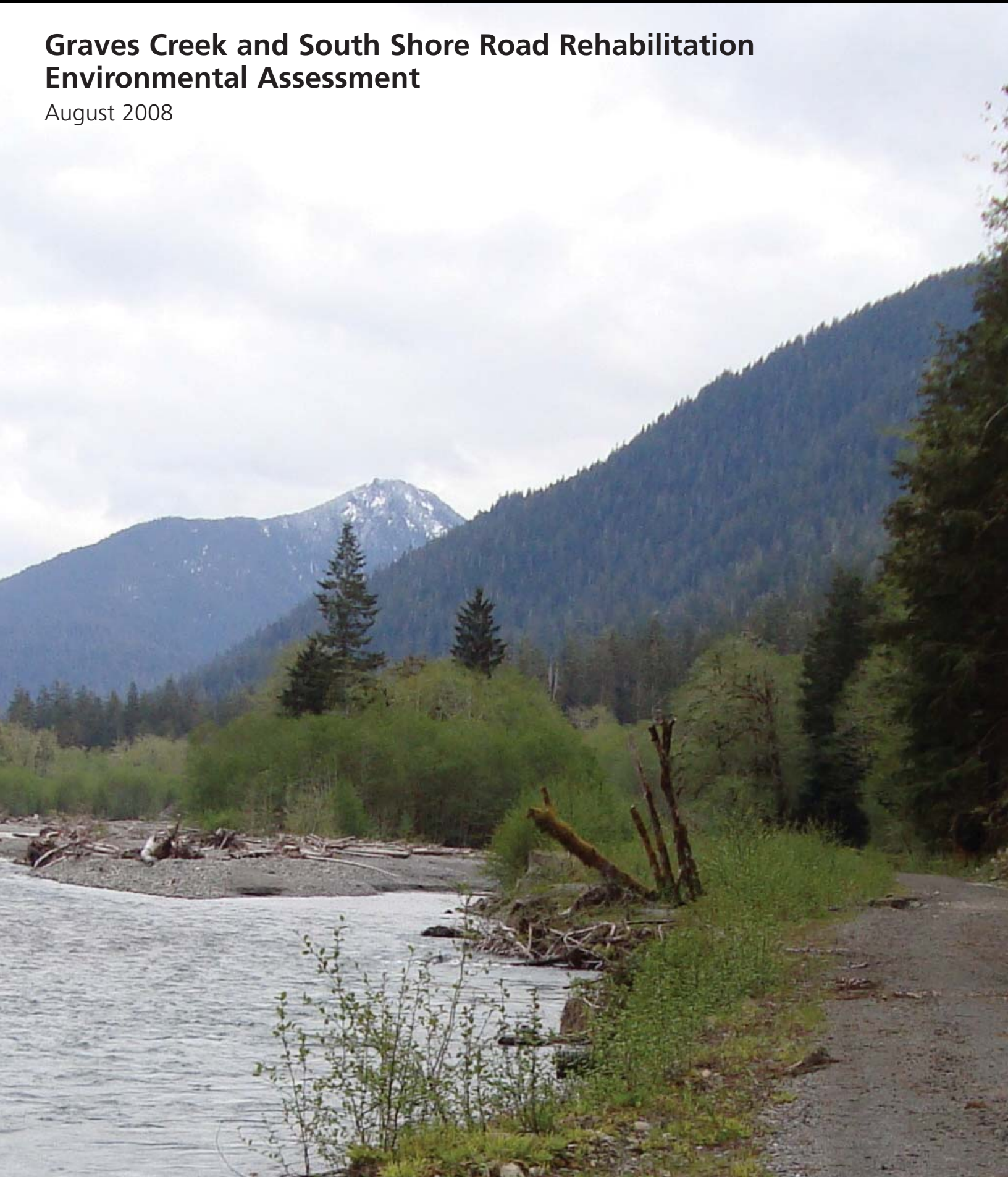
National Park Service
U.S. Department of the Interior

Olympic National Park
Washington

Graves Creek and South Shore Road Rehabilitation Environmental Assessment

August 2008



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ACRONYMS AND ABBREVIATIONS

BA	Biological Assessment
BMP	Best management practice
CEQ	Council of Environmental Quality
COE	U.S. Army Corps of Engineers
DOE	Washington State Department of Ecology
DOI	Department of Interior
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FHWA	Federal Highway Administration
FONSI	Finding of No Significant Impact
GMP	General Management Plan
MOU	Memorandum of Understanding
MP	Milepost
MSA	Magnusson Stevens Act
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
ONP	Olympic National Park
PEPC	Planning, Environment and Public Comment
QIN	Quinault Indian Nation
SOF	Statement of Findings
USFWS	U.S. Fish and Wildlife Service
WDFW	Washington Department of Fish and Wildlife
WRF	Wood reinforced floodplain

ENVIRONMENTAL ASSESSMENT

GRAVES CREEK AND SOUTH SHORE ROAD REHABILITATION QUINAULT RAIN FOREST

INTRODUCTION

Olympic National Park (ONP or park) of the National Park Service (NPS), in cooperation with Western Federal Lands Highway Division (WFLHD) of the Federal Highway Administration (FHWA), is proposing to rehabilitate and repair South Shore and Graves Creek roads in the Quinault Rain Forest area of the park. These roads were damaged by a December 3, 2007 storm that resulted in extreme flooding on the Olympic Peninsula, which caused damage to several roads and facilities on both the east and west sides of ONP. The South Shore Road and Graves Creek Road are located in the southwest portion of ONP, Washington (Figure 1 and Figure 2).

The purpose of this project is to restore permanent vehicle access on the Quinault South Shore and Graves Creek roads using methods that would provide a more sustainable roadway and would also restore, improve, and protect fisheries habitat. This Environmental Assessment (EA) includes alternatives to address the short-term repairs necessary to restore vehicular access to the roads, to protect the roads from future damage by developing more sustainable protective measures, to restore the roads in a such manner as to protect and minimize adverse effects to important native fisheries habitat in the Quinault River and tributaries, and to preserve and protect the other natural and cultural resources in the area. The EA describes a No Action Alternative and two action alternatives, and evaluates the effects of these alternatives on environmental, socioeconomic, and cultural resources. The EA was prepared in compliance with the National Environmental Policy Act (NEPA) to determine whether significant impacts would occur as a result of this proposed project and if an Environmental Impact Statement (EIS) or Finding of No Significant Impact (FONSI) would be required.

APPROPRIATE USE

Section 1.5 of Management Policies (2006), Appropriate Use of the Parks, directs the NPS to ensure that allowed park uses would not cause impairment of, or unacceptable impacts on, park resources and values. Existing authorized or a new form of park use may be allowed within a park only after a determination has been made in the professional judgment of the park manager that it will not result in unacceptable impacts.

FIGURE 1. PROJECT LOCATION.

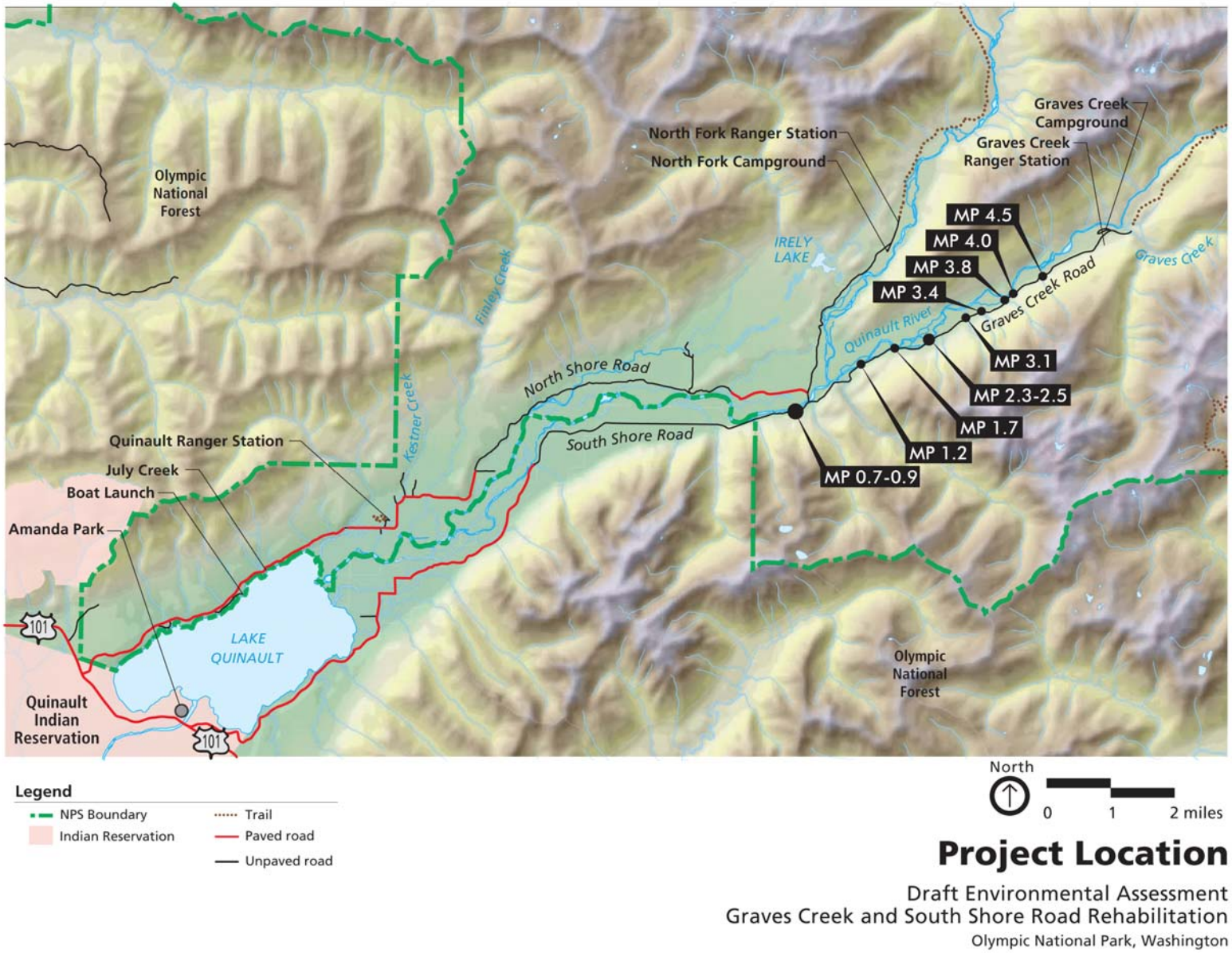
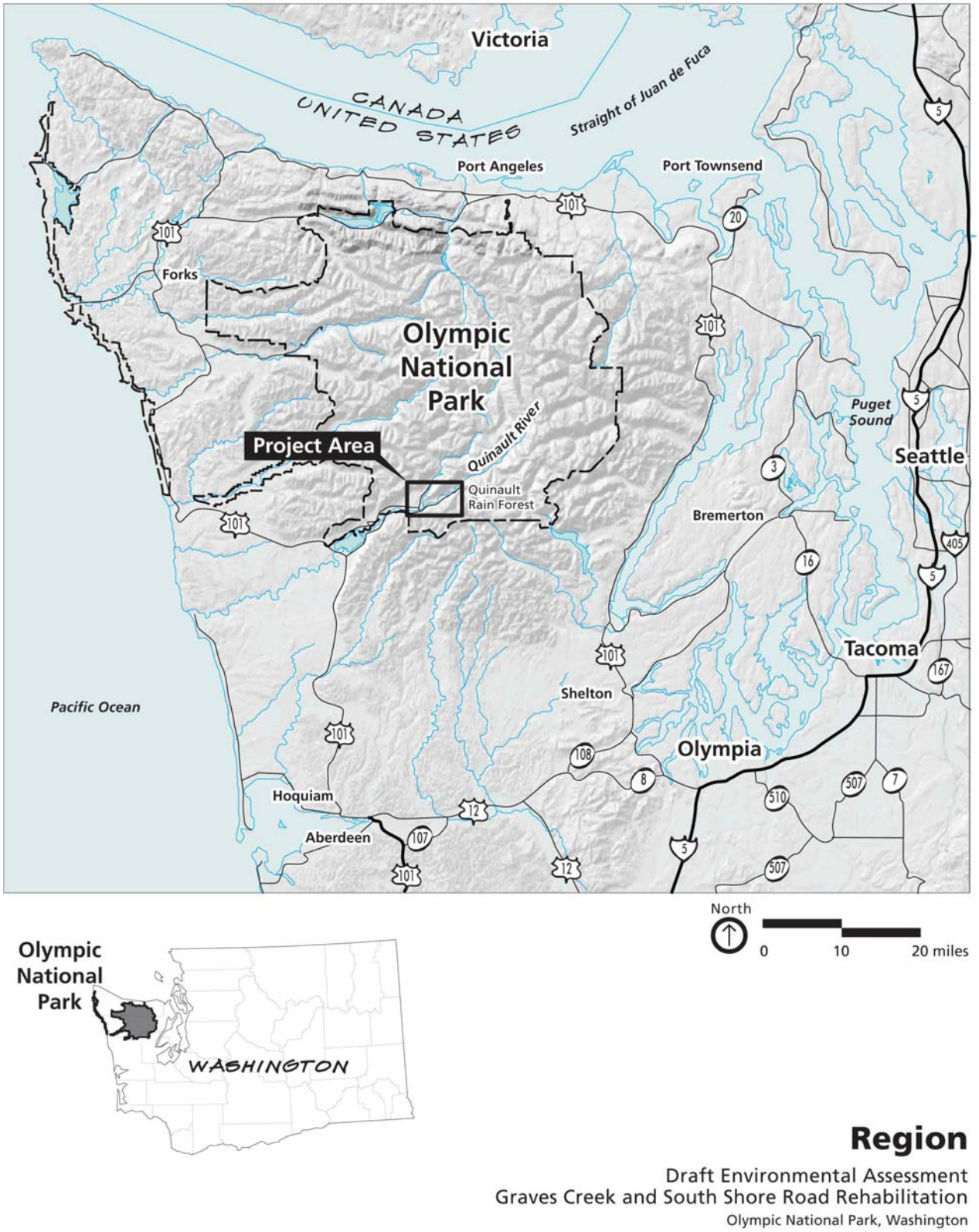


FIGURE 2. REGION.



Section 8.1.2 of Management Policies (2006), Process for Determining Appropriate Uses, provides evaluation factors for determining appropriate uses. All proposals for park uses are evaluated for:

- consistency with applicable laws, executive orders, regulations, and policies;
- consistency with existing plans for public use and resource management;
- actual and potential effects on park resources and values;
- total costs to the NPS; and
- whether the public interest will be served.

Park managers must continually monitor all park uses to prevent unanticipated and unacceptable impacts. If unanticipated and unacceptable impacts emerge, the park manager must engage in a thoughtful, deliberate process to further manage or constrain the use, or discontinue it.

Roads are used for access purposes at ONP. The existing South Shore and Graves Creek roads are consistent with the park's general management plan and other related park plans and are appropriate uses. Rehabilitation of these roads was evaluated in this EA to determine the impacts associated with each of the alternatives.

BACKGROUND

The Quinault Rain Forest provides a unique opportunity for visitors to explore the southernmost temperate rain forest in the United States. Several roads access the rain forest, including the South Shore, North Shore, North Fork, and Graves Creek roads. South Shore Road extends from U.S. 101 and follows the south side of Lake Quinault and the Quinault River. It is paved as far as the Jefferson County-Grays Harbor County line. Most of the South Shore Road is outside the park boundary. The South Shore Road crosses the park boundary just before its junction with North Shore Road at the Quinault River Bridge. Facilities along the South Shore Road include the Olympic National Forest Ranger Station, campgrounds, trails, tribal, and private facilities. Once the South Shore Road enters the park, visitors can choose to drive to the Graves Creek area or continue around to the north side of the lake. A loop driving experience between the North Shore and South Shore roads has historically been provided. However, road access and bridge connections have been endangered by periodic high flow events, flooding, and the meandering nature of the Quinault River and its tributaries.

From the junction point at the Quinault River Bridge, Graves Creek Road extends for 6 miles along the East Fork of the Quinault River. Graves Creek Road is a two-lane, unpaved road that leads to a seasonal ranger station and campground, and the East Fork Quinault and Graves Creek trailheads. Access points to trails from this location lead to the Enchanted Valley and on to Staircase and Dosewallips. The Graves Creek area has had various facilities that have served the public since at least 1928.

Both the South Shore and North Shore roads provide access to the North Fork area. The North Fork area is accessed by the two-lane, unpaved North Fork Road that runs for 4 miles from just north of the junction of North Shore and South Shore roads, along the North Fork of Quinault River. The North Fork area includes a seasonal ranger station, a campground, the

Irely Lake Trail, and the North Fork Trailhead. The North Fork Trail is the cross-park trail from the Quinault Rain Forest to the Elwha area.

On December 3, 2007, heavy rains fell throughout the Pacific Northwest, causing flooding and damage east and west of Seattle, including portions of the Olympic Peninsula. ONP sustained damage at the Hurricane Ridge, Elwha, Sol Duc, Lake Crescent, Hoh, Queets, and Quinault areas. The most extensive damage occurred in the Quinault area. More than seven inches of rain fell in the Quinault River Valley in less than 24 hours, with nearly 10 inches of rain falling in four days between December 1 and December 4. High winds resulted in extensive damage and downed hundreds of trees in the North Fork and Graves Creek areas in Quinault. Extremely elevated flows in the mainstem of the Quinault River (about 42,000 cfs measured below Lake Quinault) and its tributaries caused damage to the Graves Creek and South Shore roads within the park. The upper Quinault River migrates within the floodplain, directing substantial erosive forces to the banks of the river, especially at outside bends. For this reason, seasonal washouts have occurred periodically in recent history along at-risk portions of both the South Shore and Graves Creek roads, and there have been several attempts to stabilize these roads *(see Cumulative Effects section, page 60)*.

The South Shore Road was damaged near the park boundary. High flows on the Quinault River eroded the road prism at mile post (MP) 0.7 (Figure 3). Most of the road subgrade, base, and top course were washed out. Emergency repairs occurred in February and March 2008 to restore the road grade to the standards necessary to allow vehicular travel. The road was reopened to the public on April 1, 2008 to allow access to the Quinault Loop drive. The emergency repairs to restore access on South Shore Road, as defined in the Council on Environmental Quality (CEQ) regulations and under 23 U.S.C. Sec. 125, were categorically excluded (23 CFR 771.117 C) from preparation of an EA (CFR 1508.4, Section 3.4A.[9] of the NPS NEPA regulations (NPS Director's Order #12, Conservation Planning, Environmental Impact Analysis, and Decision Making).

FIGURE 3. SOUTH SHORE ROAD DAMAGE AT MP 0.7 TO 0.9.

The December 3, 2007 storm also resulted in heavy damage to the Graves Creek Road along the East Fork of the Quinault River (Figure 4 and Figure 5). The road was damaged at three locations from extremely high flows in the East Fork of the Quinault River (East Quinault River). The road was also damaged in five additional locations because of plugged or washed-out culverts, debris flows, and erosion on small tributaries to the East Quinault River. Numerous wind blown trees fell into the roadway as a result of the storm. The road remains closed to vehicles near MP 1.0, but was opened to pedestrians, stock, and bicycle use in May 2008.

FIGURE 4. DAMAGE TO GRAVES CREEK ROAD AT MP 1.2.

FIGURE 5. DAMAGE TO GRAVES CREEK ROAD AT MP 2.3.

Table 1 summarizes the damages on the South Shore and Graves Creek roads by milepost (MP) that would be addressed by this project.

TABLE 1. ROAD DAMAGE SUMMARY BY LOCATION AND MILEPOST

Location/Milepost	Description of Damage
South Shore Road MP 0.7 to 0.9	Extremely high flows on the Quinault River eroded the road prism over a length of 600 feet starting at MP 0.7. Most of the road subgrade, base and top course were washed out to a depth of approximately 4 feet to 6 feet. At MP 0.9, a debris flow blocked an existing 24-inch culvert, which resulted in the deposition of rock debris over 80 feet of the road to a depth of about 6 feet.
Graves Creek Road MP 1.2	Extremely high flows on the East Quinault River washed out the riprap bank hardening and the road over an approximate length of 200 feet.
Graves Creek Road MP 1.7	Extremely high flows in the East Quinault River eroded the road surface and the river bank over approximately 200 feet. High flows on an intermittent tributary to the river plugged a 24-inch culvert with debris.
Graves Creek Road MP 2.3 – 2.5	Extremely high flows in an ephemeral tributary to the East Quinault River plugged the 48-inch culvert with debris and eventually washed out both the road and the culvert. Approximately 100 feet of the road base and subgrade to a depth of 13 feet were washed out by the debris flow. Extremely heavy debris flows (e.g., gravel, logs, and rock) from the mountainside at this location, referred to as cobblestone alley, covered the road over approximately 600 feet x 25 feet to an average depth of 3 feet.
Graves Creek Road MP 3.1	Extremely high flows in a tributary to the East Quinault River plugged three culverts (two 24-inch culverts and one 36-inch culvert) with debris and covered both sides of the road with debris. The debris flow washed out and scoured approximately 1,050 feet of the road. A new channel was cut across the road and the depth of erosion into the base and subgrade is approximately 3 feet.
Graves Creek Road MP 3.4	Extremely high flows with debris in a tributary to the East Quinault River plugged the three culverts (two 24-inch culverts and one 36-inch culvert) and eroded the road surface over a length of 30 feet. Rock debris was washed west down the road over a length of approximately 600 feet and to a depth of 2 feet.
Graves Creek Road MP 3.8	Extremely high flows with debris plugged the 4 foot x 6 foot culvert and washed out both the road and the culvert on this tributary to the East Quinault River. The debris flow washed out approximately 10 feet on both sides of the road prism and the depth of erosion into the base and subgrade is approximately 4 feet. A 5-foot-wide section of the road in the center remains.
Graves Creek Road MP 4.0	Extremely high flows on the East Quinault River eroded the bank/road prism over a length of approximately 200 feet. The height of the road surface above the river channel bottom at the base of the eroded bank varies from approximately 15 to 18 feet. The road subgrade has been destabilized and there is longitudinal cracking in some locations. Another high water event will extend the bank erosion further into the road prism.
Graves Creek Road MP 4.5	Extremely high flows with debris plugged and buried the 48-inch culvert, washed out the road on this tributary to the East Quinault River. The debris flow washed out and eroded a 300 foot X 12 foot X 4 foot section of roadway.

