to marbled murrelets include degrading adjacent habitat from creating edge through the forest. Creating edge would also increase the risk of predation since nests near a forest edge are more likely to be subject to predation than nests located in interior forest. This is of particular concern with the marbled murrelet which has high levels of nest site predation by corvid predators. The threat of predation on eggs, chicks, and adult marbled murrelets has increased since the species listing and continues to be a serious threat to the species (McShane *et. at.* 2004). Management Requirements would include clean up of garbage at work sites during the construction period to reduce (but not eliminate) the risk of predation by corvids.

Using equipment, including motorized tools, chainsaws, rock drills, bulldozers, trucks and other heavy equipment during the breeding season from April 1 to September 15 could disturb marbled murrelets nesting in adjacent habitat. The potential disturbance-caused injuries include flushing from the nest, aborted feeding attempts, and postponed feedings (USDI 2003a). Marbled murrelets are particularly vulnerable to disturbance during the early breeding season (April 1 – August 5) when they are producing and incubating eggs. The risk of injury is much less during the late breeding season when adults are only present at the nest when they are feeding the young.

Under this alternative noise generating equipment would be operated during a portion of the early breeding season, from July 15 to August 5 and during the late breeding season, August 6 – September 15. The injury threshold distance for marbled murrelets from operating heavy equipment and motorized tools is 35 yards (USDI 2003a). Operating heavy equipment and motorized tools during a portion of the early breeding season within 35 yards of suitable habitat would adversely impact marbled murrelets. A total of 15.7 acres of suitable habitat would be impacted by noise disturbance (amount of habitat within 35 yards of the proposed road). In addition, the road construction requires a big disposal site to which approximately 1700 dump truck loads of material would be hauled. Potentially occupied marbled murrelet habitat adjacent to the haul route would also be impacted, if hauling occurs during the early breeding season. Impacts from noise would

last three breeding seasons, the duration of the project.

Operating equipment during the late breeding season (August 6 to September 15) would minimize disturbance impacts. Since marbled murrelets typically visit their nests at dawn or dusk, avoiding mechanical equipment work within two hours of sunrise and sunset during the breeding season, as outlined in the Management Requirements, would also reduce (but not eliminate) disturbance impacts. Operating outside of the breeding season would avoid disturbance impacts. As stated previously the tree felling of murrelet habitat for road construction would occur outside the entire breeding season so there would be no direct mortality, injury, or harassment to nesting marbled murrelets from the tree felling.

The road reroute would be constructed in marbled murrelet Critical Habitat Unit WA-06a. This road construction would adversely affect marbled murrelet critical habitat by removing 7.1 acres of forest containing both the constituent elements of critical habitat. Of the 28,640 acres suitable habitat within the CHU the removal of 7.1 acres represents less than 0.01 percent of the total amount of suitable habitat currently available. However, any critical habitat is considered essential to the conservation of the species (USDI 1996) especially in the context of permanent removal of habitat containing high quality constituent elements. The forest stand contains numerous trees (over 200) with potential nesting platforms which is one constituent element of critical habitat. The second constituent element is forest surrounding (within 0.5 mile of) suitable nesting trees with a canopy height of at least one-half the potential tree height. The canopy height of the forest stand is well over one-half the potential tree height, about 100 feet. This issue is further addressed in the Preliminary ESA Determinations section of this document.

Preliminary ESA Determinations

Under this alternative the proposed activities “may affect, and is likely to adversely affect” the marbled murrelet due to the permanent removal of 7.1 acres suitable habitat and to harassment from noise generating activities during the early breeding season. There would not be direct mortality or injury to nesting marbled murrelets from tree-felling. This alternative would also result in a “may affect, likely to adversely affect” determination for designated Critical Habitat Unit WA-06a because of the permanent removal of primary constituent elements. Coordination with US Fish and Wildlife Service has been on-going throughout the development of this project. These preliminary determinations are based in part on feed-back from the federal regulatory agencies.

Northern Spotted Owl and Designated Critical Habitat

Direct effects of the road reroute construction include permanently removing up to approximately 7.1 acres of late-successional forest habitat which is considered suitable (nesting, roosting, and foraging) habitat for the northern spotted owl. The forest stand represents good-quality habitat for this species, containing contiguous mature and old growth forest the spotted owl utilizes as habitat (large diameter standing live and dead trees, multi-layered stand, numerous down logs). Some of the standing trees that would be felled for road construction are very large, up to 72 inch (or more) dbh and some trees have deformities that could function as a nest cavity. The permanent removal of the estimated 7.1 acres of suitable habitat would reduce the availability of nesting structures

in the drainage. The surrounding forest outside the immediate project area on both National Forest and National Park lands would continue to provide quality suitable habitat. Currently the Dosewallips watershed in both the Olympic National Forest and National Park contains about 29 percent of late successional/old growth habitat.

This alternative would include the permanent removal of an estimated 7.1 acres of suitable habitat (nesting, roosting, and foraging) which is a primary constituent element within a designated critical habitat unit. Of the 25,579 acres of suitable habitat within CHU WA-49 the removal of an estimated 7.1 acres represents less than 0.0003 percent of the total amount of suitable habitat currently available in the CHU. Even with the permanent removal of 7.1 acres of nesting habitat, that would prohibit the future development of constituent elements, the CHU as an entire unit would continue to provide for the long-term recovery of the northern spotted owl. The surrounding National Forest wilderness and LSR, and Olympic National Park lands would continue to function as providing the necessary habitat requirements for the species.

The existing road prism immediately above and below the washout which includes a riparian area would be decommissioned and would eventually develop into dispersal habitat or suitable habitat, but would take over 200 years for the development equal to the loss of old growth habitat upslope.

No known occupied northern spotted owl nest sites are within the washout area (though surveys were not completed specific to the project, therefore the area is considered occupied). Two spotted owl home ranges (2.7 mile radius) overlap the project area. This alternative would remove about 7.1 acres of suitable nesting habitat within each activity center. Site #24 is below habitat threshold of 5,708 acres of suitable habitat by 206 acres. Removal of an estimated 7.1 acres would further reduce the activity center below habitat threshold. The amount of habitat in the home range would be below the habitat threshold by 213 acres under this alternative. Site #160 would remain above the habitat threshold. It is expected this activity center would have sufficient nesting, roosting, and foraging habitat within the home range to continue future successful occupation.

The project area also provides habitat for northern spotted owl primary prey, the northern flying squirrel and bushy-tailed woodrat. Implementation of this alternative would permanently remove habitat for prey species although the surrounding mature and late seral forest would continue to provide habitat for the species.

Removal of northern spotted owl suitable habitat through tree felling for road construction would occur outside the entire breeding season (March 1 to September 30) to reduce the effects to the species by eliminating the potential for harm to the possible nesting northern spotted owls. Under this alternative no removal of suitable habitat would be allowed from March 1 through September 30.

Disturbance resulting from noise generating activities (use of heavy equipment and motorized hand tools) would occur during construction activities to surrounding suitable habitat adjacent to the project area. Using equipment to build the road, including

motorized tools, chainsaws, rock drills, bulldozers, trucks and other heavy equipment, during the breeding season from March 1 to September 30 could disturb spotted owls nesting in adjacent habitat. Though the removal of suitable habitat would occur outside the breeding season, construction of the road and associated activities would need to occur during the breeding season for up to three years. The risk of disturbance is greatest during the early breeding season, March 1 – July 15, when egg laying, incubation, hatching, and feeding of nestlings occur; while the risk is much less during the late breeding season, July 16 – September 30, when most young have fledged. The noise generating activities will not occur during the early breeding season. The activities would occur only during the late breeding season, minimizing impacts from noise.

Under this alternative the dispersed recreation area adjacent to the washout along with portions of FSR 2610 (approximately 2 acres) would be used for staging equipment for the reroute. Afterwards the areas would be closed to motorized use and be rehabilitated through invasive species removal and native planting, and would eventually provide future lesser quality habitat for the spotted owl.

Preliminary ESA Determinations

Under this alternative the proposed activities “may affect, likely to adversely affect” the northern spotted owl due to the permanent removal of an estimated 7.1 acres of suitable habitat within two activity centers, one which is below habitat threshold. There would not be direct harm to nesting northern spotted owls. This alternative would also result in a “may affect, likely to adversely affect” to designated Critical Habitat Unit WA-49 because of the permanent removal of a primary constituent element. Coordination with US Fish and Wildlife Service has been on-going throughout the development of this project. These preliminary determinations are based in part on feed-back from the federal regulatory agencies.

Forest Service Sensitive

Bald Eagle

Direct effects to bald eagles include removing approximately 7.1 acres of bald eagle habitat due to road construction and removing danger trees adjacent to the road. Trees suitable for bald eagle nesting, perching, and winter roosting would be permanently removed within the Dosewallips Bald Eagle Management Area (BEMA). The Olympic National Forest LRMP requires maintaining at least 64 acres of uneven-aged forest stands in the BEMA. Currently the BEMA contains 89 acres of forest of which 55 acres are late-successional forest and 34 acres are younger aged forest with previous disturbance. However much of the younger forest stands were disturbed by fire over 100 years ago and provide habitat features (uneven-aged canopy for roosting, snags for perching, close proximity to river). Therefore the BEMA would still be within the Forest Plan objectives of providing sufficient bald eagle habitat. The uneven-aged forest in the BEMA would be decreased from 89 acres to 82 acres. Portions of FSR 2610 and the dispersed camping areas (approximately 2 acres) near the washout would be closed and rehabilitated through native vegetation treatments which would provide future bald eagle habitat in the BEMA.

Implementation of this alternative likely would not impact known bald eagle nests or communal roost sites as field reconnaissance, aerial surveys, and species database review

did not locate any sites in the project area. However individual bald eagles perched in the area while foraging could be disturbed by the project activities. During the tree falling and other project activities bald eagles could be temporarily displaced from the project area. Any eagles displaced from the removed trees would likely return to use adjacent habitat after project completion.

Under this alternative the proposed activities may impact individuals or habitat for the bald eagle but would not likely contribute towards federal listing or cause a loss of viability to the populations or species. Individual bald eagles may be affected but no known nest territories or communal night roosts would be impacted. Furthermore the BEMA objectives of maintaining sufficient bald eagle habitat would be maintained.

Terrestrial Mollusks

Direct effects to terrestrial mollusks include removing approximately 7.1 acres of suitable habitat from the road construction, removing danger trees, and damaging any undiscovered individuals by heavy equipment. Indirect effects include altering adjacent vegetation through created edges, affecting about 14.9 acres. Portions of FSR 2610 and the dispersed camping areas (approximately 2 acres) near the washout would be closed and rehabilitated through native vegetation treatments which would provide future habitat for terrestrial mollusks.

The Sensitive warty jumping slug has been found at one site in the project area. However the site would be protected since it is over 200 feet from the proposed road construction route. This species is locally common and well-distributed on the Olympic National Forest (Ziegltrum 2001 and 2004). No other special status terrestrial mollusk species have been found in the project area despite conducting surveys using current protocols (Duncan et al. 2003). Implementing this alternative may impact individuals or habitat for one Sensitive mollusk species but would not likely contribute towards federal listing or cause a loss of viability to the populations or species.

Amphibians

Effects to amphibians (Van Dyke’s Salamander, Cope’s Giant Salamander, and Olympic Torrent Salamander) would include alteration to the riparian environment during the road construction. The interruption of contiguous riparian habitat dissected with a road could become a movement barrier as the upslope area provides seep, intermittent, and permanent stream habitats that would be affected by road building. The road construction under this alternative would involve altering 0.019 acre of wetland and crossing 14 tributaries, which provide suitable habitat for amphibians. Direct effects could also include mortality to any undiscovered individuals by heavy equipment but this would be considered minimal in terms of effects upon the entire population. Implementing this alternative may impact individuals or habitat for three Sensitive amphibian species, but would not likely contribute towards federal listing or cause a loss of viability to the population or species.

Bats

Direct effects to tree-roosting bats include removing approximately 7.1 acres of suitable forest habitat, removing danger trees which may provide suitable roost sites, and

damaging any undiscovered individual bats. Indirect effects include altering adjacent suitable habitat through created edges. However no caves or human structures used by bats would be affected. Removing the trees may impact individuals or habitat for a Sensitive species, the Townsends big-eared bat, but would not likely contribute towards federal listing or cause a loss of viability to the populations or species.

Fisher

If reintroduced fishers eventually colonize the Dosewallips watershed the effects to fisher under this alternative would include the removal of an estimated 7.1 acres of late seral habitat, including downed logs that may provide foraging or denning opportunities. The removal of up to about 7.1 acres of forest vegetation from the existing landscape of extensive tracts of lowland undisturbed late-successional coniferous forest would result in minimal impacts to potential fisher habitat. Implementing this alternative may impact the fisher, a Sensitive species, but would not likely contribute towards federal listing or cause a loss of viability to the population or species.

Olympic National Forest Management Indicator Species

Primary Cavity Excavators, Pileated Woodpecker and Pine Marten

Direct effects to primary cavity excavators including the pileated woodpecker would be removal of an estimated 7.1 acres of good quality foraging and nesting habitat. The surrounding forest in mature and late seral class in the watershed would continue to provide this habitat to the species. Overall the watershed provides a high amount of forests containing dead wood for wildlife species dependent on such habitat.

Direct effects to the pine marten under this alternative would be the removal of approximately 7.1 acres of late seral habitat including downed logs that may provide denning opportunities. Although the location of the area with an existing road would not discourage the use by marten the species is likely found further from high human use areas and at higher elevations. The surrounding forest in mature and late seral class would continue to provide habitat to the marten.

The removal of an estimated 7.1 acres which includes large diameter standing and down dead would not affect the viability of wildlife species dependent upon such structure.

Deer and Elk

Direct effects include removing approximately 7.1 acres of optimal thermal habitat for deer and elk from the road construction and disturbing deer and elk in the area during the road construction and hauling activities. This is in an area of elk wintering or migration between winter and summer ranges. However optimal thermal cover for deer and elk still would be available in the area. The Dosewallips watershed contains 35,760 acres (46 percent) of forests over 200 years old (USDA 1999) with about 7,000 acres of these forests on National Forest System lands. Portions of FSR 2610 and the dispersed camping areas (approximately 2 acres) near the washout would be closed and rehabilitated through native vegetation treatments which would provide future habitat for deer and elk.

About 5 miles of road above the washout would be opened for motorized access which

would increase potential vehicular harassment by humans to wildlife such as deer and elk. In addition recreational use of the campgrounds in the National Forest and national park would increase. The campgrounds and the road are in riparian areas and many terrestrial wildlife species use riparian areas for food, cover, water, and as travel routes. This increased harassment would be an indirect effect of the project. However, since the road density in this area is low (below the recommended density of 1.0 miles road per square mile (WDFW 1991), this impact appears minimal. The road density in the middle Dosewallips subwatershed would increase from 0.5 to 0.6 mi/mi², and the road density in the upper Dosewallips subwatershed would increase from 0 to 0.2 mi/mi².

Federal Species of Concern

Northern Goshawk

Direct effects to the northern goshawk include removing approximately 7.1 acres of suitable forest habitat, removing danger trees in suitable habitat, and disturbing any goshawks in the project area. Indirect effects include altering adjacent suitable habitat through created edges, affecting about 14.9 acres. Since the road construction would be done during the breeding season it could potentially disturb any undiscovered goshawks nesting in or adjacent to the project area. Nesting birds would be displaced, causing them to expend more energy to locate new nest sites. However suitable habitat would be available in the surrounding area. Goshawk habitat would be removed during the non-breeding season so there would be no direct injury or mortality to nesting goshawks from the tree-felling. About 0.7 mile of road and the dispersed camping areas near the washout would be closed and rehabilitated through native vegetation treatments which would provide future habitat for goshawk. Implementing this alternative likely would not contribute towards federal listing or a need for conservation action for the northern goshawk.

Olive-sided flycatcher

Riparian-dependent species including the olive-sided flycatcher would benefit from the rehabilitation and decommissioning of the lower road and dispersed area along the river that would provide additional deciduous habitat in the future.

Tailed Frog and Western Toad

Effects to tailed frog and western toad would include alteration to the riparian environment during road construction. The interruption of contiguous riparian habitat dissected with a road could be a movement barrier for the tailed frog as the upslope area provides seep and stream habitats that would be affected by road building. The road construction under this alternative would involve altering approximately0.019 acre wetland and crossing 14 tributaries, which provide suitable habitat for amphibians. Direct effects could also include mortality to any undiscovered individuals by heavy equipment but this would be considered minimal in terms of effects upon the entire population.

Migratory Birds (Forest Landbirds)

Direct effects to the migratory birds that are dependant upon late-successional forests would be affected by the loss of an estimated 7.1 acres of habitat although many species likely would occupy the surrounding stands of similar habitats. The operation restriction for tree removal during the marbled murrelet and northern spotted owl breeding season

would be a benefit resulting in no loss of migratory birds during the breeding season through habitat removal and potential harm to individual birds.

Alternatives B, C, and F – All Action Alternatives

Direct/Indirect Effects

Olympic National Park
Federal Threatened and Endangered Species
There would be no habitat loss within the NPS portion of the project and no trees removed. The adverse effects would be reduced because of timing restrictions (project to be conducted between August 6 and the end of September) outside of early nesting seasons. There would be harassment from the noise of construction activities with the primary noise coming from the 2 months of work at the Dosewallips Falls site. Therefore there would be short-term, minor impacts from the road construction project resulting in a NLAA determination if consultation for this activity were to occur separately from the ONF activity.

Washington State Species of Concern
The project is on a road. There would be some temporary disturbance associated with project noise that could cause wildlife to avoid using the area during construction. During the reopening of the roadway some wildlife, particularly small mammals and birds, would be temporarily displaced or forced to relocate outside the project limits. This would increase the potential for predation and competitive stress. Direct mortality could occur in the rare circumstances when wildlife is unable to move away from equipment. The displacement could result in a slight population depression adjacent to the road corridor.

Wildlife in the area would be adversely affected by the noises from equipment used during the project work. There would be negligible to minor adverse impacts to area wildlife from reopening the road to vehicular traffic which would place wildlife at risk from collisions with automobiles and disturbance associated with vehicle use and noise.

Conclusion

Because this alternative would result in only minor impacts to murrelets and northern spotted owls, resulting in a finding of may affect, but not likely to adversely affect (if the ONP activity were consulted on its own, separate from ONF activities), there would be no impairment of this resource.

Cumulative Effects

Past activities that removed late-successional forest habitat in the Dosewallips watershed include fire, timber harvest, road construction, and the development of Elkhorn Campground and national park facilities. A total of 10,838 acres regeneration timber harvest has occurred in the Dosewallips watershed on all ownerships since the 1920's. Seven fires totaling 19,700 acres burned in the watershed since the 1800's. These areas of fire and timber harvest are now mid-successional forest, about 20 to 135 years old.

According to the watershed analysis (USDA 1999) the amount of late successional forest (forests over 200 years old) remaining in the watershed is 35,760 acres (46 percent). The amount of lower elevation late-successional forests which provide marbled murrelet and spotted owl habitat is 22,586 acres (29 percent of watershed). Alternative B would add to the aggregated effects by removing an estimated7.1 acres late-successional habitat in the National Forest.

Future timber harvest activities include the proposed Jackson thinning on National Forest land composed of 70 to100+ year old (mid-successional) forest including about 1,000 acres in Rocky Brook subwatershed. This proposed sale may in the short-term degrade habitat for terrestrial mollusks, cavity nesters, and thermal cover for deer and elk. Alternative B would add to the aggregated effects of habitat degradation by removing approximately7.1 acres of late-successional forest habitat from road construction and removing danger trees along the road.

Present and past activities that disturb wildlife include using and maintaining the road system year round. There are about 116 miles road being used and maintained in the watershed. Alternative B would add to the aggregated effects of wildlife disturbance by opening 5 miles of road and 14 acres of campground that have not been used by motorized vehicles since the washout in 2002. The miles of roads in the watershed would increase from 116 to about 122 miles. However the road density in the middle and upper watershed would still be relatively low. The road density in the middle Dosewallips subwatershed would increase from 0.5 to 0.6 miles/sq mile, and the road density in the upper Dosewallips would increase from 0 to 0.2 miles/sq mile.

Past ONP activities including the construction of the road and park facilities removed a small portion of northern spotted owl and murrelet habitat from the park. However these species still utilize the Dosewallips area and they are not necessarily disturbed by the existing use and operation of the area roads and facilities. The area facilities, maintenance activities, and visitor use has not precluded the development of a spotted owl nest site near the ranger station. Park operations including day-to-day maintenance and visitor use of the facilities as well as maintenance activities on the 1.7 miles of park road would be reinstituted in the Dosewallips area after the road is open. These activities would be confined to the existing road corridor and in the developed area, would be short-term, and could disturb listed birds. In addition it is possible that if the facilities are reopened that several danger trees would be removed. These trees may provide habitat to murrelets or owls. Timing restrictions would reduce the potential for direct loss of nests or individuals. Mitigation includes inspection of the trees by NPS wildlife biologists prior to removal. If a nest site is found in a danger tree the immediate area would be closed and the tree would not be removed until after nesting season. Overall, short-term, minor, adverse impacts would result from noise and harassment and potential removal of trees. However since this work would occur after the project is completed there would be no cumulative effects from noise and activities related to project work and since no trees would be removed from NPS lands under this alternative there would be no cumulative effects related to habitat removal.

Under this alternative, with the reopening of the road, the aerial operations landing zone would be reestablished within the park. Visitor use would increase. Most of these activities would occur during the spring to fall months (primary season of work and visitor use mid-May to mid-September). Aerial operations occur after the nesting seasons except in emergency situations such as search and rescues. Aerial operations that occur during or after late nesting seasons for listed bird species would result in negligible to minor adverse effects to listed bird species. Those aerial operations which occur during early nesting season, restricted to emergency operations, could result in adverse effects to listed bird species. The contribution of this alternative to these impacts is small since the project would be of short duration, avoiding sensitive nesting seasons. Therefore there would be very minor cumulative effects associated with ONP proposed activities.

Overall there would be very minor increases in adverse cumulative effects to wildlife in the watershed and no thresholds (such as elk cover) would be exceeded. The incremental impacts from this project when added to the impacts of the previously mentioned past, present, and reasonably foreseeable actions would not result in substantial cumulative impacts to the resource, or affect the ability of the resource to sustain itself.

Summary of Terrestrial Effects – Alternative B

Effects of alternative B include permanently removing approximately 7.1 acres of late-successional forest by constructing a road and altering habitat microclimate associated with the edge induced by the road. This would occur in high-quality suitable habitat for two federally listed species, the marbled murrelet and northern spotted owl. Suitable habitat removal would occur within the home range of a spotted owl pair already below the habitat threshold (the minimum necessary to maintain territorial owls). The habitat removal would be in designated critical habitat for both the northern spotted owl and the marbled murrelet, lands considered essential to the conservation of the species. Noise generated from the project activities during the marbled murrelet early breeding season would disturb 16 acres suitable habitat assumed occupied by marbled murrelets. Under this alternative the proposed activities “may affect, and is likely to adversely affect” the marbled murrelet, the northern spotted owl, and their designated critical habitats.

The approximately 7.1 acres of forest removal and associated edge effects would be in suitable habitat for a variety of other animal species, including the bald eagle, primary cavity excavators, terrestrial mollusks, amphibians, tree-roosting bats, deer and elk, northern goshawk, and migratory and resident forest landbirds. Of these species, 12 have the status Sensitive, five Management Indicator Species or species groups, and four species of concern. The activities under this alternative may impact habitat for these species or displace individuals, but likely would not contribute towards federal listing or cause a loss of viability to the populations or species, cause a need for conservation action, or affect the persistence of any species. The approximately 7.1 acres of habitat removal would be in a Bald Eagle Management Area (BEMA), but the amount of habitat in the BEMA would remain within ONF LRMP objectives.

Under this alternative, portions of a Forest Service road and dispersed camping areas,

approximately 2 acres total, would be closed and rehabilitated through native vegetation treatments. The two acres would develop into riparian hardwood/ coniferous forest habitat in the long-term, benefiting many terrestrial wildlife species.

There would be minor increases in adverse cumulative effects to wildlife in the watershed. Big game cover and road densities, however, would remain within required levels.

Of all the alternatives, Alternative B would have the greatest impacts to terrestrial wildlife and habitat. Effects to the federally listed marbled murrelet and northern spotted owl particularly would be considerable due to removal of high-quality suitable habitat within designated critical habitat units and in a spotted owl home range already below threshold habitat level.

Forest Plan Amendments

Olympic National Forest
This alternative would not meet the Late-Successional Reserves standards and guidelines requirements for marbled murrelet preproject surveys, protection of marbled murrelet recruitment habitat within a 0.5 mile radius of an occupied site, the requirement that new roads minimize adverse impacts to LSR habitat, or the guideline that nonsilvicultural activities located inside LSR be neutral or beneficial to the creation and maintenance of late-successional habitat. The proposed four terrestrial Forest Plan amendments to the Olympic Forest Plan would allow this alternative to be consistent with the Forest Plan. The impact of the amendment to waive the preproject survey requirement is mitigated by assuming occupancy. The adverse impacts of not providing the protection buffer, not minimizing adverse road impacts, and removing an estimated 7.1 acres of late-successional habitat are described in detail in the preceding environmental consequences section. Additionally there is a proposed Forest Plan amendment to aquatic based standards and guidelines (see Aquatic Species and Habitat Conditions section of this chapter for details).

Alternative C – Reroute 2 Retaining Wall Emphasis

Direct/Indirect Effects

Olympic National Forest
Introduction
The effects to wildlife species and habitats are the same as under Alternative B except the permanent removal of late-successional forest habitat would be approximately 6.5 acres instead of 7.1. All Management Requirements under this Alternative would be the same as Alternative B.

Federal Threatened and Endangered Species
Marbled Murrelet and Designated Critical Habitat
The effects to marbled murrelet are the same as Alternative B except the permanent removal of late-successional forest habitat would be approximately 6.5 acres, about an 8

percent decrease. This would remove an estimated 6.5 acres of forest containing constituent elements in designated Critical Habitat Unit WA-06a. There would also be more impact to potentially occupied marbled murrelet habitat adjacent to the haul route, if hauling occurs during the early breeding season, since road construction would require a material source site from which approximately 3380 dump-truck loads of material would be hauled to the project area. This is almost twice the number of truck loads compared to Alternative B.

All Management Requirements under Alternative B would be applied to this alternative. Since the road realignment would be the same as in Alternative B, the amount of suitable habitat that would by subjected to noise disturbance during the early breeding season would be the same, 15.7 acres (amount of habitat within 35 yards of the proposed road).

Preliminary ESA Determinations

Under this alternative the proposed activities "may affect, likely to adversely affect" the marbled murrelet due to the permanent removal of an estimated 6.5 acres of suitable habitat and to harassment from noise generating activities during the early breeding season. There would not be direct mortality or injury to nesting marbled murrelets from tree-felling. This alternative would also result in a "may affect, likely to adversely affect" determination for designated Critical Habitat Unit WA-06a because of the permanent removal of primary constituent elements. Coordination with US Fish and Wildlife Service has been on-going throughout the development of this project. These preliminary determinations are based in part on feed-back from the federal regulatory agencies.

Northern Spotted Owl and Designated Critical Habitat

The effects to northern spotted owl are the same as Alternative B, except the permanent removal of late-successional forest habitat would be approximately 6.5 acres, about an 8 percent decrease. This would remove an estimated 6.5 acres of forest containing constituent elements in designated Critical Habitat Unit WA-49. There would also be more impact to potentially occupied northern spotted owl habitat adjacent to the haul route if hauling occurs during the early breeding season, since road construction would require a material source site from which approximately 3380 dump-truck loads of material would be hauled to the project area. This is almost twice the number of truck loads compared to Alternative B.

All Management Requirements under Alternative B would be applied to this alternative.

Preliminary ESA Determinations

Under this alternative, the proposed action would have an effect determination for the northern spotted owl as "may affect, likely to adversely affect" due to the permanent removal of an estimated 6.5 acres of suitable habitat within two activity centers, one which is below habitat threshold. There would not be direct harm to nesting northern spotted owls. This alternative would also result in a 'may affect, likely to adversely affect' designated Critical Habitat Unit WA-49 because of the permanent removal of primary constituent element. Coordination with US Fish and Wildlife Service has been on-going throughout the development of this project. These preliminary determinations

are based in part on feed-back from the federal regulatory agencies.

Forest Service Sensitive

Bald Eagle

The effects to bald eagle are the same as under Alternative B except the permanent removal of late-successional forest habitat would be approximately 6.5 acres, about an 8 percent decrease. Within the BEMA, the amount of older forest would decrease from 89 acres to 82.5 acres.

Under this alternative the proposed activities may impact individuals or habitat for the bald eagle but would not likely contribute towards federal listing or cause a loss of viability to the populations or species. Individual bald eagles may be affected but no known nest territories or communal night roosts would be impacted. Furthermore the BEMA objectives of maintaining sufficient bald eagle habitat would be maintained.

Terrestrial Mollusks

The effects to mollusks would be the same as under Alternative B except the permanent removal of late-successional forest habitat would be approximately 6.5 acres, about an 8 percent decrease. Implementing this alternative may impact individuals or habitat for one Sensitive mollusk species, the warty jumping slug, but would not likely contribute towards federal listing or cause a loss of viability to the populations or species.

Amphibians

The effects to Van Dyke's salamander, Cope's giant salamander, and Olympic torrent salamander are the same as Alternative B except the permanent removal of late-successional forest habitat (which is all within a Riparian Reserve) would be approximately 6.5 acres, about an 8 percent decrease. The removal of an estimated 6.5 acres which includes large diameter standing and down dead and disturbing a small wetland and tributaries would not affect the viability of the species dependent upon such structure.

The effects to the Van Dyke's salamander, Cope's giant salamander, and Olympic torrent salamander would not likely contribute towards federal listing or cause a loss of viability to the populations or species.

Bats

The effects to bats are the same as Alternative B except the permanent removal of late-successional forest habitat would be approximately 6.5 acres, about an 8 percent decrease. Removing the trees may impact individuals or habitat for a Sensitive species, the Townsends big-eared bat, but would not likely contribute towards federal listing or cause a loss of viability to the populations or species.

Fisher

The effects to fisher would be the same as Alternative B except the permanent removal of late-successional forest would be approximately 6.5 acres, about an 8 percent decrease. Implementing this alternative may impact the fisher, a Sensitive species, but would not likely contribute towards federal listing or cause a loss of viability to the population or species.

Olympic National Forest Management Indicator Species

Pileated Woodpecker and Pine Marten, Primary Cavity Excavators

The effects to the above listed species are the same as Alternative B except the permanent removal of late-successional forest habitat (which is all within a Riparian Reserve) would be approximately 6.5 acres, about an 8 percent decrease. The removal of an estimated 6.5 acres which includes large diameter standing and down dead would not affect the viability of the species dependent upon such structure.

The effects to pileated woodpecker, pine marten, and primary cavity excavators would not likely contribute towards federal listing or cause a loss of viability to the populations or species.

The effects to snag and down log densities are the same as Alternative B except the permanent removal of late-successional forest would be 6.5 acres, about an 8 percent decrease. The implementation of this alternative would not affect viability of species dependent on these habitat elements.

Deer and Elk

The effects to deer and elk would be the same as under Alternative B except the permanent removal of optimal thermal cover would be approximately 6.5 acres, about an 8 percent decrease. The increase in road density would be the same as in Alternative B, from 0.5 to 0.6 mi/mi² in the middle Dosewallips subwatershed and from 0 to 0.2 mi/mi² in the upper Dosewallips subwatershed.

Federal Species of Concern

Northern Goshawk

The effects to northern goshawk are the same as Alternative B except the permanent removal of suitable forest habitat would be approximately 6.5 acres, about an 8 percent decrease. Implementing this alternative likely would not contribute towards federal listing or a need for conservation action for the northern goshawk.

Olive-sided flycatcher

The effects to this listed species are the same as Alternative B except the permanent removal of late-successional forest (which is all within a Riparian Reserve) would be approximately 6.5 acres, about an 8 percent decrease. The removal of an estimated 6.5 acres, which includes large diameter standing and down dead, would not affect the viability of the species dependent upon such structure.

The effects to olive-sided flycatcher would not likely contribute towards federal listing or cause a loss of viability to the populations or species.

Tailed Frog and Western Toad

The effects would be the same as those for Alternative B except the permanent removal of late-successional forest habitat would be approximately 6.5 acres, about an 8 percent decrease.

Migratory Birds (Forest Landbirds)

The effects to these species are the same as Alternative B except the permanent removal

of late-successional forest habitat (which is all within a Riparian Reserve) would be approximately 6.5 acres, about an 8 percent decrease.

Cumulative Effects

The cumulative effects for this alternative are the same as Alternative B.

Summary of Terrestrial Effects – Alternative C

Alternative C would have similar impacts on the terrestrial species and habitats as described for Alternative B, except the permanent removal of late-successional forest habitat removal would be approximately 6.5 acres, about an 8 percent decrease. Of the action alternatives, the impacts to terrestrial wildlife species would be slightly less than Alternative B and greater than Alternative F.

Forest Plan Amendments

Olympic National Forest
This alternative would not meet the Late-Successional Reserves standards and guidelines requirements for marbled murrelet preproject surveys and protection of recruitment habitat within a 0.5 mile radius of an occupied site, or the guideline that nonsilvicultural activities located inside LSR be neutral or beneficial to the creation and maintenance of late-successional habitat. The proposed three terrestrial Forest Plan amendments to the Olympic Forest Plan would allow this alternative to be consistent with the Forest Plan. The impact of the amendment to waive the preproject survey requirement is mitigated by assuming occupancy. The adverse impacts of not providing the protection buffer and removing approximately 6.5 acres of late-successional habitat are described in detail in the preceding environmental consequences section. Additionally there is a proposed Forest Plan amendment to aquatic based standards and guidelines (see Aquatic Species and Habitat Conditions section of this chapter for details).

Alternative F - Bridge

Direct/Indirect Effects

Olympic National Forest
Marbled Murrelet and Designated Critical Habitat
Using equipment including motorized tools, chainsaws, rock drills, impact drivers, bulldozers, trucks and other heavy equipment during the breeding season from April 1 to September 15 could disturb marbled murrelets nesting in adjacent habitat. The potential disturbance-caused injuries include flushing from the nest, aborted feeding attempts, and postponed feedings (USDI 2003a). Marbled murrelets are particularly vulnerable to disturbance during the early breeding season (April 1 – August 5) when they are producing and incubating eggs. The risk of injury is much less during the late breeding season when adults are present at the nest only when they are feeding the young. Noise generating equipment would be operated during the late breeding season, August 6 – September 15 and a portion of the early breeding season, July 1 – August 5. The injury

threshold distance for marbled murrelets from operating impact drivers is 60 yards and 35 yards from heavy equipment and motorized tools (USDI 2003a). Operating the pile driver within 60 yards and operating heavy equipment/motorized tools within 35 yards of suitable habitat during a portion of the early breeding season would adversely impact marbled murrelets. A total of approximately 2.5 acres of suitable habitat would be impacted by noise disturbance (amount of habitat within 60 yards of the proposed bridge work). Impacts from noise would last for three breeding seasons.