PROJECT PURPOSE AND NEED

The NPS is proposing repairs to the South Shore and Graves Creek roads at ONP, in Grays Harbor County, Washington. This action is needed to repair the damage to these roads by the December 3, 2007 flood event. Restoration of access to the Quinault Rain Forest roads and facilities is of vital concern to the NPS, local and regional communities, and park visitors.

The purpose of the proposed project is to restore permanent vehicular access on the South Shore and Graves Creek roads while protecting and restoring natural resource

functions; and preserving for the benefit, use, and enjoyment of the people, convenient access to the Quinault Rain Forest. The proposed project has several objectives:

- Reestablish sustainable two-lane access for park visitors and staff to the Quinault Loop Drive, and to Graves Creek facilities, including the Graves Creek Ranger Station, campground, picnic area, and trails
- Protect the roads from future damage by developing more sustainable protective measures
- Restore the roads in a such manner as to protect and minimize adverse impacts to native fish and fisheries habitat in the Quinault River and tributaries
- Protect park natural and cultural resources and values

LEGISLATION, PLANS, AND GUIDANCE

The NPS Organic Act of 1916 (16 U.S.C. 1, 2-4) and the General Authorities Act (16 U.S.C. 1a-8) direct the NPS to conserve the scenery, natural and historic objects, and wildlife, and to provide for the enjoyment of those resources in such a manner as to leave them unimpaired for future generations. The Redwood Act (March 27, 1978, 16 U.S.C. 1a-1) reaffirmed the mandates of the NPS Organic Act of 1916 and provided additional guidance on national park system management as follows:

> The authorization of activities shall be construed and the protection, management, and administration of these areas shall be conducted in light of the high public value and integrity of the national park system and shall not be exercised in derogation of the values and purposes for which these various areas have been established.

Purpose and Significance of Olympic National Park

ONP was established by House Report No. 2247 of April 28, 1938. This report established the purpose of ONP, which is to:

> Preserve for the benefit, use, and enjoyment of the people, the finest sample of primeval forests of Sitka spruce, western hemlock, Douglas-fir, and western red cedar in the entire United States; to provide suitable winter range and permanent protection for the herds of native Roosevelt elk and other wildlife indigenous to the area; to conserve and render available to the people, for recreational use, this outstanding mountainous country, containing numerous glaciers and perpetual snow fields, and a portion of the surrounding verdant forests together with a narrow strip along the beautiful Washington coast.

Management Policies 2006

NPS *Management Policies 2006* provides guidance for management of all national park units. Road systems are addressed in Section 9.2.1, which states "park roads will be well constructed, sensitive to natural and cultural resources, reflect the highest principles of park design, and enhance the visitor experience."

The purpose of park roads is to enhance visitor experience by providing access to park facilities, resources, and recreational opportunities. Park roads are not intended to provide fast and convenient transportation, but rather to access areas of recreation while being sensitive to the natural and cultural resources in the area (Section 9.2.1.1 Management Policies). Park roads provide access for the protection, use, and enjoyment of the resources that constitute the park. The South Shore and Graves Creek roads provide important access to the Quinault Rain Forest including a ranger station, campgrounds, picnic area, and trails.

1984 NPS Park Roads Standards

The 1984 NPS Park Roads Standards states that roads in national parks serve a distinctly different purpose from most other road and highway systems. Among all public resources, those of the national park system are distinguished by their unique natural, cultural, scenic, and recreational qualities. Park roads are to be designed with extreme care and sensitivity to provide access for the protection, use, and enjoyment of the resources that constitute the national park system.

Director's Order #87A: Park Roads and Parkways

Director's Order #87A states that park roads are constructed only where necessary to provide access for the protection, use, and enjoyment of the natural, historical, cultural, and recreational resources that constitute our national park system. Park roads should enhance the visitor experience while providing safe and efficient accommodation of park visitors and to serve essential management action needs. Park roads are designed with extreme care and sensitivity with respect to the terrain and environment through which they pass—they are laid lightly onto the land.

Tribal Related Laws, Policies, and Executive Orders, and Agreements

A number of executive orders provide management direction for the NPS. The Presidential Memorandum of April 29, 1994 addresses the unique legal relationship with Native American tribal governments as set forth in the Constitution of the United States, treaties, statutes, and court decisions. In accordance with the April 29, 1994 memorandum, as executive departments and agencies undertake activities affecting Native American tribal rights or trust resources, such activities should be implemented in a knowledgeable, sensitive manner respectful of tribal sovereignty. Each executive department and agency shall assess the impact of federal government plans, projects, programs, and activities on tribal trust resources and ensure that tribal government rights and concerns are considered during the development of such plans, projects, programs, and activities.

Executive Order 13175 of November 6, 2000 established the fundamental principles in formulating or implementing policies that have tribal implications, including:

> The United States has a unique legal relationship with Indian tribal governments as set forth in the Constitution of the United States, treaties, statutes, Executive Orders, and court decisions. The United States recognizes the right of Indian tribes to self-government and to exercise inherent sovereign powers over their members and territory. In accordance with this Executive Order, the United States will continue to work with Indian tribes on a government-to-government basis to address issues concerning Indian self-government, tribal trust resources, and Indian tribal treaty and other rights.

Indian Trust Resources: Secretarial Order 3175 requires that any anticipated impacts to Indian trust resources from a proposed project or action by Department of the Interior agencies be explicitly addressed in environmental documents. The federal Indian trust responsibility is a legally enforceable fiduciary obligation on the part of the United 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 NPS does not manage or administer Indian trust assets, including trust lands and trust resources. No lands comprising ONP are held in trust by the Secretary of the Interior solely for the benefit of American Indians due to their status as American Indians. 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 NPS is to manage the park units in the national park system consistent with park laws and regulations, the federal government, including the NPS, has a trust responsibility to protect Indian rights and advance their interests. The NPS will interact directly with tribal governments regarding the potential impacts of proposed NPS activities on Indian tribes and trust resources. Where ONP shares boundaries or is upstream from area reservations, some park activities may affect trust assets on the reservation. "When park managers have reason to believe that park activities may affect Indian trust assets, they are responsible for initiating and maintaining government-to-government consultation with the affected tribal government(s)" (Memo to Assistant DOI Secretary, Policy, Management and Budget from Acting NPS Director, dated March 1, 2001).

ONP and the eight Olympic Peninsula Tribes signed a Memorandum of Understanding (MOU) on July 10, 2008 in order to facilitate government-to-government relations, effective coordination, open and timely communication, and meaningful consideration of the interests and priorities between the parties on issues of concern. The parties to the MOU are the Hoh Tribe, Makah Indian Tribe, Quileute Tribe, Quinault Indian Nation, Lower Elwha Klallam Tribe, Jamestown S'Klallam Tribe, Port Gamble S'Klallam Tribe, and Skokomish Tribe, and the NPS. The purposes of the MOU are to: (a) support effective, efficient, timely, and respectful consultation, communication and discourse between and among the Parties; (b) improve coordination and collaboration of policies and programs affecting the resources within the boundaries of the ONP; (c) facilitate the sharing of information and expertise; and (d) promote collaboration in the protection, use, and conservation of natural and cultural resources for the benefit of the present and future generations.

Related Planning Documents

The following park planning documents may have relevance to the damaged South Shore and Graves Creek roads.

Olympic National Park Master Plan - 1976

The master plan outlines park purposes to preserve, protect, and interpret, for the enjoyment and benefit of the American people. The master plan integrates park actions into the natural environment of ONP. Established goals related to access have also been addressed in this master plan. The master plan analyzes various ecological determinants—geology, soils, slopes, drainage patterns, vegetation, and animal life—indicating that natural

limitations should guide development and subsequent management. The master plan was replaced by the Final General Management Plan completed in August 2008 as described below.

Statement for Management: Olympic National Park - 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 Olympic Peninsula.

Olympic National Park Final General Management Plan and Environmental Impact Statement

ONP recently completed a general management plan (GMP) to establish the overall park goals for the next 15 to 20 years. The draft GMP was released for public review from June 15 to September 30, 2006. The Final GMP was completed August 8, 2008. The GMP provides overall planning guidance for park access and protection of resources. The GMP ratifies the importance of road access by including a goal to provide visitor access and recreational opportunities. The GMP sets up parkwide policies and strategies for river and road management, including:

- Inventory flood-prone areas near facilities and roads, and develop a program to proactively protect these using the most current techniques that minimize adverse effects on aquatic and riparian habitats and fluvial processes.

- Work with area partners, including tribes, federal, state, and county agencies, and others, to develop restoration plans for at-risk river systems. Use current technologies, over time, to restore or improve floodplain and riparian functions altered in the past by bank-hardening techniques.

- Protect shoreline areas that provide spawning, feeding, and rearing habitats for fish and support rare aquatic plant species. During drought or other conditions warranting greater resource protection, this may involve occasional seasonal closures of specific areas.

- Provide information to visitors regarding river processes and natural flooding regimes.

- When emergency situations occur, work directly with appropriate tribes to fully evaluate the potential impact of the proposal and consider tribal views in the decision-making process. At the request of the tribes, and as time allows during the emergency actions, provide for coordination with the associated tribe. Protocols for consultation would be developed when needed.

The draft management Preferred Alternative for the Quinault Rain Forest area includes the following goals:

- North Fork and Graves Creek roads would be retained. Relocations of the roads might be necessary due to river movement and river restoration goals.

- Year-round road access would be retained using methods that minimize adverse effects on river processes and aquatic and riparian habitats to the extent possible. Access could be adjusted depending on weather and safety concerns.

- Evaluate roads located within the floodplain of the Quinault River and conduct river reach and other analyses to determine if roads or road segments can be relocated out of the floodplain and the floodplains restored to natural conditions. If such road relocations entail wilderness boundary adjustments, congressional legislation would be required (with a goal of no net loss of wilderness acreage parkwide, wilderness would need to be added elsewhere).

Quinault Indian Nation Restoration Plan (draft 2008)

The Quinault Indian Nation (QIN) is developing a restoration plan for the Quinault River. The NPS is committed to working with the federally recognized tribes, such as the QIN, on a government-to-government basis to develop and implement restoration plans for at-risk river systems, including the Quinault River. The NPS will continue to work with state, federal, and tribal agencies and other partners to restore fish passage in priority areas within ONP. The Restoration Plan is a reasonably foreseeable action discussed in the Cumulative Effects section.

ISSUES AND IMPACT TOPICS

Scoping

A list of issues and concerns related to repair of the South Shore and Graves Creek roads were identified through park internal scoping and through the public scoping process. Internal scoping involved an interdisciplinary team of park and regional staff, and QIN and FHWA personnel who assessed the site conditions and determined potential issues and impact topics. The purpose of public scoping was to gain input on the issues or concerns related to the proposed project and identify potential projects in the area that could lead to cumulative impacts.

The park received public scoping comments from one individual, one organization, and from the QIN. Several concerns about the proposed project were expressed in scoping comments, including:

- Potential effects to fish populations, including the federally endangered bull trout and declining sockeye salmon populations
- Support for engineered logjams to protect the road and improve fish habitat
- Potential cumulative effects to the Quinault River watershed and need for restoring natural hydrologic functions
- Potential climatic change that results in more extreme flood events
- The effects of wildlife habitat fragmentation and poaching from reopening the road
- Potential for weed invasion following road work

The QIN expressed concerns over the potential short- and long-term effects to the fisheries and tribal treaty resources, particularly the sockeye salmon, from road

reconstruction and emergency repairs. The QIN also stressed "the importance of working together towards a comprehensive long-term plan that guides the park toward a sustainable means of access over the long-term."

Internal and external scoping comments were considered in the choice of impact topics and were used in the development and evaluation of alternatives discussed in this EA. Scoping issues or impact topics that were considered, but were not evaluated further, are discussed below in "Impact Topics Eliminated from Further Consideration."

Issues and Impact Topics

Issues and impact topics were developed from the questions and comments brought forth during internal and external scoping. Issues that were identified in scoping that were evaluated in the EA were potential effects to fish populations and habitat, threatened and endangered species, possible changes in hydrologic functions, the potential for establishment of noxious weeds, and reasonably foreseeable actions that could add to the cumulative effects in the watershed. Table 2 discusses the impact topics; the reasons for retaining the topic; and the relevant laws, regulations, and policies.

TABLE 2. IMPACT TOPICS RETAINED FOR FURTHER EVALUATION AND RELEVANT LAWS, REGULATIONS, AND POLICIES

Impact Topic	Reasons for Retaining Impact Topic	Relevant Laws, Regulations, and Policies
Geology	Removal of damaged culverts from the streambeds at four areas (with the exception of MP 3.1 where culverts are deeply buried and MP 1.7 where the culvert will be cleaned out), and replacement of culverts in five locations would be considered. Bridges could be placed at MP 3.1 and/or 3.4. The excavation of the damaged culverts from the stream channel and installation of new culverts or bridges would impact the streambeds and geologic resources on a temporary basis. In the long term, having adequately sized culverts or bridges will improve the hydrologic function of the stream.	NPS *Management Policies 2006*
Vegetation	Vegetation disturbance is possible from equipment operations to repair the road surface, installation of streambank protection measures, and to remove or replace washed-out culverts.	NPS Organic Act; NPS *Management Policies 2006*; Resource Management Guidelines (NPS-77); Federal Noxious Weed Control Act; Executive Order 13112; Invasive Species (1999)
Wildlife	Construction activities and noise could affect wildlife in the project area. No terrestrial habitat would be lost. The project area contains high quality habitat for Roosevelt elk populations.	NPS Organic Act; NPS *Management Policies 2006*; NPS-77
Fishery Resources	Road rehabilitation, streambank stabilization and protection measures, and removal or replacement of buried or washed-out culverts or the construction of bridges would temporarily increase sediment in the Quinault River and tributaries, and could potentially impact fisheries resources. The Quinault River is designated as essential fish habitat for coho and Chinook salmon. The Quinault River and tributaries also provide spawning and rearing habitat for sockeye salmon and steelhead.	Endangered Species Act; NPS *Management Policies 2006*; 16 U.S.C. 1535 Section 7(a)(2); Magnuson-Stevens Fishery Conservation and Management Act; Sustainable Fishery Act of 1996 (P.L. 104-267)

Impact Topic	Reasons for Retaining Impact Topic	Relevant Laws, Regulations, and Policies
Special Status Species	No northern spotted owl nest sites are in or near the project area, but dispersal habitat is present. There is potential marbled murrelet habitat in the project area. Both bird species could be affected by disturbance from noise and human presence during construction. There would be no removal of habitat or suitable nesting trees for these species. Bull trout have been observed in the Quinault River, which is designated critical bull trout habitat. Essential fish habitat is present in the Quinault River. Sensitive or listed fish species could be affected by stream sedimentation during construction. There are no federally listed threatened or endangered plant species in the park; therefore, there would be no impacts.	Endangered Species Act; NPS *Management Policies 2006*; 16 U.S.C. 1535 Section 7(a)(2)
Soils	Soil disturbance is possible from construction activities that occur outside the road prism.	NPS *Management Policies 2006*
Hydrology and Water Quality	Temporary negative effects to water quality are possible during construction from introduction of sediment. Streamflow characteristics would be modified by streambank protection measures with the intent of long-term protection of the road and improvements to aquatic habitat.	Clean Water Act; Fish and Wildlife Coordination Act of 1934 (PL 85-624), as amended; Executive Order 12088; NPS *Management Policies 2006,* NPS-77
Floodplains	There would be work in the floodplain for road rehabilitation, replacement of culverts, and the placement of bridges, road and streambank protective measures.	Executive Order 11988 Floodplain Management, Floodplain Management (DO-77-2)
Ethnographic Resources and Treaty Resources	The QIN has concerns related to protecting fish and fisheries habitat in the Quinault River and its tributaries. Restoring access would allow the QIN biologists to reach water and fisheries monitoring sites as well as access areas of traditional use, resulting in beneficial impacts to tribal members.	Executive Order 13084 of May 14, 1998; Executive Order 13007 of May 24,1996; American Indian Religious Freedom Act of 1978; the Native American Grave Protection and Repatriation Act of 1990; Indian Trust Resources: Secretarial Order 3175; Director's Order #28; NPS Management Policies 2006
Visitor Experiences and Recreational Resources	Restoring access into the Graves Creek area would positively impact those who wish to visit this area and use vehicles to access trailheads and campgrounds. The experiences of these visitors would be improved because they would be able to once again access this area of the park by a vehicle and take advantage of the recreation opportunities in the area. Some visitors who enjoy walking on the road without vehicles would be adversely affected by the restoration of vehicle access to Graves Creek.	NPS *Management Policies 2006*

Impact Topic	Reasons for Retaining Impact Topic	Relevant Laws, Regulations, and Policies
Public Health, Safety, and Park Operations	The South Shore and Graves Creek roads provide access for emergency services, and NPS resource management and maintenance personnel. Restoring access would result in less time to reach the trailhead and increased ability to respond quickly to emergencies. Restoring vehicular access would allow for continued trail and facility management activities, and will make it less difficult for park resource specialists and researchers to conduct research and monitoring activities.	NPS *Management Policies 2006*
Socioeconomics	Restoring vehicular access would ensure visitor access to the Quinault Rain Forest and an important park trailhead. Restoring access would benefit local gateway communities supported by tourism spending.	*NPS Management Policies 2006*

Impact Topics Dismissed from Further Analysis

The following impact topics or issues were eliminated from the list of potential impacts because there would be adverse impacts of minor intensity or below.

Wetlands

Executive Order (EO) 11990, NPS *Management Policies 2006*, and DO-77-1 direct that wetlands be protected and that wetlands and wetland functions and values be preserved. These orders and policies further direct that direct or indirect impacts to wetlands be avoided whenever there are practicable alternatives. No wetlands were found during a field survey of the project area on April 30, 2008 (NPS 2008a). Because there are no wetlands in the vicinity of the project area, this topic was dismissed in this EA.

Prime Farmland

In 1980, the CEQ directed federal agencies to assess the effects of their actions on farmland soils classified as prime or unique by the United States Department of Agriculture, Natural Resources Conservation Service. Prime or unique farmland is defined as soil, which particularly produces general crops such as common foods, forage, fiber, and oil seed; and unique farmland produces specialty crops such as fruits, vegetables, and nuts. There are no prime or unique farmlands associated with the project area; therefore, prime and unique farmland was dismissed as an impact topic in this EA.

Air Quality

ONP is a designated Class I airshed under the Clean Air Act, which prevents significant deterioration of air quality. Earthwork and grading activities from rehabilitation of damaged sections of road, installation of culverts, and construction of new road and streambank protection measures under Alternatives B and C could result in short-term and localized effects to air quality. Construction equipment would generate additional emissions in the air, but the effects would be short-term, negligible, and adverse; however, visibility, deposition, and other air quality-related values are not expected to be significantly impaired. Restoration activities that reestablish vehicle traffic on South Shore and Graves Creek roads would not

result in an increase in traffic beyond what has occurred prior to road damage. If Alternative B or C is selected, local air quality would be temporarily affected by emissions from construction equipment and vehicles. Neither overall park air quality nor regional air quality would be more than negligibly affected. Under Alternatives B and C, some greenhouse gases, such as carbon dioxide would be emitted from the use of heavy equipment and restoring vehicular use to the area. These emissions would be small and would not contribute to climate change; therefore, this topic is dismissed from further evaluation. Alternative A, which eliminates vehicle traffic on Graves Creek Road, would result in a slight improvement in air quality from reduced vehicle traffic; there would be no short-term increase in emissions from construction. Because the action alternatives would result in short-term negligible adverse effects and the No Action alternative would result in beneficial effects, air quality was dismissed as an impact topic in this EA.

Indian Trust Resources

The NPS does not manage or administer Indian trust assets. The overriding mandate for the NPS is to manage the park units in the national park system consistent with park laws and regulations. Where ONP shares boundaries with the Quinault, Hoh, Quileute, Ozette, and Makah reservations, some park activities may affect trust assets on the reservation. "When park managers have reason to believe that park activities may affect Indian trust assets, they are responsible for initiating and maintaining government-to-government consultation with the affected tribal government(s)" (Memo to Assistant DOI Secretary, Policy, Management and Budget from Acting NPS Director, dated March 1, 2001).

No lands comprising ONP 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.

Cultural Resources (except for ethnography and tribal concerns)

Cultural resources include archeological resources, ethnographic resources, historic structures, and cultural landscapes. Cultural resources are found throughout ONP, from its mountain peaks and alpine meadows down to its river valleys and coastal shoreline. Legislative acts, regulations, and NPS policies provide direction for the protection, preservation, and management of cultural resources on public lands.

The proposed project lies in or near the floodplain of the Quinault River on deposition terraces less than 1,000 years old. ONP staff conducted surveys of the project area for archeological resources, historic resources, ethnographic resources, and cultural landscapes. No resources eligible for listing in the National Register of Historic Places (NRHP) were identified. To meet the requirements of Section 106 of the National Historic Preservation Act (NHPA), the Washington State Historic Preservation Office was consulted and concurred with the finding of no effect to historic properties in ONP. Since it has been determined there would be no impact to cultural resources with either of the alternatives, cultural resources have been dismissed as an impact topic in this EA.

While no historic properties were identified within the area of potential effect, limited archeological monitoring of initial ground disturbance would occur at the low water crossing location. Should previously unknown cultural resources be encountered during construction activities, work would be halted in the discovery area and the park would consult according

to 36 CFR 800.13 and, as appropriate, provisions of the Native American Graves Protection and Repatriation Act of 1990.

Museum collections (prehistoric and historic objects, artifacts, works of art, archival documents, and natural history specimens) would continue to be housed in a facility that meets most NPS museum standards. The proposed action would have no impact on museum collections in the park.

Environmental Justice

Executive Order 12898 requires federal agencies to identify and address disproportionately high and adverse human health or environmental effects on minorities and low-income populations or communities. Neither of the alternatives would have health or environmental effects on minorities or low-income populations or communities as defined in the Environmental Protection Agency's (EPA) Environmental Justice Guidance (1998). Therefore, environmental justice was dismissed as an impact topic in this EA.

Visual Resources

Visual resources would be affected by Alternative B and C; however, the construction effects would be short-term, negligible, and localized. Visual impacts would occur during construction from the presence of construction equipment and materials, although the project area would be closed to visitor access during construction activities. Rehabilitation of the damaged sections of the existing roads would not substantially change the visual qualities of the road corridor from conditions prior to the storm damage. A short reroute of the Graves Creek Road at MP 1.2 away from the Quinault River conducted during emergency repairs did result in a slight modification of the visual characteristics in this area. Under Alternative B, construction of bank barbs and wood reinforced floodplains at MP 0.7 to 0.9, MP 1.2, MP 1.7, and MP 4.0 would introduce a new visual element to the landscape. The long-term visual impact of the road rehabilitation and improvements would not adversely affect any viewsheds. The scenic views for which ONP is renowned would not be affected by Alternative B or C. By not restoring the road, under Alternative A continued erosion of the road is possible from future storms, which would have an impact on the visual quality for those hiking or biking into the area. The long-term effect to visual quality would likely be negligible to minor for all the alternatives so visual resources were dismissed as an impact topic in this EA.

Soundscapes

An important part of the NPS mission is preservation of natural soundscapes associated with national park units. Natural soundscapes exist in the absence of human-caused sound. Noise associated with construction of the action alternatives would be short-term, minor, adverse, and localized, and would not result in a measurable increase in long-term traffic noise or have any other continued effects on the park soundscape. Considerations of noise impacts on wildlife and Special Status Species, as well as visitor experience, are addressed under the respective impact topics. Alternative A would have no effect on the natural soundscape. Because there would be no to negligible effects to the soundscape under all the alternatives, this topic was dismissed from discussion in the EA.

Wilderness

The project area occurs outside of wilderness boundaries and, therefore, is not subject to Wilderness Act requirements. However, restoring vehicular access to a popular wilderness trailhead would benefit some park visitors. This effect is evaluated under "Visitor Experience and Recreational Resources." Because there would be no direct effect to wilderness resources and values, this topic was dismissed from further evaluation in this EA.

Energy

Alternative A would result in negligible expenditures of energy because no construction would occur. Alternatives B and C would require expenditures of energy, including natural and depletable resources during construction; however, the use would be short-term and have negligible impacts to these energy resources. None of the alternatives analyzed in this EA would require an increase in energy consumption, nor would the alternatives have appreciable effects on energy availability or costs. Because impacts would be no greater than negligible, energy resources were dismissed as an impact topic in this EA.

ALTERNATIVES

INTRODUCTION

The alternatives section describes Alternative A and two management alternatives for restoring access on the South Shore and Graves Creek roads, in the Quinault Rain Forest area of ONP. Alternative A would not repair the roads for vehicle access or provide protection of the Quinault River streambank, but would include minor repairs sufficient to allow use of the abandoned road as a trail. The action alternatives were developed to address the purpose and need for the project. The purpose of this project is to provide visitor and administrative vehicular access to the Graves Creek ranger station, campground, and trailheads, while protecting and preserving park natural and cultural resources, with a goal of minimizing adverse effects to fisheries resources and habitat. Each action alternative must meet the purpose and objectives, while resolving the needs in order to be considered reasonable.

The Restore Access with Improvements Alternative (Alternative B) includes additional protection measures to prevent future road washouts and resource damage, and includes measures to improve aquatic habitat. The Restore Access with Replacement in Kind Alternative (Alternative C) would involve reconstructing the damaged sections of the road with no or minimal improvements to a condition similar to what existed prior to the storm. Alternative B presents the NPS's preferred alternative and defines the rationale for the action in terms of resource protection and management, visitor and operational use, and other applicable factors. Other alternatives that were considered but eliminated from detailed analysis are also discussed in this section.

The alternatives do not address the long-term future planning and restoration needs for the Quinault River that are identified as part of the selected action in the ONP Final General Management Plan and Environmental Impact Statement (FGMP/EIS). This would be addressed in a long-range plan that will be prepared in partnership with the QIN and other key stakeholders in the area.

EMERGENCY REPAIRS

As discussed in the Background section, emergency repairs were conducted at several of the damaged road locations to provide access to other connecting roads and to prevent further road deterioration or resource impacts until permanent repairs can be completed. Approximately $450,000 was spent on emergency road repairs. A summary of emergency repairs that have been completed and are part of the existing conditions regardless of which alternative is selected are listed in Table 3.

TABLE 3. SUMMARY OF COMPLETED EMERGENCY REPAIRS

Location	Emergency Repairs
South Shore Road MP 0.7 to 0.9	Vehicle access on the Quinault Loop Road was restored in April 2008. Repair work included removal of rock debris from the road surface and regrading and installation of road base fill to restore the driving surface and allow safe travel. Riprap was installed along about 600 feet of the Quinault River streambank to protect the road. Rock debris was removed from the existing 2-foot-diameter culvert that was blocked at MP 0.9.
Graves Creek Road MP 1.2	Approximately 250 feet of road was realigned away from the existing road to reduce the potential for East Quinault River high flows from eroding the road in the future and to prevent damage to fish habitat by avoiding work directly in the river. This realignment also prevented the removal of five large trees. Installation of the road base and top course on 1,000 feet of road west of the realignment was also completed as part of emergency repairs.
Graves Creek Road MP 1.7	Debris was removed from a plugged 3-foot-diameter culvert inlet.
Graves Creek Road MP 2.3 to 2.5	Debris on the road surface was graded to allow vehicle access for downed tree removal.
Graves Creek Road MP 3.1	Debris on the road surface was graded to allow vehicle access for downed tree removal.
Graves Creek Road MP 3.4	Debris from one culvert was partially cleared, sufficient to carry low flows. Debris on the road surface was graded to allow vehicle access for downed tree removal.
Graves Creek Road MP 3.8	Debris from the culvert was cleared. Debris on the road surface was graded to allow vehicle access for downed tree removal.
Graves Creek Road MP 4.0	Debris on the road surface was graded to allow vehicle access for downed tree removal.
Graves Creek Road MP 4.5	Debris on the road surface was graded to allow vehicle access for downed tree removal.

ALTERNATIVE A—NO ACTION

Under Alternative A, no additional road rehabilitation or repairs would occur. The emergency repairs completed in April 2008 on the South Shore Road would allow the road to remain open to vehicle traffic and allow continued connections and access to the Graves Creek, North Fork and North Shore roads, and maintain vehicular travel on the Quinault Loop Drive. This section of road would not receive additional streambank protection.

No additional repairs would occur to the Graves Creek Road beyond the emergency repairs already completed except for minor actions, such as removal of washed-out culverts. Road damage and streambank stabilization measures would not be implemented. Washed-out or plugged culverts would not be replaced. The road would be permanently closed to vehicle access near MP 1.0. The trailhead would remain open to the public. Pedestrian and bicycle access would be allowed on the road as long as it remains safe for travel. Visitor access could be suspended if further road damage or washouts make travel unsafe. The Graves Creek Campground, facilities, and ranger station would be closed or converted to backcountry use. A future planning effort would be needed to determine the long-term management of this area.

Alternative A provides a basis for comparison with the action alternatives and the respective anticipated environmental consequences. Should Alternative A be selected, the NPS would respond to future needs and conditions without major actions or changes in the present course.

ACTIONS COMMON TO ALTERNATIVES B AND C

Alternative B consists of road rehabilitation and improvements at nine locations and Alternative C would involve road rehabilitation at eight locations. Although each project element at the different mileposts is independent of the other, the work would be undertaken as one project under either alternative. Work would be conducted concurrently or sequentially, depending on the activity, between July 15 and March 30. Instream channel work on the Quinault and East Quinault river would be done between July 15 and August 30 when water levels are low prior to spawning to minimize impacts to fish species. Instream work could be extended into the first week of September if snorkel activities indicated no fish or spawning in the project area. To avoid adverse impacts to breeding murrelets, any noise-producing construction activities above ambient noise levels within 35 yards of murrelet habitat would not begin until after August 6, during the murrelet late breeding season (August 6 to September 15). During the project work period between August 6 and September 15 within 35 yards of marbled murrelet habitat, no work that generates above-ambient noise levels would take place at night or within 2 hours of sunrise and sunset, when murrelets are known to be most active.

Equipment and material storage and other staging activities would be located within the footprint of the existing road, pullouts, and other areas that are currently disturbed. Sections of the roads under construction would be closed to public access until repairs are completed. The conceptual design for road improvements and structural features in the river channel presented in this document may be modified during final design to best accommodate site-specific conditions and minimize resource impacts.

ALTERNATIVE B—RESTORE ACCESS WITH IMPROVEMENTS TO PROVIDE MORE SUSTAINABLE ACCESS (INCORPORATING PROTECTIVE MEASURES FOR HABITAT RESTORATION)—THE MANAGEMENT PREFERRED ALTERNATIVE

Alternative B includes site-specific repairs and improvements at each of the damaged sections of road to restore vehicle access to the Quinault Rain Forest and facilities (Figure 1). The intent of proposed improvements is to provide additional protective measures above those of the pre-storm condition that reduce the potential for damage from future storm events and to restore and improve the quality of habitat for fish and aquatic life in the Quinault River and tributaries. Proposed rehabilitation and improvement activities are described for each of the damaged road sections by milepost (MP).

South Shore Road—MP 0.7 to 0.9

To protect the road from future washouts at this location, the installation of bank barbs and a wood reinforced floodplain structure is proposed along the Quinault River (Figure 6). Three bank barbs would be placed at about 150-foot intervals along a 600-foot section of the road that was damaged by the storm (Figure 7). The barbs would extend into the river about 40 feet at an angle with the upstream bank (Figure 8). The face and sides of the barbs would be constructed at an approximate 3:1 slope. The barbs would be about 40 feet wide and 4 to 5 feet high at the streambank and about 30 feet wide and 3 to 4 feet high at the tip. Much of the barb would be below the ordinary low water level of the river and would not be visible at

higher flows (Figure 9). The conceptual plan for the bank barbs shown in Figure 7, Figure 8, and Figure 9 may be modified during final design. Installation of the barbs would occur when the river is near the ordinary low water level. The barbs would be constructed by machine placement of large riprap rock without excavation in the stream channel. The streambank would be excavated first and the rock placed in the excavated area to form a working platform. The platform would then be expanded into the channel as the barb is constructed. No equipment would need to operate directly in the river channel. The barb would be anchored into the roadbank riprap installed during emergency repairs about 10 feet, which may require excavation of about 10 feet into the road prism. Upon completion of the barb installation, the road would be repaired.

As high flows pass over the barbs, they leave the barb in a direction perpendicular to the barb, which diverts the flow away from the streambank. At the same time, the rate of flow (energy) is slightly slowed and, as a result, suspended bedload materials are deposited upstream and downstream of the barbs. The captured sediment would eventually support riparian vegetation, further protecting the roadway. The bank barbs would not necessarily be permanent structures. They would be monitored over time to determine their effectiveness and could be removed or modified if they do not function as anticipated, or if future planning determines them to be unnecessary.

FIGURE 6. SOUTH SHORE ROAD AT MP 0.7.

FIGURE 7. SOUTH SHORE ROAD BANK BARBS AT MP 0.7.

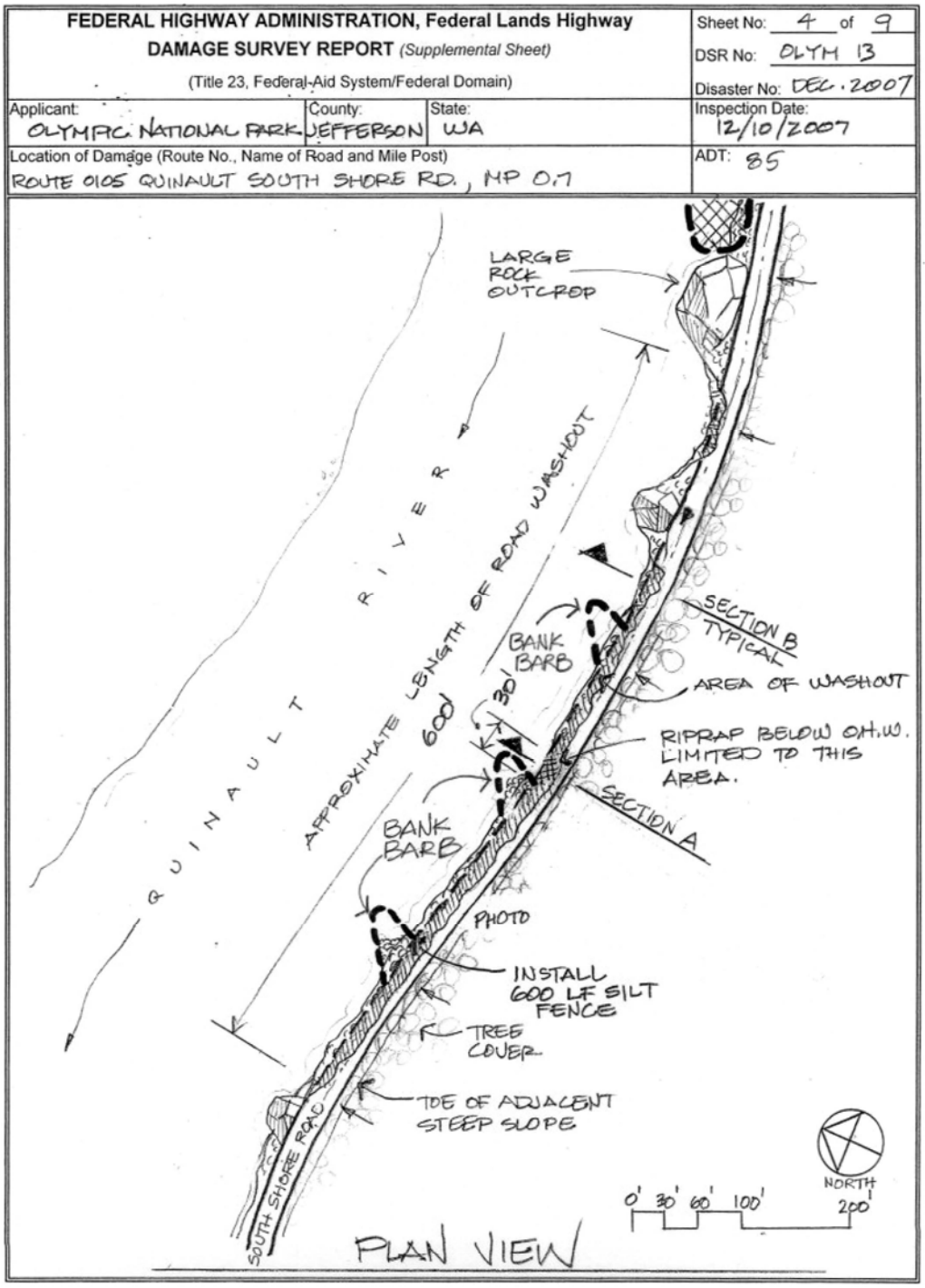


FIGURE 8. BANK BARB PLAN VIEW DETAILS.

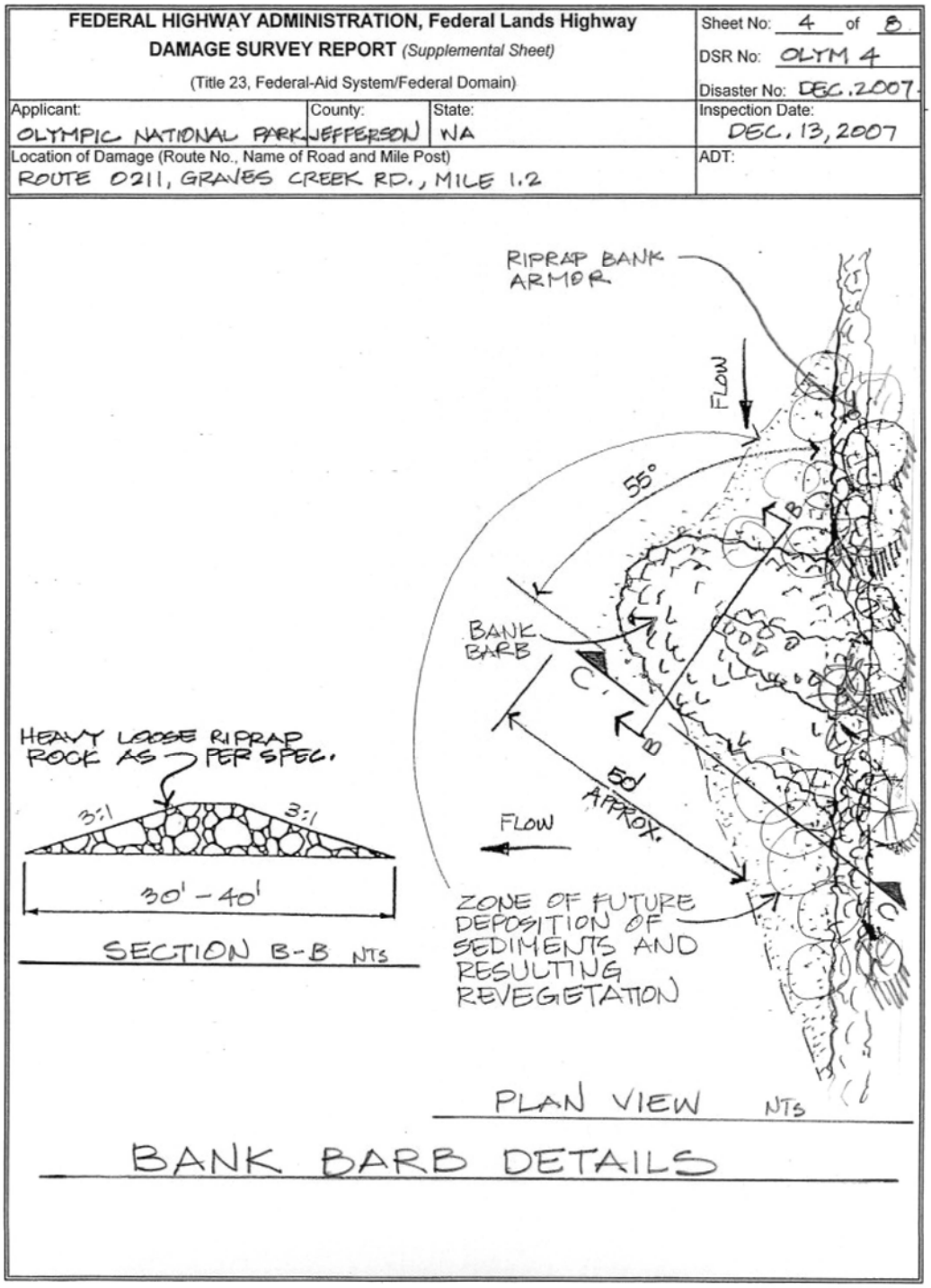
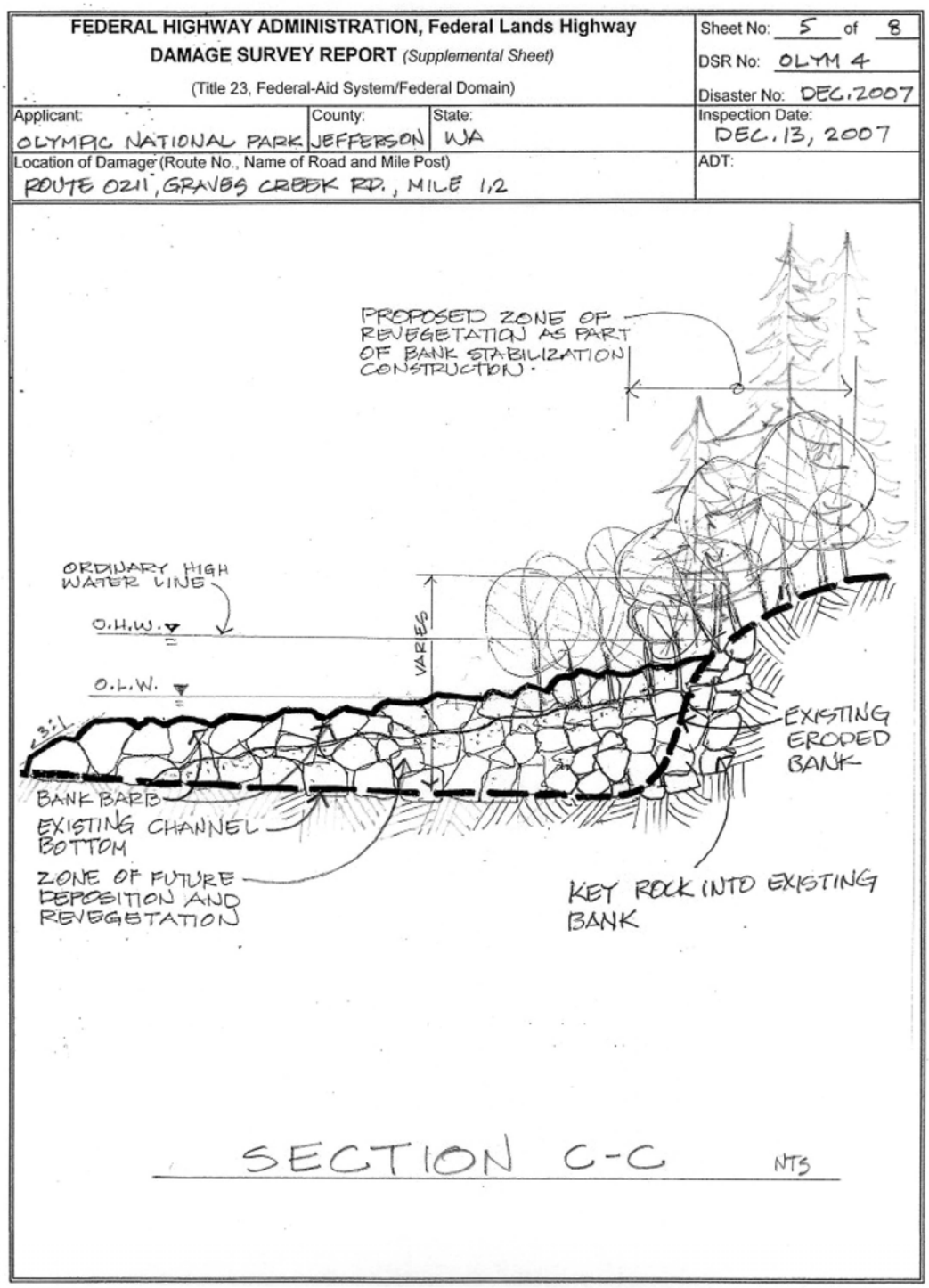


FIGURE 9. BANK BARB CROSS SECTION DETAILS.