The danger tree removal would occur within a one-acre area in a marbled murrelet Critical Habitat Unit. Since the trees in this area are small (less than 21 inches dbh) this action likely would not impact potential marbled murrelet nest trees, the first constituent element of critical habitat. However the danger tree removal may affect the second constituent element of critical habitat which is forest within 0.5 mile of suitable nest trees with a canopy height of at least one-half the potential tree height.

Preliminary ESA Determinations

Under this alternative the proposed activities "may affect, and is likely to adversely affect" the marbled murrelet due to harassment from noise generating activities during the early breeding season. There would be no direct mortality or injury to nesting marbled murrelets from tree-felling. This alternative "may affect, likely to adversely affect" designated Critical Habitat Unit WA-06a due to affecting a constituent element of critical habitat. Coordination with US Fish and Wildlife Service has been on-going throughout the development of this project. These preliminary determinations are based in part on feed-back from the federal regulatory agencies.

Northern Spotted Owl and Designated Critical Habitat

Alternative F would involve the following activities that may affect the northern spotted owl: increasing noise above ambient levels during the early breeding seasons and danger tree removal that would alter about 1.0 acre of forested habitat. The 1.0 acre affected by danger tree removal would not involve trees of substantial large diameters and stand complexity as in the reroute alternatives, but the stand is within suitable habitat component therefore the removal would constitute removal of about 1 acre of suitable habitat.

Constructing the bridge would increase noise above the natural ambient level during the early breeding season and could adversely affect the northern spotted owl. Operations occurring between July 16 and September 30 would create noise above ambient levels potentially causing disturbance over 7 acres of suitable habitat. Because of the lack of surveys within the analysis area, all suitable habitat is presumed occupied.

Spotted owls are more vulnerable to noise disturbance early in the breeding season (March 1 through July 15). Above ambient noise produced during the early breeding season could potentially disrupt normal behavior patterns making potentially nesting owls more susceptible to harassment (USDI 1996). After July 15 potential effects become less of a concern and of no concern beyond September 30. Operation of pile driver equipment, heavy equipment, and motorized tools would be scheduled to occur during a portion of the spotted owl early breeding season, July 1 – 15, and during the late breeding

season, July 16 – September 30. The injury threshold distance for spotted owls from operating impact drivers is 60 yards and from heavy equipment and motorized tools is 35 yards (USDI 2003a). Operating the pile driver within 60 yards and operating heavy equipment/motorized tools within 35 yards of suitable habitat during the early breeding season would adversely impact spotted owls. A total of 2.5 acres of suitable habitat would be impacted by noise disturbance (amount of habitat within 60 yards of the proposed bridge construction work).

Impacts from project generated noise are expected to last for three breeding seasons, the duration of the project. However once the road is reopened motorized traffic is expected to return to pre-flood event levels.

The equipment used to construct the bridge could spread seeds of noxious weeds. Also disturbed soils could become invaded with noxious weeds. If the existing noxious weed populations spread they could impact native terrestrial habitats. Management requirements would be taken to prevent the spread of noxious weeds.

Preliminary ESA Determinations

Under this alternative the proposed activities "may affect, is likely to adversely affect" the northern spotted owl resulting from noise disturbance during construction activities and the removal of one acre of suitable habitat that would further reduce one activity center below habitat threshold. For designated Critical Habitat Unit WA-49 the effects of implementing this alternative would result in a "may affect, is likely to adversely affect" due to permanent removal of constituent habitat elements. Coordination with US Fish and Wildlife Service has been on-going throughout the development of this project. These preliminary determinations are based in part on feed-back from the federal regulatory agencies.

Forest Service Sensitive

Bald Eagle

Direct effects to bald eagles include removing danger trees in the Dosewallips BEMA. The danger tree removal would alter about 1.0 acre of bald eagle habitat. However since the trees in this area are small (less than 21 inches dbh) potential nest or winter roost trees likely would not be affected. Trees suitable for diurnal perching could be removed under this alternative and individual bald eagles perched along the river could be disturbed by project activities.

Under this alternative the proposed activities may impact individuals or habitat for the bald eagle but would not likely contribute towards federal listing or cause a loss of viability to the populations or species. Individual bald eagles may be affected but no known nest territories or communal night roosts would be impacted. Furthermore the BEMA objectives of maintaining sufficient bald eagle habitat would be maintained.

Terrestrial Mollusks

Direct effects to one Sensitive terrestrial mollusk include degrading about 1.0 acre of habitat from danger tree removal and damaging any undiscovered individuals by heavy equipment. Indirect effects include the spread of noxious weeds invading habitats.

About two acres of dispersed camping areas near the washout would be closed and rehabilitated through native vegetation treatments which would provide future habitat for terrestrial mollusks.

One Sensitive mollusk species, the warty jumping slug, has been found at one site in the project area. However the site would be protected since it is over 200 feet from the proposed bridge construction route. This species is locally common and well distributed on the Olympic National Forest (Ziegltrum 2001 and 2004). No other terrestrial mollusk species have been found in the project area despite conducting surveys using current protocols (Duncan et al. 2003). Implementing this alternative may impact individuals or habitat for this Sensitive mollusk species but would not likely contribute towards federal listing or cause a loss of viability to the populations or species.

Amphibians

Direct effects to Van Dyke's Salamander, Cope's Giant Salamander, and Olympic Torrent Salamander would include the degradation of about 1.0 acre of riparian forest habitat, where amphibians may be present. The removal of danger trees, however, would be located in an area away from streams where the aquatic life form of these species would reside. This alternative would involve altering about 0.016 acre of wetland, which provides suitable habitat for amphibians. The alteration and disturbance to upslope seeps and springs that would occur under the re-route alternatives, would not occur under this alternative. Direct effects could also include mortality to any undiscovered individuals by heavy equipment, but this would be considered minimal in terms of effects upon the entire population.

The effects to the Van Dyke's Salamander, Cope's Giant Salamander, and Olympic Torrent Salamander would not likely contribute towards federal listing or cause a loss of viability to the population or species.

Bats

Direct effects to tree-roosting bats include removing trees in an estimated 1.0 acre area which may provide suitable roost sites and damaging any undiscovered individual bats. However the trees to be removed provide low-quality habitat due to small tree size. Furthermore no caves or human structures used by bats would be impacted. Implementing this alternative may affect individuals or habitat for a Sensitive species, the Townsends big-eared bat, but would not likely contribute towards federal listing or cause a loss of viability to the populations or species.

Fisher

Direct effects to fisher include the removal of danger trees for approximately 100 feet from the top of the slope which involves about 1 acre of forest. Implementing this alternative may impact individuals or habitat for the fisher, a Sensitive species, but would not likely contribute towards federal listing or cause a loss of viability to the population or species.

Olympic National Forest Management Indicator Species

Pileated Woodpecker and Pine Marten, Primary Cavity Excavators

Effects to species dependent upon standing and downed dead wood include the removal of about 1 acre of forested habitat, some that may be used for foraging, roosting, denning, or nesting. The removal of this habitat would not affect the viability of the pine marten, pileated woodpecker, or other primary cavity excavators as the amount of high quality habitat for these species in the watershed is higher than most watersheds on the eastern flank of the Peninsula.

Deer and Elk

Direct effects to deer and elk include degrading about 1 acre of thermal cover from the danger tree removal and disturbing deer and elk in the area during the bridge construction activities. Indirect effects include increasing vehicular harassment from opening the road. About 5 miles of road above the washout would be opened for motorized access, increasing potential vehicular harassment by humans to wildlife such as deer and elk. In addition recreational use of the campgrounds in the National Forest and the National Park would increase. The campgrounds and the road are in riparian areas and many terrestrial wildlife species typically use riparian areas for food, cover, water, and as travel routes. However since the road density in this area is low (less than 1.0 mile road per square mile) the indirect harassment effects from opening the road appear minimal. The road density in the middle Dosewallips subwatershed would increase from 0.5 to 0.6 mi/mi^2, and the road density in the upper Dosewallips subwatershed would increase from 0 to 0.2 mi/mi^2.

Federal Species of Concern

Northern Goshawk

Direct effects to the northern goshawk include removing trees in approximately 1.0 acre of habitat from felling danger trees. Since the work would be done during the breeding season it could potentially disturb any goshawks nesting in the area. However suitable habitat would be available in the surrounding forested areas of the watershed. The alternative would not likely contribute towards federal listing or a need for conservation action for the northern goshawk

Olive-sided Flycatcher

Under this alternative the removal of about 1 acre of forested upland habitat would have no impact to the olive-sided flycatcher on a landscape or population scale.

Tailed Frog and Western Toad

Direct effects to trailed frog and western toad would include the removal of about one acre of habitat within the Riparian Reserve where these species may be present, and altering about 0.016 acre of wetland, which potentially provides suitable habitat for amphibians. However the alteration and disturbance to upslope seeps and springs would not occur under this alternative. Direct effects could also include mortality to any undiscovered individuals by heavy equipment, but this would be considered minimal in terms of effects upon the entire population.

Migratory Birds (Forest Landbirds)

Under this alternative the removal of about 1 acre of forested upland habitat would have no impact to migratory birds on a landscape or population scale.

Cumulative Effects

Past activities that removed late-successional forest habitat in the Dosewallips watershed include fire, timber harvest, road construction, and the development of Elkhorn Campground and national park facilities. A total of 10,838 acres regeneration timber harvest has occurred in the Dosewallips watershed on all ownerships since the 1920's. Seven fires totaling 19,700 acres burned in the watershed since the 1800's. These areas of fire and timber harvest are now mid-successional forest, about 20 to 135 years old. According to the watershed analysis (USDA 1999) the amount of late successional forest (forests over 200 years old) remaining in the watershed is 35,760 acres (46 percent). The amount of lower elevation late-successional forests which provide marbled murrelet and spotted owl habitat is 22,586 acres (29 percent of watershed). Alternative F would very minimally add to the aggregated effects by altering about 1.0 acre of late-successional habitat in the National Forest.

Future timber harvest activities include the proposed Jackson thinning on National Forest land composed of 70 to100+ year old (mid-successional) forest including about 1,000 acres in Rocky Brook subwatershed. This proposed sale may in the short-term degrade habitat for terrestrial mollusks, cavity nesters, and thermal cover for deer and elk. Alternative F would add to the aggregated effects of habitat degradation by altering about 1.0 acre of late-successional forest habitat from removing danger trees along the road.

Present and past activities that disturb wildlife include using and maintaining the road system year round. There are about 116 miles road being used and maintained in the watershed. Alternative F would add to the aggregated effects of wildlife disturbance by opening 5 miles of road and 14 acres of campground that have not been used by motorized vehicles since the washout in 2002. The miles of roads in the watershed would increase from 116 to about 122 miles. However the road density in the middle and upper watershed would still be relatively low. The road density in the middle Dosewallips subwatershed would increase from 0.5 to 0.6 mile/sq mile, and the road density in the upper Dosewallips would increase from 0 to 0.2 mile/sq mile.

Past ONP activities including the construction of the road and park facilities removed a small portion of northern spotted owl and murrelet habitat from the park. However these species still utilize the Dosewallips area and they are not necessarily disturbed by the existing use and operation of the area roads and facilities. The area facilities, maintenance activities, and visitor use has not precluded the development of an owl nest site near the ranger station. Park operations including day-to-day maintenance and visitor use of the facilities as well as maintenance activities on the 1.7 miles of park road would be reinstituted in the Dosewallips area after the road is open. These activities would be confined to the existing road corridor and in the developed area, would be short-term, and could disturb listed birds. In addition it is possible that if the facilities are reopened that several danger trees would be removed. These trees may provide habitat to murrelets or owls. Timing restrictions would reduce the potential for direct loss of nests or individuals. Mitigation includes inspection of the trees by NPS wildlife biologists prior

to removal. If a nest site is found in a danger tree the immediate area would be closed and the tree would not be removed until after nesting season. Overall, short-term, minor, adverse impacts would result from noise and harassment and potential removal of trees. However since this work would occur after the project is completed there would be no cumulative effects from noise and activities related to project work and since no trees would be removed from NPS lands under this alternative there would be no cumulative effects related to habitat removal.

Under this alternative, with the reopening of the road, the aerial operations landing zone would be reestablished within the park. Visitor use would increase. Most of these activities would occur during the spring to fall months (primary season of work and visitor use mid-May to mid-September). Aerial operations occur after the nesting seasons except in emergency situations such as search and rescue operations. Aerial operations that occur during or after late nesting seasons for listed bird species would result in negligible to minor adverse effects to listed bird species. Those aerial operations which occur during early nesting season, restricted to emergency operations, could result in adverse effects to listed bird species. The contribution of this alternative to these impacts is small since the project would be of short duration avoiding sensitive nesting seasons. Therefore there would be very minor cumulative effects associated with ONP proposed activities.

Overall there would be very minor increases in adverse cumulative effects to wildlife in the watershed and no thresholds (such as elk cover) would be exceeded. The incremental impacts from this project when added to the impacts of the previously mentioned past, present, and reasonably foreseeable actions would not result in substantial cumulative impacts to the resource, or affect the ability of the resource to sustain itself.

Summary of Terrestrial Effects - Alternative F

This alternative would have the least impact to terrestrial species and habitats of the action alternatives. About one acre of riparian forest would be impacted and this would be low quality habitat for spotted owls and marbled murrelets. Noise generated from the project activities during the early breeding seasons would disturb about 2.5 acres of suitable habitat assumed occupied by marbled murrelets and northern spotted owls. About one acre forest would be altered within critical habitat for both the northern spotted owl and marbled murrelet. Under this alternative the proposed activities “may affect, and is likely to adversely affect” the marbled murrelet, the northern spotted owl, and designated critical habitats for the marbled murrelet and northern spotted owl.

Forest Plan Amendments

Olympic National Forest
This alternative is consistent with all terrestrial Forest Plan standards and guidelines and as such no site-specific, non-significant Forest Plan amendments to terrestrial standards and guidelines are proposed. However, there is a proposed Forest Plan amendment to aquatic based standards and guidelines (see Aquatic Species and Habitat Conditions

section of this chapter for details).

Table 19: Summary of effects to terrestrial species

Species or Species Groups	Species Status	Alternative A No Action	Alternative B Reroute 1 Bench Emphasis	Alternative C Reroute 2 Retaining Wall Emphasis	Alternative F Bridge
Marbled Murrelet	T	No habitat impact	Remove 7.1 acres suitable habitat; 15.7 acres noise disturbance	Remove 6.5 acres suitable habitat; 15.7 acres noise disturbance	Remove 1 acre suitable habitat; 2.5 acres noise disturbance
Marbled Murrelet Critical Habitat	Designated	No habitat impact	Remove 7.1 acres, constituent element	Remove 6.5 acres, constituent element	Degrade 1 acre of constituent element
Northern Spotted Owl	T, MIS	No habitat impact	Remove 7.1 acres suitable habitat (one activity center below habitat threshold);	Remove 6.5 acres suitable habitat (one activity center below habitat threshold);	Remove 1 acre suitable habitat (one activity center below habitat threshold); 7 acres noise disturbance
Northern Spotted Owl Critical Habitat	Designated	No habitat impact	Remove 7.1 acres constituent element (nesting, roosting, foraging, or dispersal habitat)	Remove 6.5 acres constituent element	Remove 1 acre constituent element
Bald Eagle	S, MIS	No habitat impact	Remove 7.1 acres habitat in BEMA	Removal 6.5 acres habitat in BEMA	No nest/roost habitat removal; may impact perch trees

Species or Species Groups	Species Status	Alternative A No Action	Alternative B Reroute 1 Bench Emphasis	Alternative C Reroute 2 Retaining Wall Emphasis	Alternative F Bridge
Terrestrial Mollusks	S	No habitat impact	Remove 7.1 acres habitat	Remove 6.5 acres habitat	Remove 1 acre habitat
Van Dykes Salamander	S	No habitat impact	Removal 7.1 acres of Riparian Reserve. Impact 14 tributary crossings and 0.019 acre wetland	Removal 6.5 acres in Riparian Reserve. Impact 14 tributary crossings and 0.02 acre wetland	Removal 1 acre of Riparian Reserve; impact 0.016 acre wetland habitat
Cope's Giant Salamander	S	No habitat impact	Removal 7.1 acres of Riparian Reserve. Impact 14 tributary crossings and 0.019 acre wetland	Removal 6.5 acres in Riparian Reserve. Impact 14 tributary crossings and 0.02 acre wetland	Removal 1 acre of Riparian Reserve; impact 0.016 acre wetland habitat
Olympic Torrent Salamander	S	No habitat impact	Removal 7.1 acres of Riparian Reserve. Impact 14 tributary crossings and 0.019 acre wetland	Removal 6.5 acres in Riparian Reserve. Impact 14 tributary crossings and 0.02 acre wetland	Removal 1 acre of Riparian Reserve; impact 0.016 acre wetland habitat
Townsend's Big-eared Bat	S	No habitat impact	Remove 7.1 acres forest, may be roosting habitat	Remove 6.5 acres forest, may be roosting habitat	May remove 1 acre roost habitat
Pacific Fisher	C, S (extirpated)	No habitat impact	Remove 7.1 acres habitat	Remove 6.5 acres habitat	Degrade 1 acre habitat

Species or Species Groups	Species Status	Alternative A No Action	Alternative B Reroute 1 Bench Emphasis	Alternative C Reroute 2 Retaining Wall Emphasis	Alternative F Bridge
Deer and Elk	MIS	Increase 31 acres forage habitat	Remove 7.1 acres optimal cover; increase road density 0.5 to 0.6 mi/mi²	Remove 6.5 acres optimal cover; increase road density 0.5 to 0.6 mi/mi²	Increase road density 0.5 to 0.6 mi/mi²; reduce optimal cover by 1 acre
Pileated Woodpecker, Pine Martin	MIS	No habitat impact	Remove 7.1 acres habitat	Remove 6.5 acres habitat	Remove 1 acre habitat
Primary Cavity Excavators	MIS	No habitat impact	Remove 7.1 acres habitat	Remove 6.5 acres habitat	Remove 1 acre habitat
Northern Goshawk	SOC	No habitat impact	Remove 7.1 acres habitat	Remove 6.5 acres habitat	Remove 1 acre habitat
Olive-sided Flycatcher	SOC	No habitat impact	Remove 7.1 acres habitat	Remove 6.5 acres habitat	Remove 1 acre habitat
Tailed frog and western toad	SOC	No habitat impact	Remove 7.1 acres habitat	Remove 6.5 acres habitat	Remove 1 acre habitat
Forest Landbirds		No habitat impact	Remove 7.1 acres habitat	Remove 6.5 acres habitat	Remove 1 acre habitat

T = USFWS, Federal, Threatened; SOC = USFWS, Species of Concern; S = R6 Sensitive species; MIS = ONF, Management Indicator Species; C = Candidate species.

Table 20: Terrestrial species effects determinations

Species or Species Groups	Species Status	Alternative A No Action	Alternative B Reroute 1 Bench Emphasis	Alternative C Reroute 2 Retaining Wall Emphasis	Alternative F Bridge
Marbled Murrelet	T	No Effect	May Affect, Likely to Adversely Affect	May Affect, Likely to Adversely Affect	May Affect, Likely to Adversely Affect
Marbled Murrelet Critical Habitat	Designated	No Effect	May Affect, Likely to Adversely Affect	May Affect, Likely to Adversely Affect	May Affect, Likely to Adversely Affect
Northern Spotted Owl	T, MIS	No Effect	May Affect, Likely to Adversely Affect	May Affect, Likely to Adversely Affect	May Affect, Likely to Adversely Affect
Northern Spotted Owl Critical Habitat	Designated	No Effect	May Affect, Likely to Adversely Affect	May Affect, Likely to Adversely Affect	May Affect, Likely to Adversely Affect
Bald Eagle	S, MIS	No Impact	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	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	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

Species or Species Groups	Species Status	Alternative A No Action	Alternative B Reroute 1 Bench Emphasis	Alternative C Reroute 2 Retaining Wall Emphasis	Alternative F Bridge
Terrestrial Mollusks	S	No impact	For the Sensitive warty jumping slug, 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.	For the Sensitive warty jumping slug, 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.	For the Sensitive warty jumping slug, 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.
Van Dykes Salamander	S	No Impact	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	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	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

Species or Species Groups	Species Status	Alternative A No Action	Alternative B Reroute 1 Bench Emphasis	Alternative C Reroute 2 Retaining Wall Emphasis	Alternative F Bridge
Cope's Giant Salamander	S	No Impact	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	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	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
Olympic Torrent Salamander	S	No Impact	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	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	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
Townsends' Big-eared Bat	S	No impact	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	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	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

Species or Species Groups	Species Status	Alternative A No Action	Alternative B Reroute 1 Bench Emphasis	Alternative C Reroute 2 Retaining Wall Emphasis	Alternative F Bridge
Pacific Fisher	C, S (extirpated)	No Impact	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	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	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

T = USFWS, Federal, Threatened; SOC = USFWS, Species of Concern; S = R6 Sensitive species;
MIS = ONF, Management Indicator Species; C = Candidate species.

Botanical Species and Habitat (Botany Report, May 2006 with October 2007 and March 2008 edits)

Affected Environment

Olympic National Forest
Vegetation in the Dosewallips washout project area primarily consists of late-successional and old growth coniferous forests in the silver fir vegetation zone along with riparian hardwood forests of varying ages. Numerous downed logs and snags, and standing live and dead trees exist in the area. The late-seral forests in the washout area have both overstory and understory vegetation components. Tree species include Douglas-fir, western hemlock, Sitka spruce, western redcedar, red alder, Pacific silver fir, and grand fir. There are a large number of understory species and forbs in the washout area, including vine maple, sword fern, salal, Oregon grape, hazel, various blackberry species, rattlesnake plantain, bracken fern, maidenhair fern, three-leaved foam flower, wood sorrel, thimble berry, vanilla leaf, and numerous mosses, liverworts and lichens. Invasive plant species also exist in the project area: herb Robert, tansy ragwort, and hairy catsear.

Pre-field reviews were performed in order to determine whether the activities proposed in this project pose a potential threat to Federally Threatened, Endangered or Proposed botanical species; or Forest Service Sensitive or other rare or uncommon botanical species. The following materials were considered: aerial photographs, the 2004 Regional Sensitive Plant list, the Olympic National Forest Rare Plant Occurrence GIS cover, the 2006 BLM Geographic Biotic Observations database (GeoBOB), the Washington State Natural Heritage program, district files, and the Olympic National Forest Plants of Concern Identification Guide (May 1994).

Findings from the pre-field review and associated surveys are documented below.

Federal Threatened, Endangered and Proposed Species
There are no Federally Threatened or Proposed non-vascular plants, bryophytes, fungi or lichens documented or suspected on the Olympic National Forest.

There is one Federally Endangered vascular plant, *Arenaria paludicola* (swamp sandwort), that is suspected to occur on the Olympic National Forest. This species is currently considered extirpated in Washington with historical sites recorded in Grays Harbor, King, Pacific, Pierce, and San Juan counties (*Olympic National Forest Plants of Concern Identification Guide, May 1994*). Swamp sandwort grows mainly in wetlands and freshwater marshes from sea level to 1476 feet in elevation and can grow in saturated acidic bog soils and sandy substrates with high organic content.

There are no historical sites of swamp sandwort in the project area and due to lack of suitable habitat it is not likely this species would occur there. There would be no direct, indirect or cumulative effects on this Federally Endangered plant. Therefore the implementation of this

project would not affect the viability of this species.

Forest Service Sensitive and Other Rare or Uncommom Botanical Species
The botany analysis assessed potential effects to species on the Pacific Northwest Regional Forester's Sensitive list (USDA Forest Service 2004) and other rare and uncommon species.

Vascular plants
Habitat for Forest Service Sensitive vascular plant species were assessed for the Dosewallips Road Washout project area in May 2002 (Grover 2002). Of the thirty-six documented or suspected Sensitive vascular plant species for the Olympic National Forest, twelve were identified as having potential habitat in the project area (Table 21). In addition, two rare or uncommon vascular plants were considered as having potential habitat in the project area (*Coptis trifolia* and *Platanthera orbiculata* var *orbiculata).*

Table 21: ONF Sensitive and Other Rare or Uncommon vascular plant species

Common name	Scientific Name	Forest Service Sensitive	Habitat
Triangular-lobed moonwort	*Botrychium ascendens*	Yes	Grassy fields and open woods near streams
Yellow-flowered sedge	*Carex anthoxanthea*	Yes	Grassy and boggy places
Golden chinquapin	*Chrysolepis chrysophylla*	Yes	Dry open sites to thick coniferous woodlands
Tall bugbane	*Cimicifuga elata*	Yes	Moist, shady woods, low elevation
Pacific lanceleaf springbeauty	*Claytonia lanceolata var. pacifica*	Yes	Rock ledges, along margins of creeks
Spleenwort-leaved goldthread	*Coptis asplenifolia*	Yes	Moist conifer forests and bogs at low-mid elevation
Branching montia	*Montia diffusa*	Yes	Low elevation forest
Adder's tongue	*Ophioglossum pusillum*	Yes	Moist meadows, boggy areas
Chain-fern	*Woodwardia fimbriata*	Yes	Streambanks and other moist or wet areas
Threeleaf goldthread	*Coptis trifolia*	No	Wet mossy areas in Western hemlock and silver fir forests
Boreal bedstraw	*Galium kamtschaticum*	Yes	Moist, cold conifer forests and mossy areas
Large round-leaved orchid	*Platanthera orbiculata* var. *orbiculata*	No	Mesic-dry forests in the Western hemlock and silver fir zone; shady areas with deep, moist, undisturbed duff

Bryophytes (mosses and liverworts)

The pre-field analysis for Sensitive and other rare or uncommon bryophyte species revealed no known sites in the Dosewallips Washout project area. The project area contains suitable habitat for two moss species that have both Sensitive status (Table 22).

Table 22: ONF Sensitive and Other Rare and Uncommon bryophyte species

Scientific name	Forest Service Sensitive	Habitat
Schistostega pennata Goblin's gold (moss)	Yes	Mineral soil on upturned tree roots
Tetraphis geniculata bent-knee moss	Yes	Cut end of rotten stumps and lower portion of large rotten logs in shaded, humid conditions from low-mid elevation.
Kurzia makinoana (liverwort)	No	Shady, moist, organic substrates in late-successional and old-growth forest

Fungi

There are 17 Sensitive fungi species that are documented or suspected to occur on the Olympic National Forest. (Table 23). Only one, *Bridgeoporus nobilissimus*, has characteristics that make it feasible to conduct pre-disturbance surveys as this rare fungus has a perennial conk (Hibler and O'Dell 1998). The other sixteen of the Sensitive fungi are seasonal in nature with fruiting bodies in the fall or spring but not predictable from one year to the next.

Table 23: ONF Sensitive and Other Rare and Uncommon fungi species

Sensitive Fungi Species	Status*	Ecological Function	Habitat
Albatrellus avellaneus	Sensitive	Mycorrhizal	Fruits on soil in assoc. w/roots of conifers, probably *Picea* spp., Oct. - Jan.
Albatrellus ellisii	Sensitive	Mycorrhizal	Solitary, scattered, gregarious, or in fused clusters on ground in forests. Under conifers or mixed forests associated w/ *Abies, Picea, Pinus, Pseudotsuga, Tsuga* or *Castanopsis.* Observable late summer and autumn.
Bridgeoporus nobilissimus	Sensitive	Wood saprobe	Sporocarps occur in mesic to wet microsites in forests of all seral stages in the *Abies amabilis* zone. Uses large diameter *Abies procera* & *Abies amabilis* material as host. Observable all year.
Clavariadelphus occidentalis	Sensitive	Mycorrhizal	Solitary to gregarious or in caespitose clusters of 2 or 3 sporocarps; on soil or duff under mixed deciduous-coniferous or deciduous forests. Associated with *Abies*, *Calocedrus*, *Picea*, *Pinus*, *Pseudotsuga*, *Thuja*, *Tsuga*, *Quercus* and *Arbutus*. Sept. - Mar. sometimes May.

Cordyceps capitata	Sensitive	Parasite	Parasitic on various *Elaphomyces* (Deer truffle) species in hardwood or coniferous forests. Season: autumn
Gomphus kauffmanii	Sensitive	Mycorrhizal	Closely gregarious to caespitose, partially hidden in deep humus under *Pinus* and *Abies* spp. In autumn.
Gyromitra californica	Sensitive	Wood/Litter Saprobe	Found fruiting on or adjacent to well-rotted stumps or logs of coniferous trees or on soil rich in brown rotted wood. Season: June.
Leucogaster citrinus	Sensitive	Mycorrhizal	Found in assoc. with the roots of *Abies concolor*, *A. lasiocarpa*, *Pinus contorta*, *P. monticola*, *Pseudotsuga*, & *Tsuga* from 280 - 2000 m. in elevation. Season: Aug. - Nov.
Phaeocollybia attenuata	Sensitive	Mycorrhizal	Scattered in humus soil and with mosses under mixed coniferous forests or forests associated with *Pseudotsuga*, *Tsuga*, *Picea*, *Abies*, *Pinus* and *Sequoia*. Mid to late autumn.
Phaeocollybia fallax	Sensitive	Mycorrhizal	Scattered to gregarious in highly humus soil in mixed coniferous forests assoc. with *Abies*, *Picea*, *Pseudotsuga*, *Thuja*, *Sequoia* & *Tsuga*. Season: Sept-Dec.
Phaeocollybia oregonensis	Sensitive	Mycorrhizal	Associated with the roots of *Abies amabilis*, *Pseudotsuga*, and *Tsuga*. Fruits Oct. - Nov.
Phaeocollybia piceae	Sensitive	Mycorrhizal	Associated with the roots of *Abies amabilis*, *Pseudotsuga*, and *Tsuga*. Fruits Oct. - Nov.
Ramaria cyaneigranosa	Sensitive	Mycorrhizal	Fruits in Oct. in humus or soil and matures above the surface of the ground. Assoc. w/ Abies spp., *Pseudotsuga* and *Tsuga*.
Ramaria gelatiniaurantia	Sensitive	Mycorrhizal	Fruits in Oct. in humus or soil and matures above the surface of the ground. Assoc. w/ Abies spp., *Pseudotsuga* and *Tsuga*.
Ramaria stuntzii	Sensitive	Mycorrhizal	Fruits in humus or soil and matures above the ground in Oct. or Nov. Assoc. w/ Pinaceae spp.
Sarcodon fuscoindicum	Sensitive	Mycorrhizal	Scattered to gregarious on soil in fall and winter.
Spathularia flavida	Sensitive	Litter Saprobe	In clusters or fairy rings on litter or woody debris of conifer and hardwood forests in summer and fall

Bridgeoporus nobilissimus, the fuzzy Sandozi fungus, was not found during surveys conducted on May 21, 2002 and again on June 1, 2006. None of the other 16 Sensitive fungi species have known sites documented in the project area based on a review of the 2006 database, Geographic

Biotic Observations (GeoBOB).

There is suitable habitat for the sixteen seasonal fungi species in the project area in late successional forest habitat or legacy components that are proposed for disturbance in several alternatives. An analysis of the 16 seasonal fungi species resulted in a low likelihood of occurrence in the proposed project area as the distance to any known site is substantial (greater than 20 miles).

Lichens

The pre-field analysis for Sensitive and other rare or uncommon lichen species revealed no known sites in the Dosewallips Washout project area. The project area contains suitable habitat for 15 Sensitive and other rare or uncommon lichen species documented or suspected on the Olympic National Forest (Table 24).

Table 24: ONF Sensitive and Other Rare or Uncommon lichen species

Scientific name	Forest Service Sensitive	Habitat
Dendriscocaulon intricatulum	Yes	Mesic forests in TSHE and ABAM Zones, mature old growth stands, both riparian and not. On lower twigs of suppressed understory trees.
Hypogymnia duplicata	No	OG (often ≥ 400 years old) in high precipitation areas
Leptogium cyanescens	No	TSHE/ABAM forests, 1400-1600' elevation
Nephroma occultum	Yes	OG (often ≥ 400 years old) PSME, TSHE, ABAM forests, mid-upper canopy
Pseudocyphellaria rainierensis	No	OG, on conifers in cool, humid forests in the TSHE and ABAM Zones
Cetrelia cetrarioides	Yes	On bark, mainly Alnus rubra and hardwoods in moist riparian and valley bottom forests.
Collema nigrescens	Yes	On bark of broad-leaved trees and shrubs in low elevation forest, often riparian.
Dermatocarpon luridum	Yes	Grows on rocks, boulders and bedrock in streams, rivers or seeps between 1000-6500' in elevation. Usually submerged or inundated for most of the year.
Leiodermia sorediatum	Yes	On ericaceous shrubs and riparian Alnus rubra in damp, humid habitats.
Leptogium burnetiae var. hirsutum	Yes	Typically epiphytic but also on decaying logs, mosses and rock.
Nephroma bellum	Yes	In moist forests often on riparian hardwoods.
Peltigera neckeri	Yes	On mossy logs, soil and tree bases, especially in wet habitats such as lowland forests.
Peltigera pacifica	Yes	On soil, moss, rocks, logs, and tree bases in low elevation, moist forests.
Platismatia lacunosa	Yes	On boles and branches of hardwoods and conifers in moist, cool, upland sites as well as moist riparian forest.
Usnea longissima	Yes	Epiphytic, fruticose species found in coniferous or hardwood stands and riparian areas.

Olympic National Park
The project area is located on the existing roadway, shoulder, and the adjacent bank. Species present in the general vicinity of the road include Douglas-fir, red alder, big leaf maple, pearly everlasting, yarrow, thimbleberry, salmonberry, and blue rye. At the site (the steep slope just above the wall), mineral soil supports scattered patches of pearly everlasting, grasses, and thimbleberry. Undisturbed slopes nearby which have similar slopes and soils also have low vegetation cover (less than 30%). Overall this appears to be a site which does not naturally support a dense vegetative cover. There are no Federally Threatened, Endangered, or Proposed botanical species, or any unique botanical species that would be affected by the project consequently this issue will not be futher discussed as it relates to the park actions.

Environmental Consequences

Vascular plants

Alternatives A, B, C, and F – All Alternatives

Direct, Indirect, and Cumulative Effects

Olympic National Forest
Field surveys were conducted for the 12 vascular plants listed in Table 21 on May 21, 2002 and again on June 1, 2006, and no Sensitive or other rare or uncommon plants were found. There would be no direct, indirect or cumulative effects on Sensitive vascular plants for any of the alternatives. Implementation of the proposed action would have no risk to species viability or a trend towards Federal listing.