A wood reinforced floodplain (WRF) would be installed just upstream of the bank barbs above a large rock outcrop at a bend in the Quinault River where flows are fast during high flows, but are typically low during normal flow conditions (Figure 10). The WRF structure is an interconnected log structure ballasted with approximately 30-inch-diameter rock and stabilized further with log pilings and river bed material excavated to countersink the structure into the river bed. The structure would extend into the river from the bank from 30 to 60 feet and would be about 250 feet in length. The top of the structure would be planted with trees such that over the long term, the structure would replicate a natural floodplain where trees would become established and further serve to both protect the road and form a more natural interface with the river, as compared to riprap bank armor. The conceptual drawing of the WRF shown in Figure 10 may be modified during final design.

The WRF would be installed in the late summer when there is no streamflow at the construction site. Typically there is little to no water present at the proposed site during low flows, but a small diversion structure or berm using riverbed material may need to be created with an excavator and bulldozer to prevent streamflow from entering the area during construction. Following construction, the diversion/berm would be removed. Construction of the WRF would require excavation with a tracked excavator and bulldozer to a depth of approximately 5 feet. Log piles, using trees of about 12 inches in diameter, would be driven into the stream channel. Salvaged windfall trees would then be placed with an excavator to form an interconnected stacked structure. Rock ballast would then be placed within the stacked logs and piling to form the basic structure. Quarry spalls would be placed over the rock and log structure to form a filter blanket. Pit run rock material and the excavated riverbed material would then be placed over the quarry spall filter blanket to form a growing medium for planting trees. The WRF would protect the roadbank and road by deflecting flows. The WRF is expected to create fish habitat superior to rock riprap.

No other repair work to the road surface is needed beyond what was completed as part of the emergency work.

Graves Creek Road—MP 1.2

Two bank barbs would be installed in the East Quinault River where the road washout occurred to reduce high-flow energy and direct flows away from the road and streambank (Figure 11). The bank barbs would be similar in design and installation as described for MP 0.7 to 0.9 and shown in Figure 8 and Figure 9. All work would be conducted when the river is flowing near the ordinary low water level in the late summer. The barbs would protect the streambank and allow deposition of bedload material upstream and downstream of the barbs, which would eventually support riparian vegetation. The purpose of the barbs is to protect the area from the erosive effects of high flows.

The road realignment work conducted during emergency repairs completed the work needed to rehabilitate the road, although additional road repairs may be needed following excavation into the road prism to key-in the bank barbs to the streambank.

FIGURE 10. SOUTH SHORE ROAD MP 0.7 TO 0.9 WOOD REINFORCED FLOODPLAIN.

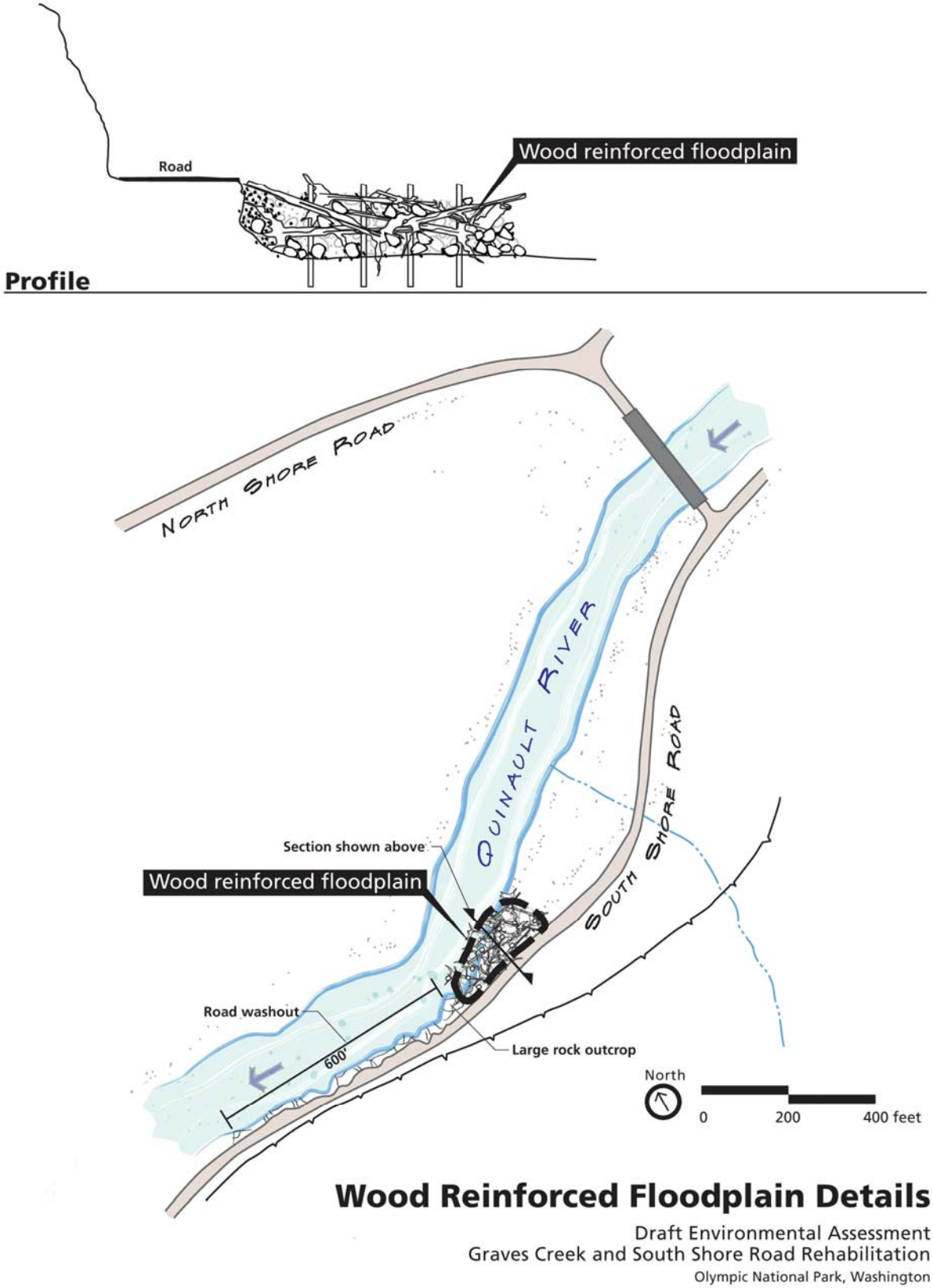
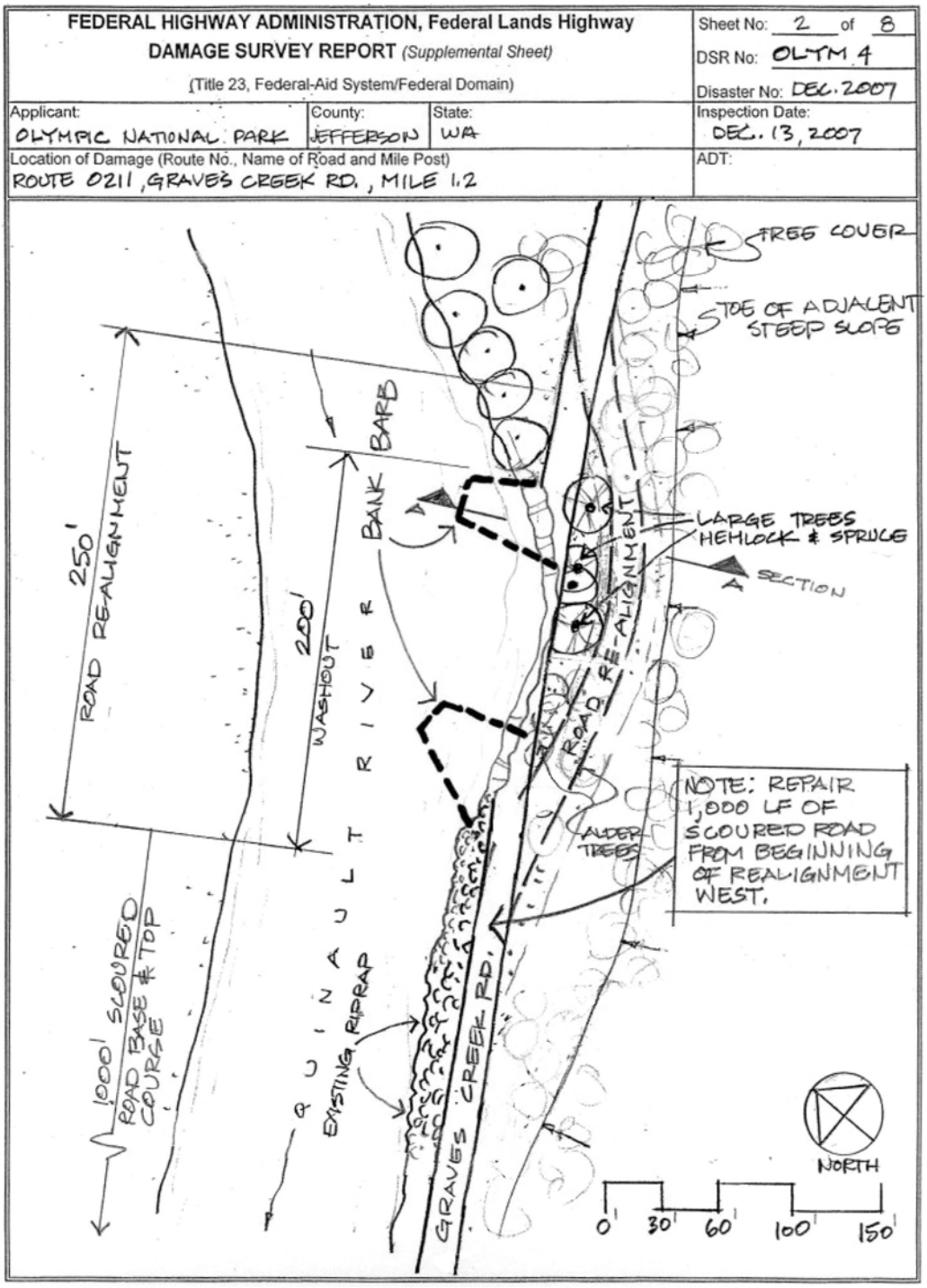


FIGURE 11. GRAVES CREEK ROAD BANK BARB AT MP 1.2.



Graves Creek Road—MP 1.7

Five bank barbs would be installed at intervals of 150 to 200 feet along about 700 feet of the East Quinault River streambank adjacent to the road (Figure 12). The barb design and installation techniques would be similar to that described for MP 0.7 to 0.9 and shown in Figure 8 and Figure 9. All work would be conducted when the river is flowing near the ordinary low water levels in the late summer. The bank barbs would deflect flow from the road and streambank and protect the area from the erosive effect of high flows. These improvements occur in the area where the road was realigned away from the stream in 2003 following a previous road washout in 2000.

Graves Creek Road—MP 2.3 to 2.5

The 200 feet of washed-out road would be reconstructed with installation of a low water crossing to replace the 4-foot culvert (Figure 13). This channel does not provide fish habitat; therefore, fish passage does not need to be considered. Installation of the low water crossing would prevent future culvert plugging and reduce the potential for road damage and sediment delivery to the East Quinault River. The approximate 30-foot x 40-foot low water crossing would be constructed using large 6-inch fractured rock to prevent the road prism from being washed out. As an alternative, a concrete foundation or surface could be installed as determined during final design. Because the low water crossing would be about 8 feet lower than the elevation of the existing road approach to the stream crossing as a result of the storm damage, a bulldozer would be used to lower the road grade on both sides of the low water crossing. The road surface would be capped with crushed rock to create the driving surface following completion of other road repairs.

FIGURE 12. GRAVES CREEK BANK BARBS AT MP 1.7.

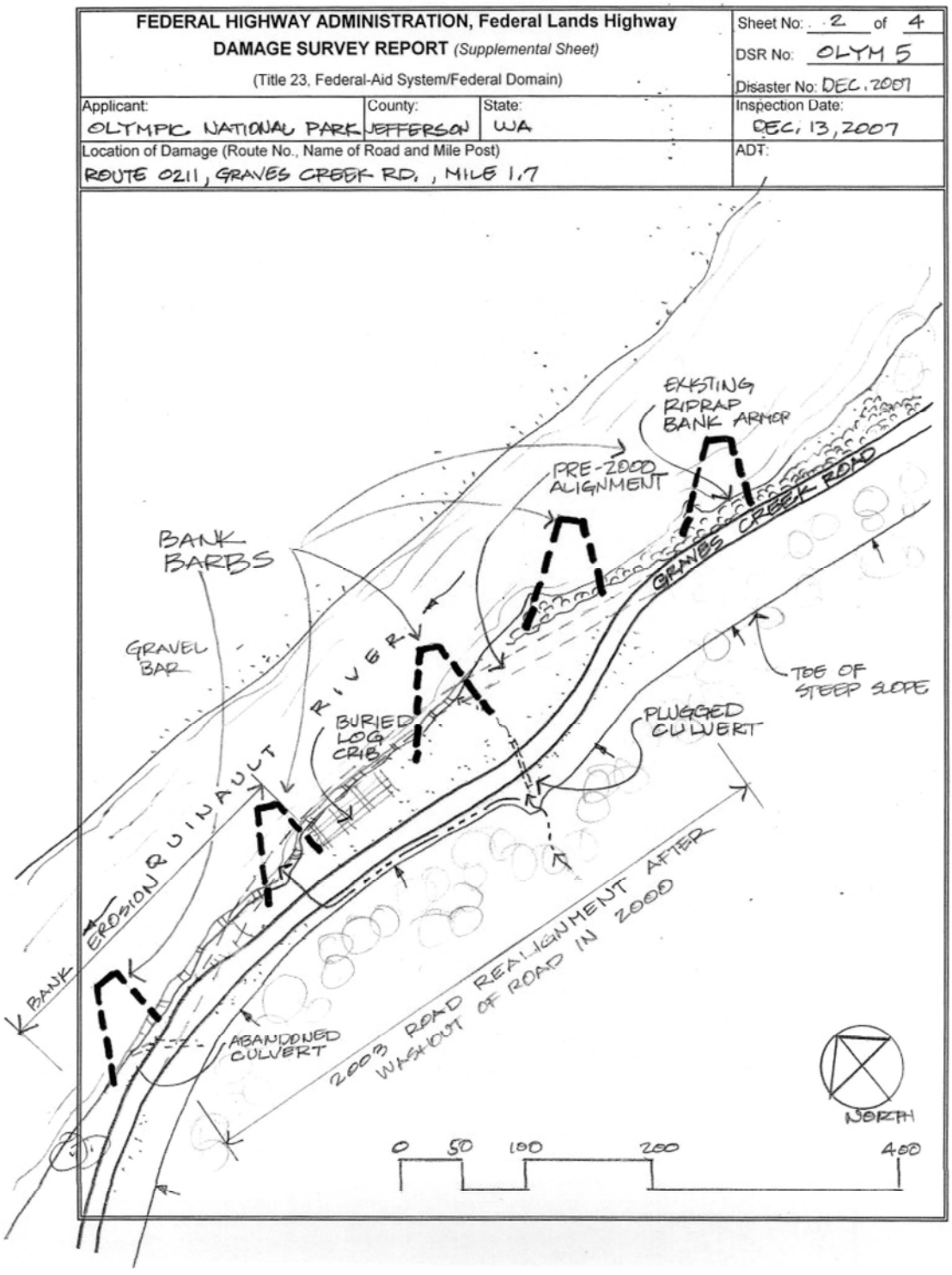
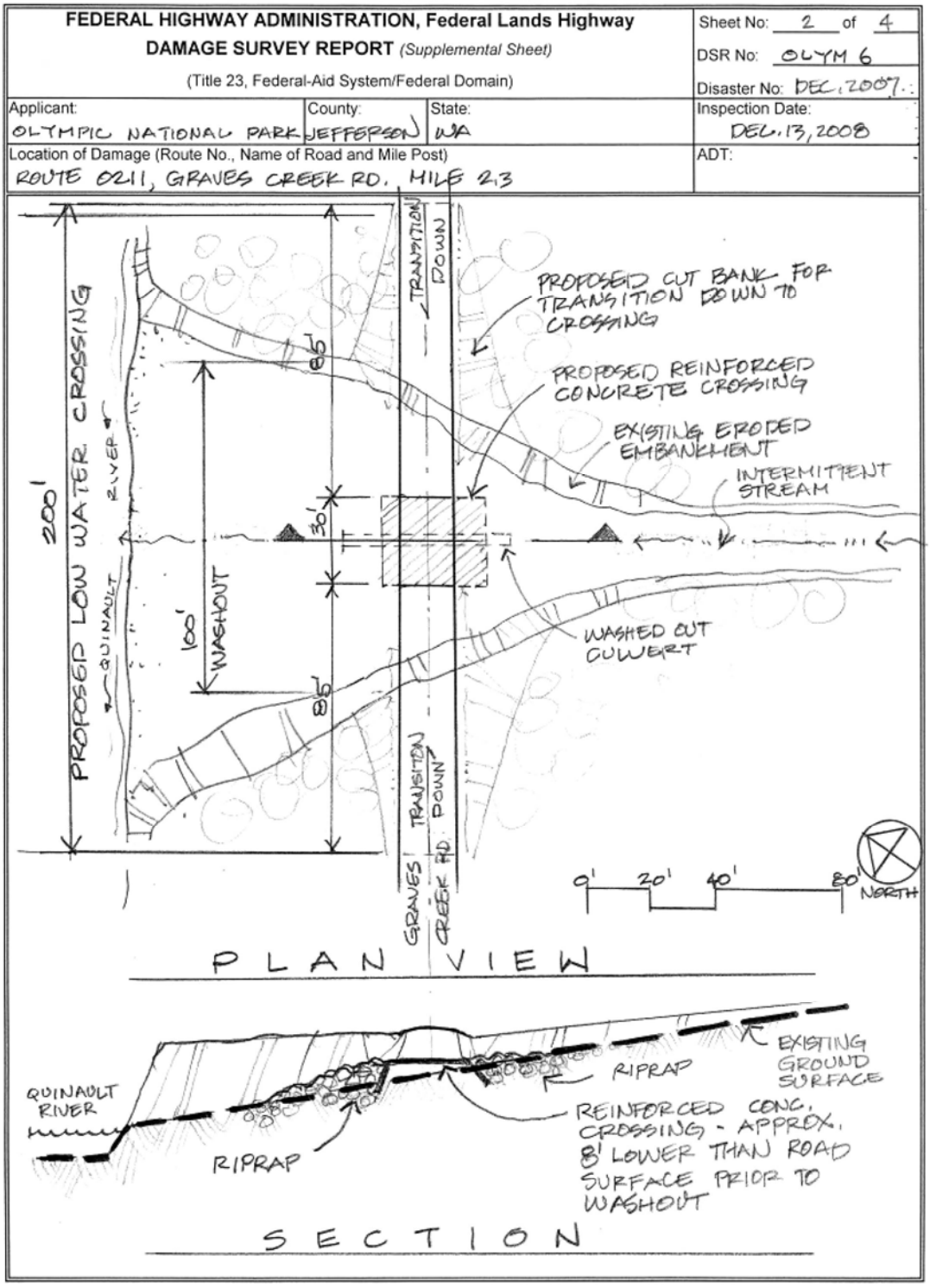


FIGURE 13. GRAVES CREEK ROAD LOW WATER CROSSING AND REPAIR AT MP 2.3 TO 2.5.



Graves Creek Road—MP 3.1

The existing three culverts that were buried and filled with debris following the storm would be left in place because of the disturbance that would be required to excavate them. Buried culverts would not be visible and would not interfere with road maintenance. A new single-lane bridge would be installed across the new intermittent stream channel created by the flood event about 50 feet east of where the buried culverts are located (Figure 14). Construction of the bridge would require excavation of the channel about 2 feet lower than the existing road surface for a width of about 30 feet across the 15-foot-wide road. The channel would be excavated to a similar depth about 40 feet both upstream and downstream of the bridge location. Additional excavation would be needed for construction of the bridge abutments. The abutments would be constructed of interlocking precast concrete on which a prefabricated approximately 12-foot by 28-foot galvanized steel truss bridge would be placed. The abutments would be protected by the placement of riprap rock. The bridge would be at an elevation about 6 feet above the bottom of the stream channel and would extend beyond the current 19-foot bankfull width of the channel which would accommodate water flow and fish passage requirements. The conceptual plan for bridge construction shown in Figure 14 may be modified during final design.

Material excavated from on-site plus additional imports of pit run rock would be used to construct the 100-foot-long approaches to the bridge from each side of the drainage. The road approaches would need to be elevated about 6 feet above the existing road surface. The road surface would be capped with crushed rock to create the driving surface, and 50 feet of road each side of the bridge would be paved with 3 inches of asphalt to protect the road during maintenance operations and reduce the potential for erosion and stream sedimentation.

Graves Creek Road—MP 3.4

The three damaged culverts would be removed with a tracked excavator and hauled to an approved landfill outside of ONP. A prefabricated steel truss bridge, as described for MP 3.1, would be installed across the stream channel (Figure 14). Construction techniques would be the same as described for MP 3.1. Rock debris flow material deposited by the storm would be excavated and used for constructing the approach to the bridge.

Graves Creek Road—MP 3.8

The damaged road subgrade would be repaired with suitable borrow material (Figure 15). The culvert inlet and outlet would be protected by placement of riprap rock material. The road surface would be capped with crushed rock to create the driving surface.

FIGURE 14. BRIDGE DESIGN AT MP 3.1.

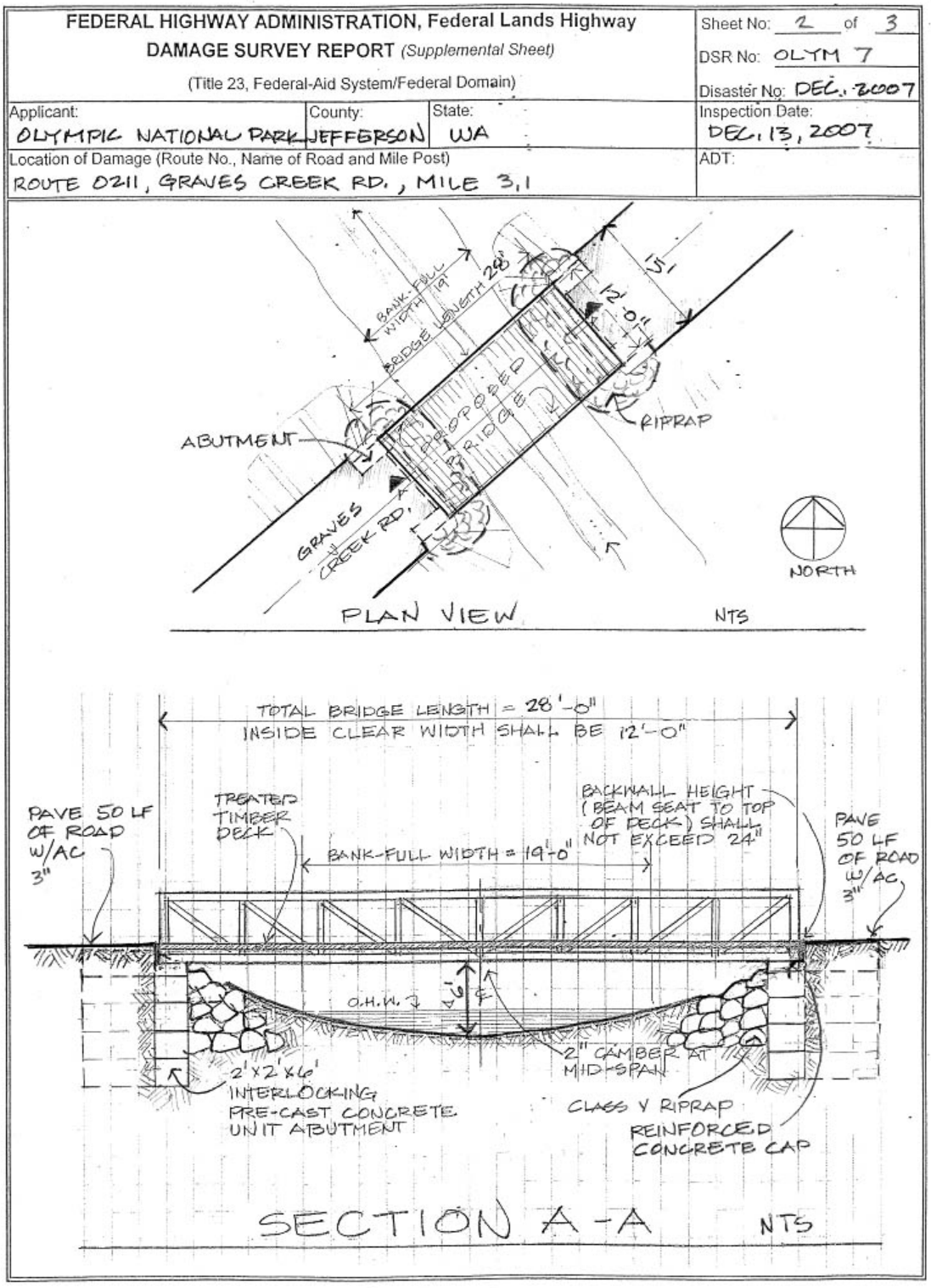


FIGURE 15. GRAVES CREEK ROAD REPAIR AT MP 3.8.

Graves Creek Road—MP 4.0

About 100 feet of riprap streambank armoring along the East Quinault River adjacent to the road would be installed (Figure 16). Installation of the riprap would be placed with an excavator below the ordinary low water level without excavating the channel to prevent undercutting, and would be composed of large rock similar in design as illustrated in Figure 17. The riprap bank armor would extend into the river about 18 to 22 feet, and the face of the armoring would be at a 1.5:1 slope. Quarry spalls would be placed between the armoring and the eroded bank to serve as a filter blanket. Pit run rock material would be placed in the voids of the rock to serve as a growing medium for willow plantings. Construction would occur in the late summer when flows are low.

Upstream of the riprap installation, up to about 275 feet of WRF may be installed in the East Quinault River to protect the streambank and road and to provide improved aquatic life habitat. Currently the river is flowing through the proposed WRF installation site, making installation at this time infeasible because the river would have to be directed away from the site due to nearby high quality fish habitat. Installation of the WRF at this location would not occur until the river naturally changes course away from the streambank and the proposed project location. The WRF would be constructed in a similar manner as described for MP 0.7 to 0.9 and shown in Figure 10, but may be modified during final design.

FIGURE 16. GRAVES CREEK ROAD IMPROVEMENTS AT MP 4.0.

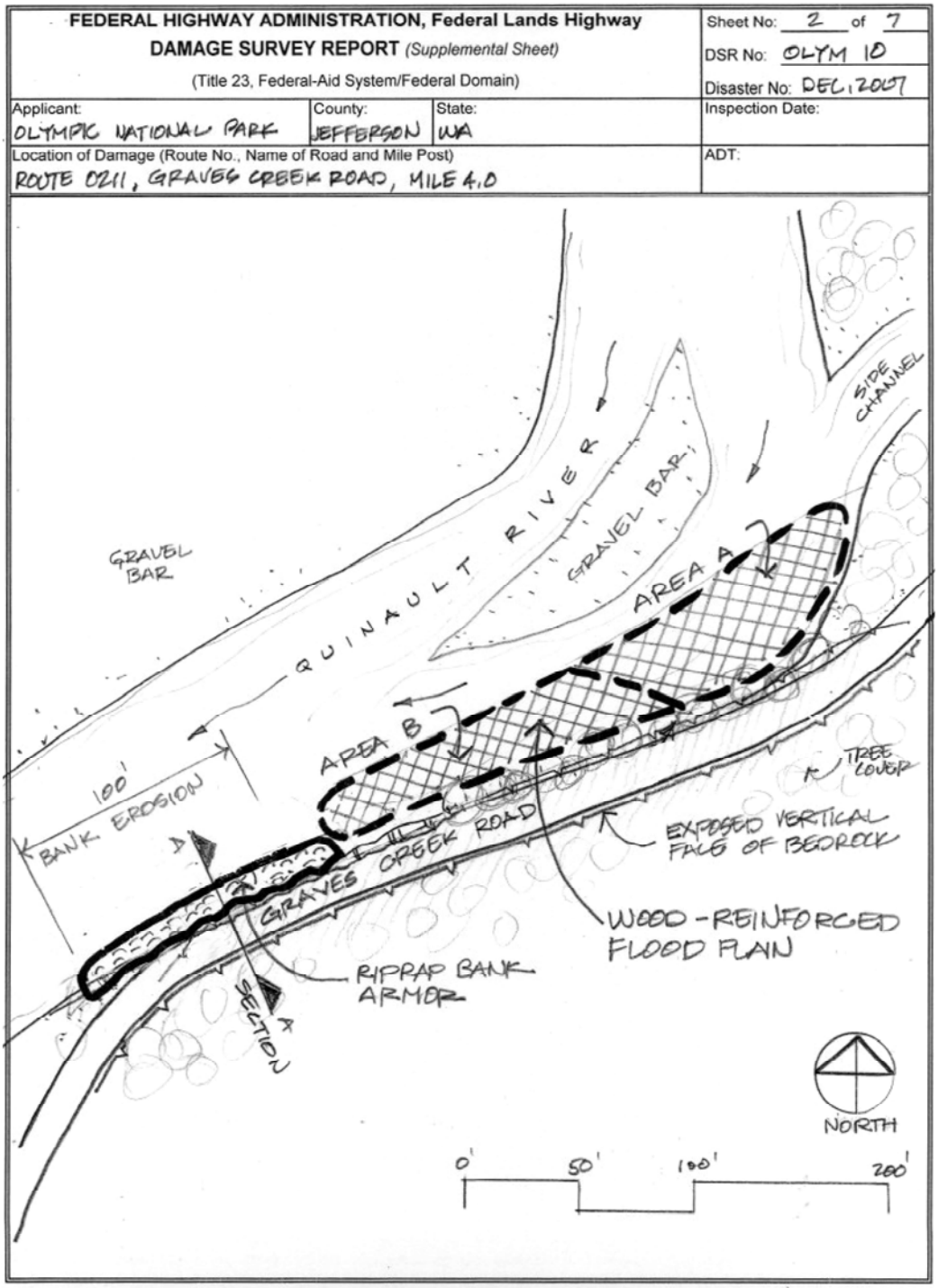
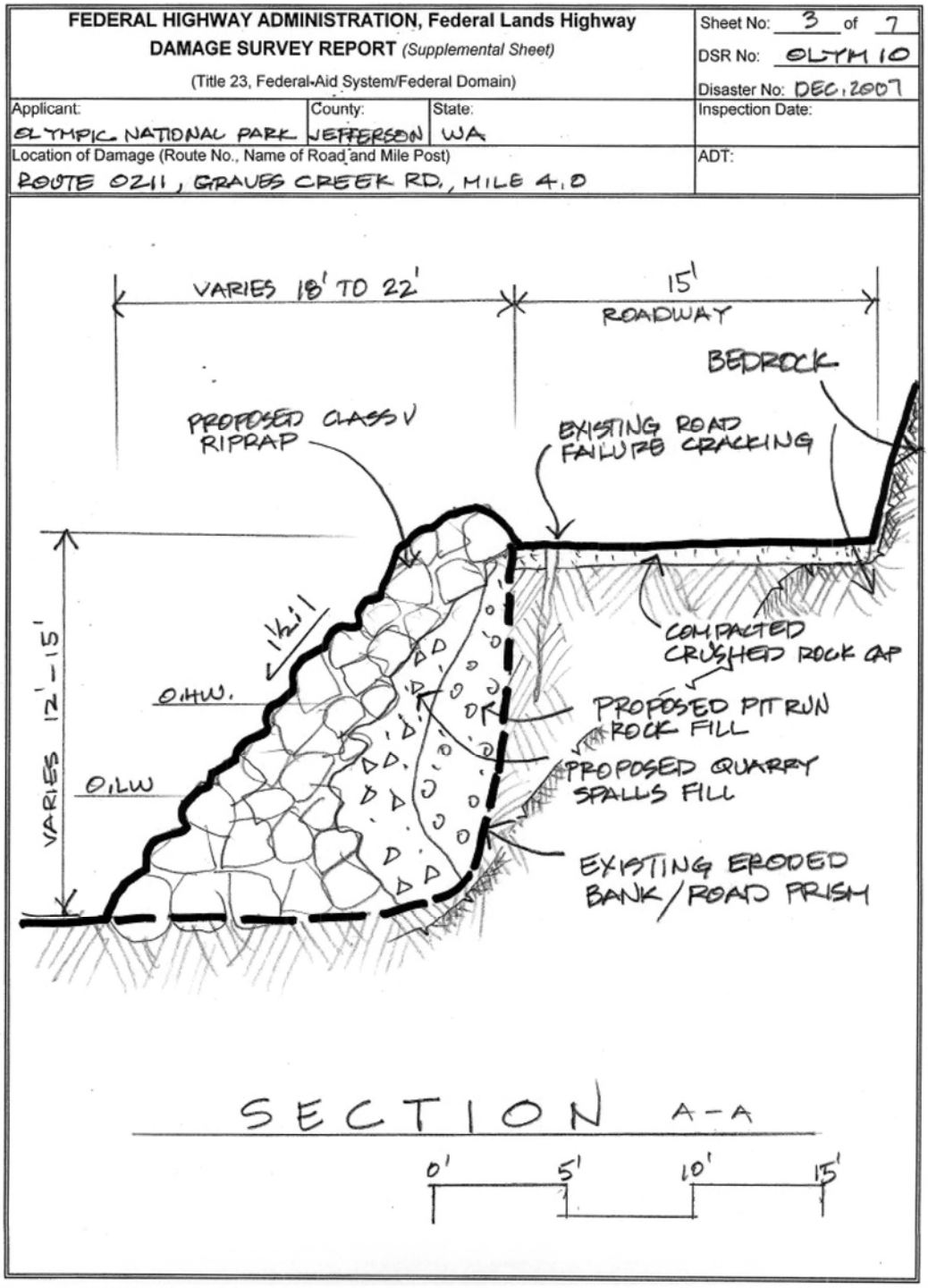


FIGURE 17. STREAMBANK RIPRAP CONCEPTUAL DRAWING AT MP 4.0.



Graves Creek Road MP 4.5

The damaged 4-foot-diameter culvert would be removed with a tracked excavator and hauled to an approved landfill outside of ONP. A new culvert(s) would be installed in the channel to meet hydrologic flows. This channel does not provide fish habitat; therefore, fish passage does not need to be considered. The culvert inlet and outlet would be protected with riprap. Some of the downstream debris in the channel would be excavated to improve flow. A drivable waterbar would be constructed in the subgrade west of the culvert to divert flows and prevent scouring of the road prism. The road surface would be capped with crushed rock to create the driving surface. Road repair and culvert installation would take about 3 days to complete in the late summer.

ALTERNATIVE C—RESTORE ACCESS THROUGH REPLACEMENT IN KIND (MINIMAL REPAIRS TO RESTORE VEHICULAR ACCESS)

Under Alternative C, the damaged sections of road would be repaired to conditions similar to that prior to the storm (Figure 1). There may be minimal improvements to the culverts to meet the hydrologic flows for the drainage areas. No additional improvements would be implemented. Road repairs are described below for each of the damaged road sections by milepost.

South Shore Road—MP 0.7 to 0.9

Emergency road repairs, including replacement of the road base, the placement of riprap on the stream embankment, and cleaning out the plugged culvert, completed rehabilitation of the road back to a condition similar to that prior to the storm. No additional work would be conducted at this site.

Graves Creek Road—MP 1.2

The road realignment conducted under emergency repairs completed work to the road. To stabilize the streambank adjacent to the road, 100 feet of rock riprap would be installed. Specifications for riprap installation would be similar to that shown in Figure 17 and as described for MP 4.0 under Alternative B.

Graves Creek Road—MP 1.7

Riprap would be placed along about 100 feet of streambank to protect and stabilize the road from future washouts. Specifications for riprap installation would be similar to that shown in Figure 17, and as described for MP 4.0 under Alternative B. The road would be laid back to reduce the slope and integrated into the riprap.

Graves Creek Road—MP 2.3 to 2.5

High flows in this tributary washed out the culvert and much of the road fill material. The 4-foot-diameter culvert would be salvaged to the extent possible and replaced using available on-site rock debris to restore the road base. Because of the depth of the washout, the culvert would be located at a lower elevation than the previous location and the road on either side of the culvert would require excavation to lower the approach to the stream crossing as described for Alternative B.

Graves Creek Road—MP 3.1

Repair of this section of road would include replacement of the existing two 24-inch culverts and one 48-inch culvert, which are plugged and crushed, with new culverts sized to handle the hydrologic changes in the new channel cut by the storm flow (Figure 14). The plugged and buried culverts would be left in place. The grade of the road approaching the culvert would need to be raised about 5 feet because the bottom of the channel is higher from the debris deposited following the storm. The road surface would be capped with crushed rock to create the driving surface following completion of the road base.

Graves Creek Road—MP 3.4

The existing damaged two 24-inch culverts and one 36-inch culvert would be removed with an excavator and new culverts sized to handle the hydrologic drainage would be installed at the same location. Some of the downstream debris in the channel would be excavated to improve flow. Repairs to the road surface would be similar to that described for Alternative B.

Graves Creek Road—MP 3.8

The washed-out section of the road would be filled with suitable borrow material and a crushed rock cap would be used to finish the road surface. The culvert inlet and outlets would be armored with rock. The road surface would be capped with crushed rock to create the driving surface.

Graves Creek Road—MP 4.0

To protect the eroded streambank adjacent to the road, 100 feet of riprap rock would be installed in the same location as that described for Alternative B and shown in Figure 16. The riprap bank armor would be installed in the same manner using techniques similar to those described for Alternative B (Figure 17).

Graves Creek Road—MP 4.5

The existing damaged and buried 48-inch culvert would be excavated and a new culvert sized to handle the hydrologic drainage would be installed. Some of the downstream debris in the channel would be excavated to improve flow. The road surface would be capped with crushed rock to create the driving surface.

COST

The estimated cost for implementation of the alternatives is summarized in Table 4.

TABLE 4. ESTIMATED COST FOR IMPLEMENTATION OF ALTERNATIVES

	Alternative A (No Action)	Alternative B Restore Access with Improvements (Preferred Alternative)	Alternative C Restore Access with Replacement in Kind
Estimated construction and engineering cost	$450,000*	$1,400,000	$900,000

*Previous expenditures for emergency repairs. No additional costs would be incurred.

MITIGATION

Mitigation measures to protect natural resources, cultural resources, and other values, as described in Table 5, would apply to both action alternatives, as applicable.

TABLE 5. MITIGATION MEASURES

Resource Area	Mitigation
General Considerations	Construction zones would be identified and fenced with construction tape, snow fencing, or some similar material prior to any construction activity. The fencing would define the construction zone and confine activity to the minimum area required for construction. All protection measures would be clearly stated in the construction specifications and workers would be instructed to avoid conducting activities beyond the construction zone. Disturbances would be limited to roadsides, culvert areas, and other areas inside the designated construction limits. No machinery or equipment would access areas outside the construction limits. Construction equipment staging would occur within the roadway for active work areas or at designated turnouts. Vehicle and equipment parking would be limited to areas within construction limits, existing roadways, parking lots, or the access routes. Area staff would be notified when the project start date is known. Hauling restrictions: Material and equipment hauling would comply with all legal load restrictions. Load restrictions on park roads are identical to state load restrictions with such additional regulations as may be imposed by the Park Superintendent. Information regarding rules and regulations for vehicle traffic on park roads may be obtained from the Chief Ranger's office. A special permit would not relieve the Contractor of liability for damage that may result from moving equipment. Construction vehicle engines would not be allowed to idle for extended periods of time. All tools, equipment, barricades, signs, surplus materials, and rubbish would be removed from the project work limits upon project completion.
Vegetation	All disturbed ground would be reclaimed using appropriate best management practices (BMPs) that include planting of native flora. Until the soil is stable, measures would be implemented to prevent sediment from reaching streams. Native species would be used in all revegetation. Erosion-control measures are designed to reduce sediment production and keep sediment from reaching the stream channel. Temporary barriers would be provided to protect existing trees, plants, and root zones. Trees or other plants would not be removed, injured, or destroyed without prior approval. To prevent the introduction of, and minimize the spread of, nonnative vegetation and noxious weeds, the following measures would be implemented during construction: • Soil disturbance would be minimized. • All construction equipment would be pressure washed and/or steam cleaned before entering the park to ensure that all equipment, machinery, rocks, gravel, and other materials are cleaned and weed free. • All haul trucks bringing fill materials from outside the park would be covered to prevent seed transport. • Vehicle and equipment parking would be limited to within construction limits. • All fill, rock, and additional topsoil would be obtained from the project area, if possible; and if not possible, then weed-free fill, rock, or additional topsoil would be obtained from sources outside the park. NPS personnel would certify that the source is weed free. • Monitoring and follow-up treatment of exotic vegetation would occur after project activities are completed. A tarp or other protective barrier would be laid down prior to stockpiling the crushed gravel/ cobble material. In addition, the tarp would be used to cover the stockpile to reduce the accumulation of and the spread of seeds when the crushed material is used in the park.