Bryophytes (mosses and liverworts)

Alternatives A, B, C, and F – All Alternatives

Direct, Indirect, and Cumulative Effects

Olympic National Forest
Field surveys were conducted for the three bryophyte species in August 2005 and June 2006, and no Sensitive or other rare or uncommon bryophytes were found. There would be no direct, indirect, or cumulative effects on Sensitive bryophytes with implementation of any of the alternatives. Implementation of any of the alternatives would have no risk to the viability of Sensitive bryophytes or a trend towards Federal listing.

Fungi

Alternatives B and C – Reroute Alternatives

Direct, Indirect Effects, and Cumulative Effects

Olympic National Forest
In general the fungi are a cryptic and challenging taxa group. Sporocarps may be seasonal, ephemeral, and annually variable, making detection difficult. In many cases the ecology and habitat requirements are poorly known. As these species are assumed to be associated with late successional habitats, alteration of these habitats has the potential to impact these fungi species.

The degree of this impact however is difficult to quantify given the lack of information on the distribution and habitat requirements of many of these fungi species.

Analysis of the 16 seasonal fungi species resulted in a low likelihood of occurrence in the project area, as the disturbance to any known site is substantial (greater than 20 miles). Additional suitable fungi habitat and potential host trees are located adjacent to the project area in the late-successional reserve and adjacent Wilderness, and these areas would continue to provide habitat for funge species. For this reason, Alternatives B and C would have no direct, indirect, or cumulative effects on Sensitive fungi and no risk to species viability or a trend towards Federal listing.

Alternatives A (No Action) and F (Bridge)

Direct, Indirect, and Cumulative Effects

Olympic National Forest
There are no known sites of the seventeen Sensitive or other rare or uncommon fungi in the project area. Also there is a low likelihood of occurrence of these fungi in the project area as the distance to any known site is substantial (greater than 20 miles). Late-successional fungi habitat is not affected in these alternatives as the proposed ground disturbance has either previously occurred (Alternative A) or the location of Alternative F does not impact late successional fungi habitat.

Implementation of Alternatives A or F would have no direct, indirect, or cumulative effects on Sensitive fungi and no risk to species viability or a trend toward Federal listing.

Lichens

Alternatives A, B, C, and F – All Alternatives

Direct, Indirect, and Cumulative Effects

Olympic National Forest
Field surveys were conducted for these species in May 2002 and in June 2006 and no Sensitive or other rare or uncommon lichens were found. There would be no direct, indirect, or cumulative effects on Sensitive lichens with implementation of any of the alternatives. Implementation of any of the alternatives would have no risk to the viability of Sensitive lichens or a trend towards Federal listing.

Invasive Plants (Botany Report, May 2006)

Affected Environment

Olympic National Forest
Noxious weeds and other invasive plants may pose a serious threat to the health of National Forests. Executive Order 13112 Invasive Species (Feb. 1999) provides direction that “Federal agencies shall: (1) prevent the introduction of invasive species; (2) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (3) monitor invasive species populations accurately and reliably; and (4) provide for restoration

of native species and habitat conditions in ecosystems that have been invaded." Prevention of invasive plant spread or new infestations along with timely treatment and monitoring of infestations are key objectives for the Olympic National Forest (2080 letter from Forest Supervisor, 2/4/2005).

As of October 2005 all projects need to comply with the Record of Decision on the Pacific Northwest Region Invasive Plant Program, Preventing and Managing Invasive Plants (USDA Forest Service 2005b).

Invasive species surveys were conducted during the August 2005 and June 2006 botanical surveys. Three invasive vascular plants were documented in the project area (Table 25).

Table 25: Invasive plants in the ONF project area

Common name	Scientific name	Washington State Weed Classification*
Herb Robert	Geranium robertianum	B
Tansy ragwort	Senecio jacobaea	B
Hairy catsear	Hypochaeris radicata	B

*****B = Non-native species presently limited to portions of the state. Species are designated for control in regions where they are not yet wide-spread. Preventing new infestations in these areas is a high priority. In regions where these species are already abundant, control is decided at the local level with containment as the primary goal.

Geranium robertianum (Herb Robert) is a low growing, herbaceous, winter and spring annual. It is capable of growing under full canopy in very dense populations and thus poses a threat to forest understories and plant biodiversity. It is spreading rapidly in western Washington. This species is found growing in the east end of the project area adjacent to the dispersed recreation area near the Dosewallips River.

Hypochaeris radicata (hairy catsear) is a perennial plant with yellow flowers resembling a dandelion. It is European in origin and widely established. It is a weed of disturbed sites and waste areas. It is found in the proposed project area along the existing road east of the washout.

Senecio jacobaea (tansy ragwort) is typically a biennial herb but may behave as a perennial if the flowering stalk is injured in any way while flowering. Vegetative regeneration can then occur from crowns, root fragments, or intact roots. It also reproduces by seed which can range from 5,000 to 20,000 per plant. It is a weed of disturbed sites, waste areas, roadsides, and forested areas recently harvested for timber. All parts of the plant are toxic to livestock and humans. It is found near the road washout area.

Olympic National Park

Invasive plants in the park project area include Herb Robert, St. Johnswort, and bull thistle. There is a 0.75 acre patch of Canada thistle at the campground.

Hypericum perforatum (St. Johnswort) is a Class C noxious weed. It is a somewhat long-lived perennial herb that spreads by both underground and above ground creeping stems, and by seed. It is toxic to livestock.

Cirsium vulgare (bull thistle) is another Class C noxious weed. It is a biennial plant that reproduces entirely from seed. This aggressive weed can form dense patches, making revegetation difficult and hindering wildlife and human access.

Cirsium arvense (Canada thistle) is a Class C noxious weed. It is a perennial plant that spreads primarily by vegetative expansion of the root system. It threatens natural communities by directly competing with and displacing native vegetation and decreasing species diversity.

Environmental Consequences

Alternative A - No Action

Direct/Indirect Effects

Olympic National Forest and Olympic National Park
Implementation of the no-action alternative would result in continued spread of existing populations and new infestations of invasive plant species in the project area.

Cumulative Effects

Under the No-Action Alternative existing infestations of invasive plant species would likely continue to spread via use of the temporary trail and the dispersed recreation and parking area on the east end of the washout. The spread of invasive plants would eventually extend beyond the project boundaries into adjacent areas.

Alternatives B, C, and F – All Action Alternatives

Direct/Indirect Effects

Olympic National Forest
Under alternatives B, C, and F there would be newly exposed ground produced in the areas of road construction or foundations for a bridge, as well as areas disturbed by routine maintenance activitites. These areas would be susceptible to noxious weed and invasive plant colonization particularly since there are already invasive species documented in the immediate adjacent area that could provide a ready seed source. In addition, vehicles traveling on roadways can carry seeds and disperse them. Passengers from these vehicles may also unknowingly transport seeds and plant parts as they transition from roadsides to trails and backcountry areas.

In order to control noxious weed colonization and spread under these alternatives weed-spread prevention and weed eradication activities would be implemented before, during, and after project activities (see Mitigations Measures and Management Requirements common to Reroute Alternatives and River Floodplain Alternatives in Chapter 2). Implementation of the mitigation measures would provide positive results in the prevention of invasive plant spread and treatment of current infestations.

Olympic National Park
The project activities would disturb the surrounding area and increase the likelihood for invasive species to become established. Areas disturbed by routine maintenance activities also can create prime habitat for invasives. By reopening the road to vehicle traffic, invasive plants and their seeds may be transported into the park on vehicles, increasing the risk for the spread of exotic plant species. And passengers from these vehicles may also unknowingly transport seeds and plant parts as they transition from roadsides to trails and backcountry areas.

This is not a new impact as vehicle use has historically occurred on the Dosewallips Road. To reduce the potential of spread road maintenance activities are coordinated with the park exotic plant management team (EPMT). Often road maintenance activities are scheduled before the reproductive growth period. Mechanical or treatment by herbicide is also accomplished to mitigate potential spread. Post project monitoring would occur and treatment would be determined on a case-by-case basis. However, there still is some risk of spread if control measures are not successful.

Cumulative Effects

Past activities that have likely contributed to the spread of invasive plant species in the Dosewallips watershed include, but are not limited to, the following:

- Construction of gravel and paved roads providing ease of access to the watershed.
- Timber harvest activities using machinery imported from other geographic areas containing different invasive species propagules.
- Erosion control measures and forage seeding projects introducing non-native invasive plant species in seed mixes and straw sediment barriers.

On going road maintenance in the form of blading, ditch pulling, and hauling away of associated debris to waste sites is currently spreading some of these species as is the use of material for resurfacing from infested rock sources. Recreational use of the area is also currently spreading invasive species. When considering these effects in addition to the potential direct and indirect effects of the action alternatives there would be minor to moderate cumulative effects associated with invasive plants. Overall the incremental impacts from this project when added to the impacts of the previously mentioned past, present, and reasonably foreseeable actions would not result in substantial cumulative impacts to the resource.

Access and Recreation Use (Recreation Report, March 2006)

Affected Environment

Olympic National Forest

FSR 2610 has provided motorized access to the Olympic National Forest Elkhorn Campground since the 1930s. In years prior to the washout the road annually had provided access to thousands of visitors to Forest facilities. Use numbers for Elkhorn Campground for 2001 were 1,908 people using campsites. The road also provided access for administrative use, such as maintaining the campgrounds.

The Olympic National Forest's Elkhorn Campground is approximately one mile beyond the washout and consists of twenty campsites with most accommodating larger camping vehicles as well as tents (Figures 21 and 22). It is located in an old growth wooded area away from busy highways. Water, vault toilets, tables, and fire pits were provided and the campground was generally open from May to September. In the 1980's, Elkhorn Campground consistently exceeded its capacity and was subsequently considered a high priority for expansion by the Olympic National Forest Plan (USDA 1990a). An additional 15 units were planned to be added as money became available. This campground is one of two on the Forest that is considered

"semi-primitive motorized" where campers can experience a high to moderate degree of isolation from the sights and sounds of humans while still enjoying reasonably easy access.

Elkhorn Campground has received no maintenance since the washout in 2002. The vault toilets were boarded closed but have been reopened several times by people. The toilets are full and unusable. Picnic tables and fire rings have deteriorated to the point of being unusable. The river has inundated several sites with gravel and sand deposits. Dispersed camping/picnicking still occurs during the year, however no services have been provided and no monitoring of this use has taken place.

Figure 21: Elkhorn Campground

Figure 22: Elkhorn Campground campsite

A temporary trail has been constructed up and around the washout to provide safe access for hikers, stock, and administrative use. Very limited parking is available near the washout and the road becomes congested in the summer months with vehicles parked along both shoulders.

Olympic National Park

FSR 2610 (becoming The Dosewallips Road when entering the park) was extended past the Elkhorn Campground area to Olympic National Park Dosewallips Campground and trailheads by the Civilian Conservation Corps in the late 1930s and early 1940s. This road up the Dosewallips River valley (FSR 2610 on the ONF and Dosewallips Road on ONP) has been one of the two motorized access points to the eastern wilderness of Olympic National Park, as well as providing access to the developed area at the end of the road. The developed area includes the road, "less developed" campground and restrooms, parking, several trailheads, and a ranger station/housing unit (Figure 23). The developed area was used as a base of operations for aerial activities, including search and rescue operations.

This area is primarily a summer recreational area with visitation reduced to a great extent in the winter months. In 1999 the road use at Dosewallips was 4,299 vehicles annually (NPS traffic counter records). In summer 2001 traffic counts were conducted along U.S. 101 around the park and on access roads within the park. These counts were used to determine the highest daily volumes to park destinations during the summer. Counts for Dosewallips recorded traffic in both directions for a total of 202 vehicles (Parametrix 2002) per day.

Figure 23: ONP Dosewallips Ranger Station

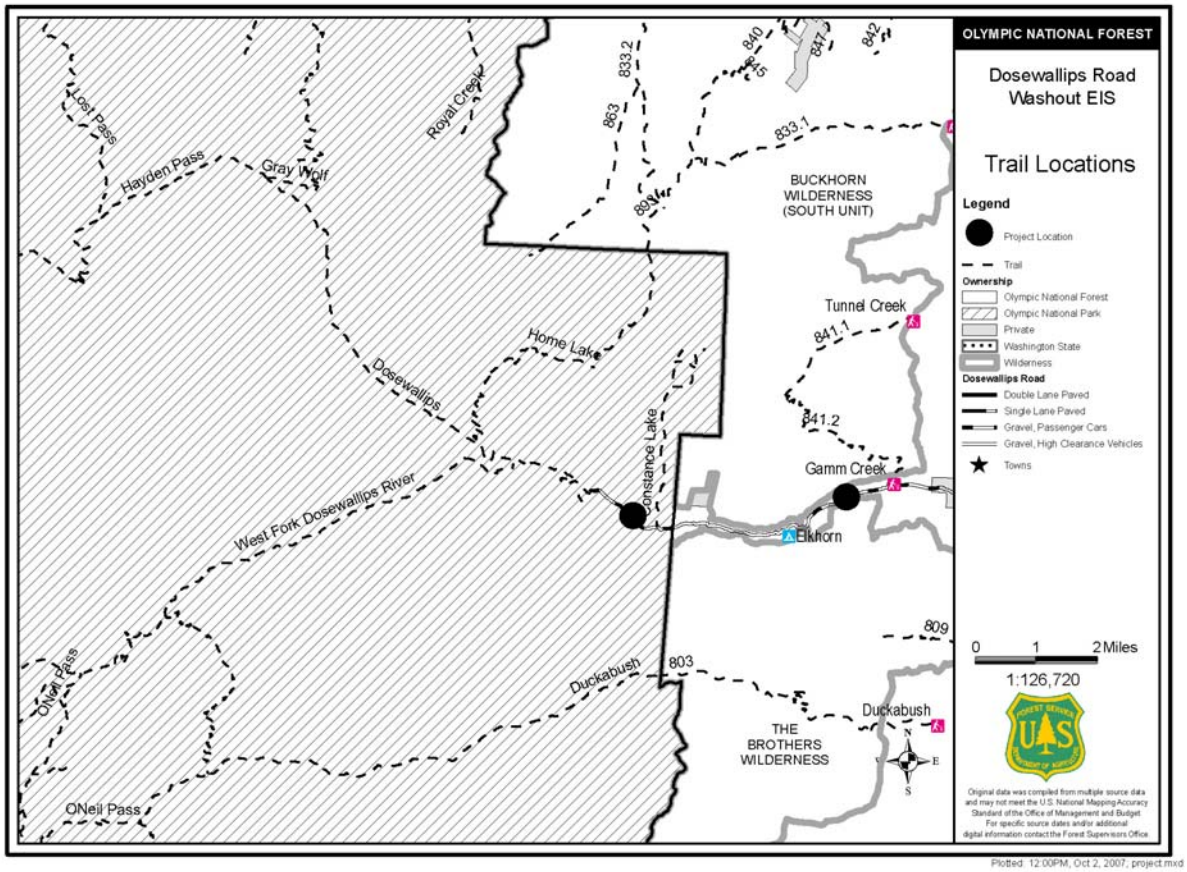
The National Park Service operates a 30-site, less-developed drive-in campground at Dosewallips. The campground was accessible to motorists but generally not accessible to large RVs or vehicles pulling trailers (which are not recommended on the Dosewallips Road past the NPS boundary). In addition Dosewallips park facilities include 30 to 40 unpaved parking spaces in the campground, ranger station area, and at the trail head.

The campground is a popular spot during the summer months and often serves as a first or last night stopover for wilderness travelers. It also provides a more primitive camping opportunity for park visitors. According to area NPS staff the campground was busy during the summer months, approaching capacity during summer weekends prior to the road closure.

Several trailheads (see Figure 24) are located at Dosewallips: the Terrace Loop Trail, and two major cross-park trails. The Main Fork Dosewallips Trail to Hayden Pass leads to the Elwha River, where the trail splits south to Quinault and north to Hurricane Ridge and Elwha. The West Fork Dosewallips Trail leads to Anderson Pass, then down into Enchanted Parkway and Graves Creek, as well as the Quinault area, Lake Constance, and Constance Pass Trail.

Several factors have influenced visitation in the Dosewallips in the past ten years. In 1994 the park determined that the High Dosewallips trail bridge on the West Fork Dosewallips Trail, one of the most popular cross-park wilderness trails, needed to be replaced. In 1996 a major trail bridge on the West Fork Dosewallips Trail was dropped because it was determined to be hazardous. It was replaced by a new bridge in 1998, but that bridge was destroyed by heavy snowloads in 1999. A new bridge was completed in the summer of 2002. Between 1996 and 1998, and 1999 and 2002, no cross park travel on the West Fork Dosewallips Trail was possible as there was no other river crossing available (due to the steepness of the canyon at this point). Therefore visitation in the Dosewallips area and wilderness was greatly reduced during this time.

Figure 24: Trail locations



Since the road was washed out shortly after the bridge was completed the expected increase in travel on the West Fork Dosewallips Trail has not occurred, and wilderness use from the Dosewallips area has decreased. Dosewallips overnight wilderness use in 2002 (pre-road closure) was 1098 parties with 2830 visitors. Post-road closure use has been 315 parties with 812 visitors. According to the NPS Wilderness Information Center staff, permit requests for overnight use in the Lake Constance Basin has also substantially decreased since the road closure.

NPS *Management Policies* 2001 state that the enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks and that the National Park Service is committed to providing appropriate high-quality opportunities for visitors to enjoy the parks.

Part of the purpose of ONP is to offer opportunities for recreation, education, inspiration, and enjoyment. Consequently, one of the park's management goals is to ensure that visitors safely enjoy and are satisfied with the availability, accessibility, diversity, and quality of park facilities, services, and appropriate recreational opportunities.

Public scoping input and observation of visitation patterns combined with assessment of what is available to visitors under current management were used to estimate the effects of the actions in the various alternatives in this document. The impact on the ability of the visitor to experience a full range of park resources was analyzed by examining resources and objectives presented in the park significance statements as derived from its enabling legislation. The potential for change in visitor use and experience proposed by the alternatives was evaluated by identifying projected increases or decreases in access and other visitor uses and then determining whether or how these projected changes would affect the desired visitor experience and to what degree and for how long. The thresholds of change for the intensity of an impact to visitor experiences are defined as follows:

Impact Intensity	Intensity Description
Negligible	Changes in visitor use, experience, and recreational resources would be below or at the level of detection. The visitor would not likely be aware of the effects associated with the alternative.
Minor	Changes in visitor use, experience, and recreational resources would be detectable, although the changes would be slight. The visitor would be aware of the effects associated with the alternative, but the effects would be slight.
Moderate	Changes in visitor use, experience, and recreational resources would be readily apparent. The visitor would be aware of the effects associated with the alternative and would likely be able to express an opinion about the changes.
Major	Changes in visitor use, experience, and recreational resources would be readily apparent and severely adverse or exceptionally beneficial. The visitor would be aware of the effects associated with the alternative and would likely express a strong opinion about the changes.

Visitor use, experience, and recreational resources impacts would be considered short-term if the effects last for the durations of the action. Visitor use impacts would be considered long-term if the effects last longer than the durations of the action.

Environmental Consequences

Alternative A – No Action

Direct/Indirect Effects

Olympic National Forest
FSR 2610 would end at or near the washout. Parking and camping opportunities would be limited and eventually only the most experienced recreationists would access the area. Elkhorn Campground would remain closed. Maintenance would not occur and the site would gradually deteriorate over time with the tables, fire rings, and defined camping sites becoming unusable. The vault toilets would gradually fall apart and the waste would eventually leach into the ground or become diluted with rain or river water. Over time people would still use the area but only for dispersed camping/picnicking. A future decision would be needed on these facilities and on the status of the temporary trail.

The dispersed camping areas along FSR 2610 near the washout would not be disturbed as part of this action.

Olympic National Park
Under the no action alternative recreational opportunities in the Dosewallips area would decrease and visitor use would remain at lower levels than pre-washout conditions. Visitors would no longer be able to utilize vehicles to access Dosewallips ranger station and campground and visitors with accessibility challenges would not be accommodated. Visitors who rely on vehicles for access would not be able to experience the primitive recreational opportunities in the Dosewallips area. Visitors would no longer be able to utilize the campground as it would remain closed.

Visitors who could hike the additional miles into the Dosewallips area may or may not change their plans due to the road and facility closures. Some visitors would hike the additional 5 miles to the NPS trailheads and still enjoy a wilderness experience. Some visitors may hike to Dosewallips and be disappointed that the facilities are closed. Some visitors may choose to visit other areas of the park that are more accessible (where trailheads are closer to the road) and have more facilities available such as campgrounds. These displaced visitors may create crowding in other areas of the park including Staircase, Deer Park, and Quinault, and in adjacent Forest Service areas.

Those visitors who prefer that the road remains closed may benefit from the no action alternative. These visitors would still be able to hike on the road free from the sights and sounds of vehicles which could lead to an improved backcountry experience in a non-wilderness area. There would be no bicycling allowed on the road should it remain closed. NPS regulations prohibit the use of bicycles except on park roads, parking lots, and designated routes. The closed road would be considered a trail and generally bicycles are not allowed on trails due to potential user conflicts between stock users, hikers, and bicyclists. Also if the road remains closed it is likely that fewer NPS wilderness permits would be requested for trails that originate out of Dosewallips, resulting in reduced use of the wilderness in this area. This could benefit wilderness users as it could result in more solitude and less visitor contact.

There could be adverse impacts to park visitors who utilize the wilderness trails out of the Dosewallips area. Trail maintenance and emergency repairs would be reduced under the no action alternative due to restricted access. Therefore trail conditions could deteriorate which could negatively affect the visitor experience in this area.

Overall under the no action alternative there would be decreased visitor facilities and recreational opportunities which would lead to reduced visitor use in the Dosewallips area and could create a moderate to major adverse effect to visitors who would access the area with vehicles.

Cumulative Effects

Dispersed camping along the riparian area below the washout location which is accessed by FSR 2610 would continue. The continued closure of FSR 2610 at the washout site would likely increase the use of these areas, especially those areas close to the washout. The planned Dosewallips Riparian Rehabilitation project which would rehabilitate dispersed recreation sites along the river would reduce the dispersed camping opportunities. The combined effects of these activities could result in creation of new dispersed camping areas as forest visitors seek places to camp while they enjoy day hikes and activities past the washout. Also continued road access restriction past the washout would not provide options for campers looking to stay in campgrounds near the Dosewallips River area such as the Forest's Seal Rock Campground and the state's Dosewallips Campground. Use numbers of the facilities along Highway 101 could exceed capacity on weekends and holidays. The proposed Pleasant Harbor Marina and Golf Resort, located near Brinnon, may result in an increased desire for recreational opportunities in the local area which would not be met under this alternative.

There are nine major park access roads (not including spur roads) in the interior portion of the park that provide vehicular access to park facilities and wilderness trailheads. Park roads can be periodically and temporarily closed due to weather conditions. It is the park's goal to continue to allow vehicular access on existing park roads; however because many of the park roads are located in floodplains or on unstable soils they are at risk from flooding and erosion. Therefore in the future there could be temporary closures due to flood events.

Currently three of the interior roads are closed to vehicular access (Dosewallips, Staircase, and Queets Roads) due to slide and/or erosion issues. This has restricted vehicular access on 33 percent of the park's interior roads and both of the two eastern access roads in the park. Both the Dosewallips and Queets Roads provide access to unique, less developed areas that allow visitors to enjoy more primitive recreational opportunities. If both areas remain closed there could be major adverse effects to visitors who would utilize vehicles to access these areas and would result in the removal of recreational facilities in both areas. Visitors would likely be redirected to other areas of the park resulting in increased visitor use in those areas. Access to the park's Staircase area has also been restricted since November 1, 2007 due to seasonal closures for safety reasons and storm damage. Staircase is the other eastern access road into the park and with its closure there are no access points on the east side of the park.

Cumulative effects from the closure of three developed areas in the park (including the seasonal closure at Staircase) and potential for additional road closures in the future would be long-term, adverse, and moderate to major.

Alternatives B, C and F – All Action Alternatives

Direct/Indirect Effects

Olympic National Forest
Alternatives B and C would restore vehicle access to the upper Dosewallips Valley area via an upland route, and Alternative F would restore vehicle access with a road alignment which approximates the original road location along the river All alternatives would have the same effects on access and recreational use.

Elkhorn Campground would be reopened, providing the semi-primitive motorized camping opportunity that many people desire as is evident from the pre-washout use. Motorized access would provide reasonably easy access for those with accessibility challenges. It would also help meet the overall increase in recreation, especially for day use activities, expected for the Olympic and other national forests in the Puget Sound and Seattle area (Hall 2005). Most of the picnic tables, fire rings, and tent pads would need to be repaired or replaced. Sites that were flooded by the river would be restored or moved. The vault toilets would be pumped and repaired or replaced, and danger trees would be identified and removed. The water system would be reopened and maintained, providing potable water for people in the area.

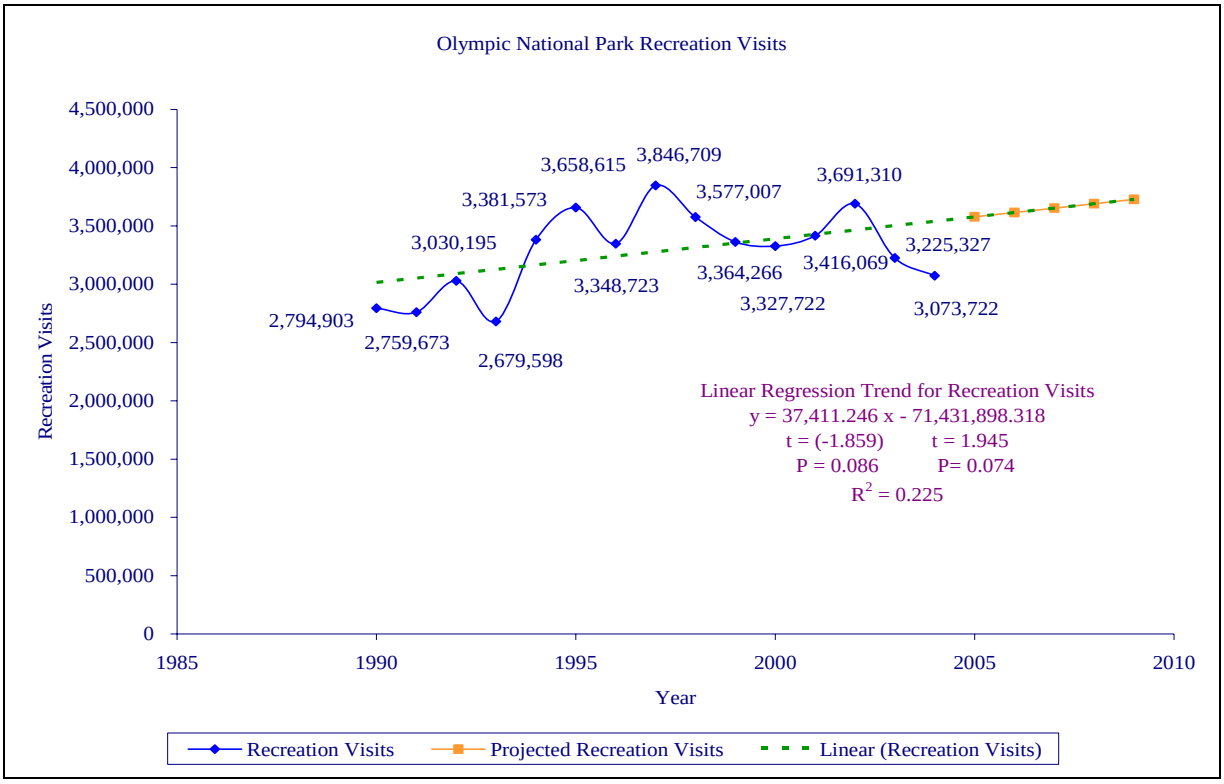
Expenses to reopen the campground are estimated to be $162,000.

The temporary trail would be restored to a natural state where needed and abandoned.

The dispersed camping areas along FSR 2610 near the washout would be used for construction equipment staging and would not be available for public use during construction. These areas would be rehabilitated after construction was finished and would be closed to camping. Dispersed sites (general forest area) are identified in the Forest's July 2007 Outdoor Recreation Strategy (USDA Olympic National Forest 2007) as locations that afford visitors an experience mostly free from the sights and sounds of developed sites. Limited Forest resources are committed to these sites and natural resource degradation is often a serious problem. The Outdoor Recreation Strategy emphasizes that these sites will be managed to reduce resource impacts while meeting user needs. A suggested action is to restore or close high priority dispersed sites. Post construction rehabilitation of the FSR 2610 dispersed camping area would follow the direction in the Outdoor Recreation Strategy.

Olympic National Park
Under these alternatives recreational opportunities in the Dosewallips would be restored to pre-road closure conditions. Visitors would be able to access the Dosewallips area by vehicle. It is expected with restored vehicular access to Dosewallips that visitation would likely be higher at first than pre-road closure conditions due to the area interest and publicity generated through this planning process. However visitation would likely level off and then would be expected to increase in the future similar to the current upward trend in park wide visitation (projected at 0.4 percent). (Figure 25, Source: National Park Service and Bureau of Reclamation)

Figure 25: ONP visitation trend



Visitors with accessibility challenges would be able to access the NPS facilities at Dosewallips. Visitors would still be able to use bicycles or hike the road to access the Dosewallips area. However since the road would be open to vehicular traffic they would no longer be able to enjoy a primitive backcountry experience free of the sights and sounds of vehicles.

Visitors who would prefer that the road remain closed would be adversely impacted by the reopening of the road to vehicular traffic. However within the park and Forest Service areas there are ample opportunities (approximately 611 miles of maintained park trails in park wilderness) for non-motorized recreation and hiking without the presence of vehicles.

Under these alternatives the facilities at Dosewallips would reopen at an estimated expense of $17,600. Visitors would be able to utilize the campground and restrooms which would improve the visitor experience and recreational opportunities in the area. Visitors would be able to access the wilderness more easily by parking at or near the trailheads. Trail maintenance activities would be increased to pre- closure levels and trail conditions would likely improve in the trails accessed from Dosewallips. The Dosewallips area provides access to two of the most popular cross park trails.

Overall these alternatives would lead to increased recreational opportunities and visitor use at Dosewallips and an improved visitor experience.

Cumulative Effects

Motorized access to Elkhorn Campground and the park's Dosewallips Campground would reduce the use of the dispersed campsites located along the Dosewallips River riparian area below the washout. There would be less likelihood of new dispersed sites being created to replace the existing sites rehabilitated by the Dosewallips Riparian Rehabilitation project. Utilization of Elkhorn and the park's Dosewallips Campground would provide a camping opportunity in the Dosewallips River area in the case the campgrounds along Highway 101 become filled, especially during weekends and holidays. The proposed Pleasant Harbor Marina and Golf Resort, located near Brinnon, may result in an increased desire for recreational opportunities in the local area which would these alternatives would meet in part.

Park roads can be periodically and temporarily closed due to weather conditions. It is the park's goal to allow vehicular access on existing park roads; however because many of the park roads are located in floodplains or on unstable soils they are at risk from flooding and erosion. Therefore in the future there could be temporary closures due to flood events.

Reopening the Dosewallips Road would restore vehicular access to one of the three closed roads in the park and this could have major beneficial effects to visitors who would utilize vehicles to access this area and would result in the reopening of recreational facilities at Dosewallips. Therefore these alternatives would not result in adverse cumulative effects to visitor use and recreational facilities and would result in beneficial effects from reopening one of the three currently closed access roads in the park.

Wilderness (Wilderness Report, March 2006)

Affected Environment

Olympic National Forest
The Washington State Wilderness Act of 1984 created the two Wildernesses near the project area, Buckhorn and The Brothers. A boundary adjustment in 1986 between the Forest and ONP altered the size of these two Wildernesses. Wildernesses within the Forest are to be managed to assure that appropriate diversity and existing wilderness character are maintained.

The Buckhorn Wilderness located to the north of the project area is 44,258 acres. It is bordered on the south by the Dosewallips River and ONP on the west. The wilderness boundary in the vicinity of the project is at the 1,000 foot elevation contour. While there are about 68 miles of trail within the Wilderness the only trail in the southern most portion of the Wilderness is the southern end of the Tunnel Creek Trail. At the closest point this trail is about ¾ mile away from the project area.

The Brothers Wilderness located to the south of the project area is 16,682 acres. It is bordered on the north by the Dosewallips River and ONP on the west. The wilderness boundary in the vicinity of the project area follows the southern edge of the river as it was located in 1984 when the wilderness was designated. There are no trails near the project area.

Olympic National Park
Proposed activities are located outside of wilderness boundaries.

Environmental Consequences

Effects of the alternatives on wilderness resources within the Forest were evaluated by using the Arthur Carhart National Wilderness Training Center "Minimum Requirement Decision Guide" (MRDG). While this guide is primarily designed to assist managers in making appropriate decisions about administrative actions in wilderness, the processes used are a useful way to frame the analysis of actions near wilderness boundaries.

Alternative A - No Action

Direct/Indirect Effects

Olympic National Forest
There would be no effects on the preservation of wilderness character in terms of these qualities: untrammeled, undeveloped, natural, and outstanding opportunities for solitude or a primitive and unconfined type of recreation. Consequently there would be no effects that would prevent the wilderness from remaining unimpaired for the future use and enjoyment as wilderness.

There would also be no effect to wilderness heritage and cultural resources; maintaining contrast and skills; special provisions; safety of visitors, personnel, and contactors; and economic and time constraints.

Alternatives B and C – Reroute Alternatives

Direct/Indirect Effects

Olympic National Forest
These alternatives propose no activities within the Buckhorn Wilderness or The Brothers Wilderness and would have no effect on the preservation of wilderness character in terms of these qualities: untrammeled, undeveloped, and natural.

The Brothers Wilderness is located south of the Dosewallips River well away from the proposed activities. The boundary of the Buckhorn Wilderness in the project area is at the 1,000 foot elevation contour. The highest elevation of the proposed reroutes would be at the clearing limits beyond the top of the cut as the road climbs the slope to the northeast of the washout. This elevation would be at about 650 feet. There would be an approximate 350 foot elevation gain or a 500 foot horizontal distance to reach the Buckhorn Wilderness boundary. There are no trails or known recreational activities within the wildernesses near the project area.

There would be some limited effect to the wilderness character of outstanding opportunities for solitude and unconfined type of recreation during road construction. Construction activities would generate noise and dust for limited times within a three year period. However due to the distance of the activity from the wilderness boundaries and the limited use of the wildernesses in the affected area the effect if any would be minor and short-term in nature. The road would result in increased vehicle traffic in the project area and in the area beyond the washout up to the Dosewallips Campground. This increase in traffic would generate some noise and limited dust (road surface would be crushed aggregate), but due to

the distance from the wilderness boundaries combined with the condition that there are no trails in the portions of the Buckhorn Wilderness and The Brothers Wilderness near the project area, this would result in no effect to opportunities for solitude or unconfined recreation over the long-term.

There would also be no effect to wilderness heritage and cultural resources; maintaining contrast and skills; special provisions; safety of visitors, personnel, and contactors; and economic and time constraints.

Alternative F - Bridge

Direct/Indirect Effects

Olympic National Forest
This alternative proposes no activities within The Brothers Wilderness or the Buckhorn Wilderness and would have no effect on the preservation of wilderness character in terms of these qualities: untrammeled, undeveloped, and natural.

There would be some limited effect to the wilderness character of outstanding opportunities for solitude and unconfined type of recreation during road construction. Construction activities would generate noise and dust for limited times within a three year period. However none of the activities proposed under this alternative occur on the south side of the river, and proposed activities would occur close to where FSR 2610 was located at the time of wilderness designation. Due to the distance of the activity from the wilderness boundaries and the limited use of the wildernesses in the affected area, the effect if any would be minor and short-term in nature. The road would result in increased vehicle traffic in the project area and in the area beyond the washout up to the Dosewallips Campground. This increase in traffic would generate some noise and limited dust (road surface is crushed aggregate) but due to the distance from the wilderness boundaries combined with the condition that there are no trails in the portions of the Buckhorn Wilderness and The Brothers Wilderness near the project area, this would result in no effect to opportunities for solitude or unconfined recreation over the long-term. Conditions created by restoring road access at the washout site would not be appreciably different than what existed at the time of wilderness designation.

There would also be no effect to wilderness heritage and cultural resources; maintaining contrast and skills; special provisions; safety of visitors, personnel, and contactors; and economic and time constraints.

Alternatives A, B, C, and F – All Alternatives

Direct/Indirect Effects

Olympic National Park
Wilderness Values: The project occurs outside of wilderness boundaries and therefore is not subject to Wilderness Act requirements.

Cumulative Effects

There are no past, present, and reasonably foreseeable activities in the Wilderness areas near the ONF project area. As such there is no overlap with effects of the project and no cumulative effects.

Social/Economic (Socio/Economic Assessment, March 2006)

Introduction

Information and tools used in this assessment came from a variety of sources. Formal and informal business interviews were conducted in the Brinnon, Quilcene, and Eldon areas in April 2002. A total of six businesses were contacted. Additional informal interviews of six Brinnon area service oriented businesses were conducted in February/March 2006. Information was also gathered from county profile information, 2000 US census information, and Northwest Forest Plan socioeconomic monitoring results.

The economic analysis was conducted using Quick-Silver which is a program for financial and economic efficiency analyses of resource management and capital investment projects. Monetized benefits associated with reestablishing road access on FSR 2610 are difficult to quantify (e.g. the value associated with being able to drive into the Dosewallips area of the park) as are those associated with not restoring motorized access (e.g. the value of solitude in walking the closed road). These benefits are discussed qualitatively in the "Access and Recreation" section. Additionally the affects on businesses such as related jobs and income are not included in financial and economic efficiency analyses. Results of informal interviews with local businesses did not include the quantitative information necessary to include these values in the financial and economic efficiency analysis. Since there are no benefits included in this analysis this is a cost minimization analysis. Cost estimates used in the analysis are the agencies' best approximation. They are used in comparing the alternatives against each other rather than projecting an absolute value. Investment performance is displayed as the present value of discounted costs.

Affected Environment

There are two primary locations of concern with respect to social and economic conditions. One is the small unincorporated community of Brinnon (Figure 26) located in east Jefferson County about 2 ½ hours from Seattle by ferry. The Brinnon Census Designated Place had a population of 803 reported in the 2000 census with the core area situated along Highway 101 near the mouth of the Dosewallips River (Figure 27). As such it is the community most affected by changes in recreation opportunities in the Dosewallips watershed. The other location of concern is the nearby community of Quilcene located about 10 miles north of Brinnon along Highway 101 which is valuable to consider when assessing the social and economic effects of the alternatives as it is a hub for goods and services for the Hood Canal geographic area that includes Brinnon. The community of Quilcene was included in a recent Northwest Forest Plan monitoring report on socioeconomic conditions which provides information useful to this evaluation (USDA 2006a, USDA 2006b).

Figure 26: Brinnon along Highway 101

The economies of Brinnon and Quilcene were highly dependent on the timber industry until the early 1990's. As the timber industry has declined there has been increased employment in all the service industries. Between 1990 and 2000 there was a slightly greater than 100 percent increase in the number of people employed in service industries in east Jefferson County (USDA 2006a). Many local entrepreneurs are focusing on recreation and tourism development and there has been some business development in this arena.

Based on interviews it is clear that local service-oriented businesses along Hood Canal in east Jefferson County depend heavily on recreation as a primary source of income. Income generated between mid-May and Labor Day for these businesses was in the 75 percent range of total annual income indicating a strong reliance on summer recreation for business survival. In context of the overall economy of the eastern Olympic peninsula the effects of reduced access to the upper Dosewallips River valley are a small drop in the bucket. But on an individual business scale the effects become much more meaningful.

Figure 27: Looking up the Dosewallips River valley from Brinnon

Many visitors, including international travelers, come to the eastern Olympic peninsula with specific destinations in mind. Although the upper Dosewallips River valley is not considered the biggest attraction in the area (Dosewallips State Park, shoreline activities such as clamming, and Seal Rock Campground were all mentioned as bigger draws), local businesses did indicate this area has been mentioned as a destination area and they still get questions and comments about access to the area.

Environmental Consequences

Alternative A – No Action

Direct/Indirect Effects

Olympic National Forest and Olympic National Park

Effects experienced by local businesses since the washout in 2002 would continue. Continued loss of the attractions in the upper Dosewallips River valley would likely entail reduced income

for service-oriented businesses in the Brinnon area as well as the potential for reduced employment and the possible failure of businesses heavily dependent on recreation use of the upper Dosewallips River area. It is possible that as the limited access to the upper Dosewallips River attractions has become known that those whose destination would have been this area may have diverted their recreation to somewhere other than Brinnon and vicinity.

Efforts to promote tourism in the area have been hampered by the closure of FSR 2610 (USDA 2006b). While business owners are interested in working with the Forest Service in developing tourism, there are concerns about the potential to exploit and rely on the national forest to support tourism. One business owner commented about the closure of FSR 2610 in the Northwest Forest Plan socioeconomic monitoring report and stated "The washed out road directly affects the businesses and people who rely on tourists who would normally use that road. … Once that access is cut-off people just stop coming" (USDA 2006a).

Most businesses indicated there was a slight adverse effect due to the closure on FSR 2610 (these businesses are more dependent on people passing through the area or in one case the users of the Dosewallips State Park). Some mentioned a decrease in business associated with the belief that some recreationists who would have come to the Brinnon area if the road were open are going elsewhere. While most businesses were unable to quantify these effects, one business reported an 80 percent decrease since 2002, primarily due to this business's location along the Dosewallips Road and its reliance on day-use visitors to the park's Dosewallips facilities. This decrease has resulted in the business no longer providing a livable source of income and the owners have had to supplement their income with other endeavors.

The discounted cost (the current value of costs that occur over time) for this alternative would be $5,000. This reflects an estimate of the expenses associated with safely terminating FSR 2610 at the washout, such as installation of a jersey barrier. Costs associated with developing facilities at the end of the road near the washout are not included in costs of this alternative. Any new facilities would need to be considered in a future analysis and decision. The park would incur no expenses under this alternative.

Cumulative Effects

While the potential effects of the washout on FSR 2610 on local Brinnon area businesses are isolated situations and may not be noticeable at a larger scale the continuation of reduced access to some recreation opportunities on the eastern Olympic peninsula may have some effect on the overall economy of the area. With the increased focus on tourism in the area as a component of economic health any reductions in recreation opportunities could contribute to reduced economic vitality of the area.

Alternatives B, C, and F - All Action Alternatives

Direct/Indirect Effects

Olympic National Forest and Olympic National Park
All the action alternatives reestablish road access on FSR 2610 and would have similar social and economic effects.

Restoration of motorized access to the attractions in the upper Dosewallips River valley would

likely restore recreation use of the area to levels approaching use prior to the washout. This would result in an increase in income for service oriented businesses in the Brinnon area which could lead to increased employment. As it becomes known that road access to these attractions is available visitors could once again make the Dosewallips area a destination in their travels.

The discounted cost of each alternative is shown in Table 26. They were calculated using the Quick Silver economic analysis program and represent the current value of the costs associated with each alternative (including construction and maintenance costs). Alternative A has by far the lowest cost and Alternative F is by far the most expensive having estimated costs in excess of nine million dollars. Costs for park expenses for all action alternatives remain constant.

Table 26: Discounted costs

	Present Value of Discounted Costs	
Alternative	**Forest**	**Park**
A	$5,000	NA
B	$3,116,000	$330,100
C	$4,329,000	$330,100
F	$9,095,000	$330,100

Cumulative Effects

The positive effects of restoring motorized access on FSR 2610 to local Brinnon area businesses may not be noticeable at scales larger than the community. There may be some positive effects to the overall economy of the eastern Olympic peninsula because of improved access to the recreation attractions in the upper Dosewallips River valley. These benefits could increase the focus on tourism which is an important component of the area's economy.

Visual Quality (Visuals Report, March 2006) (Olympic National Forest actions only)

This issue applies only to ONF actions. There is no issue with visuals on ONP lands as there would be no change from the existing condition. ONP actions would occur on an existing road and involve work on existing erosion control structures.

Management Direction

Forest Plan direction for visual resources is provided by the Visual Management System. This system assigned Visual Quality Objectives (VQOs) to all parts of the Forest. The VQOs are categories of acceptable landscape alteration measured in degrees of deviation from the natural-appearing landscape. Visitor sensitivity, variety classes, and distance zones were the major criteria used to establish the VQOs.

The VQOs for the project area were established in standard and guideline 2.a. for Natural Management Rivers (under the River Corridor Management Prescription A4BN). This standard and guideline states "Within the river corridor, the Visual Quality Objectives of Retention and

Partial Retention should be met as seen from the river and riverbank." Retention means that activities should not be evident but remain visually subordinate to the characteristic landscape. Partial Retention means that activities may be evident but remain visually subordinate to the characteristic landscape. The Dosewallips project area viewshed is a mix of Retention and Partial Retention.

Additionally there is an area about ½ mile southwest of the project area that is designated "Management Prescription A2 – Scenic" under the Forest Plan. This area is located near the end of FSR 2610040. The project area cannot be seen from this area due to existing mature vegetation and terrain features so there is no effect to the visual quality of this area.

Affected Environment

The existing visual condition for the Dosewallips project area viewshed as described in the Forest Plan FEIS is moderately altered appearance. This indicates that the existing visual appearance of the viewshed has been moderately altered, less than 20 percent, from a natural appearing landscape. The viewshed is the landscape viewed from FSR 2610 and use areas.

The visual condition has been further modified by the road washout which has created the high bank. This is an area of exposed mineral soil, about 500 feet long and 150 feet high.

Environmental Consequences

Alternative A – No Action

Direct/Indirect Effects

The existing visual condition as seen from the river and river bank would be unchanged by management activities. The high bank would remain predominately unvegetated in the short-term as the river continues to periodically erode the base and maintain conditions for continued raveling of the exposed slope. The high bank would continue to be viewed as an area of exposed mineral soil. The VQO of Retention would be met under this alternative.

Alternatives B and C – Reroute Alternatives

Direct/Indirect Effects

There would be minor if any effects to visual quality as seen from the river and riverbank due to the management activities associated with the reroute alternatives. The majority of the reroute would not be visible from the river and riverbank due to existing vegetation screening any view of the newly constructed road. Only in the area above the washout is there a lack of this existing vegetative screen and in this area the terrain blocks the view of the road from the river and riverbank. The road in this area would be constructed on a relatively flat terrace which would not be visible when down on the river. The high bank would continue to develop naturally with no improvement in the visual condition in the short-term. The VQO of Retention would be met under these alternatives.

Alternative F - Bridge

Direct/Indirect Effects

There would be minor effects to the visual quality of the project area as seen from the river and riverbank. The bridge would be constructed of concrete spans, supported by five to seven concrete pilings. This management activity would be noticeable from the river and riverbank but would remain subordinate to the overall characteristics of the existing landscape which includes FSR 2610. The vegetated slopes which make up the majority of the landscape characteristics would be unchanged. The high bank would continue to develop naturally with no improvement in the visual condition in the short-term. The VQO of Partial Retention would be met under this alternative.

Alternatives A, B, C, and F - All Alternatives

Cumulative Effects

None of the past, present, and reasonable foreseeable activities in the Dosewallips River watershed are visible from the project area. As such there is no overlap in space with effects of the project and there are no cumulative effects.

Climate Change (Climate Issues Report, January 2006)

Stream Flows

Affected Environment

Climate trends that may influence stream flows and the frequency of flooding in the future include cyclic effects such as the Pacific Decadal Oscillation (PDO) and long-term effects such as Global Warming. These are both long-term and large-scale phenomenon with fairly subtle changes and a lot variability. Cyclic trends such as PDO are expected to have a greater impact on stream flow (floods) than long-term increases represented by global warming. It is important to note that any effects from global warming or cyclic climate changes would be system wide. The important thing is scale as this would not be a site-specific change.

There is not a currently active stream gage on the Dosewallips River. The Dosewallips gage was discontinued in 1969. The closest stream gage with a substantial period of record is on the Duckabush River (USGS 1205400 Duckabush River near Brinnon, WA). The period of record is from 1939 to present. Looking at the annual peak flow data a trend in increasing peak stream flow over time is evident. All 3 of the flood flows exceeding 9,000 cubic feet per second (cfs) (20 to 25-year recurrence interval flood as calculated in the reach analysis) have occurred in the past 10 years. Seven out of the 10 highest flows on record occurred during this same period, this included 5 floods exceeding Q_{10} (10-year recurrence interval). It seems unlikely that the magnitude of the largest (extreme) flood events would be affected. If any effect is noticeable, an increase in the frequency of annual and modest floods would be most likely.

Increasing peak flows are evident in the streamflow records, the 5-year average with the post 1995 data shows an increasing trend, and it would not be surprising to find an increasing trend in the frequency of bankfull flows as well. The frequency of flows equaling or exceeding bankfull

are of interest because these flow levels are responsible for doing the most work over time in terms of shaping and maintaining the channel.

Climate driven channel adjustments would take place on a scale well beyond the washout site. Examining site specific effects and links to adjacent habitat for example is highly speculative and may be missing the larger effects of changes to or within the system. Predictions of effects at the site level (if any) would be unreliable. Links between the washout and downstream habitat are unknown in this context.

Additional risk or impact to the road from high flows seems more likely. Examining the issue of risk assessment and the potential for future washouts is probably more reasonable in this context.

Environmental Consequences

Direct/Indirect/Cumulative Effects

Alternatives A (No Action); B and C (Reroute Alternatives)

The effects resulting from a change in climate as addressed here really only affect the alternative that puts the road back along the channel margin. It is primarily a function of the interaction of the river and the restored road, and the cost of maintenance and repair. Alternatives A, B, and C are not expected to be affected by increased stream flows.

Alternative F - Bridge

A possible outcome of an increasing trend in peak flows is an increased interaction (and effect) between the river and the bridge. Continued expansion of the washout area (eroding bank area) upstream or downstream would be the primary issue. Flanking of the downstream abutment with a channel shift into the low laying area north of FSR 2610 was a concern suggested by the regional bridge engineer during the Choosing By Advantages analysis. The downstream abutment would be armored accordingly and locating this abutment downstream of the washout area to an area where the river exerts less force on the bank would mitigate this concern. The bridge would be designed such that the deck would be high enough to pass flood water with associated debris. Any changes in streamflow are expected to be fairly small and most prevalent in the frequency of small and moderate floods rather than in the magnitude of the largest peak events. Bridge design should be capable of accommodating these conditions as safety factors typically used are usually intended to address hydrologic variability within the expected range of the 500-year flood (Q_{500}).

Carbon Sequestration

Affected Environment

Carbon sequestration is the uptake and storage of carbon. Forests can play an important role in mitigating climate change by naturally taking carbon out of the atmosphere (Perschel et al 2007). Permanent removal of forested ground, such as due to road construction, could impact carbon sequestration.

The forest vegetation within the proposed reroute alternatives is sequestering carbon. Included in

this vegetation are about 200 trees that are 21 inches dbh or larger.

Environmental Consequences

The No Action Alternative and Alternative F (Bridge) would have little if any impact on carbon sequestration since very little vegetation would be removed and very little ground that currently supports vegetation would be converted to a non-vegetative condition.

Alternatives B and C, the reroute alternatives, would remove about 7 acres of forest and convert it to a roaded condition. This acreage includes the cuts and fills on the steeper side slopes that are not likely to support mature vegetation into the future. It is reasonable to assume that there would be some loss of carbon sequestration under these two alternatives. However this is a complex issue and tools are not available to estimate impacts at the fine project scale and put those impacts into context of the overall carbon budget at a regional scale (Gravenmier per com 2008).

Uncertainty limits our ability to know what effects Alternatives B and C might have on carbon sequestration. The state of our understanding of this issue is not developed enough for us to make conclusions at the project scale. But considering the very small potential impact of this project (7 acres out of the 21,600 acres of National Forest System land in the Dosewallips watershed) it is reasonable to assume that any project impacts would be so small in the regional carbon budget scale that it is acceptable to act even in the face of uncertainty.

Soundscapes (National Park Service Report, January 2006) (Olympic National Park actions only)

Affected Environment

The Dosewallips area is considered a low use area with previous motorized use on the road corridor and in the developed area at the terminus of the road creating the most adverse effects to the natural soundscape. In addition park maintenance and ranger operations do generate noise from the use of equipment and the operation of the hydroelectric system. Visitor noise is also common during the summer months in the campground and parking lots. Since this is a developed area with an access road some human generated noise is expected. Occasional helicopter flights are also a source of noise. Natural sounds predominate away from the developed area and road.

The methodology used to assess noise impacts in this document is consistent with NPS *Management Policies* 2001 and *Director's Order #47: Soundscape Preservation and Noise Management.*

Context, time, and intensity collectively determine the level of impact for an activity. It is usually necessary to evaluate all three factors together to determine the level of noise impact. In some cases an analysis of one or more factors may indicate one impact level while an analysis of another factor may indicate a different impact level, according to the criteria below. In such cases best professional judgment based on a documented rationale must be used to determine which impact level best applies to the situation being evaluated.

- National literature was used to estimate the average decibel levels of the activity.

- Areas of use by visitors were identified in relation to where the activity is proposed. Personal observation from park staff and monthly use reports were used to identify these areas.

Other considerations such as topography and prevailing winds were then used to identify areas where noise levels could be exacerbated or minimized. The thresholds of change for the intensity of an impact to soundscape are defined as follows:

Impact Intensity	Intensity Description
Negligible	Natural sounds would prevail. Effects to natural sound environment would be at or below the level of detection and such changes would be so slight that they would not be of any measurable or perceptible consequence to the visitor experience or to biological resources.
Minor	Natural sounds would prevail in those areas where management objectives call for natural processes to predominant. In areas where activity noise is consistent with park purpose and objectives (i.e. road corridors), noise would predominate during daylight hours and would not be overly disruptive to noise-sensitive visitor activities in the area; in such areas, natural sounds could still be heard occasionally. Activity noise would be localized, short-term, and would be small and of little consequence to the visitor experience or to biological resources. Mitigation measures, if needed to offset adverse effects, would simple and successful.
Moderate	In areas where management objectives call for natural processes to predominate, natural sounds would predominate, but activity noise could occasionally be present at low to moderate levels. In areas where activity noise is consistent with park purpose and zoning, the natural soundscape would be impacted most of the day. Effects to the natural sound environment would be readily detectable, localized, short- or long-term, with consequences at the regional or population level. Natural sounds would be occasionally heard during the day. Mitigation measures, if needed to offset adverse effects, would be extensive and likely successful.
Major	In those areas where management objectives call for natural processes to predominate, natural sounds would be impacted by activity noise frequently for extended periods of time. In areas where activity noise is consistent with park purpose and zoning, the natural soundscape would be impacted most of the day, with disruptions to conversation for long periods of time, making enjoyment of other activities in the area difficult. Effects to the natural sound environment would be obvious, long-term, and have substantial consequences to the visitor experience or to biological resources in the region. Extensive mitigation measures would be needed to offset any adverse effects and success would not be guaranteed.

Short-term disturbances are defined as noise limited to the construction period, while long-term disturbances are defined as noise events occurring after construction has been completed.

Environmental Consequences

Alternative A - No Action

Direct/Indirect Effects

There would be no adverse impact to soundscapes from the no action alternative. There would be more natural sounds as a result of the road remaining closed to vehicular traffic except during periods of overflights (including search and rescue flights) which would result in short-term minor adverse impacts to the park soundscape.

Cumulative Effects

There would be temporary, short-term, minor to moderate adverse impacts to the park soundscape in the Dosewallips area if helicopter use increases due to the closure of the road. The further work projects are from access points, the more challenging it is to transport equipment and supplies into project sites. The use of helicopters would likely increase for trail maintenance activities in this area. If future planning determines that the facilities would be removed from the Dosewallips developed area then there would be temporary, adverse, and minor to moderate impacts during removal operations. After the facilities are removed human generated noise would be reduced and natural sounds would be predominate resulting in a beneficial effect to the park's soundscape in this area. Under the no action alternative there would be no adverse impact to soundscapes thus there would be no cumulative effects to the area soundscape.

There would be no impairment to the park's soundscape under the no-action alternative as noise from the potential use of helicopters would be very infrequent (approximately four missions per year) and temporary in nature.

Alternatives B, C, and F – All Action Alternatives

Direct/Indirect Effects

The following is a summary of the equipment that would be used in addition to the total time required for each.

Equipment	Decibel Ranger	Amount of Use Required
Tracked Excavator	62-75 db at 300'	15 days
Bulldozer	72-98 db at 50'	15 days
End Loader	72-99 db at 50' 50-61 db at 0.75 mile	15 days
10-yard Dump Truck	70-96 db at 50'	15 days
Vibratory roller/compactor	71-89 db at 50'	15 days
Rock drill	84-94 db from 100' to 200' direct or obstructed view	2 days

Sources: Handbook of Noise Control, Cyril M. Harris 1979, Table 3.11-1
And, U.S. Forest Service Programmatic Biological Assessment for Forest Management,

Appendix G

Project activities would create temporary, moderate impacts on the natural soundscapes on and adjacent to the road corridor. Other maintenance and operational activities would occur on the road and in the developed area and would also generate noise. However these activities would be short-term in an area where activity noise is consistent with park purpose and zoning (park developed area) resulting in minor to moderate, temporary, adverse impacts to the natural soundscape.

Cumulative Effects

Park operations would resume to their preexisting levels with scheduled road and facility maintenance each spring and subsequent maintenance and roadwork as needed in the spring, summer, and fall. Equipment utilized during this project work includes graders, backhoes, power washers, chain saws, trucks, hand tools, and other mechanized equipment such as power saws. This equipment use creates noise but only temporarily in a developed area where a certain amount of human generated noise is expected. Noise related to visitor use of the road, campground, and facilities would resume to pre-road closure levels. Noise would not be generated throughout the entire day, would rarely occur at night, and is of little consequence to the visitor experience or biological resource, resulting in minor, temporary, adverse effects. Because this noise would occur after project work is completed, there would be no cumulative effects from this alternative.

Park Operations (National Park Service Report, January 2006) (Olympic National Park actions only)

Affected Environment

Dosewallips Road leads to a seasonal ranger station, a campground, and several trailheads and is generally open year round and only closed due to weather conditions. Prior to the washout annual maintenance on the Dosewallips Road included spring clean-up work including but not limited to clearing the 8 to 10 culverts, grading, road sign maintenance and replacement, removing downed trees and rocks, pulling ditches, and checking gabions.

The structures that are maintained at the Dosewallips area include: one ranger station, one residence, a flush comfort station, a maintenance shop, hydroelectric building, and one vault toilet. Maintenance activities on the structures could include routine maintenance such as pressure washing of roofs, siding, and decks; propane system maintenance; water system maintenance and monitoring; and occasional painting and repair work (i.e. roof repairs, interior and exterior painting). From May 15 through September maintenance staff work at the Dosewallips area an average of three days a week except during special projects when they are present more often. During the remaining days seasonal ranger staff covers the day-to-day maintenance activities.

Each spring prior to the washout the 30-site campground was prepared for use. Campground maintenance included grading the roadways, danger tree assessments and removal, replacement of damaged picnic tables and grills, cleaning and opening the restrooms, maintaining the intake for the hydroelectric system, and maintaining the water system including weekly chlorine and

turbidity tests. The campground has been closed since the road closure.

The Dosewallips area provides access to two major cross park trails. Prior to the washout trail maintenance activities were frequently staged out of the Dosewallips station for the eastern portion of the park. The Dosewallips was also used as a base for aerial operations for trail maintenance activities and supplies and equipment were often staged at Dosewallips.

The ranger station was also seasonal quarters and was occupied between Memorial Day weekend to mid-September and was used as a base of operations for park backcountry staff and trail maintenance operations. Prior to the washout there was one ranger in residence at the Dosewallips, a permanent ranger assigned to the area that lived off-site, a seasonal ranger based out of the West Fork, and a volunteer at Lake Constance. During the first year after the washout the ranger station was occupied by a seasonal ranger in the summer. Since that time there has been infrequent use of the cabin by the ranger staff during their occasional patrols in the Dosewallips area.

The Dosewallips area has been used in the past as a base of operation for search and rescues on the east side of the park. The Dosewallips landing zone is on the road on an open, level location above Dosewallips Falls. During operations the road was temporarily closed in no more than 15 minute increments when the helicopter landed and during refueling operations. In the past at least three flight missions a year took place out of Dosewallips including trail maintenance and supply transport flights, Mt. Constance backcountry privy management flights, and search and rescue operations. On average one search and rescue was flown out of the Dosewallips each year (Nickey pers. comm). The Dosewallips landing zone was used for search and rescues in the Dosewallips, Duckabush, and, depending on weather, Mt. Anderson areas. Due to other priorities the park has had to limit the amount of on the ground work out of the Dosewallips area since the washout occurred in 2002. As future operations are funded it is anticipated that there will be an increased need in aerial operations.

Since the road closure the park has utilized a location outside of the park, at the Bailey ranch, for the base of operations for aerial activities. This location adds about 3 to 5 minutes of travel time (loaded v. unloaded helicopter) for aerial activities. With the road closure park staff would be required to hike an additional five miles (one-way) for search and rescue operations that do not warrant the use of an aircraft. If a search was determined to meet the criteria for an aircraft it would be possible to transport park staff into the park by helicopter so they could carry out their mission. Flying out of private land could further delay missions until permission is received and a land use agreement is finalized.

Flying outside the park, above private and Forest Service lands, shifts the impacts related to aerial operations (noise and harassment of listed bird species) to additional areas. Flying above private lands could disturb residents and would result in increased safety concerns and more flight restrictions.

In addition to the guiding regulations and policies described in the “Visitor Experience and Recreational Resources” section the NPS Management Policies also state that the NPS is committed to providing appropriate and high quality opportunities for visitors to enjoy the parks. The policies also state that although there are limitations on the NPS ability to totally eliminate all hazards, the NPS will strive to provide a safe and healthful environment for visitors and employees, to protect human life, and to provide for injury-free visits.

Park operations for the purposes of this analysis refers to the quality and effectiveness of the Dosewallips Road and the park's ability to maintain the road in order to adequately protect and preserve vital resources, maintain existing facilities and trails in the Dosewallips area, and provide for a successful visitor experience. Park staff members knowledgeable of these issues were members of the planning team that evaluated the impacts of each alternative.

Impact intensity	Impact Description
Negligible	Park operations would not be affected.
Minor	The effect would be detectable, but short-term and would not have an appreciable effect on park operations. If mitigation were needed, it would be relatively simple and would likely be successful.
Moderate	The effects would be readily apparent, short-or long-term, and would result in a substantial change in park operations in a manner noticeable to park staff and the public. Mitigation measures would probably be necessary and would likely be successful.
Major	The effects would be readily apparent, would result in a substantial change in park operations in a manner noticeable to park staff and the public, and be markedly different from existing operations. Extensive mitigation measures would be needed, and success would not be guaranteed.

Environmental Consequences

Alternative A - No Action

Direct/Indirect Effects

Under this alternative the Dosewallips Road would not be reopened or maintained. The campground and restrooms would remain closed to public use. Trail management activities would no longer be based out of Dosewallips and additional helicopter use would be required to provide support and transport equipment for the park trail crews. Because the park trail crew would be unable to respond quickly to trail damage because of no road access and the required planning necessary to utilize helicopters, trail conditions could deteriorate on the trails out of the Dosewallips area.

The ranger station and quarters would likely be closed to use or converted to a backcountry site. Park facilities in the Dosewallips would deteriorate to unusable conditions, resulting in a loss of one of the two areas with park facilities on the eastern side of the park. Eventually these facilities would have to be removed. Any removal activities would have to be addressed in a subsequent planning document. The closure of the facilities in Dosewallips would result in minor to moderate adverse effects on park operations and facilities.

With the reopening of the Staircase area it is likely that its use would continue to increase with the permanent closure of the Dosewallips area. This could increase the maintenance needs in this area resulting in increased pressure on park operations and a need to expand the facilities at Staircase.

Aerial operations at the Dosewallips would continue to be based outside the park at Bailey Ranch if the private landowner agrees to these activities. This adversely affects trail operations and backcountry privy management by adding more flight time and coordination for these activities. This could also adversely affect search and rescue operations. Park aerial search and rescue operations would no longer be based at Dosewallips since refueling would not be possible at that location. Park employees could hike into the trailheads at Dosewallips, or be transported to the trailhead area by helicopter for search and rescues out of Dosewallips. This could result in more time needed for search and rescue operations, resulting in major adverse impacts to those visitors who need assistance and could result in more severe injuries or fatalities. Flying above private lands could disturb residents.

Overall the effects to park operations from the no action alternative would be long-term, adverse, and moderate to major as they would be readily apparent, would result in a substantial change in park operations as existed prior to the washout in 2002, and would be noticeable to park staff and the public.

Cumulative Effects

If future planning determines that the facilities in the Dosewallips area would be modified or removed because of the lack of road access this would change the park operations. As stated above more helicopter use would occur in this area to provide support for project work. The closure of the facilities could result in more maintenance staff availability in other areas, primarily Staircase, and would likely reduce the presence of rangers in the Dosewallips area. More visitor use would be directed to the Staircase area, putting more stress on those facilities and park operations in that area. Because the no action alternative would result in long-term, adverse, and moderate to major impacts on park operations, and potential future planned projects and actions would add to these impacts, the cumulative effects on park operations would be long-term, adverse, and major.

Alternatives B, C, and F – All Action Alternatives

Direct/Indirect Effects

Under the action alternative the park would resume its annual maintenance activities on the Dosewallips Road and at the campground, ranger station, and trail head. At least one seasonal ranger would be staffed at Dosewallips during the summer. The road would be utilized by rangers and trail maintenance staff and Dosewallips would again be used as a base of operations on the eastern side of the park. This would improve maintenance of area trails, reducing the time and funding required for trail projects by reducing the use of helicopters. Visitation at Staircase should remain steady.

Park search and rescue operations again could be based at Dosewallips which could lead to improved search and rescue time for park visitors in need. Lives could be saved by reducing the time needed for emergency response.

The impact to park operations from reopening the road to Dosewallips would be beneficial, moderate to major, and long-term.

Table 27 Work to open NPS facilities

Work Item	Estimated Cost
Hazard tree survey and abatement of the developed area, including debris clean up	90 person hours = $2,500 Materials and equipment $1,500
Site maintenance (includes tables, grills and pads)	80 hours = $2,000 Materials $4,000
General building maintenance (all structures)	30 hours = $800 Materials $1,500
Utilities systems start up (inspection, monitoring and testing 10-15 days; 3 hrs per day)	45 hours = $1,200 Materials $500
Totals	Personal services: $ 6,500 Materials and equipment: $ 8,500

Cumulative Effects

The action alternatives would restore park operations to pre-existing levels at Dosewallips. Future project work in the area includes yearly maintenance activities to open the road and facilities and day-to-day maintenance and ranger activities. No change is expected in park operations in the future, therefore, there would be no cumulative effects.

Note: No "impairment" conclusion is required for park operations and recreation and visitor use

Compliance with Other Laws, Regulations, and Policies

National Historic Preservation Act

Olympic National Forest
Cultural resource reconnaissance was completed on the project area and no cultural resources were identified. The Forest Archaeologist prepared a report to the State Historic Preservation Office (SHPO) with a finding of No Potential to Effect Cultural Resources. In March 2006 the SHPO concurred with the report's finding.

Olympic National Park
No cultural resources exist in the project site therefore no resources would be impacted by reopening the Dosewallips Road. The park's cultural resource staff has determined that the project would be covered under the NPS/Advisory Council on Historic Preservation (ACHP) Memorandum of Understanding.

Endangered Species Act and Regional Forester's Sensitive Species

The Endangered Species Act requires protection of all species listed as threatened or endangered by federal regulating agencies (US Fish and Wildlife Service and National Marine Fisheries Service). There are also species recognized by the Forest Service Regional Forester as needing special management to prevent their being placed on Federal or State lists. Surveys and/or evaluations were completed for ESA and Regional Forester Sensitive species which are found in the project area. These results are discussed in detail in the resource sections of this chapter.

Informal consultation with the federal regulatory agencies has been on-going throughout the life of this project. Representatives of the regulating agencies have participated in field visits and attended many of the IDT meetings. There have been regular contacts between ONF and ONP resource specialists and regulatory agency specialists to share information. Formal ESA Section 7 consultation with the regulatory agencies will be initiated once a preferred alternative has been identified by the Responsible Officials. At that time the appropriate consultation documentation will be submitted to the regulatory agencies for their review and consideration. Formal consultation will be completed prior to the Responsible Officials signing Records of Decision.

Magnuson-Stevens Fishery Conservation and Management Act, Essential Fish Habitat

Essential Fish Habitat (EFH) has been designated by the National Marine Fisheries Service within the Dosewallips watershed under the Magnuson-Stevens Fishery Conservation and Management Act. EFH includes all Chinook, coho, and pink salmon habitat, which is the entire anadromous zone in the Dosewallips up to the barrier falls at RM 15.4. Effects to EFH are displayed in the aquatics habitat section of this chapter. Consultation with the National Marine Fisheries Service for EFH will run concurrently with ESA fish consultation.