Resource Area	Mitigation
Water Quality and Soils	Best management erosion-control practices for drainage and sediment control would be implemented to prevent or reduce nonpoint source pollution and minimize soil loss and sedimentation in drainage areas. These practices may include, but are not limited to, silt fencing, filter fabric, temporary sediment ponds, check dams of pea gravel-filled burlap bags or other material, and/or immediate mulching of exposed areas to minimize sedimentation and turbidity impacts as a result of construction activities. Silt fencing fabric would be inspected daily during project work and weekly after project completion, until removed. Accumulated sediments would be removed when the fabric is estimated to be approximately 75% full. Silt removal would be accomplished in such a way as to avoid introduction into any flowing water bodies. Although soil side-cast during construction may be susceptible to some erosion, such erosion would be minimized by placing silt fencing around the excavated soil. Excavated soil may be used in the construction project; excess soil would be stored in approved areas outside the high water mark. If weather conditions during project operations generate and transport sediment to the stream channel, operations would cease until weather conditions improve. During these work stoppage periods, project personnel would continue to check the silt fences and check dams, maintain the silt fences in effective conditions, and remove accumulated sediment, as necessary, to ensure stabilization is maintained. The operation of ground-disturbing equipment during large precipitation events would increase the production of sediment that may be transported to flowing waters. This measure is designed to reduce the production of fine and coarse sediments, which may affect spawning gravels, substrate embeddedness, pool frequency/quality and the development of large pools if they reach the stream channel. Streambanks would be properly sloped to an angle of stability (natural repose) when removing culverts. This measure can reduce sediment production from bank erosion, undercutting, and slumping as the stream channel reestablishes following culvert removal. Fine and coarse sediment transported to the stream channel may affect spawning gravels, substrate embeddedness, pool frequency, and quality and development of large pools. This measure can also reduce the recovery time of impacted streambanks at the project site, affecting streambank conditions. Excess material (spoils) would be disposed of at least 300 feet from the active stream channels. This measure is designed to keep fine and coarse sediments from reaching flowing waters where they can be transported downstream, which may affect spawning gravels, substrate embeddedness, pool frequency/quality, and development of large pools. A storm water site plan (SWSP) would be developed and approved by the park prior to commencing any near-water activities. Regular site inspections would be conducted to ensure that erosion-control measures are properly installed and functioning effectively. Prior to starting work each day, all machinery would be inspected for leaks (e.g., fuel, oil, and hydraulic fluid) and all necessary repairs would be made before the commencement of work. This measure is designed to avoid/minimize the introduction of chemical contaminants associated with machinery used in project implementation. Any machinery maintenance involving potential contaminants (e.g., fuel, oil, and hydraulic fluid) would occur outside the riparian area, defined as the entire channel migration zone or a distance greater than 150 feet from the stream edge. This measure is designed to avoid/minimize the introduction of chemical contaminants associated with machinery used in project implementation. Hazardous spill clean-up materials would be on-site at all times. This measure is designed to avoid/minimize the introduction of chemical contaminants associated with machinery (e.g., fuel, oil, and hydraulic fluid) used in project implementation. Chemicals may have a toxic effect on aquatic organisms, including salmonids.
Special Status Species	Project activities that do not affect flows in the Quinault or the East Quinault Rivers would begin August 6th or later, during the late breeding season for owls (after July 15) and murrelets (after August 6th). No trees large enough to contain suitable habitat for spotted owls or murrelets would be cut. To avoid adverse impacts to breeding murrelets, any noise-producing construction activities above ambient noise levels within 35 yards of murrelet habitat would not begin until after August 6th, during the murrelet late breeding season (August 6 to September 15), and would be initiated as

Resource Area	Mitigation
	late as possible. This would ensure that heavy equipment operation would occur outside of the prime breeding season, yet provide a window for construction to be completed before winter weather and bull trout spawning seasons begin. During the project work period between August 6 and September 15 within 35 yards of marbled murrelet habitat, no work that generates above ambient noise levels would take place at night or within 2 hours of sunrise and sunset, when murrelets are known to be most active. The park would maintain strict garbage control to prevent scavengers (e.g., jays and crows), which are predators on murrelet nests, from being attracted to the project area. No food scraps would be discarded or fed to wildlife. Mitigation for bull trout would be the same as described for Fishery Resources.
Fishery Resources	Snorkel surveys would be conducted at the Quinault River in-channel work locations before work begins and periodically during construction. If spawning salmon or bull trout are found, work would be delayed at that particular area. In accordance with Washington Department of Fish and Wildlife work windows, instream work would be scheduled from July 15 through August 30, during periods of low flow and before spawning, to minimize impacts to bull trout or Chinook salmon. Instream construction should be completed before any bull trout or salmon fry hatchings. Work could be extended into the first week of September should snorkel surveys show no fish or spawning in the project area. Large woody material removed from a culvert inlet would be returned to the stream, downstream of the culvert. This measure would preserve large woody debris already in the stream channel. The removal and loss of large woody debris can affect sediment, substrate embeddedness, large woody debris, pool frequency and quality, large pools, and off-channel habitat. Large woody debris and plants would be incorporated into the design of bank protection projects whenever possible, and in consultation with park and tribal biologists. At a minimum, all culverts would be designed to accommodate hydrologic flows of the drainage areas. Erosion-control measures, such as the installation of silt fences, sediment traps, stream diversions, and spill-protection controls, would be implemented to minimize potential effects of sedimentation on bull trout. Erosion-control measures would be left in place, where appropriate, until the site is revegetated. Construction erosion-control measures would be inspected weekly or after a major storm. Repairs and maintenance would be performed, where necessary. Wood reinforced floodplain structures would be installed in the late summer when there is typically no streamflow at the construction site. If streamflows are encountered, a small diversion structure or berm using riverbed material would be created with an excavator and bull dozer to prevent streamflow from entering the area during construction. Diversions would be conducted in a manner to minimize disturbance and sedimentation. Following construction the diversion would be removed and natural flow would be unimpeded after construction is completed. During and following construction, disturbed areas would be stabilized, contoured to fit existing natural conditions, and revegetated with native soil and plant species as approved by NPS biologists. Construction equipment would be checked daily and maintained to reduce the likelihood of hazardous fluid leaks. Hazardous spill containment measures would be located on site.
Visitor Experience and Recreational Resources	Visitors would be informed in advance of construction activities. The road would be closed to all visitors during construction activities. If a visitor inadvertently comes upon construction, they would be escorted through the construction zone and/or routed away from construction activities. The Wilderness Information Center would be notified when the project start date is known so that they may inform wilderness users. The ONP Public Information Officer would be provided with the project schedule (as soon as it is known) and periodic updates of project work to inform visitors of project status and access.

Resource Area	Mitigation
Cultural Resources	Should any archeological resources be uncovered during construction, work would be halted in the area and the park archaeologist, Office of Archeology and Historic Preservation (OAHP), and appropriate Native American Tribes would be contacted for further consultation. Park cultural resources staff would be available during construction to advise or take appropriate actions should any archeological resources be uncovered during construction. In the unlikely event that human remains are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (1990) would be followed. The NPS would ensure that all contractors and subcontractors are informed of the penalties for illegally collecting artifacts or intentionally damaging archeological sites or historic properties. Contractors and subcontractors also would be instructed on procedures to follow in case previously unknown archeological resources are uncovered during construction. Equipment and material staging areas would avoid known archeological resources.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

Close All Access to the Graves Creek Road

Under this alternative, public access on Graves Creek Road would be closed at the intersection of South Shore Road. Existing facilities such as the Graves Creek Ranger Station and campground would be removed. A future planning process would be required to determine if the road would be decommissioned and converted to a trail, if a new trail would be constructed in a different area, or if trail access would be eliminated. This alternative would result in an unacceptable impact to the Graves Creek Ranger Station, which is a historic structure listed on the National Register of Historic Places. This alternative does not meet the project purpose of providing permanent two-lane access to the Quinault Rain Forest and park facilities at Graves Creek, which are a component of the General Management Plan and a park goal for maintaining existing vehicle access and preserving historic resources. Therefore, this alternative was eliminated from further analysis.

Relocate All or Portions of the South Shore Road and Graves Creek Road

Relocation of these roads at the locations where they currently abut the Quinault River (MP 0.7 – 0.9) or East Quinault River (MP 1.2, MP 1.7, and MP 4.0) is not technically feasible. The road at these locations is bounded by steep bedrock outcrops and terrain unsuitable for road relocation. Short segments of the Graves Creek Road at MP 1.2 and MP 1.7 have already been shifted as far from the river as feasible during previous repairs. Excavation or blasting into the hillsides to shift the road farther is likely to result in substantial erosion, mass wasting, and environmental damage. For these reasons, this alternative was eliminated from further consideration.

Construct Culverts at MP 3.1 and 3.4 to Meet Fish Passage Requirements

The crossings at MP 3.1 and 3.4 are unstable and dynamic crossings. Storms occur periodically and bring large debris flows, blocking culverts and redirecting the streamflows into different areas. However, the streams are intermittent and dry during the summer months. To meet fish passage requirements, the culverts would be extremely oversized based on bankfull width during the winter months, and would require an increased road grade on the approaches, resulting in an approximately 10-foot grade change from existing conditions.

This would create a berm in the forest floor and prevent natural sediment transport processes from occurring. Erosion due to streamflow would result in a perched culvert over time, which would preclude any advantage to fish from installing the oversized culverts. Fish passage would not be possible in the long term. It is also likely that even with the oversized culverts, debris flows would plug the culverts and periodic maintenance would be necessary. For these reasons, this alternative was eliminated from further consideration.

Keep the Graves Creek Road closed until a Long-term Restoration Plan can be Developed for the Quinault River System

The QIN has requested that the NPS and other key stakeholders work together to develop a comprehensive restoration plan for the Quinault River and its watershed that guides the park toward a more sustainable means of access over the long term. Through the general management plan process, the park has committed to pursuing opportunities to improve management within the park and across administrative boundaries by pursuing cooperative conservation with American Indian tribes in accordance with Executive Order 13352 (Facilitation of Cooperative Conservation) and Management Policies 2006 (4.1.4). The park will collaborate with the QIN and other partners for restoration planning for the Quinault River. This study can proceed and is separate from the proposed short-term repairs to the Graves Creek and South Shore roads. The proposed repairs are part of the Emergency Relief Federally-Owned (ERFO) program and funds are limited in scope of use and timing. Funds cannot be used for long-term planning and can only be used at those locations damaged from the flood event. Funding availability is limited to the end of the second fiscal year following the fiscal year in which the disaster occurred. The NPS is committed to working with the QIN and area stakeholders on a long-term plan. This long-term planning process would not be encumbered by the proposed repairs that will allow vehicular access to be restored to Graves Creek. Proposed repairs could be modified or removed if future long-term planning indicates other measures are more appropriate. Therefore, this alternative was dismissed from further analysis.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

The CEQ defines the Environmentally Preferred Alternative as "…the alternative that will promote the national environmental policy as expressed in the National Environmental Policy Act § 101." Section 101 states that, "…it is the continuing responsibility of the Federal Government to:

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

2. Assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings;

3. Attain the widest range of beneficial uses of the environment without degradation, risk to 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, which supports diversity and variety of individual choice;

5. Achieve a balance between population and resource use, which 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."

The identification of the "Environmentally Preferred Alternative" was based on an analysis that balances factors such as physical impacts on various aspects of the environment, mitigation measures to deal with impacts, and other factors including the statutory mission of the NPS and the purposes for the project.

While Alternative A would preserve existing conditions, it would not be considered the Environmentally Preferred Alternative because not repairing the damaged road and improving bank stability would not meet the goals of providing the widest range of beneficial uses without degradation and risk of health or safety. Alternative A is not the Environmentally Preferred Alternative for the following reasons: (1) implementing this alternative would not improve road safety or allow vehicle access, (2) this alternative would not allow park managers to effectively preserve and maintain park resources and facilities in the Quinault River Valley because access to the ranger station would be limited, (3) this alternative would reduce visitor access and recreation opportunities, (4) damaged roads would continue to erode and result in stream sedimentation if not repaired, and (5) there is a higher likelihood the road would not withstand large flood events, which would result in road closure, making it more difficult for visitors and staff to access the park complex. Thus, Alternative A would not meet NEPA Section 101 goals 2, 3, 5, and 6.

Alternative C would restore vehicle access on the Graves Creek Road similar to conditions prior to the storm damage. While this would meet the purpose and need of the proposed project, it would not provide the additional sustainable protective measures to reduce the potential for road damage during high flows or improvements designed to protect or restore fish habitat. Alternative C would meet NEPA Section 101 goals, but not to the same extent as the Preferred Alternative.

The NPS determined that the Environmentally Preferred Alternative is to implement the improvements described for Alternative B because it surpasses the other alternatives in realizing the full range of national environmental policy goals as stated in Section 101 of NEPA. Selective placement of bank barbs, wood reinforced floodplain, and riprap along the South Shore and Graves Creek roads adjacent to the Quinault and East Quinault rivers, along with bridge construction, and installation of culverts and a low water crossing on intermittent drainages, would provide the widest range of beneficial uses without degradation, and would reduce risks to health and safety because it would provide sustainable vehicular access to the facilities and trailheads in the upper Quinault River Valley. Implementing Alternative B would best preserve the natural aspects of streams because it protects the road while seeking to restore natural hydrologic stream conditions (goals 1 and 4). Road improvements would allow for more unimpeded access (i.e., fewer road closures from storm damage) to the recreational opportunities in the Quinault River Valley (goals 2, 3, and 5). Alternative B provides for the reuse of rock debris from the storm damage to restore the road base in several locations (goal 6).

ALTERNATIVES COMPARISON TABLE

A comparison of the alternatives and the degree to which each alternative fulfills the needs and objectives of the proposed project is summarized in Table 6.

TABLE 6. ALTERNATIVES COMPARISON

Alternative A (No Action)	Alternative B Restore Access with Improvements (Preferred Alternative)	Alternative C Restore Access with Replacement in Kind
Under Alternative A, the NPS would not conduct additional road rehabilitation or repairs beyond the emergency repairs completed on the South Shore and Graves Creek roads. Road damage and streambank stabilization measures would not be implemented. Washed-out or plugged culverts would not be replaced. Graves Creek Road would be permanently closed to vehicle access near MP 1.0. Pedestrian, bicycle, and stock access would be allowed on the road as long as it remains safe for travel. Visitor access could be suspended if further road damage or washouts make travel unsafe. The Graves Creek campground, facilities, and ranger station would be closed or converted for backcountry use. The trailhead would remain open.	Under Alternative B, the NPS would implement site-specific repairs and improvements at each of the damaged sections of South Shore and Graves Creek roads to restore and maintain vehicle access to the Quinault Rain Forest and facilities. The proposed improvements would provide protective measures, such as bank barbs, wood reinforced floodplains, bridges, new culverts, and a low water crossing. These measures would reduce the potential for road damage from future storm events and would restore and improve the quality of habitat for fish and aquatic life in the Quinault River and tributaries.	Under Alternative C, the NPS would repair the damaged sections of the Graves Creek Road to conditions similar to that prior to the storm. There may be minimal improvements to the culverts to meet the hydrologic flows for the drainage areas. No additional improvements would be implemented on the South Shore Road, and no other protective measures would be implemented on the Graves Creek Road. Vehicle access would be restored on Graves Creek Road.
Meets Project Objectives?		
The No Action Alternative does not fulfill the project objectives. Vehicle access on the Graves Creek Road beyond MP 1.0 would not be restored. Visitor access would be restricted to hiking and biking and recreational opportunities would be reduced. No protective measures would be implemented to prevent future damage that could jeopardize visitor access.	Alternative B, the Preferred Alternative, fulfills the project objectives by reestablishing vehicle access into the Quinault Rain Forest for visitors. Campground and ranger station operations would be restored. The South Shore and Graves Creek roads would receive sustainable protective measures that would reduce the potential for damage from high flows in the future. Road repairs and improvements would be implemented in a manner to minimize adverse effects to native fish and habitat and to protect other natural and cultural resource values.	Alternative C fulfills the project objectives of reestablishing vehicle access and repairing damaged sections of road; however, it does not include the more sustainable protective measures that would provide better long-term protection of the road from future storms and the degree of protection of resource values that would occur under the Preferred Alternative.

IMPACT SUMMARY

A summary of potential environmental effects for the alternatives is presented in Table 7.

TABLE 7. IMPACT SUMMARY TABLE

Impact Topic	Alternative A No Action	Alternative B Restore Access with Improvements (Preferred Alternative)	Alternative C Restore Access-Replacement in Kind
Geology	Alternative A would have long-term beneficial effects on geologic resources from natural restoration of geologic processes. Cumulative effects would be long-term, minor to moderate, and adverse. Because there would be no major adverse or unacceptable impacts to geologic resources, there would be no impairment of park resources or values.	Alternative B would have long-term minor adverse effects on geologic resources from installation of roadbank protection measures in the Quinault and East Quinault rivers and from excavations for culvert and bridge placement. Cumulative effects would be long-term, minor to moderate, and adverse. Because there would be no major adverse or unacceptable impacts to geologic resources, there would be no impairment of park resources or values.	Alternative C would have long-term minor adverse effects on geologic resources from installation of roadbank protection measures in the Quinault and East Quinault rivers and from excavations for culvert and bridge placement. Cumulative effects would be long-term, minor to moderate, and adverse. Because there would be no major adverse or unacceptable impacts to geologic resources, there would be no impairment of park resources or values.
Vegetation	Alternative A would have long-term beneficial effects on vegetation. Cumulative effects would be long-term, moderate, and adverse, with a slight beneficial contribution from Alternative A. Because there would be no major adverse or unacceptable impacts to vegetation, there would be no impairment of park resources or values.	Alternative B would have short-term negligible adverse effects to vegetation; along with long-term beneficial effects from streambank stabilization. Cumulative effects would be long-term, moderate, and adverse, with a short-term negligible adverse contribution from Alternative B. Because there would be no major adverse or unacceptable impacts to vegetation, there would be no impairment of park resources or values.	Alternative C would have short-term negligible adverse impacts on vegetation. Cumulative effects would be long-term, moderate, and adverse, with a short-term negligible adverse contribution from Alternative C. Because there would be no major adverse or unacceptable impacts to vegetation, there would be no impairment of park resources or values.

Impact Topic	Alternative A No Action	Alternative B Restore Access with Improvements (Preferred Alternative)	Alternative C Restore Access- Replacement in Kind
Wildlife	Alternative A would result in long-term beneficial effects to wildlife by reducing vehicle access and restoration of natural processes, but short-term negligible to minor adverse effects are possible from erosion and pedestrian travel. The cumulative wildlife effects would be long-term, moderate, and adverse, with a long-term beneficial contribution from Alternative A. Because there would be no major adverse or unacceptable impacts to wildlife, there would be no impairment of park resources or values.	Alternative B would result in short-term negligible adverse impacts to wildlife in the immediate area during the construction period and long-term negligible to minor adverse impacts on wildlife as a result of reopening the road. Measures to protect the road would have long-term localized beneficial effects from stabilization and creation of riparian habitat. Cumulative effects would be long-term, moderate, and adverse, with only a slight negligible to minor adverse contribution from Alternative B. Because there would be no major adverse or unacceptable impacts to wildlife, there would be no impairment of park resources or values.	Alternative C would result in short-term negligible adverse impacts to wildlife in the immediate area during the construction period and long-term negligible to minor adverse impacts on wildlife as a result of reopening the road. Although more limited than Alternative B, measures to protect the road would have long-term localized beneficial effects from stabilization of riparian habitat. Cumulative effects would be long-term, moderate, and adverse, with only a slight negligible to minor adverse contribution from Alternative C. Because there would be no major adverse or unacceptable impacts to wildlife, there would be no impairment of park resources or values.
Fishery Resources	Alternative A would result in long-term minor adverse localized effects to fisheries from road erosion, but as the road remains closed and the system's equilibrium is restored, there would be long-term beneficial effects to fisheries resources. The overall cumulative effects on fish would be long-term, moderate and adverse, with only a slight contribution from Alternative A. Because there would be no major adverse or unacceptable impacts to fisheries, there would be no impairment of park resources or values.	Alternative B would have short-term minor adverse localized effects on fish from construction of two bridges and a long-term beneficial effect by making the road crossings fish passable. No fish habitat would be affected with installation of the low water crossing at MP 2.3 to 2.5 and 4.5. There would be short-term minor and moderate adverse localized impacts on fish and EFH during construction of the bank barbs, WRFs, installation of riprap. However, there would be long-term beneficial effects on fish from construction of project activities that would ultimately increase riparian habitat and reduce potential sedimentation into the system. Overall cumulative effects would be long-term, moderate and adverse, but Alternative B would contribute only slightly to these effects. Because there would be no major adverse or unacceptable impacts to fish or their habitat from Alternative B, there would be no impairment of park resources or values.	Alternative C would have short-term, moderate, adverse localized effects and long-term minor and moderate effects on fish from placement of riprap along three sections of the Quinault River. Removal and replacement of culverts at road crossings within tributaries to the Quinault River would result in short-term minor adverse effects on fish and EFH. Potential bank erosion on damaged portions of the road that would not be repaired under this alternative would result in a long-term, minor, adverse effect. Overall cumulative effects would be long-term, moderate and adverse, but Alternative C would contribute only slightly to these effects. Because there would be no major adverse or unacceptable impacts to fish or their habitat from Alternative C, there would be no impairment of park resources or values.