Clean Air Act

This project would not appreciably affect air quality. No burning is planned during implementation of any of the alternatives. Road construction and future use of the road could create a limited amount of dust, but this would be minimal and localized to the project area. The Dosewallips River watershed is not on the list of currently designated nonattainment areas for criteria pollutants (December 20, 2007 Environmental Protection Agency (EPA) Greenbook). Nonattainment areas as defined in the Clean Air Act are those areas that don't meet (or that contribute to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for criteria pollutants.

Clean Water Act

Olympic National Forest

State Water Quality Standards

Surface water quality standards of the State of Washington are described in Chapter 173-201A of the Washington Administrative Code (WAC) under water quality standards for surface waters of the State of Washington. Waters on National Forest System lands within the Dosewallips watershed are categorized as Class AA or extraordinary waters.

Characteristic uses for Class AA waters include but are not limited to: water supply, stock watering, fish and shellfish, wildlife habitat, recreation, and commerce and navigation. The characteristic use of primary concern for this analysis is fish migration, rearing, and spawning.

Water quality criteria for Class AA waters include: fecal coliform organisms; dissolved oxygen; total dissolved gas; temperature; pH; turbidity; toxic radioactive or deleterious material concentrations, and; aesthetic values. The water quality parameters which could be impacted by the proposed alternatives include temperature, turbidity and sediment.

Temperature
Potential direct, indirect, and cumulative effects to stream temperature for the various alternatives are described in detail under Chapter 3, Aquatic Habitat Conditions, Environmental Consequences.

Alternatives A and F would have no effect on stream temperatures. Alternatives B and C would remove some riparian trees on first and second order streams but increases in stream temperature due to removal of shade would not be measurable. All of the alternatives would meet water quality standards for temperature.

Turbidity
Potential direct, indirect, and cumulative effects to turbidity for the various alternatives are described in detail under Chapter 3, Soil Productivity, Environmental Consequences and Chapter 3, Aquatic Species and Habitat Conditions, Environmental Consequences.

Alternative A could result in exceedance of turbidity standards due to road failures within the road system upstream from the washout site as the result of no maintenance to the abandoned roads. Alternatives B and C could result in short-term exceedance of turbidity standards due to construction activities. There is also some risk of increased long-term turbidity due to increased sediment from the new road construction but the effects would be localized to the small tributaries. Alternative F would result in severe short-term exceedance to turbidity standards as the result of instream bridge construction activities. Elevated turbidity would likely continue intermittently for at least one year due to channel adjustments during periods of high streamflow. For Alternative F turbidity created during instream construction activities would likely remain in suspension for long distances potentially resulting in short-term increases in turbidity in the lower watershed.

All of the alternatives would likely result in some exceedance of turbidity standards at least in the short-term. Short-term turbidity exceedances would likely be substantial for instream construction activities associated with Alternative F. All action alternatives will include mitigation measures to minimize turbidity levels resulting from construction activities. Mitigation measures are described in detail in Chapter 2, Alternatives Considered in Detail. Overall the effects of project related turbidity would be short-term and would not adversely affect characteristic uses at the watershed scale. A waiver from the Washington State Department of Ecology for the short-term exceedances of standards would need to be requested and received prior to implementing any of the action alternatives.

Fine Sediment
Potential direct, indirect, and cumulative effects to fine sediment production for the various alternatives are described in detail under Chapter 3, Soil Productivity, Environmental Consequences and Chapter 3, Aquatic Species and Habitat Conditions, Environmental Consequences.

All of the alternatives would likely result in increases in fine sediment levels at least in the short-term. Short-term increases would likely be substantial for instream construction activities associated with Alternative F. All action alternatives will include mitigation measures to minimize fine sediment levels resulting from construction activities. Mitigation measures are described in detail in Chapter 2, Alternatives Considered in Detail. Overall the effects of project related fine sediment would be short-term and would not adversely affect

characteristic uses at the watershed scale. A waiver from the Washington State Department of Ecology for the short-term exceedances of standards would need to be requested and received prior to implementing any of the action alternatives.

Antidegradation Policy
WAC 173-201A-300 outlines the anti-degradation policy of the State of Washington. It states that beneficial uses shall be maintained and protected and no further degradation which would interfere with or become injurous to existing beneficial uses shall be allowed.

Potential direct, indirect, and cumulative effects to fish habitat and aquatic species for the various alternatives are described in detail under Chapter 3, Aquatic Species and Habitat Conditions, Environmental Consequences.

Alternatives A, B, and C would have little or no effect on fish spawning or rearing habitat within the Dosewallips River watershed. By constructing a bridge across the eroding bank rather than hardening the streambank Alternative F would avoid substantial long-term impacts to fish and fish habitat associated with complete hardening of the streambank. Actions under all alternatives would not become injurous to existing beneficial uses.

2004 Clean Water Act 303(d) List
There is one degraded water body listed on the 2004 Clean Water Act 303(d) List within the Dosewallips River Watershed. The water body, listing identification 21929, is located near the mouth of the river at River Mile (RM) 0.7. It is listed for stream temperature. None of the alternatives would affect the 303(d) listed reach.

Olympic National Park
The park's rivers including the Dosewallips River are relatively pristine.

Watershed	Length in Miles	Linear Creek Miles (total miles of tributaries and rivers)	Glacial (G) or Nonglacial (NG)	Percent of Watershed in the Park
Dosewallips	28.3	170	G	79 percent

In order to assess the magnitude of water quality impacts to park waters under the various alternatives State water quality standards governing the waters of the park were examined and compared to baseline water quality data (if available). The thresholds of change for the intensity of an impact to water quality are defined as follows:

Impact Intensity	Intensity Description
Negligible	Impacts (chemical, physical, or biological effects) that would not be detectable, would be well below water quality standards or criteria, and would be within historical or desired water quality conditions.
Minor	Impacts (chemical, physical, or biological effects) would be detectable, short-term, but would be well below water quality standards or criteria and within historical or desired water quality conditions.
Moderate	Impacts (chemical, physical, or biological effects) would be detectable but would be at or below water quality standards or criteria; however, historical baseline or desired water quality conditions would be

	temporally altered.
Major	Impacts (chemical, physical, or biological effects) would be detectable and would be frequently altered from the historical baseline or desired water quality conditions; and/or chemical, physical, or biological water quality standards or criteria would temporarily be slightly and singularly exceeded.

Alternative A – No Action

Direct/Indirect Effects

There could be some run off occurring that might temporarily increase turbidity downstream of the project site during periods of heavy rains, creating negligible to minor, temporary, adverse impacts to water quality at the slide site and downstream of the site.

Cumulative Effects

Past road and facility construction has modified the amount of impervious or hard packed surface in the developed area and likely changed the area drainage patterns slightly creating negligible to minor adverse impacts to the area water resources through run off and erosion. If road maintenance does not occur there is the potential for increased run-off and erosion due to filled ditchlines and plugged culverts. This could result in adverse, temporary to long-term impacts to water resources from decreased water quality, resulting in minor adverse impacts. By doing nothing, run off from the road is expected to continue, but it would be small and of little consequence to the overall water quality of the Dosewallips River unless a major slide occurred. Therefore there would be negligible cumulative effects to water quality from the no action alternative.

Conclusion

Since there would be negligible to minor, temporary effects from the current runoff associated with poor road drainage there would be no impairment to water resources.

Alternatives B, C, and F – All Action Alternatives

Direct/Indirect Effects

Under the action alternatives with best management practices, a sediment control plan, timing to avoid the rainy season, and designing the road reconstruction to improve stormwater runoff and retention there would be negligible to minor, short-term adverse impacts to water resources and long-term negligible beneficial effects to water resources from NPS actions.

Cumulative Effects

Past road and facility construction has modified the amount of impervious or hard packed surface in the developed area and likely changed the area drainage patterns slightly creating negligible to minor adverse impacts to water resources through run-off and erosion. Under this alternative with the reopening of the road park operations would be reinstituted. These activities would be confined to the existing road and developed area and could create negligible adverse impacts to

water resources from road maintenance activities such as grading and facility operation and use. However these activities (such as cleaning culverts and clearing ditchlines) could improve run-off and drainage and reduce sedimentation resulting in beneficial, indirect effects to water resources. Overall the cumulative effects to water resources would be minor, short-term, beneficial and adverse.

Conclusion

This alternative would implement best management practices to avoid adverse effects to water resources. There could be minor, short-term, adverse impacts to water resources during construction if the best management practices are not effective. However the road reconstruction would improve the drainage from current conditions and could slightly improve water quality at the project site during high rain events, resulting in beneficial effects. Thus there would be no impairment to water resources.

Wetlands and Other Waters of the U.S.

Wetland Requirements

Road and bridge construction activities for the proposed alternatives would involve the discharge of fill material or excavation in wetlands or waters of the U.S. The U.S. Army Corps of Engineers (Corps) regulates these activities under Section 404 of the Clean Water Act. Federal agencies also have responsibilities to avoid, minimize, and mitigate unavoidable impacts on wetlands under Executive Order (EO) 11990. The Forest Service is also responsible for managing wetlands, riparian areas, and waters on the Olympic National Forest under the Olympic Land and Resource Management Plan (LRMP). Therefore project activities that may affect wetlands need to comply with Section 404, EO 11990, and for activities on National Forest System Lands they must also comply with the LRMP. The NPS is responsible for managing wetlands within the ONP.

The Corps defines wetlands (33 CFR 323.2[c]) as:

> "…those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

Waters tributary to navigable waters are considered waters of the U.S. and are subject to the Corps' jurisdiction. The Dosewallips River and its unnamed tributaries in the project area are considered jurisdictional because of their tributary nature to the Hood Canal. The wetlands in the project area are also considered jurisdictional because they are adjacent to or have a surface tributary connection to navigable waters of the U.S.

EO 11990 requires federal agencies to "consider factors relevant to a proposal's effect on the survival and quality of the wetlands." EO 11990 requires that adverse effects on wetlands and other waters of the U.S. be avoided where possible in implementing federal actions.

The Olympic LRMP manages wetlands as part of the riparian/wetland ecosystem under management allocations Riparian Reserves and F2 – Riparian Areas. These areas are intended to

maintain and restore riparian structures and functions of intermittent streams, confer benefits to riparian-dependent and associated species other than fish, enhance habitat conservation for organisms that are dependent on the transition zone between upslope and riparian areas, improve travel and dispersal corridors for many terrestrial animals and plants, and provide for greater connectivity of the watershed.

Affected Environment

Introduction

Wetland delineation in the project areas was performed under contract by WFLHD. The delineation was performed in accordance with the *Washington State Wetlands Identification and Delineation Manual*, which is consistent with the 1987 *Corps of Engineers Wetlands Delineation Manual*, and included field investigations conducted in February 2007. Results of the delineation work are documented in a March 2007 Wetland and Stream Delineation Report (WFLHD 2007) (Wetland Report). Table 28 summarizes the results of field data collection and analysis. Included in the table are project area, wetland size, USFWS classification, hydrogeomorphic wetland classification, and Washington state rating. Wetland classification and rating systems are described in the Wetland and Steam Delineation Report.

Table 28: Wetland areas identified in the project areas

Wetland	Project Area	Size (acres)	USFWS Class *	HGM Class **	State Rating***
A	ONF	0.199	PFO	Riverine flow-through	I
B	ONF	0.421	PFO	Depressional outflow	II/I
C	ONF	0.046	PFO	Riverine flow-through	II
D	ONF	0.070	PFO	Slope	III
E	ONF	0.383	PFO	Slope	II
F	ONF	0.134	PFO	Slope	II
G	ONF	0.227	PFO	Depressional outflow	II
H	ONF	0.237	PFO	Slope	III
I	ONF	0.007	PSS	Slope	III
J	ONF	0.019	PFO	Slope	III
K	ONF	0.194	PFO	Slope	III
L	ONF	0.017	PFO	Slope	III
M	ONF	0.042	PSS	Slope	III
N	ONF	0.068	PSS	Depressional outflow	III
Z	ONP	Not mapped	PFO/PSS	Riverine flow-through	III

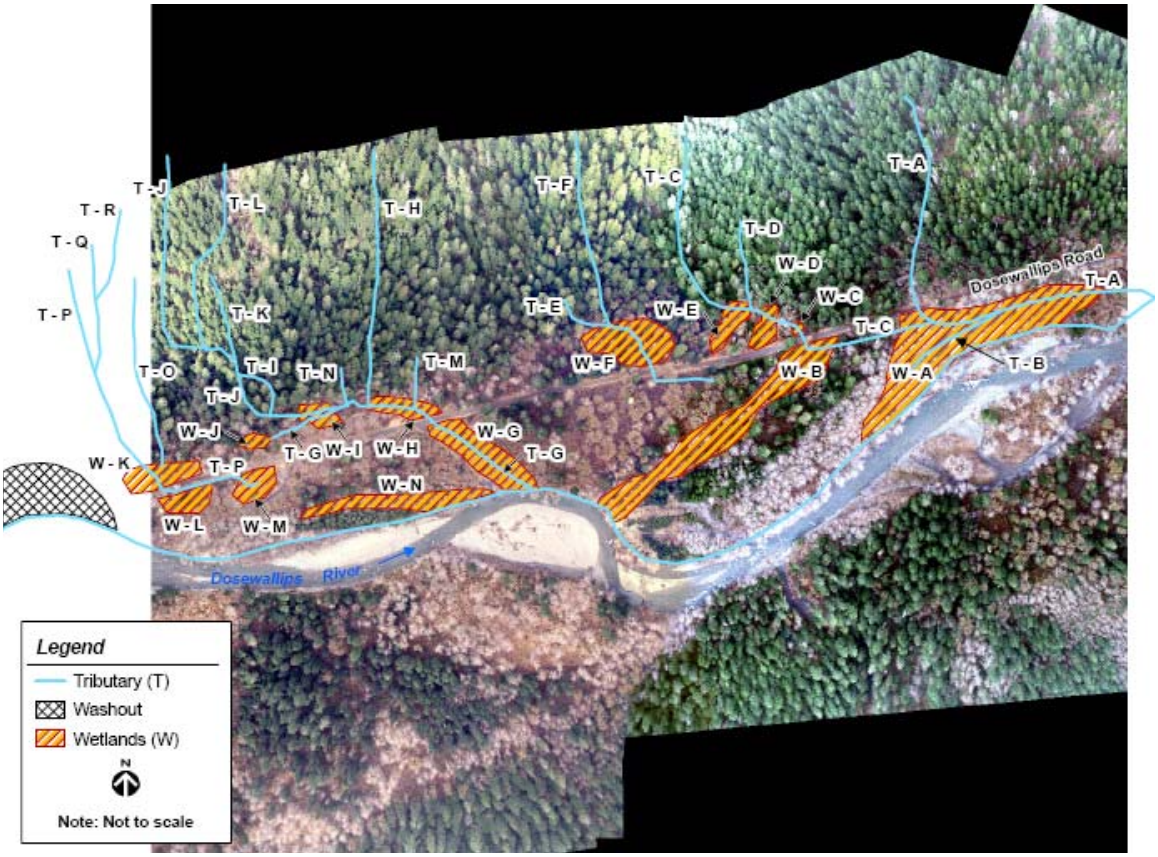
* U.S. Fish and Wildlife Service classification, based on Cowardin et al. (1979): palustrine forested (PFO) and palustrine scrub-shrub (PSS).
** Hydrogeomorphic class is based on Brinson (1993).
*** Washington state classification is based on Hruby et al. (2004)

Olympic National Forest

A total of 14 wetlands were delineated on the National Forest, amounting to about 2.1 acres. Approximate locations are shown on Figure 28. These wetlands are associated with the Dosewallips River and its floodplain, or with the numerous springs and small streams that flow out of the hillslope to the north. More detailed information about each wetland, such as classification and rating, can be found in the Wetland Report (WFLHD 2007).

Sixteen tributaries to the Dosewallips River were identifed in the project area. Two additional fish bearing tributaries, Tributary A (Gamm Creek) and Tributary B, are located just outside of the project area to the east. Locations of streams are shown on Figure 28. Two of the tributaries in the project area, tributaries C and G, are fish bearing; the remainder are non-fish bearing. As with the wetlands, more detailed information about each stream can be found in the Wetland Report (ibid).

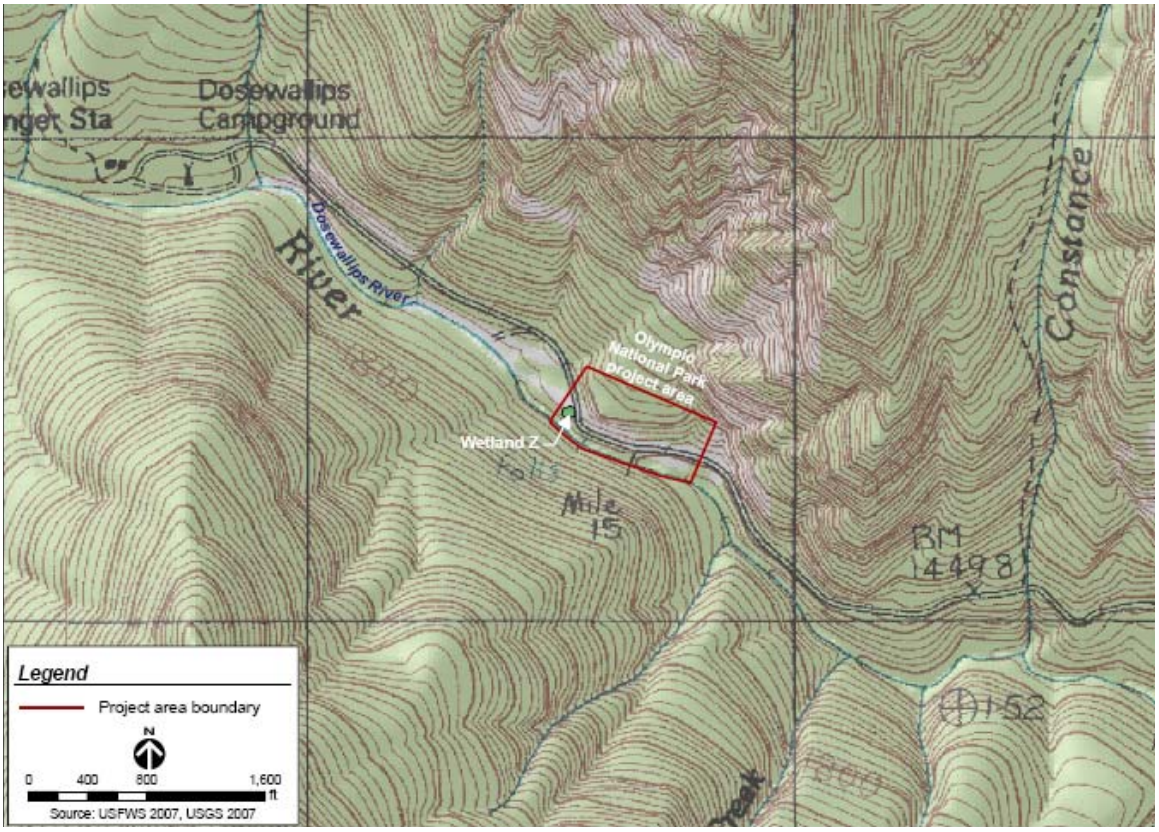
Figure 28: Wetlands and streams in the ONF project area



Olympic National Park

One wetland was identified to the west of the park's project area (Figure 29). This wetland (wetland Z) was not mapped so its size has not been determined. The source of water for this wetland is the Dosewallips River. This wetland would not be impacted by any of the proposed activities and as such there are no environmental effects to disclose. No tributaries to the Dosewallips River were identified in the project area. All proposed activities would occur above the high water mark of the Dosewallips River. Due to the lack of impacts on wetlands or waters of the U.S. related to any proposed park activities there will be no further discussion in this section related to the park.

Figure 29: Wetland in the ONP project area



Environmental Consequences

Alternative A – No Action

Direct, Indirect, and Cumulative Effects

Because no construction would occur there would be no impacts on wetlands or other waters of the U.S. Periodic road maintenance likely would occur at a similar rate and in a similar manner as it has in the past and would not affect wetlands or other waters of the U.S.

Alternatives B, C, and F – All Action Alternatives

Direct/Indirect Effects

Direct impacts on wetlands would range from an estimated 0.016 to 0.020 acre in the action alternatives. Alternative F (bridge) would affect the least amount of wetlands (0.016 acre), with Alternatives B (bench emphasis) and C (retaining wall emphasis) affecting slightly more area, 0.019 acre and 0.020 acre respectively. The total acreages impacted by the alternatives are a combination of impacts to small pieces of wetlands that are adjacent to the existing road (FSR 2610). Only a small percentage of any wetland would be impacted. Alternative F would impact 8 percent of wetland K, Alternative B would impact 7 percent of wetland D and 4 percent of wetland E, and Alterntative B would impact 9 percent of wetland D and 4 percent of wetland E. The adverse impacts to these wetlands would be minor. All action alternatives would result in an irreversible commitment of resources, as functions and values provided by impacted wetlands would be lost for the foreseeable future. However these impacts would be mitigated with compensatory mitigation as described below.

Indirect effects to wetlands under all the action alternatives include loss of shading and loss of vegetative buffers. Alternatives B and C could also potentially alter shallow groundwater flows to some of the wetlands by interception of the road ditchline and culverts. This could potentially result in altering wetland function by reducing the late season water supply and reducing soil moisture. These impacts would be mitigated by frequent ditch relief culvert spacing and road outsloping. Other mitigations that would reduce indirect impacts to wetlands include use of straw bales and filter fences. It is expected that the majority of the wetlands would not be substantially altered hydroogically.

Cumulative Effects

A number of watershed restoration activities have been completed in the Dosewallips River watershed in the last 10 years, including road decommissioning and bank stabilization. Also there are proposed restoration activities such as placement of large woody debris, additional road decommissioning, and rehabilitation of dispersed camping areas in riparian areas along the Dosewallips River. These past and future activities result in an improving trend in the overall condition of the watershed. Wetland impacts associated with the action alternatives would have a negative effect on watershed conditions but are relatively minor and would not significantly change the overall trend of the improving watershed conditions.

Forest Plan Amendment

The action alternatives would not meet the Riparian Reserves roads management standards and guidelines requirement of avoiding wetlands entirely when constructing new roads. The proposed Forest Plan amendent to the Olympic Forest Plan would allow these alternatives to be consistent with the Forest Plan. The adverse impacts of not meeting this standard and guideline, including mitigation measures to minimize impacts, are described in the preceeding environmental consequences section.

Proposed Mitigation

A conceptual wetland mitigation plan has been prepared for this project. The overall wetland mitigation goal is to protect existing wetlands and provide compensation for wetland areas and functions lost as a result of project activities. To the greatest extent possible, impacts on wetlands in the project area have been avoided and minimized. In developing the preliminary designs, resource information and mapping of wetland and waters of the U.S. features were considered to modify as much as possible the roadway or bridge design to avoid and minimize impacts. Coordination and field reviews would occur as the design of the selected alternative progresses to ensure new impacts to wetlands would not occur.

Temporary impacts to wetlands would be mitigated through the use of best management practices (BMP), such as silt fences to help prevent erosion and siltation from construction activities. Unavoidable permanent impacts would be mitigated through the use of both on- and off-site mitigation. This could include on-site wetland restoration (decommissioning of about 0.5 mile of FSR 2610 west of the proposed reroute take-off point, including culvert removal and removal of road prism), on-site wetland creation (within the dispersed camping area located south of FSR 2610 adjacent to the east end of the washout), and off-site riparian area restoration (rehabilitation of dispersed camping area along the Dosewallips River east of the project area). Mitigations would provide functions, values, and areas similar to the impacted wetlands.

Only Practicable Alternative Finding

EO 11990 requires that adverse effects on wetlands and other waters of the U.S. be avoided where possible. The action alternatives involve the reestablishment of vehicle access in the washout area, and as a result opportunities to avoid wetlands in the project area are limited, especially due to the proximity of Wilderness boundaries to the north and south of the project area. Project alternatives and design concepts that involved other route corridors were considered but eliminated earlier in the NEPA process due to greater environmental impacts with limited added benefit. As described in Chapter 2, alternatives that would have avoided some of the wetlands along FSR 2610 were considered but dropped from detailed study. Several proposed a different road alignment above the washout but were dropped as the reroute would have been longer (greater impact on late-successional reserve habitat), more of the route would have been on steep and potentially unstable slopes, there still would have been impacts to wetlands along the upper slope, and one encroached on the Buckhorn Wilderness. A southern road alignment was also considered but dropped for reasons detailed in Chapter 2. No impacts would occur under the No Action alternative but it would not meet the purpose and need of the project.

Based on the above considerations, it is determined that there is no practicable alternative to the proposed construction in wetlands and that all of the action alternatives would include all practicable measures to minimize harm to wetlands that may result from such use.

Shoreline Management Act and Federal Coastal Zone Management Act

The State’s Shoreline Management Act and the Federal Coastal Zone Management Act provide direction to protect, restore, and manage shoreline and coastal resources through ecosystem

based management. Rivers over a certain flow rate are classified as shorelines of statewide significance and fall under the requirements of these Acts, and the Dosewallips River is included in this classification. However the state shoreline point on the Dosewallips River begins at the Forest boundary between T26N, R3W, Section 25 and T26N, R2W, Section 30; and activities proposed under any of the alternatives are at least 3 miles upstream from this point. Consequently the requirements of these two Acts do not apply to this project.

Wild and Scenic Rivers (River Management Report, February 2006)

Olympic National Forest

Introduction

Management of the Dosewallips River on the ONF is governed by the 1990 Forest Plan as amended by the 1994 Northwest Forest Plan Record of Decision. While it was considered for inclusion into the National Wild and Scenic Rivers System along with other Olympic Peninsula rivers during the forest planning process it was not recommended for inclusion. Instead the River Corridors management prescription (A4B) was assigned as a means of protecting many of the values which are unique to the rivers of the Olympic Peninsula. The Wild and Scenic Rivers analysis process, in general and as applied to the Dosewallips River, is described below to provide information on the important values of the river.

Olympic Forest Plan Wild and Scenic River Analysis

As part of the forest planning process for the 1990 Olympic NF Land and Resource Management Plan and as required in the Wild and Scenic Rivers Act of October 1, 1982, and USDA-USDI Guidelines for Eligibility, Classification and Management of River Areas (September 7, 1982), seventeen rivers that originate in or flow through or have a portion of the river corridor within the Olympic National Forest were evaluated for their potential for inclusion in the National Wild and Scenic Rivers System.

Each river was evaluated to determine its eligibility, that is if the river is free flowing and its adjacent land area possesses an “outstandingly remarkable” value. Those rivers which were determined to be eligible were then evaluated to determine the appropriate classification for each river segment. A suitability analysis was then conducted on these eligible rivers and based on this analysis certain rivers were recommended for addition to the Wild and Scenic Rivers System.

Dosewallips Wild and Scenic Rivers Analysis

The Dosewallips River is about 28.3 miles long. Slightly over half of its distance (14.3 miles) is within Olympic National Park. Of the remaining 14 miles, 8 are within the Olympic National Forest, with the majority of the last 5.9 miles flowing through a number of private ownerships. The final stretch (about 0.3 miles) before reaching the Hood Canal is within the Dosewallips State Park.

The eligibility determination process for the Dosewallips River resulted in the identification of two “outstandingly remarkable” values, scenic and fish. Noted scenic values were mountain meadows, lakes, snowfields, mountain peaks, tumbling water, river canyons, and dense forests. Fish values included four salmon species, steelhead, and cutthroat trout; and were noted as regionally significant. River segments were classified as follows:

Classification	Length	Description
Wild	12.5	Source to Station Creek
Scenic *	9.9	Station Creek to Olympic NF boundary
Recreational	5.9	Olympic NF boundary to mouth

* The washout is located within this classification, approximately at RM 10.75.

In the Forest Plan planning process the determination was made that suitability analysis should proceed.

Suitability analysis was based on seven criteria. These criteria included items such as representation of river conditions and major ecosystems found on the Olympic Peninsula, compatibility with existing uses, and support or opposition. The Dosewallips River was rated as high suitability on five of the criteria and medium suitability on the remaining two. It was not included in the group of three rivers which were ultimately recommended for addition in the Wild and Scenic Rivers System in the Forest Plan.

Forest Plan Management Direction
Rivers that meet Wild and Scenic River eligibility but are not recommended for designation will be managed as River Corridors, a management prescription in the Forest Plan. River Corridor management provides management flexibility and retains options for the future. The Dosewallips River corridor is assigned the management intensity of Natural (A4BN). The desired future condition for this management intensity is that the forest along the riverbanks generally appears natural when viewed from the river. The river is accessed in places by roads and roads may reach and occasionally bridge the river.

Forest Plan Consistency
All of the alternatives analyzed for the Dosewallips Road Washout project are consistent with the standards and guidelines for Natural Management Rivers. Consideration of the important river values (recreation, scenic, and fish) are described elsewhere in this document.

Olympic National Park
The project would not alter its Wild and Scenic River eligibility. When the Dosewallips River was initially evaluated the road and erosion control features along the river were in place. In the evaluation process the river was identified to have outstandingly remarkable values of scenic, recreation, geological, and fish and wildlife; and was classified as scenic and recreational. Roads can exist under both the scenic and recreational determinations.

Ecologically Critical Areas, Other Unique Natural Resources (ONP only)

The project would have no effect on any ecologically critical areas. Unique natural resources are identified in previous sections of this document and include vegetation and wildlife.

Native American Treaty Rights

Olympic National Forest
The Forest Service has an obligation to consult, cooperate, and coordinate with Indian Tribes in developing and planning management decisions regarding resources on National Forest System lands that may affect tribal rights. The Forest Service and Tribes should work on a government to government basis to accomplish a reasonable accommodation of tribal needs. The Olympic National Forest has endeavored to solicit comments of the potentially affected tribes by letters sent to tribal councils, phone calls from the Hood Canal District Ranger, and attendance at interdisciplinary team meetings by tribal resource specialists. Comments were received from the Port Gamble S'Klallam, Jamestown S'Klallam, and Lower Elwah Klallam Tribes. Effects to areas of concern raised by these tribes are discussed in the environmental consequences section of this chapter.

Olympic National Park
Secretarial Order 3175 requires that any anticipated impacts to Indian trust resources from a proposed project or action by Department of Interior agencies be explicitly addressed in environmental documents. The federal Indian trust responsibility is a legally enforceable fiduciary obligation on the part of the Unites States to protect tribal lands, assets, resources, and treaty rights; and it represents a duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes. The National Park Service does not manage or administer Indian trust assets (the term "trust assets" means all tangible property including land, minerals, coal, oil and gas, forest resources, agricultural resources, water and water sources, and fish and wildlife held by the secretary for the benefit of an Indian tribe or an individual member) including trust lands and trust resources; however activities carried out on park lands may sometimes affect tribal trust resources. Trust resources are those natural resources reserved by or for Indian tribes through treaties, statutes, judicial decisions, and executive orders that are protected by a fiduciary obligation on the part of the United States. While the overriding mandate for the National Park Service is to manage the park units in the national park system consistent with park laws and regulations, the federal government, including the National Park Service, has a trust responsibility to protect Indian's rights and advance their interests.

No lands comprising Olympic National Park are held in trust by the secretary of the interior solely for the benefit of American Indians due to their status as American Indians. Therefore, this topic was dismissed from further analysis.

Executive Order 11988 Floodplains

In 1977 the National Environmental Policy Act of 1969 (NEPA) was amended (42 U.S.C. 4321 et seq.) in order to avoid short and long-term adverse impacts associated with the destruction or modification of flood plains. An Executive Order was issued as a result of this amendment.

Affected Environment

Olympic National Forest
Floodplains on National Forest System land within the project area were identified in a hydraulic study, the Reach Analysis (Cenderelli et al. 2003). The floodplain area is delineated in Figure 30 as area f.lt (T1).

Olympic National Park
The project is above the river in an incised canyon and there are no floodplains in this area. Due to the lack of floodplains near any of the park proposed activities there will be no further discussion in this section related to the park.

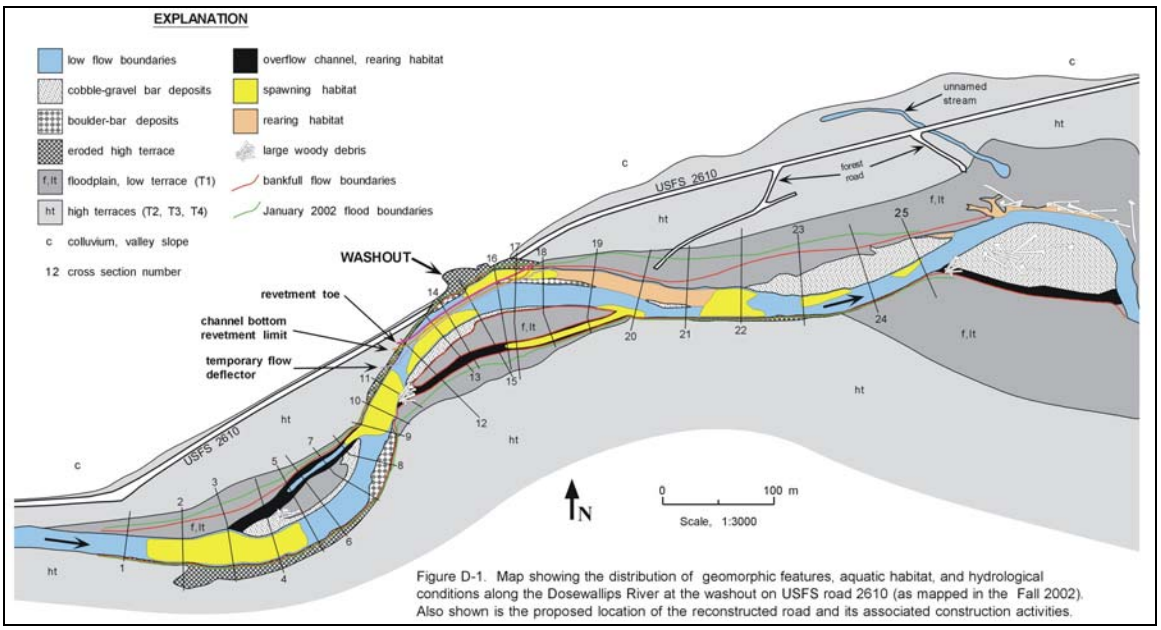
Environmental Consequences

Alternative A – No Action

Direct/Indirect/Cumulative Effects

Because no construction would occur there would be no impacts on floodplains. Periodic road maintenance likely would occur at a similar rate in a similar manner as it has in the past and would not affect floodplains.

Figure 30: Washout area floodplain



Alternatives B, C, and F – All Action Alternatives

Direct/Indirect Effects

There would be no direct impacts to floodplains from Alternatives B and C as all proposed activities occur well outside of the floodplain area. Additionally there would be no direct impacts to floodplains from Alternative F as the bridge construction would not occur within the river's floodplain.