Impact Topic	Alternative A No Action	Alternative B Restore Access with Improvements (Preferred Alternative)	Alternative C Restore Access- Replacement in Kind
Special Status Species	Alternative A would result in long-term beneficial effects on spotted owl, marbled murrelet, and terrestrial species of concern; long-term minor adverse localized effects on bull trout habitat; and negligible effects on amphibian species of concern. The cumulative effects on terrestrial species would be long-term, negligible, and adverse, with only a slight contribution from Alternative A. Alternative A would result in long-term minor adverse localized effects to bull trout as erosion continues as a result of flood events, as the road remains closed and the system's equilibrium is restored, there would be beneficial effects to bull trout. The overall cumulative effects on bull trout would be long-term, moderate and adverse, with only a slight contribution from Alternative A. Because there would be no major adverse or unacceptable effects on spotted owl, marbled murrelet, bull trout, or species of concern, there would be no impairment of park resources or values.	Alternative B may affect, but is not likely to adversely affect, northern spotted owls, marbled murrelets; and is likely to affect bull trout. This alternative would result in short-term adverse localized effects to provide long-term benefits for bull trout and other water-dependent special status species. Alternative B would result in short-term negligible adverse effects to other species of concern during the construction period. Impacts to water-dependent species resulting from physical disturbance of the streambed and noise disturbance would be negligible, temporary, and localized. Overall cumulative effects to bull trout and water-dependent species would be long-term, moderate and adverse, with only a slight contribution from Alternative B. Alternative B would result in short-term negligible adverse cumulative impacts on the northern spotted owl, marbled murrelet, and other terrestrial Special Status Species. There would be no impact on federally listed plants in the project area because there are none present. Because there would be no major adverse or unacceptable impacts to Special Status Species, there would be no impairment of park resources or values.	Alternative C may affect, but is not likely to adversely affect, northern spotted owls and marbled murrelets, and is likely to adversely affect bull trout. Alternative C would result in short-term negligible adverse effects to other species of concern during the construction period. Impacts to water-dependent species resulting from physical disturbance of the streambed and noise disturbance would be short-term, negligible, and localized. Overall cumulative effects to bull trout and water-dependent species would be long-term, moderate and adverse, with only a slight contribution from Alternative C. Alternative C would result in short-term negligible adverse cumulative impacts on the northern spotted owl, marbled murrelet, and other terrestrial Special Status Species. Because there would be no major adverse or unacceptable impacts to special status species, there would be no impairment of park resources or values.
Soils	Alternative A would have long-term beneficial effects to soils following a short-term period of erosion as natural processes are restored in the absence of road use and maintenance. Cumulative effects would be long-term, minor, and adverse. Because there would be no major adverse or unacceptable impacts to soils, there would be no impairment of park resources or values.	Alternative B would have short-term minor adverse effects on soils during construction with long-term benefits by stabilizing the roadbank and reducing erosion. Cumulative effects would be long-term, minor, and adverse. Because there would be no major adverse or unacceptable impacts to soils, there would be no impairment of park resources or values.	Alternative C would have short-term minor adverse effects on soils during construction with long-term benefits by stabilizing the roadbank and reducing erosion. Cumulative effects would be long-term, minor, adverse, with long-term beneficial contributions from Alternative C. Because there would be no major adverse or unacceptable impacts to soils, there would be no impairment of park resources or values.

Impact Topic	Alternative A No Action	Alternative B Restore Access with Improvements (Preferred Alternative)	Alternative C Restore Access- Replacement in Kind
Hydrology and Water Quality	Alternative A would have long-term minor adverse impacts by leaving the Quinault River vulnerable to erosion, debris flows, and sedimentation where the road was damaged and tributaries flooded; however, after the river and its tributaries have reached a new equilibrium and more natural conditions, Alternative A would have long-term minor beneficial impacts. Cumulative effects would be long-term, moderate, and adverse, with Alternative A contributing short-term minor adverse effects and long-term beneficial effects. Because there would be no major adverse or unacceptable impacts to hydrology and water quality, there would be no impairment of park resources or values.	Alternative B would have short-term minor adverse impacts to water quality and streamflow characteristics during construction. There would be long-term minor beneficial effects to hydrology and water quality from additional protective measures designed to reduce future erosion of the roads, streambanks, and tributary channels. Cumulative effects would be long-term, moderate, and adverse, with short-term, minor, and adverse, with long-term beneficial contributions from Alternative B. Because there would be no major adverse or unacceptable impacts to hydrology and water quality, there would be no impairment of park resources or values.	Alternative C would have short-term minor adverse impacts to water quality and streamflow characteristics during construction. There would be long-term beneficial effects to hydrology and water quality from repairing the streambanks, improving streamflow by removing debris, and installing culverts. Cumulative effects would be long-term moderate and adverse, with a short-term, minor, and adverse and long-term and beneficial contribution from Alternative C. Because there would be no major adverse or unacceptable impacts to hydrology and water quality, there would be no impairment of park resources or values.
Floodplain	Alternative A would initially have long-term negligible adverse impacts on the Quinault River floodplain from not repairing the damaged roads, but in the long term would have minor beneficial impacts. Cumulative effects would be long-term and beneficial. Because there would be no major adverse or unacceptable impacts to floodplains, there would be no impairment of park resources or values.	Alternative B would have long-term minor adverse effects to the Quinault River floodplain by slightly reducing the width of the floodplain where riprap bank armor, bank barbs, and WRFs are installed. Long-term minor beneficial effects would occur with improvements to the drainage crossings on tributaries. Cumulative effects would be long-term and beneficial. Because there would be no major adverse or unacceptable impacts to floodplains, there would be no impairment of park resources or values.	Alternative C would have long-term minor adverse effects to the Quinault River floodplain and slight beneficial effects on the tributary floodplains. Cumulative effects would be long-term and largely beneficial. Because there would be no major adverse or unacceptable impacts to floodplains, there would be no impairment of park resources or values.
Ethnographic Resources and Treaty Resources	Reduced traditional access by the QIN and affiliated tribes would result in long-term moderate adverse effects. However, the QIN believes that closing the Graves Creek Road to vehicular traffic and eventually restoring the Quinault River above the intersection of South Shore and North Shore roads would be beneficial to tribal treaty resources such as salmon. Alternative A would	Restoring access to the Graves Creek Road would result in a long-term beneficial effect to affiliated tribes. This alternative would have a long-term beneficial contribution to the overall short-and long-term cumulative adverse effects. Because there would be no major adverse or unacceptable impacts to ethnographic resources and treaty resources, there would be no impairment of park	Restoring access to the Graves Creek Road would result in long-term beneficial effects to affiliated tribes. Alternative C would have a long-term beneficial contribution to the overall short- and long-term cumulative adverse effects. Because there would be no major adverse or unacceptable impacts to ethnographic resources and treaty resources, there would be no impairment of park resources

Impact Topic	Alternative A No Action	Alternative B Restore Access with Improvements (Preferred Alternative)	Alternative C Restore Access- Replacement in Kind
	contribute slightly to the short- and long-term moderate adverse cumulative effects. Because there would be no major adverse or unacceptable impacts to ethnographic resources and treaty resources, there would be no impairment of park resources or values. The effects to fisheries (a tribal treaty resource) are evaluated in the Fishery Resources section	resources or values.	or values
Visitor Experience and Recreational Resources	Alternative A would have long-term moderate adverse effects to visitors who wish to experience the Quinault area resources by vehicle, and beneficial effects to those visitors wanting to use the road for hiking or biking without the presence of vehicles. This alternative would alter recreation use in the area and may increase visitor numbers to other areas of the park. These effects would cause long-term moderate adverse impacts to the visitor experience. Cumulative effects would be moderate and adverse. Closure of the road would result in unacceptable impacts to the visitor experience and recreational resources because it would be inconsistent with the park's purpose, would diminish opportunities for current or future generations to enjoy, learn about, or be inspired by park resources or values, and would unreasonably interfere with park programs and activities.	Under Alternative B, the effects to visitor experience and public use would be long-term and beneficial. This alternative would have a long-term beneficial contribution to the overall moderate adverse cumulative effects in the park. Those who wish the road to remain open only to bicycles and pedestrians would be adversely affected if the road is reopened to vehicular traffic. There would be no unacceptable impacts to the visitor experience and recreation resources.	Under Alternative C, the effects to visitor experience and public use would be long-term and beneficial. Current and future actions would result in short-term moderate adverse cumulative impacts. This alternative would have a long-term beneficial contribution to the overall moderate adverse cumulative effects in the park. Those who wish the road to remain open only to bicycles and pedestrians would be adversely affected if the road is reopened to vehicular traffic. There would be no unacceptable impacts to the visitor experience and recreation resources.

Impact Topic	Alternative A No Action	Alternative B Restore Access with Improvements (Preferred Alternative)	Alternative C Restore Access- Replacement in Kind
Public Health, Safety, and Park Operations	Alternative A would result in a change to park operations because vehicle access on Graves Creek Road would be closed beyond about 1 mile. A long-term moderate adverse impact to park operations related to emergency response, campground, trail, facility maintenance, resource management, and research would occur from access restrictions. Cumulative effects to park operations would be long-term, moderate, and adverse. Closure of the road would result in unacceptable impacts to the park health, safety, and park operations because it would create an unsafe or unhealthful environment for visitors and employees and would unreasonably interfere with park programs and activities.	Alternative B would result in long-term beneficial effects to park operations by restoring vehicle access on Graves Creek Road. The cumulative effects to park operations would be long-term and beneficial. There would be no unacceptable impacts to the park health, safety, and park operations.	Alternative C would result in long-term beneficial effects to park operations by restoring vehicle access on Graves Creek Road. The cumulative effects to park operations would be long-term and beneficial. There would be no unacceptable impacts to the park health, safety, and park operations.
Socioeconomics	Alternative A would have long-term moderate adverse effects to socioeconomics if park visitation decreases because of closure of the Graves Creek Road. Cumulative effects would be long-term, moderate, and adverse. Because there would be no major adverse or unacceptable impacts to socioeconomics, there would be no impairment of park resources or values.	Alternative B would have long-term beneficial effects to local socioeconomics by ensuring visitor access to a popular destination in the park. Construction-related spending would also benefit the local economy. Cumulative effects would be long-term and beneficial. Because there would be no major adverse or unacceptable impacts to socioeconomics, there would be no impairment of park resources or values.	Alternative C would have long-term beneficial effects to local socioeconomics by ensuring visitor access to a popular destination in the park. Construction-related spending would also benefit the local economy. Cumulative effects would be long-term and beneficial. Because there would be no major adverse or unacceptable impacts to socioeconomics, there would be no impairment of park resources or values.

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This section provides a description of the resources potentially impacted by the alternatives and the likely environmental consequences. It is organized by impact topics that were derived from internal park and external public scoping. Impacts are evaluated based on context, duration, intensity, and whether they are direct, indirect, or cumulative. NPS policy also requires that impairment of resources be evaluated in all environmental documents except for Visitor Experience and Public Use, and Park Operations, which require no impairment determination. More detailed information on resources in ONP may be found in the *Statement for Management: Olympic National Park – 1996*, the *Olympic National Park Resource Management Plan* (1990, 1999), and the *Draft General Management Plan and Environmental Impact Statement* (2006) (it is anticipated that the ROD will be signed in August 2008).

GENERAL METHODS

This section contains the environmental impacts, including direct and indirect effects, and their significance to the alternatives. The analysis is based on the assumption that the mitigation measures identified in the "Mitigation" section of this EA would be implemented for the Preferred Alternative. Overall, the NPS based these impact analyses and conclusions on the review of existing literature and park studies, information provided by experts within the park, the QIN, the U.S. Fish and Wildlife Service (USFWS) and other agencies, professional judgment and park staff insights, and public input.

There are several terms used within the "Environmental Consequences" section to assess the impacts of each alternative on each impact topic. The following terms were used to define the nature of impacts associated with project alternatives:

Type: Impacts can be beneficial or adverse.

Context: Context is the setting within which an impact would occur, such as local, park-wide, or regional.

Impact Intensity: Impact intensity is defined individually for each impact topic. There may be no impact, or impacts may be negligible, minor, moderate, or major.

Duration: Duration of impact is analyzed independently for each resource because impact duration is dependent on the resource being analyzed. Depending on the resource, impacts may last for the construction period, a single year or growing season, or longer. For purposes of this analysis, impact duration is described as short- or long-term.

Direct and Indirect Impacts: Effects can be direct, indirect, or cumulative. Direct effects are caused by an action and occur at the same time and place as the action. Indirect effects are caused by the action and occur later or farther away, but are still reasonably foreseeable.

Direct and indirect impacts are considered in this analysis, but are not specified in the narratives. Cumulative effects are discussed on page 60.

THRESHOLD FOR IMPACT ANALYSIS

The duration and intensity of effects vary by resource. Therefore, the definitions for each impact topic are described separately. These definitions were formulated through the review of existing laws, policies, and guidelines; and with assistance from park staff, regional NPS, and Washington office NPS specialists.

Geology

Potential impacts to geologic resources were based on professional judgment and the degree of disturbance. The threshold for the intensity of an impact on geology is defined in Table 8.

TABLE 8. GEOLOGY IMPACT AND INTENSITY

Impact Intensity	Intensity Description
Negligible	An action that could result in a change in a geologic feature or process, but the change would be so small that it would not be of any measurable or perceptible consequence.
Minor	An action that could result in a change in a geologic feature or process, but the change would be small and localized and of little consequence.
Moderate	An action that would result in a noticeable change in a geologic feature or process; the change would be measurable and of consequence.
Major	An action that would result in an extensive change in a geologic feature or process; the change would be measurable and result in a severe adverse impact.

Long-term—effects would last more than 1 year

Vegetation

Predictions about short- and long-term impacts were based on professional judgment and experience with previous projects with similar vegetation. Impacts were assessed qualitatively. The thresholds of change for the intensity of an impact on vegetation are defined in Table 9.

TABLE 9. VEGETATION IMPACT AND INTENSITY

Impact Intensity	Intensity Description
Negligible	The impacts on vegetation (individuals or communities) would not be measurable. The abundance or distribution of individuals would not be affected or would be slightly affected. The effects would be on a small scale and no species of special concern would be affected. Ecological processes and biological productivity would not be affected.
Minor	The action would not necessarily decrease or increase the project area's overall biological productivity. The alternative would affect the abundance or distribution of individuals in a localized area, but would not affect the viability of local or regional populations or communities. Mitigation to offset adverse effects, including special measures to avoid affecting species of special concern, could be required and would be effective. Mitigation may be needed to offset adverse effects, would be relatively simple to implement, and would likely be successful.
Moderate	The action would result in effects to some individual native plants and could also affect a sizeable segment of the species' population and over a relatively large area. Permanent impacts could occur to native vegetation, but in a relatively small area. Some special status species could also be affected. Mitigation measures would be necessary to offset adverse effects and would likely be successful.

Impact Intensity	Intensity Description
Major	The action would have considerable effects on native plant populations, including special status species, and affect a relatively large area within and outside the park. Extensive mitigation measures to offset the adverse effects would be required; success of the mitigation measures would not be guaranteed.

Short-term impact—recovers in less than 1 year
Long-term impact—takes more than 1 year to recover

Wildlife

The NPS Organic Act, which directs parks to conserve wild life unimpaired for future generations, is interpreted to mean that native animal life should be protected and perpetuated as part of the park's natural ecosystem. Natural processes are relied on to control populations of native species to the greatest extent possible; otherwise they are protected from harvest, harassment, or harm by human activities. According to NPS *Management Policies 2006*, the restoration of native species is a high priority (sec. 4.1). Management goals for wildlife include maintaining components and processes of naturally evolving park ecosystems, including natural abundance, diversity, and the ecological integrity of plants and animals. Information on ONP wildlife was taken from park documents and records. ONP natural resource management staff, the USFWS, and the Washington Department of Fish and Wildlife (WDFW) also provided information. The thresholds of change for the intensity of impacts to wildlife are defined in Table 10.

TABLE 10. WILDLIFE IMPACT AND INTENSITY

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 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 could be expected on an occasional basis, but would not be 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 and 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 and 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.

Short-term impact—recovers in less than 1 year
Long-term impact—takes more than 1 year to recover

Fishery Resources

Fish and their habitat would be evaluated with the same criteria listed above under "Wildlife."

Special Status Species

Section 7 of the Endangered Species Act (ESA) mandates all federal agencies to determine how to use their existing authorities to further the purposes of the ESA to aid in recovering listed species, and to address existing and potential conservation issues. Section 7(a)(2) states that each federal agency shall, in consultation with the Secretary of the Interior, ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. NPS *Management Policies 2006* state that potential effects of agency actions would also be considered for state or locally listed species (i.e., special status species). The thresholds of change for the intensity of impacts to special status species are defined in Table 11.

TABLE 11. SPECIAL STATUS SPECIES IMPACT AND INTENSITY

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. In the case of federally listed species, 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. In the case of federally listed species, 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 could 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. In the case of federally listed species, this impact intensity equates to a USFWS determination of "may affect, likely to adversely affect."
Major	The action would result in noticeable effects to the viability of the population or individuals of a species. Impacts on special status species or the natural processes sustaining them would be detectable, both inside 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. In the case of federally listed species, the impact intensity equates to a USFWS determination of "may affect, likely to jeopardize the continued existence of a species."

Short-term impact—recovers in less than 1 year
Long-term impact—takes more than 1 year to recover

Soils

Available information on potentially impacted soils in the project area was compiled. Potential impacts from the alternatives were based on professional judgment and experience with similar actions. The thresholds of change for the intensity of an impact are defined in Table 12.

TABLE 12. SOIL IMPACT AND INTENSITY

Impact Intensity	Intensity Description
Negligible	The effects to soils would be below or at a lower level of detection. Any effects on productivity or erosion potential would be slight.
Minor	An action's effects on soils would be detectable. It would change a soil's profile in a relatively small area, but it would not appreciably increase the potential for erosion of additional soil. If mitigation were needed to offset adverse effects, it would be relatively simple to implement and would likely be successful.
Moderate	An action would result in a change in quantity or alteration of the topsoil, overall biological productivity, or the potential for erosion to remove small quantities of additional soil. Changes to localized ecological processes would be limited. Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.
Major	An action would result in a change in the potential for erosion to remove large quantities of additional soil or in alterations to topsoil and overall biological productivity in a relatively large area. Key ecological processes would be altered, and landscape-level changes would be expected. Mitigation measures to offset adverse effects would be necessary, extensive, and their success could not be guaranteed.

Short-term impact—recovers in less than 3 years
Long-term impact—takes more than 3 years to recover

Hydrology and Water Quality

Available information on hydrology in the project area was compiled. Potential impacts from the alternatives are based on professional judgment and experience with similar actions. The thresholds of change for the intensity of an impact are defined in Table 13.

TABLE 13. HYDROLOGY AND WATER QUALITY IMPACT AND INTENSITY

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

Short-term impact—following project completion, recovers in less than 1 year
Long-term impact—following project completion, takes more than 1 year to recover

Floodplains

Floodplains are defined by the NPS Floodplain Management Guideline (1993) as "the lowland and relatively flat areas adjoining inland and coastal waters, including flood-prone areas of offshore islands, and including, at a minimum, that area subject to temporary inundation by a regulatory flood." Executive Order 11988 ("Floodplain Management") requires an examination of impacts to floodplains, potential risks involved in placing facilities within floodplains, and protecting floodplain values. The NPS has adopted the policy of preserving floodplain values and minimizing potentially hazardous conditions associated with flooding (NPS Floodplain Management Guideline, July 1, 1993). The planning team based the impact analysis and the conclusions for possible impacts to the geographically well-defined floodplains on site inspections within the park, a review of existing literature and studies, information provided by experts in the NPS and other agencies, and park staff insights and professional judgment. Where possible, locations of the Quinault River and tributary floodplains 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 morphologically similar floodplains from similar projects and recent scientific data. The thresholds of change for the intensity of an impact are defined in Table 14.

TABLE 14. FLOODPLAIN IMPACT AND INTENSITY

Impact Intensity	Intensity Description
Negligible	There would be very little change in the ability of a floodplain to convey floodwaters, or its values and functions. The proposed project would not contribute to flooding.
Minor	Changes in the ability of a floodplain to convey floodwaters, or its values and functions, would be measurable and local, although the changes would be barely measurable. The proposed project would not contribute to flooding. No mitigation would be needed.
Moderate	Changes in the ability of a floodplain to convey floodwaters, or its values and functions, would be measurable and local. The proposed project could contribute to flooding. The impacts could be mitigated by modification of proposed facilities in floodplains.
Major	Changes in the ability of a floodplain to convey floodwaters, or its values and functions, would be measurable and widespread. The proposed project would contribute to flooding. The impacts could not be mitigated by modification of proposed facilities in floodplains.

Short-term impact—usually less than 1 year; impacts would not be measurable or measurable only during the life of construction

Long-term impact—usually more than 1 year; impacts would be measurable during and after project construction

Ethnographic Resources and Treaty Resources

Ethnographic resources are expressions of human culture and the basis of continuity of cultural systems (NPS Director's Order #28). Ethnographic resources can include sites, structures, objects, traditional landscapes, or a natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a traditionally associated group. Park ethnographic studies have found that the Olympic Peninsula and its waters are crucial for subsistence activities, as well as important as a place of power and identity for the Native American groups on the peninsula. Indian lifeways on the peninsula involve harvesting river and ocean fisheries and traveling into the mountains to gather plant products such as huckleberries, thimbleberries, roots, and wood.

Both riverine and marine fisheries resources continue to be important to all of the Olympic Peninsula tribes, including the QIN. For most tribes, the major economy is fishing, and many tribes operate fish hatcheries.

The intensity of potential impacts on ethnographic and tribal resources is described in Table 15.