There would be indirect effects to floodplains under all the action alternatives. Alternatives B and C could potentially alter shallow groundwater flows through the interception of flow by road ditchline and culverts. This could reduce late season water supply to the floodplain but the effect is expected to be very minor due to project design features (frequent ditch relief culverts and

road outsloping). Indirect effects of Alternative F would be from bridge piers altering the natural flow of the river and how this flow impacts the floodplain area near the washout on the south side of the river. Again this effect is expected to be very minor as the bridge is designed and mitigation measures developed to allow as near a natural flow pattern as possible. These effects are discussed in more detail in this chapter under the Geotechnical Hazards and Geomorphic Processes, Soil Productivity, and Aquatic Species and Habitat Conditions sections.

Cumulative Effects

A number of watershed restoration activities that have had a positive effect on the floodplain resource have been completed in the Dosewalllips River watershed in the last 10 years. These past and activities planned for the future result in an improving trend in the overall condition of the floodplain in the watershed. Impacts to floodplains associated with the action alternatives would have an immeasurable effect on watershed conditions and would not change the overall trend of improving floodplain conditions.

Only Practicable Alternative Finding

EO 11988 and 23 CFR 650, Subpart A require that adverse effects on floodplains be avoided where possible. The action alternatives involve the reestablishment of vehicle access in the washout area, which is in the vicinity of a floodplain. Opportunities to avoid all impacts to floodplains are limited due to the location of the existing road and the proximity of Wilderness boundaries to the north and south of the project area. Project alternatives and design concepts (as described in Chapter 2 of this document) were considered but eliminated early in the NEPA process due to greater environmental impacts with limited added benefits.

Based on the above considerations, it is determined that there is no practicable alternative to the proposed construction that would have minor indirect effects to floodplains and that all of the action alternatives would include all practicable measures to minimize harm to floodplains that may result from such construction.

Executive Order 12898: Environmental Justice

Olympic National Forest
Executive Order (EO) 12898 requires federal agencies to identify and address disproportionately high and adverse human health or environmental effects on minority and low-income populations. None of the environmental impacts identified for the proposed ONF activities would result in disproportionately high and adverse human health or environmental effects on minority (including Native American tribes) or low-income populations.

Olympic National Park
None of the proposed ONP activities would affect the populations described in Executive Order 12898. No proposed activities would have health or environmental effects on minorities (including Native American tribes) or low-income populations or communities as defined in the Environmental Protection Agency's (EPA) Environmental Justice Guidance (1998). Therefore, this topic will not be analyzed further in this document.

Executive Order 13186: Migratory Bird Treaty Act

Executive Order 13186 requires that environmental analyses of Federal actions required by the NEPA or other established environmental review processes evaluate the effects of actions and agency plans on migratory birds with emphasis on species of concern. Effects of the alternatives on migratory birds are discussed in the Terrestrial Species and Habitat section of this chapter.

National Forest Management Act Compliance (Olympic National Forest only)

Compliance with the National Forest Management Act (NFMA) can be demonstrated by finding that a project is consistent with the following applicable requirements of 16 USC 1604(g)(3).

(g)(3)(A) *insure consideration of the economic and environmental aspects of various systems of renewable resource management, including the related systems of renewable resource management, including the related systems of silviculture and protection of forest resources, to provide for outdoor recreation (including wilderness), range, timber, watershed, wildlife, and fish*

This EIS considered the effects of implementing the alternatives on the economic and environmental aspects of the project area. This consideration as documented in this chapter included the forest resources of recreation (including Wilderness), watershed, wildlife, and fish.

(g)(3)(B) *provide for diversity of plant and animal communities based on the sustainability and capability of the specific land area in order to meet overall multiple-use objectives, and within the multiple-use objectives of a land management plan adopted pursuant to this section, provide, where appropriate, to the degree practicable, for steps to be taken to preserve the diversity of tree species similar to that existing in the region controlled by the plan*

Actions proposed under the alternatives provide for diversity of plant and animal communities within the project area as described within the multiple-use objectives of the Forest Plan as non-significantly amended for this project. The effects to plant and animal communities are described in the resource sections of this chapter.

(g)(3)(C) *insure research on and (based on continuous monitoring and assessment in the field) evaluation of the effects of each management system to the end that it will not produce substantial and permanent impairment of the productivity of the land*

Implementation and effectiveness monitoring proposed in chapter 2 of this document would provide an evaluation of the effects of implementing an alternative.

Forest Plan Consistency (Olympic National Forest only)

The analysis performed by the interdisciplinary team found that the actions proposed under Alternative A are consistent with the Forest Plan. The team further found that the actions proposed under Alternatives B, C, and F would be consistent with the Forest Plan as long as proposed non-significant amendments are approved as part of the project's decision. The project's purpose and need is consistent with Forest Plan goals and impacts to resources as evaluated in this EIS have been found to be consistent with Forest Plan direction and standards and guidelines as non-significantly amended for this project. Descriptions of the effects of implementing the various alternatives and Forest Plan consistency rationale can be found in the individual resource sections in this chapter.

Aquatic Conservation Strategy (ACS) Consistency (Olympic National Forest only)

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

All action alternatives would contribute to maintaining Objective 1.

Alternatives B and C – Both alternatives reroute the road away from the mainstem of the Dosewallips River thus allowing for the natural stream channel migration and erosional processes to continue at the washout.

Alternative F – The bridge alternative would for the most part allow the high terrace to erode and supply spawning gravels to the channel. Large wood would be allowed to rack up along the piers of the bridge (unless it was inhibiting gravel recruitment from the high bank or affecting bridge performance), creating deep pools and complex fish habitat.

The scope of all action alternatives is not large enough to affect the distribution, diversity, and complexity of watershed or landscape-scale features.

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

All action alternatives would contribute to maintaining Objective 2.

Alternatives B and C – Several new culverts would be installed in the proposed reroute to allow existing stream channels to pass water through the newly constructed road prism. All but one of the culverts would be installed in small headwater channels, well above the upstream limit of fish habitat. The only fish bearing stream crossing constructed as part of the new road construction would be on a small unnamed coho tributary. The crossing would be designed to pass all fish species and all life stages found in the stream.

Alternative F - Spanning the river at the washout site with a bridge would maintain almost all of the existing stream channel features and processes in the mainstem Dosewallips. Habitat connectivity within the mainstem river would be assured. None of the instream components of pilings and riprap would affect habitat connectivity.

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

All action alternatives would contribute to maintaining Objective 3.

Alternatives B and C would contribute to maintaining Objective 3 by relocating the road away from the mainstem Dosewallips River. The resulting buffer strip would maintain the integrity of the streambanks and floodplain along the mainstem Dosewallips River. Several culverts would be installed in the new road segment to pass small streams through the road prism. The small number and relatively short length of small stream channels converted to culverts would be more

than offset by the benefits of creating a buffer and protecting the stream channel and streambanks along the mainstem Dosewallips River.

Alternative F would contribute to maintaining Objective 3 by spanning the washout section with a bridge. The bridge would allow the stream bottom and stream banks along the mainstem Dosewallips within the project area to remain more-or-less undisturbed. There would be short-term impacts to the stream bottom during the instream construction phase as pilings are placed in the river channel, however the area of disturbance would be relatively small. Pile driving activities would be short-lived, occurring at most over a 3.5 month period primarily during the summer low flow period. There would likely be some adjustment of the stream bottom during high flows the first winter but substantial changes to the existing streambed are unlikely.

Streambanks and channels are anticipated to stabilize after instream implementation of all of the action alternatives.

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

All action alternatives would contribute to maintaining Objective 4. There would be short-term impacts to water quality associated with instream implementation of all action alternatives. The current water quality conditions on National Forest lands within the project area are considered high quality for aquatic communities as described in the Reach Analysis (Cenderelli et. al. 2003) and the Dosewallips Watershed Analysis (USFS 1999)

Alternative B and C – There would be some unavoidable short-term turbidity in the small streams and the small perennial fish-bearing stream coming off the hillslope during the construction of the new road. Constructing the road during the summer and following standard de-watering and erosion control mitigation measures would minimize the amount of fine sediment and turbidity entering streamcourses. Adverse impacts related to increased fine sediments during road construction are anticipated to be minor. Many of the small stream channels would be almost dry during the summer construction period. Increased turbidity due to construction activities would likely be limited to a few hours as the individual culvert sites are prepared and placed. Potential impacts would be limited to the non-fish bearing streams and to a small unnamed coho rearing tributary. Substantial turbidity impacts from road construction, if any, would be unobservable within a couple of hours after construction was completed at an individual culvert site. Elevated turbidity levels, if any, would be diluted rapidly as the tributaries entered the mainstem Dosewallips River. Elevated turbidity levels would not likely be observable outside of the immediate project area and no cumulative impacts are anticipated. Potential sediment impacts from road construction are anticipated to be unobservable after 1-2 years, when the fill and cutslopes stabilize and revegetate.

Alternative F – Constructing the bridge would create some substantial local inputs of fine sediment and turbidity into the Dosewallips River. Water quality in the upper watershed is in good condition due to intact riparian areas and minimal development (USFS 1999). Most of the fine sediment inputs associated with the project would occur during the instream water diversion activities, pile driving for the bridge piers, and placement of riprap along bridge approaches.

Turbidity and fine sediment inputs would be locally severe during these activities. These inputs would generally occur only during specific construction activities and would disappear quickly once those construction activities ended which would be a few days and no cumulative impacts are anticipated. While the inputs of fine sediment into the stream would be unavoidable, required mitigation measures (see Mitigation Measures and Management Requirements section of this document) would minimize impacts. Some additional streambed disturbance and generation of fine sediment and turbidity would be anticipated for at least one year as the streambed changes in response to the channel alterations during high flow events. Any increases in turbidity during these periods would be unobservable because of the high natural sediment loads carried by the Dosewallips during storm events.

Most of this turbidity and fine sediment would simply be remobilizing stream sediments within the river channel. Much of this would occur during the construction of water diversion/ work isolation facilities. Fish are anticipated to move out of the area for short periods, during the construction phase.

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

All action alternatives would contribute to maintaining Objective 5. The reactivation of the high terrace at the washout as a source of spawning gravels has contributed to the high quality of fish habitat below the washout, as the high glacial terrace sources of spawning gravel sediment are limited above the washout (Cenderelli et. al. 2003).

Alternative B and C – By relocating the road away from the mainstem Dosewallips River these alternatives would allow natural channel migration processes to continue in the vicinity of the washout. Continued channel migration and continued erosion of the high glacial terrace at the washout would provide necessary inputs of coarse sediment to the river over time. Refer to sediment section of this EIS for more detail.

Alternative F – By spanning the washout site with a bridge most of the stream channel migration and erosional processes would be allowed to continue at the washout site. Although riprap would be placed along the upstream and downstream bridges approaches, 80 to 90 percent of the high glacial terrace would still be allowed to erode and contribute coarse sediments to the Dosewallips River. The high quality spawning and rearing habitat immediately downstream of the washout would be maintained. Refer to sediment section of this EIS for more detail.

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

All action alternatives would contribute to maintaining Objective 6.

Alternative B and C – Both alternatives have the potential to affect hillslope hydrology by intercepting groundwater from cutslopes and drainage ditches associated with road building. Transport efficiency of the groundwater in the hillslope would likely increase some what – meaning the water would likely run off faster, thus affecting water storage capacity. However

impacts are not anticipated to be substantial. Potential adverse impacts to groundwater and hillslope hydrology would be minimized by the utilizing permeable road fill materials where possible and installing frequent ditch relief pipes. Magnitude and extent of impacts are anticipated to small and would not be observable beyond the immediate project area. Refer to off-channel habitat section of this EIS for more detail.

Alternative F – This alternative would have no effect on instream flows. No new road construction with cutslopes and drainage ditches would be built that would have the potential to intercept groundwater.

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

All action alternatives would contribute to maintaining Objective 7.

Alternative B and C - Both alternatives have the potential to affect hillslope hydrology by intercepting groundwater from cutslopes and drainage ditches associated with road building. These changes may potentially dry up some springs and seeps that feed the small tributary or cause some to go intermittent during the dryer summer season. However impacts to wetlands are anticipated to be minimal. Decommissioning a portion of FSR 2610 would improve riparian function in this area and partially restore natural hydrologic flow. Potential adverse impacts to groundwater and hillslope hydrology would be reduced by the utilizing permeable road fill materials where possible and installing frequent ditch relief pipes. Magnitude and extent of impacts are anticipated to be small due to above mentioned mitigation measures and management requirements. Refer to off-channel habitat section of this EIS for more detail.

Alternative F - This alternative would have no effect on floodplain inundation or water table elevation in meadows and wetlands.

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

All action alternatives would contribute to maintaining Objective 8.

Alternative B and C – Alternative B and C would contribute to maintaining Objective 8 by relocating the road away from the mainstem of the Dosewallips River. The resulting buffer strip would maintain the riparian vegetation along the streambanks and the floodplain along the mainstem of the Dosewallips River. Some riparian vegetation would be lost where the new road crosses small headwater streams but the small number and relatively short length of small stream channels affected would be more than offset by the benefits of creating a buffer and protecting the riparian vegetation along the mainstem of the Dosewallips River. Both alternatives would impact riparian vegetation as new road construction crosses streams. However impacts would not have a measurable effect on thermal regulation, nutrient filtering, bank erosion, channel migration, and coarse wood.

Alternative F - Project activities would only remove a small portion of the riparian area within

the project area and would be a negligible from a watershed perspective. Because a bridge will be used to span the washout section the species composition and structural diversity of riparian plant communities along the vast majority of the Dosewallips mainstem within the project area would be maintained.

There would be unavoidable minor amounts of wetlands impacted connected with all action alternatives, however required mitigations established by the Army Corp of Engineers that prevent no net loss of wetlands would be incorporated into all action alternatives. Mitigations would replace lost wetland function and/or improve existing functions by enhancing wetlands.

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

All action alternatives would contribute to maintaining Objective 9.

Alternative B and C – Alternative B and C would contribute to maintaining Objective 9 by relocating the road away from the mainstem of the Dosewallips River. The resulting buffer strip would maintain the riparian habitat along the streambanks and the floodplain along the mainstem of the Dosewallips River. Some riparian habitat would be lost where the new road crosses small headwater streams but the small number and relatively short length of small stream channels affected would be more than offset by the benefits of creating a buffer and protecting the riparian habitat along the mainstem of the Dosewallips River. Both alternatives would impact riparian habitat as new road construction crosses streams. However impacts would not have a measurable effect on populations of native plant, invertebrate and vertebrate riparian-dependent species.

Alternative F - Project activities would only remove a small portion of the riparian area within the project area and would be a negligible from a watershed perspective. Because a bridge will be used to span the washout section the species composition and structural diversity of riparian dependent species along the vast majority of the Dosewallips River mainstem within the project area would be maintained.

Summary

There would be short term project scale impacts, primarily associated with turbidity and sediment production during construction phases. However changes in turbidity and sediment production would not be detectable at the watershed scale. Additionally, there would be minor amounts of wetlands impacted, which would be mitigated. In order to achieve no net loss of wetlands, the mitigations would replace lost wetland function or improve existing functions by enhancing wetlands, within the watershed.

Alternative B and C – Magnitude and extent of turbidity and fine sediment impacts would be minimal and would last only during the construction phase and a few years after as fill and cutslopes revegetate. Both alternatives reroute the road away from the mainstem of the Dosewallips River thus allowing for the natural stream channel migration and erosion processes to continue at the washout which would maintain the high quality fish habitat below the washout. Additionally a vegetated buffer strip along the mainstem Dosewallips would result.

Alternative F – Constructing the bridge would create some substantial local inputs of fine sediment and turbidity into the Dosewallips River. However impacts would last only during the

instream construction phase. By spanning the washout site with a bridge most of the stream channel migration and erosional processes would be allowed to continue at the washout site. The high quality spawning and rearing habitat immediately downstream of the washout would be maintained

Other Jurisdictions

The USDI Fish and Wildlife Service and National Marine Fisheries Service are responsible for the recovery of species listed under the Endangered Species Act. Any Forest Service and park activities that have the potential to affect such species must be approved by the responsible agency. Consultation with those agencies regarding the Dosewallips Road Washout project activities is ongoing and will be completed before any activities related to this EIS can be implemented.

The Washington State Department of Fish and Wildlife (WDFW) is responsible for the protection, perpetuation, and management of fish life in the State of Washington. The Forest Service will coordinate and collaborate with the WDFW on any hydraulic project activities associated with the selected alternative for the Dosewallips Road Washout project, as per conditions in the March 2005 MOU.

Energy Requirements

Olympic National Forest
Some form of energy would be necessary for the proposed activities which require the use of mechanized equipment, such as road construction, instream work, road decommissioning, and area rehabilitation. No adverse effects on energy requirements would be expected from implementation of any alternative.

Olympic National Park
Resource, Including Energy, Conservation Potential: Maintaining access is not expected to impact resource conservation potential in the park

Prime Farmland, Rangeland, and Forestland

Olympic National Forest and Olympic National Park

No prime farmland, rangeland, or forestland occurs within the project area.

Consumers, Minority Groups, and Women

No adverse effects on consumers, minority groups, and women not already identified in the FEIS for the Forest Plan would be expected to result from implementation of any alternative. Actions associated with implementing any of the alternatives would be governed by Forest Service, park, or Federal Highways contracts, which are awarded to qualified contractors regardless of race, color, sex, religion, etc. Such contracts also contain nondiscrimination requirements.

Unavoidable Adverse Effects

Implementation of any of the alternatives including the No Action alternative would inevitably result in some adverse environmental effects. Adherence to Forest Plan direction and the mitigation measures and management requirements proposed in Chapter 2 of this document would help reduce the severity of the effects. Adverse environmental effects are discussed in this document under each resource section.

Short-Term Use and Long-Term Productivity

Olympic National Forest
NEPA requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 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 present and future generations of Americans (NEPA Section 101).

Short-term uses are generally those that determine the present quality of life for the public. Long-term productivity refers to the land's capability to support sound ecosystems producing a continuous supply of resources and values for future generations.

The alternatives to reestablish road access at the washout on FSR 2610 would improve accessibility to the recreational opportunities provided by Forest Service and park facilities and other resources in the upper Dosewallips River area in the short-term. Alternatives B and C would have effects on long-term soil and late-successional habitat dependent species productivity, and Alternative F would have an effect on long-term aquatic species productivity; which are described in the environmental consequences section of this chapter.

Olympic National Park
Long-term Management of Resources or Land/Resource Productivity: No impact to the long-term management of resources or land/resource productivity should result from maintaining road access in the Dosewallips.

Irreversible and Irretrievable Commitment of Resources

Irreversible commitment of resources refers to a loss of future options with nonrenewable resources or resources that are only renewable over a long period of time. There would be an irreversible reduction in soil productivity and the amount of old growth habitat associated with the road construction proposed in Alternatives B and C. However the reduction is only about seven acres at most and is very small in comparison to the available acres in the Dosewallips Watershed. There would be an irreversible commitment of mineral resources due to the rock used to surface roads and provide bank protection under all action alternatives. The amount involved would not substantially deplete the overall supply of rock suitable for these purposes. An additional irreversible commitment of fuel would occur due to the fuel required to build and maintain the road, but this amount would not substantially deplete the overall supply of this resource. There would also be an irreversible commitment of resources associated with wetlands as the functions and values provided by impacted wetlands would be lost for the foreseeable future. As previously disclosed wetland impacts would be minor due to the small acreage impacted and mitigation measures.

Irretrievable commitment of resources refers to a loss of production of renewable resources. Resources that would be irretrievably lost as a result of the road construction in Alternatives B and C are loss of tree growth and wildlife habitat where vegetation is removed. Again this reduction is a very small percentage of the available acres in the Dosewallips Watershed. There would also be an irretrievable loss of some fish habitat under Alternative F as described in the aquatics environmental consequences section of this chapter.

Olympic National Park Specific Disclosures

The following impact topics or issues were eliminated from the list of potential impacts by the NPS because they would not be affected by reestablishing access to recreation facilities and ranger station.

- Unique Ecosystems, Biosphere Reserves, or World Heritage Sites: No unique ecosystems, biosphere reserves, or world heritage sites would be affected by the proposed project.
- Streamflow Characteristics: No impacts to streamflow characteristics are anticipated as a result of reestablishing access to the Dosewallips facilities in ONP.
- Marine or Estuarine Resources: No marine or estuarine resources are located within the project area.
- Urban Quality: Because this area is not located in an urban setting, no impacts to urban quality are anticipated.
- Other Important Environmental Resources: No additional important to environmental resources have been identified that could be impacted by maintaining access to the Dosewallips.

CHAPTER 4 – SUPPORTING INFORMATION

Preparers and Contributors

The following is a list of contributors to this environmental impact statement. Other Forest Service employees contributed to the completion of this document through their assistance in support functions and/or by providing Forest level data and other information needs. Their help was greatly appreciated.

Interdisciplinary Team

Tim Davis – Team Leader/Social-Economic Analysis. Olympic National Forest Planner, B.S. in Forest Management, 29 years with Forest Service and Bureau of Land in natural resource management, planning, and NEPA compliance.

Bill Shelmerdine – Geotechnical/Stream Morphology. Olympic National Forest Geotechnical Engineer/Geologist, B.S. in Geology with Post Baccalaureate study in Civil and Geotechnical Engineering, 24 years experience with Forest Service in geology and geotechnical engineering.

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Scott Hagerty – Watershed Processes. Forest Soil Scientist, B.S. in Forest Management, minor in Soil Science, 25 years experience (17 on the Olympic National Forest) with soil survey and management.

Marc McHenry – Aquatic Species and Habitat. Hood Canal Ranger District Fisheries Biologist, B.S. in Biology, 12 years experience as a Fisheries Biologist.

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Susan Piper – Terrestrial Species and Habitat. Olympic National Forest Wildlife Program Manager, B.S. in Environmental Studies and M.S. in Wildlife Management, 14 years experience as a wildlife biologist with the Forest Service, and 3 years as a wildlife biological technician.

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Olympic National Forest

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Dave Colthorp, Facilities Supervisor.

Distribution of the Environmental Impact Statement

The following is a list of those state and local governments, agencies, tribes, and organizations who received a copy of this DEIS or notification of its availability.

State and Local Government and Agencies

Jefferson County Commissioner
Mason County Prosecutor's Office
Mason County Sheriff
Washington State Department of Ecology
Washington State Department of Fish & Wildlife

Washington State Department of Natural Resources
Washington State Parks & Recreation Commission

Federal Agencies:

Director, Planning and Review, Advisory Council on Historic Preservation
Deputy Director, USDA APHIS PPD/EAD
Natural Resources Conservation Service, National Environmental Coordinator, U.S. Department of Agriculture
USDA, National Agricultural Library Head, Acquisitions & Serials Branch
NOAA Office of Policy and Strategic Planning NEPA Coordinator
National Marine Fisheries Service, Habitat Conservationists Division, Northwest Region
U. S. Army Engr. Northwestern Division
Environmental Protection Agency, Region 10, EIS Review Coordinator
Director, Office of Environmental Policy and Compliance, U.S. Department of the Interior
Northwest Power Planning Council
U.S. Coast Guard (USCG), Environmental Management CG-443
Northwest Mountain Region, Regional Administrator, Federal Aviation Administration
Division Administrator, Federal Highway Administration, WA
U.S. Department of Energy, Director, Office of NEPA Policy and Compliance
USDI, National Park Service, Olympic National Park
U.S. Army Corps of Engineers, Regulatory Branch

American Indian Tribes

Jamestown S'Klallam Tribe
Lower Elwha Klallam Tribe
Port Gamble S'Klallam Tribe
Skokomish Indian Tribe

Businesses and Organizations

Backcountry Horseman
Blue Ribbon Coalition, Inc.
Blue Ribbon Olympic Volunteers
Boulton & Yarr Logging
Bremerton Sun
Chinook Resources
Conservation Northwest
Entrix, Inc.
Forest Conservation Council
Friends of Miller Peninsula State Park
FSEEE
Harza Engineering
Hermann Bros. Logging & Constr.
Hood Canal Environmental Council
Hood Canal Salmon Enhancement
Jim H. Bower Logging
K Ply, Inc.
KMAS
Leavitt Trucking Inc.
Meridian Environmental
National Audubon Society
Northwest Forestry Association
Olympic Coast Alliance
Olympic Forest Coalition
Olympic Park Associates
Olympic Peninsula Audubon Society
Pacific Northwest Trail Association
Pacific Rivers Council
Peninsula Wilderness Club
Pope Resources
Port Angeles Daily News
Port Ludlow Hiking Club
Port Townsend Leader
Port Townsend Paper

Protect the Peninsula's Future
Quilcene/Brinnon Chamber of Commerce
Resource Renewal, Inc.
Sequim Gazette
Shelton-Mason County Journal
Sierra Club, Cascade Chapter
Simpson Investment Company
Simpson Timber Company
Skokomish Watershed Coalition
The Mountaineers
Washington Native Plant Society
Washington Trails Association
Washington Wilderness Coalition
Wild Olympic Salmon

Glossary

Access and Travel Management (ATM) Plan – A document that outlines management policies for motorized vehicles and their associated travelways (development and maintenance).

Aggradation - To fill and raise the level of (the bed of a stream) by deposition of sediment.

Aggregate – Crushed rock used on road surfacing.

Alternative – One of several policies, plans, ways, or projects proposed for decision making. An alternative does not necessarily differ from other alternatives in all aspects.

Avulsion – The sudden abandonment of a part or the whole of a meander area by a stream for some new course.

Avulsion hazard zone – The portion of the channel migration zone that delineates avulsion hazards.

Bankfull Channel – Area used by a river or stream at its maximum flow without overflowing its banks.

Channel bed scour – Powerful and concentrated clearing and digging action of flowing water on the bottom of a river channel.

Channel migration zone – The area along a river within which the channel can be reasonably predicted to migrate over time as a result of natural processes.

Coarse Sediment – Substrate that are more than 2 milimeters in diameter; such as gravels, cobbles, and boulders.

Constituent elements – Habitat features associated with the terrestrial environment that support the requirements for nesting, roosting, and other normal behaviors of a species. Associated with designated critical habitat.

Cooperating agency – Any Federal agency other than a lead agency which has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal.

Cross drains – Installed structures, such as culverts and rolling dips that move water from one side of a road to the other.

Danger tree – Those trees and snags that have the potential for, or are of imminent danger, to roadway traffic.

Decommissioning – Activities that result in the stabilization and restoration of unneeded roads to a more natural state (36 CFR 212.1, (FSM 7703). Decommissioning may include the following:

- Closing entrances -preferably using full-restoration techniques to obscure.

- Scarifying road surfaces, or decompacting (subsoiling or ripping) to establish vegetation and reduce run-off.
- Seeding to control erosion and in some cases provide forage.
- Partial to full restoration of stream channel by removing culverts and fills.
- Water-barring and cross-ditching of roadbed.
- Removing unstable portion of embankments.

Discounted Costs – The current value of costs that occur over time. A discount rate is used to reduce future costs to their present time equivalent.

Embeddedness – The degree to which large particles in a streambed (boulders, rubble, gravel) are surrounded or covered by fine sediment, usually measured in classes according to percent coverage.

Environmentally preferred alternative – The alternative which best meets section 101 of NEPA; that causes the least damage to the biological and physical environment and best preserves and enhances historical, cultural, and natural resources.

Erosion hazard zone – The area of the channel migration zone that delineates channel susceptibility to bank erosion from stream flow or mass wasting.

Fine Sediment – Substrate that are less than 2 milimeters in diameter; such as sands, silts, and clays.

Fluvial processes – Processes pertaining to rivers, produced by the action of a stream or river.

Forest road – A road wholly or partly within, or adjacent to, and serving the National Forest System and which is necessary for the protection, administration, and utilization of the National Forest System and the use and developments of its resources.

Full bench construction – Road construction that uses no fill or side-cast material.

Gabion – A specially designed container or structure used to hold coarse rock aggregate, used in forming a retaining wall.

Geomorphic processes – Processes which create or shape land forms.

High bank – The bare slope at the washout which is subject to river erosion, undercutting, and slope instability. It is also referred to as the bluff slope and the high glacial terrace.

Historical migration zone – The portion of the channel migration zone that the channel occupied in the historical record.

Hydromulching – Hydromulching, sometimes referred to as hydroseeding, is a grass planting process. This grass planting process is usually more effective than conventional seeding. The process begins by mixing mulch, seed, fertilizer, and water in the tank of a hydro-mulching machine. The mixed material is then pumped from the tank and sprayed onto the ground. The material is often referred to as a slurry, much like a soupy batch of green papier-mâché. Once

applied to the soil, the material enhances initial growth by providing a micro-environment beneficial to seed germination.

Impairment – National Park Service determination of impact that would harm the entire integrity of a resource or value, whose conservation is key to the cultural or natural integrity of the recreation area, or is a resource or value needed to fulfill a specific purpose identified in the park's enabling legislation.

Interdisciplinary team (IDT) – A group of individuals with different training assembled to solve a problem or perform a task.

Invasive plants (noxious weeds) – Alien plant species whose introduction does or is likely to cause economic or environmental harm or harm to human health.

Jersey barrier – A concrete barrier that acts as a traffic control device to prohibit traffic flow or prevent materials from entering the roadway or ditchline.

Key Watershed – A component of the Aquatic Conservation Strategy (ACS) of the Northwest Forest Plan which involves a system of large refugia comprising watersheds that are crucial to at-risk fish species and stocks and provide high quality water.

Late-Successional Reserve – A Northwest Forest Plan land allocation with an objective to protect and enhance conditions of late-successional and old-growth forest ecosystems.

Lead or Co-Lead agency – The agency preparing or having taken primary responsibility for preparing an environmental impact statement.

Log complexes – Structures designed to mimic natural logjams. They function to reduce river flow energy, redirect flow, scour pools, and create cover for aquatic species.

Maintenance level – Defines the level of service provided by, and maintenance required for, a specific road, consistent with road management objectives and maintenance criteria:

Maintenance Level 1 Assigned to intermittent service roads during the time they are not closed to vehicular traffic. The closure period is one year or longer. Basic custodial maintenance is performed.

Maintenance Level 2 Assigned to roads open to for use by high clearance vehicles. Passenger car traffic is not a consideration.

Maintenance Level 3 Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities.

Maintenance Level 4 Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds.

Maintenance Level 5 Assigned to roads that provide a high degree of user comfort and convenience. Normally, these roads are double lane and paved or aggregate surfaced with dust abatement.

Meander bend – Curved portion of meandering channel where the current is directed toward the

stream bank.

Meandering channel – A winding channel pattern occurring in part from local variations in erosional resistance of bed and bank material.

Mitigation – Mitigation includes: (1) Avoiding the impact altogether by not taking a certain action or parts of an action; (2) minimizing impacts by limiting the degree or magnitude of the action and its implementation; (3) rectifying the impact by repairing, rehabilitating, or restoring the affected environment; (4) reducing or eliminating the impact over time by preservation and maintenance operations during the life of an action; and (5) compensating for the impact by replacing or providing substitute resources of environments. (40 CFR Part 1508.20)

Pacific Decadal Oscillation – A cyclic climate pattern.

Perched water table or aquifer – An aquifer that occurs above the main water table, caused by an impermeable layer of rock above the main aquifer. Water percolating down gets trapped above the impermeable layer and if the flow intersects the surface the water is discharged as a spring.

Preferred alternative – The alternative which best fulfills an agency's statutory mission and responsibilities, considering environmental, social, economic, and other factors.

Present value of discounted costs – The sum of the discounted costs.

Proposed action - A proposed action is a proposal to authorize, recommend, or implement an action to meet a specific purpose and need. It is formed at that stage in the development of an action when agencies; in this case the Forest Service, WFLHD, and Park Service; have a goal and are actively preparing to make a decision on one or more alternative means to accomplish that goal (40 CFR 1508.23).

Reach analysis – An Olympic National Forest document summarizing geomorphic characteristics and processes and aquatic habitat conditions along one kilometer of the Dosewallips River in the vicinity of the washout.

Redds – Shallow depressions excavated in gravel by female salmon where eggs are laid.

Revetment – A facing of rock or other material built to protect an embankment from water erosion.

Riparian – A geographically delineated area with distinctive resource values and characteristics that is composed of aquatic and riparian ecosystems.

Riparian Reserve – A key element of the Northwest Forest Plan Aquatic Conservation Strategy (ACS) which provides an area along all streams, wetlands, ponds, lakes, and unstable and potentially unstable areas where riparian-dependent resources receive primary emphasis.

Riprap – A layer of large, durable rock whose purpose is to prevent erosion by currents, and thereby preserves the shape of a surface.

River planform – The shape and size of channel and overbank features as viewed from above.

Shear stress – Stress caused by forces operating parallel to each other but in opposite directions.

Semi-primitive motorized – A management intensity class within the Recreation Opportunity Spectrum (ROS).

Soundscape – A National Park Service resource, referring to natural quiet and sounds associated with the physical and biological resources of the park.

Spawning gravels – An appropriate mix of fine and coarse sediment with the primary component being gravel size material with some smaller cobbles.

Stream Order – Stream size based on the confluence of one stream with another. First order streams are the origin or headwaters. The confluence or joining of two first order streams forms a second order stream.

Turbidty - A cloudiness or haziness of water (or other fluid) caused by individual particles (suspended solids) that are generally invisible to the naked eye, thus being much like smoke in air.

Visual quality objective – Categories of acceptable landscape alteration measured in degrees of deviation from the natural-appearing landscape.

Wetted perimeter – The width of the wetted contact between a river and its channel.

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Appendices

Appendix A: Alternatives Evaluated in Detail but Eliminated from Consideration

As previously discussed in Chapter 2 these two alternatives were evaluated but eliminated from consideration. Based on the evaluation completed by the Dosewallips IDT the Agencies' Responsible Officials determined that the environmental consequences of these two alternatives would be unacceptable. An additional factor in making this determination was a comment from NMFS that they had serious concerns about replacing the washed-out road into the Dosewallips River channel due to serious long-term affects to Puget Sound chinook salmon. A full description of these alternatives is included here. These alternatives were developed based on site conditions as existed in late 2005 and have not been modifified to reflect the current conditions. Additionally costs were estimated for these alternatives in 2006 and have not been updated. They should not be compared with costs displayed in the main body of this EIS.

Alternative D – Replace-in-Kind

Objective
This alternative is designed to meet the project's purpose and need and to minimize impacts to terrestrial habitats by avoiding the clearing associated with road construction in LSR and to soil productivity, while reestablishing road access in the washout area as close to the preexisting conditions, in terms of grade and alignment, as possible.

Description
A 14-foot wide single lane road about 500 feet in length would be reconstructed similar to what existed prior to the washout (maintenance level 3). It would provide access for passenger cars, recreational vehicles, and vehicles pulling trailers. The horizontal alignment would swing into the hillside as much as possible without undercutting the slope while also providing sufficient catchment area at the base of the slope to accommodate bank sloughing and ravel (Figure 31). Cross drains would be needed to allow for proper road drainage. The bluff slope would be laid back to a slope angle of 1 horizontal: 1 vertical to create a more stable slope. This would require moving the top of the slope back about 60 feet, removing up to 0.7 acre of ground or about 13,250 cubic yards of material. Some of this material could be used to build the road fill with the remainder (about 30 percent or 4,000 cubic yards) hauled to an off-Forest disposal site. There would be clearing of danger trees for approximately 100 feet from the top of the laid back slope involving about 1 acre of forest within LSR. The height of the roadway surface would be at a grade to minimize the road's footprint while meeting design criteria for a 100 year flood (Q100). This design would be about 10 to 15 feet above the channel at the washout with the road extending outward from the base of the slope 40 to 55 feet depending on the final design height. Near the upstream portion of the washout the road fill would occupy about one half of the existing bankfull channel width. Road bank protection (most likely in the form of riprap) would extend along the new construction area and approaches for a distance of about 680 feet.

Figure 31: December 2005 aerial view of washout showing estimated alignment for Alternative D. Dashed line approximates toe of fill at channel elevation.

Under this alternative the existing north edge of the Dosewallips River would be relocated between 20 and 60 feet back toward the pre-damage location. Fill and riprap would be placed within the existing river channel to form the road prism. The toe of the fill would be well within the wetted perimeter of the river. Near the upstream portion of the washout the new road fill would occupy approximately ½ of the existing bankfull channel width (Figure 32). The new road fill would occupy less of the existing channel near the downstream portion of the washout. The existing bankfull channel width at the riverbend is approximately 195 feet with the low water channel width estimated at 90 feet. The revetment would reduce the width of the current bankfull channel by about 33 percent and potentially as much as 70 percent of the low water channel width at the washout site. These are short-term effects as the river would be expected to shift outward (toward the south) and eventually regain needed flow area. In addition an armor layer would extend out about 15 feet from the toe of the riprap and beneath the channel bed. Approximately 680 feet of riprap would be placed to stabilize the streambank. The surface of the riprap revetment would be roughened to dissipate flow energy by placing a series of rock clusters or large individual rocks along the riprap, placing rocks in conjunction with wood, and constructing an uneven surface to the riprap.

Figure 32: View upstream at the washout showing approximate location of roadway for Alternative D. Dashed line indicates toe for the riprap at channel bed elevation.

The river would be expected to adjust to the channel relocation, the reduced channel cross section, and the bank armoring with some combination of down cutting, lateral shifting and/or bed coarsening. The extended riprap toe would protect the integrity of the riprap revetment and limit the amount of channel bed scour adjacent to road.

Approximately five log complexes estimated to cost $400,000 would be constructed within the project reach to partially mitigate for the loss of aquatic habitat, channel function, spawning gravels, and large wood caused by the reconstruction of the road and subsequent hardening of the bank. One log complex would be located at the upstream end of the revetment. Another complex would be located at the downstream end of the revetment. Three complexes would be constructed 160 to 1150 feet downstream of the revetment. These structures would function to reduce flow energy, redirect flow and scour pools, and create cover for aquatic species. The structures would be designed to mimic natural logjams. The log complexes would consist of interlocking pieces of large wood that are stacked and racked against several large trees with attached root wads. Like natural accumulations of large wood the constructed log complexes would provide streambank protection while creating valuable fish and wildlife habitat.

Constructing the five log complexes would require work with a track excavator in the channel below ordinary high water. It may also involve crossing the river channel with heavy equipment,

excavating channel-bed and floodplain material, removing riparian vegetation, placing large wood in the excavated area, and partial burial of the wood with the excavated material. Existing dispersed campsite roads would be used to access the river and would be rehabilitated post construction. Approximately 80 to 90 conifer trees ranging from 24 to 32 inches dbh would be removed along FSRs 2610, 2620-030, and 2620-032 to provide materials for the log complexes. In the event this alternative had been selected for implementation a more detailed proposal would have been developed with its own NEPA analysis and ESA consultation.

The estimated cost of this alternative is $1.7 million. This estimate includes additional maintenance needed on FSR 2610 from the Forest boundary to the reroute location due to the increased road wear associated with the disposal of excess excavation, estimated at $15,840, and the deferred maintenance on FSR 2610 past the reroute to the Forest boundary, estimated at $13,200. The estimated annual maintenance cost for the new road itself is $2,210 for the first two years and then $1,320 annually. Annual maintenance on FSR 2610 past the washout to the Forest boundary would also be needed, estimated at $9,200.

During construction FSR 2610 would be closed to the public from the Forest boundary up to the washout site to provide for public safety. Portions of FSR 2610 and previously disturbed dispersed camping areas (approximately 2 acres) near the washout would be used for construction equipment staging areas. The dispersed camping areas would be rehabilitated at the conclusion of construction activities. Rehabilitation would include soil improvement work, scattering of large wood, seeding/planting, and treatment for invasive species.

A wood use plan would be developed to insure the best use of the trees removed during construction activities. Trees would be tipped instead of cut when possible as stems with root wads attached are more suitable for restoration projects. The FS would give priority use for these downed trees for restoration and enhancement uses such as instream large woody debris structures, terrestrial coarse woody debris, and tribal uses. Additional uses may include road decommissioning rehabilitation and repair of the park's Dosewallips Road. Trees in excess to these uses may be sold.

Additionally ONP and WFLHD propose to repair the Dosewallips Road at MP 0.85 in the vicinity of the Dosewallips Falls, at an estimated cost of $550,000. Approximately 120 feet of road that was constructed in the 1940's on log retaining wall/structures failed in late 2003. The road would be repaired by removing the old road fill material and reconstructing the road prism by using riprap and crushed rock to form a foundation on which structural backfill would be constructed. Stabilization techniques (such as gabions or other wall structures) would be used to protect the stabilized fill from erosion. All of the construction would be above the ordinary high water line of the river. Deferred maintenance on the park's Dosewallips Road would be needed prior to the repair work at an estimated cost of $3,800.

Forest Plan Amendments

Selection of this alternative would include site-specific, non-significant amendments (as defined under the National Forest Management Act) to the Forest Plan. The following amendments are associated with Aquatic Conservation Strategy (ACS) objectives and management direction for Key Watersheds as identified in the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (referred to as the NWFP ROD), which amended the Olympic's Forest Plan.

1. Projects must be consistent with the nine ACS objectives (ROD B 9-11) at both the project or site scale and the watershed scale. The preliminary effects analysis for this alternative indicated that isolating the high bank at the washout from the river by road bank protection would degrade fifth-field watershed conditions over the long-term and prevent the maintenance or restoration of some of the ACS objectives at project and watershed scales. The proposed amendment would waive the requirement that the project be consistent with all the ACS objectives.

2. Management within Key Watersheds must maintain or improve conditions for at-risk fish (ROD B-18). The preliminary effects analysis for this alternative indicated that there would be substantial short and long-term adverse impacts to aquatic habitat and fish in the Dosewallips watershed. The proposed amendment would waive the direction that this project maintain or improve conditions for at-risk fish.

Alternative E – Low-water Revetment (Original Proposed Action)

Objective
This alternative is designed to meet the project's purpose and need and minimize impacts to terrestrial habitats by avoiding the clearing associated with road construction in LSR and to soil productivity. It also lessens aquatic habitat and riparian function impacts by reducing the road's footprint or the amount that the road and associated fill encroach into the river and allowing some gravel recruitment from the high bank.

Description
Alternative E would be similar to Alternative D except the reconstructed roadway would be lower, the road footprint would be narrower and it would encroach less into the river channel. A 14-foot wide single lane road about 500 feet in length would be constructed to maintenance level 3 standards. It would provide seasonal access for passenger cars, recreational vehicles, and vehicles pulling trailers. The horizontal alignment would be similar to Alternative D and would swing into the hillside as much as possible without undercutting the slope while also providing sufficient catchment at the base of the slope to accommodate bank sloughing and ravel. A catchment structure, such as a jersey barrier, would be installed to prevent material raveling off the bluff slope from reaching the road. There would be no scaling back of the bluff slope but there would be clearing of danger trees for approximately 100 feet from the top of the slope, involving about 1 acre of forest within LSR.

The height of the roadway surface would be at a grade to minimize the road's footprint while meeting design criteria for a 10-year flood (Q10). The design would be such that the road would be overtopped by the river during moderately large flood events (10-year flood and larger), estimated to be slightly more than 8 feet above the channel bottom. The road fill would be constructed of riprap with a sacrificial surfacing which would be scoured during high flow events. Since the bankfull water surface elevation is about 5.5 feet above channel bottom, the road's surface height is estimated to be between 6 and 8 feet above the channel bottom. Depending on actual road height the road would extend outward from the base of the slope 30 to 35 feet. Near the upstream portion of the washout the road fill would occupy about one third of the existing bankfull channel width. Road bank protection (most likely in the form of riprap) would extend along the new construction area and approaches for a distance of about 680 feet.

Because the roadway would be lower the road footprint within the existing river channel would

be narrower. The new roadway would encroach approximately 20-22 feet less into the existing river channel than under Alternative D. The toe of the fill would be within the wetted perimeter of the river for all flow conditions. At the maximum the new road fill would occupy approximately 1/3 of the current bankfull channel width. At the riverbend the revetment would reduce the width of the existing bankfull channel width by about 25 percent and potentially as much as 53 percent of the low water channel. An armor layer would extend out about 15 feet from the toe of the riprap and beneath the channel bed. With the reduced cross sectional area of the bankfull channel within the project area the river would be expected to adjust with some combination of down cutting, lateral shifting and/or bed coarsening. The extended toe would secure the integrity of the riprap revetment and limit the amount channel bed scour adjacent to road.

The estimated cost of this alternative is $1.4 million. This estimate includes additional maintenance needed on FSR 2610 from the Forest boundary to the low-water revetment due to the increased road wear associated with the disposal of excess excavation, estimated at $6,570, and the deferred maintenance on FSR 2610 past the reroute to the Forest boundary, estimated at $13,200. The estimated annual maintenance cost for the low-water revetment itself is $6,040 for the first two years and then $4,840 annually. Annual maintenance on FSR 2610 past the washout to the Forest boundary would also be needed, estimated at $9,200.

To provide for safety there would be a seasonal road closure from October 15 through April 30. A gate or some type of removable barricade along with signs would be installed on the downstream approach.

Road construction activities would involve:

- Isolation of the work site from the flowing water of the river by placement of temporary flow deflectors.
- Work below the ordinary high water mark including subexcavation of channel bed material and placement of riprap toe and revetment; roadway embankment; and backfilling riprap toe with streambed material, and placement of habitat and roughness feature at the toe of the riprap.
- Removal of temporary flow diversions.
- Completion of work above ordinary high water including the remaining portion of the roadway embankment and riprap revetment, gravel placement, and seeding and mulching.

During construction FSR 2610 would be closed to the public from the Forest boundary up to the washout site to provide for public safety. Portions of FSR 2610 and previously disturbed dispersed camping areas (approximately 2 acres) near the washout would be used for construction equipment staging areas. The dispersed camping areas would be rehabilitated at the conclusion of construction activities. Rehabilitation would include soil improvement work, scattering of large wood, seeding/planting, and treatment for invasive species.

This alternative would also include the following mitigation activities:

- Gravel raveling from the high bank and deposited in the catchment area located adjacent to the new section of road would be stockpiled along the river in locations where the river could recruit it during high flows.

- Construction of approximately five constructed log complexes near the project area and up to 1150 feet downstream from the washout area, estimated to cost $400,000. This activity would require work in the channel below ordinary high water, excavation of channel bed and floodplain material, removal of riparian vegetation, placement of large wood in the excavated area, and partial burial of the wood with excavated material. Existing dispersed campsite roads would be used to access the river and would be rehabilitated post construction. Approximately 80 to 90 conifer trees ranging from 24 to 32 inches dbh would be removed along FSR 2610, 2620-030, and 2620-032 to provide materials for the log complexes. In the event this alternative is selected for implementation a more detailed proposal will be developed with its own NEPA analysis and ESA consultation.

A wood use plan would be developed to insure the best use of the trees removed during construction activities. Trees would be tipped instead of cut when possible as stems with root wads attached are more suitable for restoration projects. The FS would give priority use for these downed trees for restoration and enhancement uses such as instream large woody debris structures, terrestrial coarse woody debris, and tribal uses. Additional uses may include road decommissioning rehabilitation and repair of the park's Dosewallips Road. Trees in excess to these uses may be sold.

Additionally ONP and WFLHD propose to repair the Dosewallips Road at MP 0.85 in the vicinity of the Dosewallips Falls, at an estimated cost of $550,000. Approximately 120 feet of road that was constructed in the 1940's on log retaining wall/structures failed in late 2003. The road would be repaired by removing the old road fill material and reconstructing the road prism by using riprap and crushed rock to form a foundation on which structural backfill would be constructed. Stabilization techniques (such as gabions or other wall structures) would be used to protect the stabilized fill from erosion. All of the construction would be above the ordinary high water line of the river. Deferred maintenance on the park's Dosewallips Road would be needed prior to the repair work at an estimated cost of $3,800.

Forest Plan Amendments

Selection of this alternative would include site-specific, non-significant amendments (as defined under the National Forest Management Act) to the 1990 Forest Plan. The following amendments are associated with Aquatic Conservation Strategy (ACS) objectives and management direction for Key Watersheds as identified in the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (referred to as the NWFP ROD), which amended the Olympic's Forest Plan.

1. Projects must be consistent with the nine ACS objectives (ROD B 9-11) at both the project or site scale and the watershed scale. The preliminary effects analysis for this alternative indicated that isolating the high bank at the washout from the river by road bank protection would degrade fifth-field watershed conditions over the long-term and prevent the maintenance or restoration of some of the ACS objectives at project and watershed scales. The proposed amendment would waive the requirement that the project be consistent with all the ACS objectives.

2. Management within Key Watersheds must maintain or improve conditions for at-risk fish (ROD B-18). The preliminary effects analysis for this alternative indicated that there would be substantial short and long-term adverse impacts to aquatic habitat and fish in

the Dosewallips watershed. The proposed amendment would waive the direction that this project maintain or improve conditions for at-risk fish.

Appendix B: Selected Environmental Consequences of Alternatives D and E

The environmental consequences of Alternatives D and E which are important in the understanding of these alternatives and why they were dropped from consideration are disclosed in this appendix. Environmental consequences of the other issues tracked in Chapter 3 which are not discussed in this apppendix can be found in the applicable specialist reports which are part of the project file. Environmental consequences of ONP actions are the same as previously disclosed in Chapter 3 for the action alternatives and are not repeated here. These environmental consequences were described based on site conditions as existed in 2006 and have not been updated to reflect current conditions.

Road Management

Alternative D – Replace-in-Kind

Direct/Indirect Effects

Olympic National Forest
This alternative would replace the road in the approximate location that existed prior to the washout. The exact alignment would depend on the most advantageous design and would be a compromise between reducing encroachment into the river and decreasing hazard from ravel and rockfall from the high bank. The design would be a single lane road with turnouts at each end. The road running surface would be 14 feet wide with an additional 8 to 12 feet provided on the inside edge of the road at the base of the slope to provide suitable room for catching slope ravel. The high bank would be laid back to create a more stable slope, approximately 1 horizontal to 1 vertical. Laying the slope back would result in a large cut that moves the existing top of the slope back about 60 feet and would generate an estimated 13,250 cubic yards of material.

Costs
Construction and maintenance cost estimates are displayed in Table 29.

Table 29: Alternative D cost estimates

Item	Cost	Term	Estimated duration
Construction	$1,721,000	NA	NA
Annual Maintenance, New	$2,120/yr	short	1st 2 years
Annual maintenance, Life	$1320/yr	long	After 2-yrs – life of project
Annual maintenance beyond washout, Life	$9,200/yr	long	Life of project

User Safety
Potential rock fall and slide hazards would be reduced by laying the high bank back to a flatter

or long-term stable angle and by establishing an area for ravel to accumulate. Danger trees along the top of the slope would be removed.

Alternative E – Low-water Revetment

Direct/Indirect Effects

Olympic National Forest
This alternative would follow essentially the same horizontal alignment as Alternative D and would be operated with a seasonal closure. The surface of the road would include a catchment area or debris accumulation zone along the base of the slope. The road would be lower and set to the 10 year flood (Q_{10}) water surface elevation. The purpose of this alternative is to allow periodic inundation of the road during modest and larger floods, in this case the Q_{10} and larger floods.

Costs
Road construction costs are estimated to be lower than Alternative D but maintenance costs are estimated to be higher. This is expected to be the highest cost alternative with regards to road maintenance but is also the most difficult to predict. If the road is inundated by flood flows more frequently than predicted the costs would be expected to be higher. Accurately predicting the proper road surface elevation equivalent to the predicted water surface elevation (WSL) at the 10-year flood would be challenging because the estimated range between the WSL at the estimated 1.5-year flood and the 25-year flood is small. Analysis conducted during the Reach Analysis estimated that the difference in WSL between these two flows is only 2.8 feet. The WSL for the 10 year flood has not yet been estimated but would be between these two values. The issue of not estimating this level correctly which would result in either too frequent or only rare inundation is a concern for this alternative.

If the previous flood history used to estimate flood recurrence interval is not representative of current trends then this may increase the costs associated with this alternative. The potential for increased cost because of higher flows in the future relative to flows in the recent past is a possibility. An evaluation of the most recent (last 10 years) stream flow records suggests increases in large floods in recent years. Similarly increases in flows as a result of cyclic climate factors or long-term climate trends are possible. However the uncertainty involved in predicting these trends suggests that associated costs can not be quantified (see Climate Trends and Stream Flow discussion Chapter 3). These factors should be viewed as uncertainty associated with this alternative rather than elements that can be factored into design or impact assessments.

The costs associated with flood flows overtopping the road would be greater because they would occur much more frequently and inundation by floodwaters would be more extensive. Each time the road surface is flooded most of the surfacing could be washed away along with a limited amount of fill material. Most of the roadway template and riprap armor would be designed to withstand floods with return periods of 50 to 100 years.

The primary maintenance expected would be slough and slide clean-up, periodic resurfacing,

and occasional repair of flood damage (replacement of riprap and any eroded fill). The deposits that have accumulated at the toe of the slope would be collected through standard road maintenance and placed along the river margins (possibly right on the riprap) such that subsequent high flows could remove this material and continue to supply sediment from the high bank area to the downstream channel areas.

It is expected that significant maintenance would occur each time the road surface is inundated. There is a concern that annual road maintenance funding would be inadequate in the future to keep up with maintenance needed on this high maintenance cost alternative. Decreasing road maintenance budgets in recent years have been a concern to road managers and have resulted in a decrease in the amount of road maintenance conducted annually. As for reconstruction if severe flood damage is experienced it would be unreasonable to expect that any emergency flood repair funds (such as ERFO) would be available for this segment of road because it would be managed for relatively frequent inundation as compared with typical designs such as Alternative D.

Table 30: Alternative E cost estimates

Item	Cost	Term	Estimated duration
Construction	$1,396,000	NA	NA
Annual Maintenance, New	$6,040/yr	short	1st 2 years
Annual maintenance, Life	$4,840/yr	long	After 2-yrs – life of project
Annual maintenance beyond washout, Life	$9,200/yr	long	Life of project

User Safety
Unlike Alternative D this alternative would not lay back the slope of the high bank but would include a barrier along the inside edge of the road to provide for user safety against rockfall and sloughing from the high bank as well as establishing a catchment area. This would be a seasonal barrier which would be removed at the beginning of the seasonal road closure each October and would be replaced when the road is opened in April. The seasonal closure would also provide for user safety by closing the road during periods when the road would be prone to flooding, October 15 through April 30. Danger trees along the top of the slope would be removed.

Alternatives D and E

Cumulative Effects

Use of ONF road funds for any of the action alternatives would reduce the overall total road fund available to perform other road work on the Forest. The alternatives with higher expenses would have a greater impact in this regard.

Geotechnical and Geomorphic Processes

Alternative D – Replace-in-Kind

Direct/Indirect Effects

Olympic National Forest
The primary effects in regards to this alternative include: 1) slope stability and the potential for future or expanding washout, 2) fluvial processes, and 3) sediment supply.

With regards to large scale slope movement, so far all of the observed slope movements at the washout have been shallow movements involving ravel, collapse of blocks, and erosion of individual particles. This is also true for the comparable high bank slope at the next meander upstream. These types of movements are expected to result in accumulation of debris on the road surface and at the base of the slope. However a more stable slope angle would be created under this alternative and this would reduce the amount of debris accumulating at the base of the slope. The largest movements are not expected to close the road and would be removed with normal road maintenance. Slope movement would be expected to occur less in the long-term as the high bank revegetates. The potential for increased slope instability under Alternative D would be lower than Alternatives B and C, since the location is within stable landforms. Stability of the channel and risk of damage to riprap integrity during high flows would remain a concern however. There may be a slight increase in streambank instability in downstream reaches below the site of reconstruction in the channel due to the hardening of the bank and increased velocities since channel width of the Dosewallips River would be reduced.

In regards to future or an expanding washout the riprap along the channel edge would be designed to address this factor. The long-term trend of the river has been to shift into the hillside at this location (refer to the Reach Analysis). The potential for future washouts at this road location would remain although it is expected that riprap used would be large enough and keyed in deeply enough to minimize this potential to an acceptable level of risk.

Currently the high bank at the washout is over-steep meaning it is steeper than the predicted long-term stability of the slope. The slope evolution process involves erosion at the toe of the slope by the river which produces a very steep slope; then involves gradual erosion of the slope through ravel, collapse, rock fall and various shallow movements. Through this process the slope evolves toward a long-term stable angle unless erosion at the toe is maintained or re-initiated. Placing and maintaining a riprap fill under this alternative would be expected to eliminate (river) erosion at the toe of the slope. Sediment supply to the adjacent gravel bar at the inside of the bend to the pool tail at the washout and in the downstream response reach (alluvial unconfined segment) would be reduced and supply from this site would be eliminated.

The sites within the river immediately adjacent to the washout would likely become coarser (cobble dominated) and stay that way most of the time. Areas downstream would be more variable. During and for a few years following large floods and years of high sediment supply the areas downstream would be supplemented by sediment from other (upstream) sources. During periods of low supply the bed would be expected to be coarser more often and for longer

periods. An overall reduction in (coarse) sediment supply would limit channel bed gravel storage and could also limit habitat complexity, channel shifting, new side channel development, and wood loading.

Alternative E – Low-water Revetment

Direct/Indirect Effects

Olympic National Forest
Current high bank conditions and processes in terms of slope stability are as described for Alternative D. Construction of riprap to armor the road fill would limit the amount of river induced erosion at the base of the slope and slow recession. This would allow the natural shallow slope movements of ravel, collapse of blocks, and erosion of individual particles to lead to eventual stabilization of the slope in the long-term. Deep-seated, large-scale, or particularly active slope instability has not been observed in the area. A catchment area would be provided on the inside edge of the road to provide a setback for rock and debris fall and space for slope deposits to accumulate. This in combination with a catchment structure would keep an accumulation of deposits off the road. As with Alternative D slope movement would be expected to occur less in the long-term as the high bank revegetates but this condition would develop slower as more time would be needed for the high bank to stabilize naturally. The risk of slope instability under Alternative E would be lower than Alternatives B and C, and the same risk as Alternative D. The road would be located on a stable landform with the exception of the existing streambank failure. This would continue to erode into the new ditchline and catchment area. Stability of the channel and risk of damage to riprap integrity during high flows would remain a concern however. There may be a slight increase in streambank instability in downstream reaches below the site of reconstruction in the channel due to the hardening of the bank and increased velocities since channel width of the Dosewallips River would be reduced.

This alternative is designed to maintain a more natural supply of sediment from the high bank at the washout. It would also reduce encroachment of the road into the river because it is much lower in elevation. It would be designed to be over-topped during floods with estimated recurrence intervals of about 10 years (Q_{10}). Moderate to large floods such as Q_{10} and larger are expected to create the most sediment supply and substantial channel adjustments.

During floods the flow that expands over the road surface would be shallow and would not have the higher energy and shear stresses of the deeper channel areas. This flow would be expected to be ineffective with regards to spiral flow or secondary circulation and subsequent erosion of the high bank. The flow may remove some of the sediment accumulated at the base of the slope but the erosive energy may be insufficient to affect the bluff appreciably. The resulting flow might selectively remove the finer material but leave the more desirable coarse material at the base of the slope.

It is important to understand that this alternative would limit the amount of future sediment supply that would occur because the cycle of bluff slope erosion and sediment supply downstream is initiated through river erosion at the toe of the slope. Because the lower part of the slope along the channel margin would be armored with riprap the primary erosion forces

would not act directly on the base of the high bank and further bluff slope recession would be prevented. Sediment supply from the high bank would be reduced with respect to the natural condition but not as much as Alternative D.

This alternative is designed to allow the accumulated slope deposits to be transported by the river during floods when the road is over-topped. These deposits could become a road maintenance problem in years when the road is not over-topped by floods and if the flow over the road surface does not have sufficient energy to transport it downstream. A maintenance plan that includes banking the slope deposits along the riprap or along the channel margin downstream is a mitigation measure. This would allow sediment from the high bank to reach the channel but in amounts that are reduced over the natural (current) condition.

Alternatives D and E

Cumulative Effects

In terms of slope stability there is no overlap in space or time with any of the proposed activities and past, present, and reasonably foreseeable future activities identified for this area. Project effects are minor and in terms of slope stability are localized to the project area where there are no effects due to past, present, and reasonably foreseeable activities. Consequently there are no cumulative effects associated with slope stability for any of the action alternatives.

Soil Productivity

Alternative D – Replace-in-Kind

Direct/Indirect Effects

Olympic National Forest
Soil Productivity
Under Alternative D there would be fewer impacts to soil productivity than Alternatives B and C, but overall greater impacts to soils, watershed, and aquatics than Alternatives E and F. As a result of the reconstruction of FSR 2610 detrimental soil conditions would be primarily confined to the channel in the washout area and the high bank at the washout. Approximately 0.7 acre would be removed from the productive land base as a result of the area removed and disturbed above the top of the bluff. Additional surface erosion, soil displacement, and ravel would occur at the top of the bluff area until it becomes stabilized in 3 to 5 years. Surface erosion and sedimentation would also occur during the reconstruction especially across the washout area.

- Overall a net increase of 0.7 acre of new disturbance would result from this action. Within the upper watershed this is not considered to be significant and it would remain well below the Regional and Forest Standards for soil quality.

The indirect effects with soil productivity under Alternative D would be minor. Construction across the washout area would prevent the large streambank failure from depositing soil material and rock into the Dosewallips River. This material would be captured in a catchment and/or

ditchline area that would need to be removed through road maintenance on a regular basis. Other chronic road-related sedimentation would occur as a result of the road surfacing and fillslope materials being located directly within the channel. Vegetation should become established after a few years however which would reduce surface erosion and sedimentation from these slopes.

Mitigation measures identified in Chapter 2 are designed so that surface erosion, sedimentation, and water quality impacts should be minimized and would be within acceptable levels.

Hillslope Hydrology
Road reconstruction under Alternative D would not result in significant changes to the existing hillslope hydrology. Surface runoff and subsurface flows would be altered slightly with the establishment of a ditchline and culverts along the washout area reconstruction. The channel hydrology effects would be much greater than those to hillslope water and are described in the Aquatic Species and Habitat Conditions consequences section.

The wetlands along FRS 2610 to the east of the washout would not be affected under this alternative, nor would the tributary streams located east of the washout.

Alternative E – Low-water Revetment

Direct/Indirect Effects

Olympic National Forest
Soil Productivity
Under Alternative E there would be fewer impacts to soil productivity than Alternatives B, C, and D, and slightly more impacts than Alternative F. These impacts would mainly be concentrated to watershed and aquatic resources within the channel and downstream. As a result of the reconstruction of FSR 2610 detrimental soil conditions would be primarily confined to the channel in the washout area only. The high bank at the washout would not be disturbed so no impacts would occur to the area designated as late successional reserve. Additional surface erosion, soil displacement, and ravel would occur at the top of the bluff area until it becomes stabilized in 3 to 5 years. Surface erosion and sedimentation would also occur during the reconstruction especially across the washout area.

There would be no increase in area in a detrimental soil condition resulting from this action. Cumulative soil impacts in the upper watershed would remain well below the Regional and Forest Standards for soil quality.

The indirect effects with soil productivity under Alternative E would be minor. Construction across the washout area would prevent the large streambank failure from depositing soil material and rock directly into the Dosewallips River. This material would be captured in a catchment and/or ditchline area. Under this alternative road maintenance would then place this material on the lower fillslope edges adjacent to the river so that this important spawning gravel-sized material could enter the river during 10+ year flows. Other occasional road-related sedimentation would occur as a result of the road surfacing and fillslope materials being washed

off this segment when 10+ yr flows occur. Additional road surfacing would be needed when this occurs.

Mitigation measures identified in Chapter 2 for this alternative are designed so that surface erosion and sedimentation would be minimized.

Hillslope Hydrology
Road reconstruction under Alternative E would result in minimal changes to the existing hillslope hydrology. Surface runoff and subsurface flows would be slightly altered with the establishment of a ditchline and culverts along the reconstruction washout area.

The wetlands along FRS 2610 to the east of the washout would not be affected under this alternative, nor would the tributary streams located east of the washout.

Alternatives D and E

Cumulative Effects

The cumulative watershed effects area includes the entire Dosewallips watershed. The positive and negative effects include a combination of the management actions that occur on private, Olympic National Park, and National Forest System (NFS) lands, along with natural occurrences. The Dosewallips Watershed Analysis identified and described the negative effects of erosion and sedimentation, and the impacts from past management activities on aquatic habitat conditions. These resources are currently recovering from the past effects. Other detrimental conditions would remain in the watershed, comprised mainly of compacted surfaces (roading, developed and dispersed recreation sites).

Foreseeable management activities on National Forest lands include the Jackson Timber Sale and two miles of road decommissioning (FSR 2610-012). The timber sale would commercially thin approximately 1,000 acres and construct 3 miles of temporary road in the Rocky Brook subwatershed. Temporary roads would be decommissioned after use. These foreseeable actions would result in short-term sediment impacts associated with temporary road building and log haul, however they are anticipated to be relatively minor.

Other on-going and foreseeable activities on private lands include, but are not limited to the following: timber harvesting and road construction; agricultural uses; infrastructure development; dispersed recreation and off-road vehicle use. Implementation of all of these on-going and foreseeable off-site activities would occur a significant distance below the FSR 2610 washout.

All of the activities described above would result in additional detrimental soil conditions (both short and long-term), that would reduce soil productivity. Overall acres in a detrimental condition would be within Regional and Forest standards for soil quality. Within the upper watershed this is not considered to be significant and would remain well below the Regional and Forest Standards for soil quality, with a cumulative total of 42.7 acres for Alternative D and 42.0 acres for Alternative E in a detrimental condition. This includes the additional areas that are

currently in a long-term detrimental condition:

- 17 acres of Dosewallips road beyond washout (5.0 miles of road)
- 6 acres - Elkhorn Campground
- 8 acres – Dosewallips campground
- 8 acres trails, skid trails, unauthorized trails, dispersed recreation sites

Effects to soil productivity of past, present, and reasonably foreseeable activities in the Dosewallips watershed are described under the previous Olympic National Forest effects discussion. Since these effects are negligible or occur a significant distance below the proposed work site near the Dosewallips Falls, cumulative effects to soil productivity would be negligible.

Aquatic Species and Habitat Conditions

Alternative D – Replace-in-Kind

Direct/Indirect Effects

Olympic National Forest
Sediment
Source of spawning gravels and channel function
The project area represents the upstream extent of one of the three most important reaches for spawning habitat within the Dosewallips watershed (Labbe et al. 2005). Reconstructing the road corridor and hardening the streambank at the washout site would preclude the natural channel migration and erosion processes at the site and remove an important source area of spawning gravels for the complex and productive aquatic habitat immediately downstream. These processes are especially important in this location because of the amount of gravel potentially available, the limited gravel supplies available in adjacent stream reaches, the link between sediment supply and fish habitat, and the high quality and importance of fish habitat immediately downstream of the washout site.

As described under the Affected Environment section and detailed in the Reach Analysis (Cenderelli et al. 2003) the project area is unique in its ability to contribute substantial quantities of coarse sediments to this portion of the Dosewallips River. Potential coarse sediment inputs into the Dosewallips River are limited in the approximately 5-mile long hillslope confined reach immediately above the project area and in the approximately 3-mile alluvial unconfined reach immediately below the project area. The short terrace transition reach which includes the washout site provides an abundance of potential spawning gravel to the system because of the high glacial terraces immediately adjacent to the stream channel. The glacial terraces especially the high bank at the washout site also contain a high proportion of spawning gravel-size material and a relatively low proportion of fine sediments. Based on an analysis of the volume of eroding streambanks and the composition of the streambank materials the Reach Analysis concluded that approximately 41 percent of spawning gravels recently supplied to the channel within the project area originated from the eroding high bank at the washout site (Cenderelli et al. 2003).

Reconstructing the roadway and placing 680 feet of riprap through the washout would reduce the area of eroding bank (the area supplying sediment) in the terrace transition zone by about a 25 percent from the current condition (Cenderelli et al. 2003). Because of the high proportion of spawning gravel size substrate within the washout high bank relative to other eroding banks the impact to spawning gravel recruitment would be somewhat greater. Under Alternative D the road reconstruction and bank hardening at the washout site would reduce the volume of spawning gravel potentially recruited into the river from the project area by about 30 percent from current conditions (Cenderelli et al. 2003). These figures may have increased somewhat since 2002 due to the increased size of the eroding face of the high bank at the washout since the initial storm.

The length of riprap bank stabilization needed to protect the road would likely increase over time as the meander pattern changed and put additional pressure on the upstream and downstream ends of the new revetment (Leon 2004). Increasing the length of bank stabilization over time would cause further reductions in the amount of coarse sediment and spawning gravel potentially recruited from the high bank at the washout site.

How much gravel the natural bank erosion of the high bank at the washout would ultimately contribute to the stream channel if the road is not reconstructed, the timing and amount of sediment inputs, and how long the stream channel would continue to erode glacial terrace are all unknown. The stream channel would likely continue to be dynamic in the vicinity of the washout and alter both its location and shape in response to large flood events. There is no indication that the river channel will naturally shift location away from the washout site within the near future, however the rate of bank erosion along the outer bank at the washout site would probably decline over time as trees fall into the channel from the upper terrace and naturally stabilize the bank. Sediment inputs from the washout site would likely continue to be episodic (pulses) rather than a continuous steady input over the long-term.

Episodic inputs of coarse sediment and large wood are recognized as an important aspect of creating and maintaining complex, high quality fish habitat (Reeves et al. 1995). The large inputs of coarse sediment into the Dosewallips River from channel migration and erosion processes at the washout site are critical in developing and maintaining the high quality spawning and rearing habitat in the reach immediately downstream of the washout. A key assumption implicit in this analysis is that a large source of coarse sediment immediately upstream from a key habitat area is more important to maintaining that habitat than smaller sources of coarse sediment further away from the site.

The high quality, complex habitat that extends from the washout to the old Steelhead Campground one mile downstream is extremely important from a watershed context. This reach is one of three alluvial valley segments that are disproportionately important as salmon spawning and rearing areas in the Dosewallips watershed (Labbe et al. 2005). It is also one of the three primary spawning areas for Chinook and steelhead within the Dosewallips River.

Given the large percentage of coarse sediment and spawning gravel recruitment that would potentially be eliminated by the road reconstruction, the relatively limited gravel sources in the reach immediately above the project area, and the proximity of habitat immediately downstream

Alternative D would substantially reduce the quality of a key spawning and rearing reach within the Dosewallips River. Because habitat characteristics and quality typically vary over time in response to disturbances such as fires, floods, and large debris torrents, specific habitat degradation related to the road reconstruction may or may not be readily apparent. Over the long-term, reconstructing the road and preventing the coarse sediment inputs from the high bank at the washout that would otherwise occur would likely reduce the amount of time that the key spawning and rearing habitat in the reach immediately downstream would be considered to be in "good" condition and increase the amount of time that the habitat would be considered to be in "poor" condition (Shelmerdine 2006).

Approximately five log complexes would be constructed under this alternative as a mitigation measure to increase the production of gravel from one of the low terraces below the project area and to trap and temporarily store gravels that are being transported through the system. There is no expectation that the log complexes would fully make up for the loss of gravel inputs from the washout site. The terrace that the structures would be designed to erode is much smaller and the content of spawning sized gravels that make up the mid-level terrace is lower than the high bank at the washout so it would contribute much less spawning gravel. The long-term stability and effectiveness of the log complexes in mitigating the loss of coarse sediment inputs from the washout site is unknown.

The intent of the mitigation measure of placing large wood complexes along the channel margins downstream of the vicinity of the washout is to redirect flow and increase sinuosity erosion along the right bank of the mid-level terrace downstream of the riprap revetment. Increased erosion along this terrace would provide recruitment of gravels into the river which the road revetment prevents upstream. However the composition of substrate that makes up the mid-level terrace downstream of the washout is coarser than the high bank at the washout. Composition of the high bank (gravel and cobbles) is better sized for spawning gravels. So there is not a one-to-one replacement of quality and/or quantity of a spawning gravel source. One objective of these structures is to create channel complexity and high quality fish habitat. However these log complexes are somewhat experimental and there is no guarantee that the objectives will be fully achieved.

Spawning and Rearing Habitat within the Project Area

The project area is at the upper extent of one of three primary spawning reaches for Chinook and steelhead in the Dosewallips watershed. In 2002 after the washout occurred one Chinook salmon redd was documented just downstream of the washout (personal communication T. Johnson) and four coho salmon redds were also observed in the vicinity of the washout. Spawning data shows pink salmon and steelhead trout have spawned directly across from the proposed reconstruction site prior to the washout (personal communication T. Johnson).

Reconstructing the road under Alternative D would eliminate approximately 19,200 square feet of existing spawning habitat from direct filling in of the channel. Another approximately 44,400 square feet of spawning habitat would be lost from increased scour that would occur from the installation of the riprap revetment. Approximately a total of 63,600 square feet (about 1.5 acres) of anadromous spawning habitat would be lost or displaced.

If as the EDT model suggests that the spawning habitat for Chinook is currently underutilized in

the Dosewallips the reduction in spawning habitat from direct filling for the roadbed and the subsequent scour due to greater stream energy and lower sediment supply may not directly correlate to Chinook salmon mortalities.

Approximately 22,500 square feet (about 0.5 acre) of juvenile off-channel rearing habitat would also be lost or adversely impacted as a result of the road reconstruction due to channel shifts and subsequent scour (Cenderelli et al. 2003). The above areas of spawning and rearing habitat loss were calculated from channel conditions in 2002. Habitat changes that have occurred at the project site since that time may have altered the actual quantities of spawning and rearing habitat that would be eliminated or adversely impacted under this alternative.

Turbidity and Fine Sediment

Reconstructing the road and constructing the log complexes would create some substantial local inputs of fine sediment and turbidity into the Dosewallips River. Most of the fine sediment inputs associated with the project would occur during the instream water diversion activities and the subexcavation and placement of riprap along the left bank of the Dosewallips River. Turbidity and sediment inputs would be locally severe during these activities. Some sediment inputs into the river would also be caused during the second year when large wood would be buried into the river channel during the construction of the log complexes. Each of these inputs would generally be short-term during specific construction activities and would disappear quickly once those construction activities ended. While the input of fine sediments into the stream would be unavoidable the required mitigation measures would minimize impacts. Some additional streambed disturbance and generation of fine sediments and turbidity would be anticipated for at least one year as the streambed changes in response to the channel alterations.

Fine sediment generated in the Dosewallips River from construction activities would likely settle out within a short distance. Based on field experience with other construction projects deposition of fine sediments would be unlikely to be observable more than a few thousand feet below the project area.

Negative impacts of sediment and turbidity to fish immediately downstream of the project area during the instream construction phase would range from gill trauma, avoidance/displacement, and disruption of feeding behavior. Additionally the increased level of fine sediment generated during the in-channel construction work could reduce spawning, incubation, and rearing success within and immediately downstream of the project area for a short period; however the gradient, stream velocity, and discharge of Dosewallips River are sufficient to flush fines out of the system rather quickly. The newly deposited sediments would be remobilized rapidly by high water flows during the fall and winter. Observable fine sediment deposition within the project area from construction activities would be unlikely after a few years, at most. At a watershed scale the amount of sediment generated by this project would be indistinguishable in relation to the high levels of natural sediment carried by the river during typical frequent storm events.

Because the Dosewallips River is relatively swift and there are few substantial tributaries turbidity created during construction activities would likely remain in suspension for long distances. There would be a potential for short-term increases in turbidity to be observed down into the lower watershed.

The in-stream work would occur during summer low-flow conditions from July 16 to August 31. The timing restrictions would avoid direct impacts to migrating and spawning Chinook, coho, and pink salmon. The adult life stage of these salmon would not be in the river during the instream construction phase. Juvenile Chinook and pink salmon would also be unlikely to be in the river at this time. Juvenile coho, steelhead, cutthroat trout would be present in the river during the instream construction period. They have the potential to be impacted by the turbidity and fine sediment generated from the instream construction. Actual adverse impacts would depend on the magnitude and duration of the sediment and turbidity releases and the distance of the fish from the project area.

During the first and second winters following construction coarse sediment would also be mobilized due to channel adjustments from the riprap revetment and log jams and would likely settle out in pools just downstream of these sites. Scouring and filling in of redds due to gravel instability and sifting may also occur. Coarse sediment scoured from the project area would continue to be remobilized downstream following subsequent high water events. Because the instream construction would occur over two years, turbidity and sediment impacts from construction and the following winter seasons would be long-term (more than one year) in the project area. Additionally the high bank along the revetment would be cut back to 1 horizontal:1 vertical slope and it is anticipated erosion from this cutslope would last 1-2 years and be delivered to the Dosewallips until it becomes revegetated and stabilized. At the project scale there would be substantial short-term adverse impacts associated with the construction under this alternative.

Overall this indicator, sediment, would be degraded at both the project and watershed scales.

Large Woody Debris

Reconstructing the road and stabilizing the streambank at the washout would preclude natural channel migration and bank erosion processes which are currently contributing a substantial quantity of large trees to the river at the washout site. The watershed from the Forest boundary upstream appears to be in a relatively natural condition. Current amounts of large woody debris vary in the basin, the old Steelhead Campground reach immediately downstream of the washout currently has an abundant amount of large wood (Labbe et al. 2005).

The five constructed large wood complexes would partially mitigate for the future loss of large wood recruitment due to the road reconstruction and bank hardening at the washout site. The logs jams would be designed to create deep, complex pools and provide cover for fish. Three of the constructed wood complexes would also be designed to redirect flow into the right bank and increase bank erosion and potential future large wood recruitment.

Loss of large wood recruitment along the 680 feet of revetment would likely not have an impact at the watershed scale. However loss of the wood source immediately above the key spawning and rearing habitat immediately downstream could have an adverse effect on that habitat over the long-term.

Overall this indicator would be degraded at the project scale and maintained at the watershed scale.

Pool Frequency and Quality
Under Alternative D the entire river channel adjacent and immediately below the revetment would be altered. Existing pools would be filled in and others would be created by scour as the stream channel adjusted to the alterations. Approximately 22,500 square feet of rearing habitat would be directly filled in, lost due to channel shifts, or made less accessible due to channel response and adjustment to the revetment (Cenderelli et al. 2003). Effects would be limited to the immediate project area (see sediment discussion).

The formation of a large deep pool typically associated with bank stabilization projects would be less likely to occur at this site because of the extended riprap toe that would be placed under the channel bottom to protect the revetment.

This indicator would be degraded at the project scale and maintained at the watershed scale.

Off-Channel Habitat
Alternative D would be expected to eliminate or reduce seasonal access to two side channel areas within the project area. The side channel habitat that has developed behind the point bar immediately opposite the washout site would likely be eliminated due to channel shifts associated with the road reconstruction. This would reduce the ability of the project area to provide off-channel overwintering habitat for coho salmon, steelhead, and cutthroat trout.

Seasonal access into a second side channel habitat area upstream of the road reconstruction site on the north side of the river would also likely be reduced. As the river adjusts to the riprap revetment the channel would headcut upstream and cause the side channel (approximately 200 feet of side channel habitat) to be disconnected from the main channel at low flow conditions. This would reduce summer juvenile rearing habitat for coho salmon and to a lesser extent for steelhead and cutthroat trout. During higher winter flows the side channel would be reconnected with the mainstem of the Dosewallips River. At a watershed scale off-channel areas are relatively limited and any decrease is a negative impact.

This indicator would be degraded at the project scale and maintained at the watershed scale.

Width/Depth Ratio
This alternative would fill in a substantial portion of the existing river and constrict the stream channel, at least initially. Along the proposed revetment the bankfull channel width would decrease 30 to 40 percent through the meander bend (Cenderelli et al. 2003). The greatest reduction in bankfull width would occur near the upper portion of the washout. The reduced stream channel cross section would increase the flow energy and transport capacity at the site. The river would be expected to adjust with some combination of down cutting, lateral shifting and/or bed coarsening. The extended riprap toe would limit the amount of channel bed scour along the revetment. Adjustments from the reduced area of flow would likely include erosion of the point bar along the far bank and shifting the river channel to the south, away from the road. The long-term effect would likely be a channel that is slightly deeper with a coarser substrate. It would also likely be a bit narrower. As the stream channel adjusts it is also likely that the channel would headcut upstream of the revetment. The increased scour would eliminate or

displace approximately 63,500 square feet of anadromous spawning habitat directly across and up and downstream from the of riprap revetment. The largest change in channel geometry would occur during high water periods the first winter. Over time the channel would reach a new equilibrium. Impacts to stream channel geometry from the filling and relocation would be relatively localized and would not be observable at a watershed scale.

This indicator would be degraded at the project scale and maintained at the watershed scale.

Streambank Condition
Implementation of this alternative would prevent the natural, lateral channel migration processes from occurring in the vicinity of the washout. Natural inputs of coarse sediment and woody debris into the stream channel would not occur. Precluding the natural channel migration and erosion processes at the washout would in turn affect channel processes and fish habitat within the project area and immediately downstream from the washout.

Bank erosion would likely increase immediately upstream and downstream from the new riprap revetment because of the magnitude and direction of shear stresses acting on those banks. Over time the riprap revetment would likely need to be extended to protect the road corridor (Leon, 2004, Meander migration references).

Evaluation of aerial photographs indicate that the river channel in the washout area is dynamic and highly responsive. The river channel has changed its sinuosity and has undergone multiple cycles of widening and narrowing in response to large floods between 1939 and 1998. Regardless of whether the road is reconstructed this segment of the stream valley would continue to be dynamic and experience changes in channel dimensions and sinuosity in response to large floods. Channel responses to the proposed road reconstruction would most likely be limited to approximately 330 feet above the revetment (effect of headcutting). Downstream effects would be most obvious immediately downstream of the project area. Observable effects would be attenuated as you go further downstream. Measurable change would not be seen beyond the bedrock control reach approximately 3 miles downstream of the washout. Because of the forested environment and absence of infrastructure and private property the project would be unlikely to create the need for further bank hardening downstream, outside of the project area. Impacts to streambank condition would not be observed at a watershed scale.

This indicator would be degraded at the project scale and maintained at the watershed scale.

Drainage Network Increase
This alternative would not substantially affect this indicator; current conditions would be maintained at both project area and 5th field watershed scale.

Road Density and Location
Road density would be increase by approximately 0.1 miles over existing conditions. A substantially greater affect of Alternative D would be the construction of 680 feet of revetment along the Dosewallips River to protect the road. The road reconstruction would constrict the existing river channel by 30 to 40 percent (Cenderelli et al. 2003). There would also be substantial short-term instream impacts related to the construction phase of this alternative.

Because of the bank hardening and the associated reduction in channel margin complexity, habitat along the outer channel margin would be reduced. Incorporation of roughness trees along the toe of the riprap would slow river velocities down and temporarily mitigate for this reduction in rearing habitat. The roughness trees would likely only last a few year. After a few large storm events they would dislodge and float downstream. This alternative would degrade this indicator in the long-term at the project site. Impacts to road density and location would not be observed at a watershed scale and this indicator would be maintained.

Temperature
The lower portion of the Dosewallips River from River Mile 0 to River Mile 0.7 is designated as a water quality impaired 303d listed waterbody due to elevated water temperatures (Washington State 303d list, 2004). There are no 303d listed stream segments upstream on National Forest or National Park lands. This alternative would have no affect on water temperatures in the lower watershed. This indicator would be maintained at both the project and watershed scales.

Riparian Reserve Function
Localized disturbance to soil and vegetation would occur during project construction however this would be limited in extent and is anticipated to recover. The function of the riparian area at the site of the washout is primarily for large woody debris recruitment. Natural erosion processes which are the mechanism for large wood input into the river would not occur due to the bank hardening. The long-term effect would be the elimination of recruitment potential for LWD along 680 feet of streambank within the Riparian Reserve. Impacts to the Riparian Reserve would not be observed at a watershed scale.

This indicator would be degraded at the project scale and maintained at the watershed scale.

Sensitive Fish Species
The determination to Sensitive fish species, Puget Sound/Strait of Georgia Coho and Puget Sound Coastal Cutthroat Trout, found within the project area as related to this alternative would be “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”.

Proposed and Threatened Fish and Critical Habitat
This alternative “may affect, and is likely to adversely affect” Puget Sound Steelhead, Puget Sound Chinook, and Critical Habitat for Puget Sound Chinook (see above effects of Alternative D). For Hood Canal summer chum and its associated critical habitat, and Coastal Puget Sound bull trout this alterative “may affect, and is not likely to adversely affect”.

Essential Fish Habitat
Alternative D would adversely affect EFH because of both the short and long-term adverse affects to Chinook, coho, and pink habitat in the mainstem Dosewallips River (see above Sediment section).

Summary
Alternative D clearly has the greatest adverse impacts to aquatic resources. It would create substantial short-term and long-term impacts. Several of the adverse impacts would extend well

beyond the immediate project area and could adversely impact aquatic habitat and/or fish populations at the watershed scale.

Rebuilding the road at the washout and stabilizing the streambank to prevent future washouts would re-establish the degraded stream conditions at the washout site that existed prior to the January 2002 storm. It would preclude the natural stream channel migration and erosion processes which are important for creating and maintaining high quality fish habitat. By eliminating the substantial inputs of coarse sediment and wood which are currently being produced from the washout site Alternative D would jeopardize the long-term maintenance of one of the primary spawning areas for Chinook and steelhead in the Dosewallips watershed.

This alternative would also create substantial adverse impacts at the site level. Reconstructing the road would fill in a substantial portion of the existing river channel at the washout site. The new roadbed would project up to 40 – 55 feet into the existing river channel from the base of the current washout. Over 40 percent of the existing channel would be filled in near the upper portion of the washout.

Reconstructing the road and relocating the river channel would eliminate a substantial amount of existing spawning habitat at the washout site either by direct filling for the roadbed or by the subsequent scour due to increased stream energy and decreased sediment supply. Chinook, coho, steelhead, and pink salmon have all been observed spawning in the project area.

Reconstructing the road and relocating the river channel would also eliminate or jeopardize the existing off-channel rearing habitat within the project area through channel shifts and subsequent scour.

Under this alternative approximately five log complexes would be constructed to partially mitigate for the substantial adverse impacts to aquatic resources. Although the complexes would likely be at least somewhat successful in meeting their objectives there is no expectation that the constructed log complexes would fully mitigate the adverse impacts of rebuilding the road in its previous location. Because constructed log placements are still somewhat experimental there would be a relatively high level of uncertainty with the long-term stability and effectiveness of these structures.

Cumulative Effects

Although the Dosewallips watershed is considered one of the more relatively intact watersheds in the Puget Sound, it is considered to have impaired ecological integrity (Frissell et at. 2000). Past and present activities in the watershed that have had a lasting detrimental affect on fish habitat include: timber harvest, splash dam operations, road building, bank hardening, LWD removal, dike construction, dispersed recreation, and conversion of floodplain to pasture land and residential development. Impacts to fish habitat occur on a gradient within the watershed. The magnitude and frequency of impacts as identified above to fish habitat are greater lower in the watershed and as you move up river fish habitat and the processes affecting habitat are less impaired.

Foreseeable activities on National Forest System lands include the Jackson Timber Sale, which would commercially thin approximately 1,000 acres and construct 3 miles of temporary road in the Rocky Brook subwatershed. There would be short-term sediment impacts associated with temporary road building and log haul however they are anticipated to be relatively minor. Any effects would occur well downstream from the FSR 2610 washout and there would be no cumulative impacts.

With the reopening of the road beyond the washout a larger area of bank hardening would be maintained in Alternative D (as in all the other action alternatives) than in Alternative A, with the riprap associated with the added 5 miles of road beyond the washout and the two campgrounds. Alternative D would add to the cumulative adverse effects to fish habitat from bank hardening actions in the watershed.

Effects from the road repair activities proposed by ONP further upstream in the watershed would not overlap with effects of this alternative. Past road and facility construction by the park has modified the amount of impervious or hard packed surface in the developed area of the park and likely changed the area drainage patterns slightly. Under this alternative with the reopening of the road park operations and road maintenance would be reinstituted. These activities would be confined to the existing road and developed area and could create negligible adverse impacts to fisheries resources from road maintenance activities such as grading and facility operation and use. This work could improve drainage as culverts are cleaned and ditchlines are cleared, resulting in beneficial, indirect effects to fisheries resources from decreased run off and improved water quality.

Maintenance of FSR 2610 below the washout would continue. There are a number of areas along the road where the river and road are adjacent to each other and the riprap and other bank stabilization measures at these points would continue to be maintained over time. These activities would occur well downstream from the washout and no cumulative impacts are anticipated.

Existing and foreseeable non-Federal activities in the lower Dosewallips watershed include timber sales, road construction, bank hardening, dike construction, LWD removal, and the conversion of floodplain to pasture lands and residential development. Assuming population increases in the lower watershed and population densities rise these future private and state actions will persist and will likely increase, thus exacerbating the adverse effects on salmonid habitat within the lower watershed.

Over the past 10 years approximately 10.1 miles of road have been decommissioned on National Forest System lands within the Dosewallips watershed. Two miles of existing roads are planned to be decommissioned on National Forest System lands within the next several years. Additionally there have been several positive efforts made to improve salmonid habitat in the lower watershed by local environmental groups, tribal, state and county governments. Projects such as levee removal, placing large wood, land acquisition and conservation easements to protect high value floodplain and riparian areas have been accomplished and are underway.

Alternative D would have the greatest impacts on cumulative effects to fish habitat when

compared to the other alternatives. Although measurable affects to the stream channel from this alternative would most likely not be distinguishable beyond 3 miles below the washout there would still be cumulative effects to fish and their habitat. As fish habitat in the lower watershed on state and private lands degrade from activities mentioned above fish utilization of habitat further up in the watershed, in relatively intact habitat, will become more important. As fish populations decline within the Dosewallips, especially Chinook and steelhead, the importance of healthy productive habitats and the processes that maintain them become more critical. The 680 feet of riprap revetment would result in the direct loss of approximately 86,000 square feet of anadromous spawning and rearing habitat. This would add incrementally to the elimination and destruction of fish habitat from bank hardening within the watershed. With regard to Chinook and a lesser extent coho, pink, steelhead and cutthroat, spawning habitat will be impacted below the washout. Because the majority of Chinook spawning occurs on National Forest (personal communication T. Johnson) and two of three spawning reaches occur below the washout, these spawning reaches are particularly important. Impacts to these reaches would have a long-term watershed scale effect to the population of Chinook in the Dosewallips.

Forest Plan Amendments

Alternative D would create substantial, short-term and long-term adverse impacts to aquatic habitat and fish in the Dosewallips watershed. This alternative would preclude the natural channel migration and erosion processes in the vicinity of the washout for the foreseeable future. It would cause direct short-term impacts to fish habitat by direct filling in of existing spawning habitat. Hydraulic changes caused by the filling in the channel and placing riprap to protect the road corridor would scour away additional existing spawning habitat and either obliterate existing off channel rearing habitat or make it less accessible. Because of the unique geologic characteristics of the washout site, the importance of the habitat immediately downstream as one of the key spawning areas for Chinook and steelhead within the watershed, and the influence of coarse sediment and wood from the washout area in maintaining the high quality habitat downstream, the adverse impacts created by this alternative would be at the watershed scale.

The magnitude, extent, and long-term nature of adverse aquatic impacts created under Alternative D would clearly be inconsistent with some of the Aquatic Conservation Strategy objectives (USDA/USDI 1994). Alternative D would also be inconsistent with the Forest Plan direction for Key Watersheds that management must maintain or improve conditions for at-risk fish (USDA/USDI 1994).

The proposed amendments to the Olympic Forest Plan would allow this alternative to be consistent with the Forest Plan. Impacts of this alternative are described in detail in the preceding pages.

Alternative E – Low-water Revetment

Direct/Indirect Effects

Olympic National Forest
Sediment

Source of spawning gravels and channel function

For the most part the substantial adverse effects to spawning gravel recruitment and channel function under Alternative E would be the same as for Alternative D. The reconstructed road and riprap revetment would preclude any further lateral channel migration and prevent future fluvial erosion of the high bank.

Although the road would be designed to be inundated during moderate and large floods and the river would theoretically have the ability to erode the high bank during these periods, the amount of new bluff slope erosion that would actually occur and the quantity of new gravels that would actually be recruited into the river would be very small. Bluff slope erosion and subsequent sediment recruitment is typically initiated by river erosion at the toe of the slope. This is the point at which the water is deepest and water velocities and sheer stress are greatest. The outside of a meander bend (at the toe of the washout high bank) is also the point where the secondary spiral circulation pattern which typically occurs around bends is most effective at creating erosion along streambanks. Because the road fill would be fully armored with riprap the primary erosion forces could not act directly on the base of the terrace and further bluff slope recession would be prevented (Shelmerdine 2006).

During floods the flow that would expand over the road surface would be shallow. It would not have the velocity, the high energy, or the shear stresses of the deeper channel areas. It would also have less spiral or secondary circulation. Flood flows over the road surface may recruit some of the sediment accumulated at the base of the slope from ravel or hillslope erosion, but the erosive energy would likely be insufficient to affect the bluff appreciably (Shelmerdine 2006).

Whether the flood waters over the road surface would have sufficient energy to transport gravel-sized substrate is uncertain. If the flood was relatively small and the floodwaters were shallow and relatively slow they could simply erode the fine sediments from the road surface and leave the coarse substrates behind.

Spawning and Rearing Habitat

Adverse effects to spawning and rearing habitat within the project area would be similar to Alternative D but they would be slightly less. The low-water revetment would have a slightly narrower footprint in the existing river channel than Alternative D. Alternative E would directly fill in approximately 5,000 square feet less habitat than Alternative D. Habitat loss caused by channel shifting and scour would likely be similar between the two alternatives. The long-term difference between Alternative D and Alternative E would likely be insignificant. Both alternatives would create substantial impacts to spawning and rearing habitat.

Turbidity and Fine Sediment Input

Adverse impacts due to fine sediment and turbidity would be similar to Alternative D however the impacts could be more chronic and more frequent. Because the road would be designed to flood this alternative has the potential of creating frequent in-channel work to maintain the riprap revetment. The low-water revetment which would be designed to be overtopped during a 10 year or larger flood event could be overtopped and require maintenance as often as every 1 to 3 years. The Duckabush River which should have comparable flows to the Dosewallips has recorded 10 year flow events in seven of the last ten years.

Due to the need for continued maintenance, sedimentation and turbidity impacts associated with instream construction work would most likely extend well beyond the initial construction phase of two years. This would extend instream construction/maintenance activities into long-term effects. However these long-term instream maintenance activities would not be of the same scale and magnitude as the original construction phase.

Under Alternative E long-term detrimental inputs of fine sediments into the Dosewallips River would occur each time the river overtops the road and the road surfacing erodes into the river. Based on recently streamflow records in an adjacent watershed this may occur every 1 to 3 years.

Large Woody Debris
Effects are the same as Alternative D.

Pool Frequency and Quality
Effects are the same as Alternative D.

Off-Channel Habitat
Effects are the same as Alternative D.

Width/Depth Ratio
For the most part effects are same as Alternative D. The revetment in Alternative E would only occupy 1/3 of the existing bankfull stream channel rather than ½ of the bankfull channel in Alternative D.

Streambank Condition
Effects are the same as Alternative D

Drainage Network Increase
Effects are the same as Alternative D.

Temperature
Effects are the same as Alternative D

Road Density and Location
For the most part effects are same as Alternative D. The revetment in Alternative E would occupy only 1/3 of the existing bankfull stream channel rather than ½ of the bankfull channel in Alternative D.

Riparian Reserve Function
Effects are the same as Alternative D.

Sensitive Fish Species
The effects of Alternative E on Puget Sound/Strait of Georgia Coho, Puget Sound/Strait of Georgia Chum, and Puget Sound Coastal Cutthroat Trout would be identical to the effects

created by Alternative D.

Proposed and Threatened Fish and Critical Habitat
ESA determinations for Puget Sound Steelhead, Puget Sound Chinook, Hood Canal summer chum, and Coastal Puget Sound bull trout are the same as for Alternative D. Puget Sound Chinook and Hood Canal summer chum Critical Habitat determinations are the same as for Alternative D.

Essential Fish Habitat
Effects are the same as Alternative D.

Summary
The effects of Alternative E on the aquatic environment would be very similar to those associated with Alternative D. It would create substantial short-term and long-term impacts. Several of the adverse impacts would extend well beyond the immediate project area and could adversely impact aquatic habitat and/or fish populations at the watershed scale.

Although the road would be designed to be overtopped during moderate and large floods the impacts on coarse sediment recruitment from the high bank at the washout site would be almost identical to Alternative D. Streambank armoring along the outside of the meander bend, the dynamics of streambed scour, and the limited capacity of shallow floodwaters over the roadway to transport coarse sediments would all preclude any substantial gravel recruitment from the high bank at the washout.

Adverse impacts due to direct channel filling and stream displacement would be less than Alternative D because the low road option would allow a narrower footprint for the road. Under Alternative E the new road would project out into the existing channel approximately 20 – 22 feet less than under the replace in kind alternative (Alternative D).

Over the long-term any difference in adverse impacts to the aquatic environment between Alternatives D and Alternative E would be insignificant.

Cumulative Effects

The cumulative effects of Alternative E to the aquatic environment would be identical to the cumulative effects created by Alternative D.

Forest Plan Amendments

Effects are the same as Alternative D.

Table 31: NMFS matrix indicators

	Effects of the Proposed Alternatives (Project Scale)						Effects of the Proposed Alternatives (Watershed Scale)						Environmental Baseline (Watershed scale)		
Indicator				Alt. D	Alt. E					Alt D	Alt. E		Properly Functioning	At Risk	Not Properly Functioning
Sediment				D	D					D	D			X	
Large Woody Debris				D	D					M	M			X	
Pool Frequency and Quality				D	D					M	M			X	
Off-channel Habitat				D	D					M	M			X	
Width/Depth Ratio				D	D					M	M		Unknown		
Streambank Condition				D	D					M	M			X	
Drainage Network Increase				M	M					M	M			X	
Road Density & Location				D	D					M	M			X	
Temperature				M	M					M	M		X		
Function of Riparian Reserves				D	D					M	M			X	

(R)estore = project is likely to have a beneficial impact on habitat indicator.
(M)aintain = project may affect indicator, but impact is neutral.
(D)egrade = project is likely to have a negative impact on the habitat indicator.

Terrestrial Species and Habitat

A summary of the environmental consequences of Alternatives D and E are presented here. A detailed discussion of the environmental consequences of these two alternatives can be found in the wildlife specialist reports for this project.

Table 32: Summary of effects to terrestrial species for ONF activities

Species or Species Groups	Species Status	Alternative D Replace-in-Kind	Alternative E Low-water Revetment
Marbled Murrelet	T	Remove 1.7 acre suitable habitat; 5 acres noise disturbance	Remove 1 acre suitable habitat; 5 acres noise disturbance
Marbled Murrelet Critical Habitat	Designated	Degrade 1.7 acre constituent element; plus remove up to 90 trees resulting in possible degrade of constituent element	Degrade 1 acre of constituent element; plus remove up to 90 trees resulting in possible degrade of constituent element
Northern Spotted Owl	T, MIS	Remove 1.7 acre suitable habitat (one activity center below habitat threshold); 7 acres noise disturbance	Remove 1 acre suitable habitat (one activity center below habitat threshold); 7 acres noise disturbance
Northern Spotted Owl Critical Habitat	Designated	Remove 1.7 acre constituent element; plus remove up to 90 trees resulting in possible degrade of constituent element	Remove 1 acre constituent element; plus remove up to 90 trees resulting in possible degrade of constituent element
Bald Eagle	S, MIS	No nest/roost habitat removal; may impact perch trees	No nest/roost habitat removal; may impact perch trees

Species or Species Groups	Species Status	Alternative D Replace-in-Kind	Alternative E Low-water Revetment
Terrestrial Mollusks	S	Remove 1.7 acre habitat, plus possible removal of up to 90 trees within habitat	Remove 1 acre habitat, plus possible removal of up to 90 trees within habitat
Van Dykes Salamander	S	Removal 1.7 acre of Riparian Reserve	Removal 1 acre of Riparian Reserve
Cope's Giant Salamander	S	Removal 1.7 acre of Riparian Reserve	Removal 1 acre of Riparian Reserve
Olympic Torrent Salamander	S	Removal 1.7 acre of Riparian Reserve	Removal 1 acre of Riparian Reserve
Townsend's Big-eared Bat	S	Remove 1.7 acre habitat (possible roost habitat); plus possible removal of up to 90 roost trees habitat	May remove 1 acre roost habitat; plus possible removal of up to 90 roost trees
Pacific Fisher	C, S (extirpated)	Degrade 1.7 acre habitat	Degrade 1 acre habitat
Deer and Elk	MIS	Increase road density 0.5 to 0.6 mi/mi^2; reduce optimal cover by 1.7 acre	Increase road density 0.5 to 0.6 mi/mi^2; reduce optimal cover by 1 acre
Pileated Woodpecker, Pine Martin	MIS	Remove 1.7 acre habitat, plus possible removal of up to 90 habitat trees	Remove 1 acre habitat, plus possible removal of up to 90 habitat trees
Primary Cavity Excavators	MIS	Remove 1.7 acre habitat, plus possible removal of up to 90 habitat trees	Remove 1 acre habitat, plus possible removal of up to 90 habitat trees
Northern Goshawk	SOC	Remove 1.7 acre habitat, plus possible removal of up to 90 trees within habitat	Remove 1 acre habitat, plus possible removal of up to 90 trees within habitat

Species or Species Groups	Species Status	Alternative D Replace-in-Kind	Alternative E Low-water Revetment
Olive-sided Flycatcher	SOC	Remove 1.7 acre habitat, plus possible removal of up to 90 trees within habitat	Remove 1 acre habitat, plus possible removal of up to 90 trees within habitat
Tailed frog and western toad	SOC	Remove 1.7 acre habitat	Remove 1 acre habitat
Forest Landbirds		Remove 1.7 acre, plus possible removal of up to 90 trees within habitat	Remove 1 acre, plus possible removal of up to 90 trees within habitat

T = USFWS, Federal, Threatened; SOC = USFWS, Species of Concern; S = R6 Sensitive species; MIS = ONF, Management Indicator Species; C = Candidate species.

Table 33: Terrestrial species effects determinations for ONF activities

Species or Species Groups	Species Status	Alternative D Replace-in-Kind	Alternative E Low-water Revetment
Marbled Murrelet	T	May Affect, Likely to Adversely Affect	May Affect, Likely to Adversely Affect
Marbled Murrelet Critical Habitat	Designated	May Affect, Likely to Adversely Affect	May Affect, Likely to Adversely Affect
Northern Spotted Owl	T, MIS	May Affect, Likely to Adversely Affect	May Affect, Likely to Adversely Affect
Northern Spotted Owl Critical Habitat	Designated	May Affect, Likely to Adversely Affect	May Affect, Likely to Adversely Affect
Bald Eagle	S, MIS	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	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
Terrestrial Mollusks	S	For the Sensitive warty jumping slug, 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.	For the Sensitive warty jumping slug, 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.
Van Dykes Salamander	S	No Impact	No Impact
Cope's Giant Salamander	S	No Impact	No Impact
Olympic Torrent Salamander	S	No Impact	No Impact

Species or Species Groups	Species Status	Alternative D Replace-in-Kind	Alternative E Low-water Revetment
Townsends' Big-eared Bat	S	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	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
Pacific Fisher	C, S	No Impact	No Impact

T = USFWS, Federal, Threatened; SOC = USFWS, Species of Concern; S = R6 Sensitive species; MIS = ONF, Management Indicator Species; C = Candidate species.

Social/Economic

The cost of the constructed log complexes required mitigation associated with alternatives D and E is estimated at $400,000 and is included in the present value of discounted costs for these two alternatives.

Table 34: Discounted costs

	Present Value of Discounted Costs	
Alternative	**Forest**	**Park**
D	$1,953,700	$525,400
E	$1,672,500	$525,400