TABLE 15. ETHNOGRAPHIC RESOURCES AND TREATY RESOURCES IMPACT AND INTENSITY

Impact Intensity	Intensity Description
Negligible	Effects would be barely perceptible and would not alter resource conditions, traditional access or site preservation, or the relationship between the resource and the affiliated group's body of practices and beliefs.
Minor	Effects would be slight but noticeable, and would not appreciably alter resource conditions, traditional access or site preservation, or the relationship between the resource and the affiliated group's body of practices and beliefs.
Moderate	Effects would be apparent and would alter resource conditions. Something would interfere with traditional access, site preservation, or the relationship between the

Impact Intensity	Intensity Description
	resource and the affiliated group's practices and beliefs, although the group's practices and beliefs would survive.
Major	Effects would alter resource conditions. Something would block or greatly affect traditional access, site preservation, or the relationship between the resource and the affiliated group's body of practices and beliefs to the extent that the survival of a group's practices and/or beliefs would be jeopardized.

Visitor Experiences and Recreational Resources

NPS *Management Policies 2006* 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 NPS 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 park management, were used to estimate the effects of the alternatives. 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 experience proposed by the alternatives was evaluated by identifying projected increases or decreases in access and other visitor uses, and determining whether or how these projected changes would affect the desired visitor experience, to what degree, and for how long. The thresholds of change for the intensity of an impact to visitor experience and public use are described in Table 16.

TABLE 16. VISITOR EXPERIENCE AND RECREATIONAL RESOURCES IMPACT AND INTENSITY

Impact Intensity	Intensity Description
Negligible	Changes in visitor experience and public use would be below or at an imperceptible level of detection. The visitor would not likely be aware of the effects associated with the action.
Minor	Changes in visitor experience and public use would be detectable, although the changes would be slight. The visitor would be aware of the effects associated with the action, but the effects would be slight.
Moderate	Changes in visitor experience and public use would be readily apparent. The visitor would be aware of the effects associated with the action and would likely express an opinion about the changes.
Major	Changes in visitor experience and public use would be readily apparent and severely adverse or exceptionally beneficial. The visitor would be aware of the effects associated with the action and would likely express a strong opinion about the changes.

Short-term impact—occurs only during project construction
Long-term impact—continues after project construction

Public Health, Safety, and Park Operations

Public health and safety refers to the ability of the NPS to provide a healthy and safe environment for visitors and employees, and to protect human life and provide for injury-free visits and appropriate responses when accidents and injuries occur. Park operations, for the purposes of this EA, refers to the quality and effectiveness of the infrastructure, and the ability of park staff to maintain the infrastructure used in the operation of the park in order to adequately protect and preserve vital resources and provide for a high quality visitor experience. Facilities included in the analysis include the South Shore and Graves Creek

roads and park facilities in the Quinault Rain Forest, such as the ranger station, trailhead, trails, and campground.

Park staff knowledgeable of the park operations issues are members of the planning team that evaluated the impacts of each alternative. Impact analysis is based on the current description of park operations presented in the "Affected Environment" section of this EA. The thresholds of change for the intensity of an impact to visitor experiences and public use are described in Table 17.

TABLE 17. PUBLIC HEALTH, SAFETY, AND PARK OPERATIONS IMPACT AND INTENSITY

Impact Intensity	Intensity Description
Negligible	The effects would be at low levels of detection and would not have appreciable effects on park operations.
Minor	The effects would be detectable and would be of a magnitude that would not have appreciable effects on park operations. If mitigation is needed to offset adverse effects, it would be simple and likely successful.
Moderate	The effects would be readily apparent and result in a change in park operations that would be noticeable to park staff and the public. Mitigation measures would be necessary to offset adverse effects 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 staff and the public, and would be markedly different from existing operations. Mitigation measures to offset adverse effects would be needed and extensive, and success could not be guaranteed.

Short-term impact—effects lasting for the duration of the treatment action
Long-term impact—effects continuing after the treatment action

Socioeconomics

Issues were identified through the scoping process. Concerns covered by this section include effects on the economic contribution of ONP to the local economies in the gateway communities if vehicle access on upper Graves Creek Road is not restored. The thresholds of change for the intensity of an impact to socioeconomics are described in Table 18.

TABLE 18. SOCIOECONOMIC IMPACT AND INTENSITY

Impact Intensity	Intensity Description
Negligible	No effects would occur or the effects to socioeconomic conditions would be below the level of detection.
Minor	The effects to socioeconomic conditions would be detectable. Any effects would be small and if mitigation were needed to offset potential adverse effects, it would be simple and successful.
Moderate	The effects to socioeconomic conditions would be readily apparent. Any effects would result in changes to socioeconomic conditions on a local scale. If mitigation is needed to offset potential adverse effects, it could be extensive, but would likely be successful.
Major	The effects to socioeconomic conditions would be readily apparent and would cause substantial changes to socioeconomic conditions in the region. Mitigation measures to offset potential adverse effects would be extensive and success could not be guaranteed.

Short-term impact—effects lasting for the duration of the treatment action
Long-term impact—effects lasting longer than the duration of the treatment action

CUMULATIVE EFFECTS

Effects can be direct, indirect, or cumulative. Direct effects are caused by an action and occur at the same time and place as the action. Indirect effects are caused by the action and occur later or farther away, but are reasonably foreseeable. Cumulative impacts are defined as

"the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or nonfederal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time. The CEQ regulations that implement NEPA require assessment of cumulative impacts in the decision-making process for federal projects.

Methods for Assessing Cumulative Effects

To determine potential cumulative effects, actions and land uses that have occurred, are occurring, or are reasonably expected to occur near the project area (particularly those along the Quinault or East Quinault rivers), were identified. Potential future actions were determined by reviewing the plans and activities of ONP, the QIN, Jefferson County, and Grays Harbor County. These actions were then assessed in conjunction with the impacts of the alternatives to determine if they would have any added adverse or beneficial effects on a particular natural resource, park operation, or visitor use. The evaluation of cumulative effects was based on available information of the actions. Cumulative effects are considered for each of the alternatives and are presented at the end of each impact topic discussion.

Past Actions

Past actions include activities that influenced and affected the current conditions of the environment near the project area. Settlement in the Quinault River Valley began between 1900 and 1920 (Reclamation 2005). A number of land management practices since that time have influenced the condition of the watershed and the Quinault River. The clearing of old-growth forest on terraced streambanks in the channel migration zone of the Quinault River is believed to be the most significant factor affecting river processes (Reclamation 2005). Logging occurred in the Quinault River Valley from the early 1900s to about 1950. Homesteaders, as well as others, have attempted to manage the Quinault River by removing natural logjams from the river, installing riprap for bank protection, or taking measures to redirect river flow. Road construction, including the North Shore Road to South Shore Road bridge across the Quinault River have also influenced river-forming processes in the Quinault River Valley. The park periodically removes cobble and gravel buildup in the Finley Creek drainage, a tributary of the Quinault River, to maintain sufficient clearance under the North Shore Road bridge. These activities have contributed little to stream sedimentation because the work is done when the channel is dry. Past development in the Quinault River Valley, outside the park boundaries, including construction and the protection of private property, has influenced river processes. The establishment of ONP has resulted in beneficial effects to the natural resources in the area by protecting large amounts of habitat.

Previous repairs inside the park boundary, such as streambank stabilization on the South Shore Road and Graves Creek Road from other storm events have contributed to both temporary and long-term disturbances to the existing quality of the environment. The South Shore Road from about MP 0.4 to 0.9 has had several streambank protection measures installed from the 1960s, 1984, and 1992, including placement of riprap and groins to protect the road (Chadd 1997). In 1994, at MP 1.2 on the Graves Creek Road, about 350 feet of riprap was installed including barbs and logs (Reclamation 2002). Riprap was installed along about 350 feet of the Graves Creek Road at MP 1.2 in 1984. Storm-related damage in 2001 required road reconstruction and excavation of the vertical rock outcrop to widen the road at MP 1.5. Riprap was installed at MP 1.7 in 1984 along about 800 feet of the streambank. In 2003, following a storm event, a section of the road was rerouted away from the streambank. In

2003, streambank repairs included placement of a log revetment with rock ballast and riprap (NPS 2003). Streambank protection measures began as early as 1935 at MP 4.0 on the Graves Creek Road with placement of 970 feet of riprap. In addition to these repairs, there have been ongoing smaller repairs and maintenance of the road as required.

The South Shore Road outside the park boundary is under the jurisdiction of Grays Harbor and Jefferson County, both of which periodically conduct road maintenance operations. In January 2006, Jefferson County installed 200 feet of riprap along the Quinault River on the South Shore Road about 0.6 miles north of the Grays Harbor County line (Peters, pers. comm. 2008). Following the December 2007 storm event, the Grays Harbor County Public Works Department conducted repairs for minor road damage at MP 7.0 (Esses, pers. comm. 2008).

Current and Future Actions

The following current and reasonably foreseeable future actions were considered in the cumulative effects analysis.

The QIN, in cooperation with the U.S. Forest Service, is planning to install a reinforced logjam in the floodplain of the Quinault River near Alder Creek. The site is located about 5 miles downstream from the proposed South Shore Road improvements at MP 0.7. The proposed logjam would be constructed outside of the active channel and is intended to create a natural structure in the drainage that would provide fish habitat at higher flows and would provide some protection of the streambank near the South Shore Road.

The Grays Harbor County Public Works Department (County) is responsible for about 8 miles of the South Shore Road from U.S. Highway 101 east to the Jefferson County line. The County has three potential road projects planned, pending available funding (Esses, pers. comm. 2008). From MP 1.4 to 2.0 near Lake Quinault Lodge, the addition of 6 to 8 feet of paved shoulder adjacent to the road for pedestrian use would be installed in about 2 years. At MP 2.8, the County intends to replace the culvert across Gatlin Creek with a bridge to provide fish passage. As a safety measure, the County plans to flatten the angle of the corner on three 90-degree turns in the road between MP 4 and 5.

The QIN is in the process of developing a restoration plan for the Quinault River. The plan is expected to include measures to restore degraded portions of the river to restore and improve the quality of fish habitat. Details of the plan are not currently available, but were expected to be released in the summer of 2008.

Current development in the Quinault River Valley, outside the park boundaries, such as construction and the protection of private property continues to influence river processes.

IMPAIRMENT OF OLYMPIC NATIONAL PARK RESOURCES OR VALUES

In addition to determining the environmental consequences of the alternatives, NPS *Management Policies 2006* and Director's Order #12 require an analysis of potential effects to determine if actions would impair park resources or cause unacceptable impacts. 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 direction, however, to allow impacts to park resources and values when necessary and appropriate to fulfill the purpose of the 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 more likely constitute an impairment when 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 establishment legislation or proclamation of the park;
- Key to the natural and cultural integrity of the park or to opportunities for enjoyment of the park; or
- Identified as a goal in the park's general management plan or other relevant NPS planning documents.

Impairment may result from NPS activities in managing the park, visitor activities, or activities undertaken by concessioners, contractors, and others operating in ONP. The "Environmental Consequences" section includes a determination on impairment in the conclusion statement of the appropriate impact topics for each alternative. Impairment statements are not required for recreational values/visitor experience, park operations, or health and safety topics. In addition, neither NPS policies nor managerial determinations regarding impairment apply to non-NPS lands or resources.

UNACCEPTABLE IMPACTS

The impact threshold at which impairment occurs is not always readily apparent. Therefore, the NPS applies a standard that offers greater assurance that impairment will not occur. The NPS does this by avoiding impacts that it determines to be unacceptable. These are impacts that fall short of impairment, but are still not acceptable within a particular park's environment. Therefore, for the purposes of these policies, unacceptable impacts are impacts that, individually or cumulatively, would:

- be inconsistent with a park's purposes or values, or
- impede the attainment of a park's desired future conditions for natural and cultural resources as identified through the park's planning process, or
- create an unsafe or unhealthful environment for visitors or employees, or
- diminish opportunities for current or future generations to enjoy, learn about, or be inspired by park resources or values, or
- unreasonably interfere with park programs or activities, or
    - an appropriate use, or

- the atmosphere of peace and tranquility, or the natural soundscape maintained in wilderness and natural, historic, or commemorative locations within the park
- NPS concessioner or contractor operations or services

A determination on unacceptable impacts is made in the conclusion statement of each impact topic for each alternative in the "Environmental Consequences" section.

GEOLOGY

Affected Environment

Glaciation, earthquakes, subsidence, and erosion have shaped the topography of ONP. Alpine glaciers have scoured the Quinault River Valley, creating characteristic U-shaped valleys and leaving behind glacial deposits. The extremely high precipitation has caused rapid downcutting by streams, which results in many steep mountain slopes. The park's landscapes are continually being modified by landslides, river erosion, deposition, and uplift. The Olympic Peninsula consists of a central core of the rugged Olympic mountains surrounded by lowlands. Geologically, the Olympic mountains are made of a core of sedimentary and metamorphic rocks that are surrounded by volcanic rock on the north, east, and south sides. The lowlands are glacial outwashes, while the western and southern portions are marine terraces and glacial outwash fans. The ongoing dynamic geologic processes (both natural and human-altered) have the potential to affect park facilities.

Land management practices, such as historical timber harvesting and construction of the South Shore and Graves Creek roads, along with natural geologic processes, have shaped the broad alluvial Quinault River Valley. The Quinault and East Quinault rivers are dynamic and continue to shift and move within the floodplain as influenced by runoff and channel conditions. Tributaries along the Graves Creek Road damaged by stormflows are alluvial outwashes that normally carry low intermittent volumes of water, but steep upstream slopes can generate large volumes of runoff and rock debris during high precipitation events.

Environmental Consequences

Alternative A—No Action

Direct and Indirect Impacts of the Alternative. No direct effects would occur to geologic resources under the No Action Alternative. Natural geologic processes would continue, which include streamflow and river erosion that would likely continue to erode the riverbank where the South Shore and Graves Creek roads are adjacent to the river at MP 0.7 to 0.9, 1.2, 1.7, and 4.0. Tributaries damaged by the December 2007 storm would also continue to experience periodic high flows that could result in channel erosion and debris flows that would damage the road. Effects to geologic resources would be long-term and primarily beneficial as geologic processes stabilize as the road erodes.

Cumulative Impacts. The original construction of the South Shore and Graves Creek roads resulted in minor to moderate adverse impacts to geologic resources from earthwork and excavation. Ongoing road construction, repairs, and regular maintenance activities in the Quinault River Valley would have minor adverse effects on geologic resources because surface disturbances occur primarily within existing areas of disturbance. The QIN's plan for

restoration of degraded portions of the Quinault River may benefit stream geomorphology by restoring natural fluvial processes. By not restoring or protecting segments of the damaged road, Alternative A would contribute long-term beneficial effects as natural geologic processes are reestablished. Cumulative impacts on geologic resources would remain minor to moderate from past and current activities in the basin even with the slight beneficial effects of Alternative A and plans by the QIN for floodplain improvements.

Conclusion. Alternative A would have a long-term beneficial effect on geologic resources from natural restoration of geologic processes. Cumulative effects would be long-term, minor to moderate, and adverse. Because there would be no major adverse or unacceptable impacts to geologic resources, there would be no impairment of park resources or values.

Alternative B—Restore Access with Improvements (Preferred)

Direct and Indirect Impacts of the Alternative. Installation of bank barbs, WRF, and riprap at locations on the Quinault and East Quinault rivers are intended to redirect stream energy away from the road and protect the roadbank. These measures would have long-term minor adverse effects on the natural geomorphologic processes in the stream channel from the introduction of structural features that would alter streamflow and channel formation. Excavation and removal of culverts at MP 3.4 and 4.5 would disturb alluvial deposition within the channel. Excavation of the stream channel for installation of bridges at MP 3.1 and 3.4 would require disturbance of alluvial deposits to provide adequate hydraulic capacity to carry streamflow. These disturbances would have a long-term minor adverse effect on the geologic resources at the localized sites.

Cumulative Impacts. The original construction of the South Shore and Graves Creek roads resulted in minor to moderate adverse impacts to geologic resources from earthwork and excavation. Ongoing road construction, repairs, and regular maintenance activities in the Quinault River Valley would have minor adverse effects on geologic resources because surface disturbances occur primarily within existing areas of disturbance. The QIN's plan for restoration of degraded portions of the Quinault River may benefit stream geomorphology by restoring natural fluvial processes. The changes to stream channel morphology from armoring the roadbank under Alternative B, in combination with the impacts of other actions would result in long-term minor to moderate adverse cumulative impacts on geologic resources. Because Alternative B would result in minor adverse effects, it would contribute only slightly to the cumulative effects on geology.

Conclusion. Alternative B would have long-term minor adverse effects on geologic resources from installation of roadbank protection measures in the Quinault and East Quinault rivers and from excavations for culvert and bridge placement. Cumulative effects would be long-term, minor to moderate, and adverse. Because there would be no major adverse or unacceptable impacts to geologic resources, there would be no impairment of park resources or values.

Alternative C—Restore Access with Replacement in Kind

Direct and Indirect Impacts of the Alternative. The placement of riprap along the road bank at MP 1.2, 1.7, and 4.0 would have a long-term minor adverse effect on natural geomorphologic processes by armoring the streambank, preventing erosion, altering streamflow, and changing natural stream processes. Removal and replacement of culverts at

MP 2.3, 3.1, 3.4, and 4.5 would require excavation in alluvial deposition within the channel. This would be a long-term minor adverse effect at localized sites.

Cumulative Impacts. The original construction of the South Shore and Graves Creek roads resulted in minor to moderate adverse impacts to geologic resources from earthwork and excavation. Ongoing road construction, repairs, and regular maintenance activities in the Quinault River Valley would have minor adverse effects on geologic resources because surface disturbances occur primarily within existing areas of disturbance. The QIN's plan for restoration of degraded portions of the Quinault River may benefit stream geomorphology by restoring natural fluvial processes. The impacts of Alternative C, in combination with the impacts of other actions would result in long-term minor to moderate adverse cumulative impacts on geologic resources. Because Alternative C would result in minor adverse effects to the stream channels from riprap bank protection and excavation for culverts, it would contribute only slightly to the cumulative effects on geology.

Conclusion. Alternative C would have long-term minor adverse effects on geologic resources from installation of roadbank protection measures in the Quinault and East Quinault rivers and from excavations for culvert and bridge placement. Cumulative effects would be long-term, minor to moderate, and adverse. Because there would be no major adverse or unacceptable impacts to geologic resources, there would be no impairment of park resources or values.

VEGETATION

Affected Environment

Vegetation in the project vicinity consists primarily of the Western Hemlock/Swordfern-Oxalis Association described by Henderson et al. (1989). Though dominated by towering conifers, the rainforest is also characterized by many shrub species including salmonberry and several huckleberry species. Dominant understory species are swordfern and oxalis. A characteristic of the rainforest is the thick layers of moss on the forest floor and on tree limbs. Willow, big-leaf maple, and red alder dominate riparian areas close to the Quinault River. Little or no riparian vegetation is present along the Quinault and East Quinault rivers adjacent to the road because the river has scoured the streambank, although some species have begun to recolonize portions of the banks in some locations. Large conifers frequently are found next to the river or tributaries in the project area. Several exotic plant species are present in the Quinault River Valley including knotweed sp., blackberry spp., herb Robert, scot's broom, foxglove, English holly, and laurel cherry. Control and eradication of these species is currently part of the park exotic plants treatment program.

Environmental Consequences

Alternative A—No Action

Direct and Indirect Impacts of the Alternative. There would be no project-related ground disturbance with the potential to adversely impact vegetation. All emergency repairs would remain in place, and the portion of Graves Creek Road above MP 1.0 would be closed to vehicles. Although vegetation may increase along the margins of the portion of the road closed to vehicles, this long-term benefit would likely be negligible. Overall, there would be no change in the current status of vegetative communities either in terms of species

composition or population dynamics other than those brought about by natural environmental processes.

Washed-out or plugged culverts in several tributaries to the East Quinault River would not be replaced, which could change the hydrologic conditions of the tributaries, causing changes in vegetation growth or distribution near the road crossing. The effect would be long-term and negligible on a localized scale.

The damaged road sites along the Quinault and East Quinault rivers would remain susceptible to further erosion from high flow events. Additional stream scouring could result in the loss of streambank vegetation and the undercutting of large trees. Trees that fall into the river would result in a loss of vegetation cover, although they would add a structural component to the stream system that can provide fish habitat. Alternative A would not create disturbed conditions conducive to the establishment of invasive plants; however, the nonnative plants that currently exist along the roads in the Quinault River Valley may invade streambanks disturbed by flood flows and washed-out sections of the road. Restoration of riparian vegetation would provide long-term beneficial effects on a local scale as the natural riparian functions of the river are established.

Cumulative Impacts. Past actions such as road construction and maintenance, emergency road repairs and reroutes, logging, and development have had a long-term moderate to major adverse impact on vegetation resources in the Quinault River Valley by removing vegetation from the area, or by introducing nonnative and invasive exotic species, which has led to changes in species composition. Present and future foreseeable actions, such as future road maintenance and relocations inside and outside the park, and development outside the park, could result in short-term minor adverse effects to vegetation. The QIN's plan for restoration of degraded portions of the Quinault River may benefit vegetation by allowing more wetland and riparian vegetation communities to establish. Alternative A would contribute slightly to the overall long-term moderate adverse cumulative effects on vegetation.

Conclusion. Alternative A would have long-term beneficial effects on vegetation. Cumulative effects would be long-term, moderate, and adverse, with a slight beneficial contribution from Alternative A. Because there would be no major adverse or unacceptable impacts to vegetation, there would be no impairment of park resources or values.

Alternative B—Restore Access with Improvements (Preferred)

Direct and Indirect Impacts of the Alternative. Bank barbs are proposed at three locations between MP 0.7 and 0.9, at two locations at MP 1.2, and at five locations at MP 1.7. A negligible amount of existing streamside vegetation would be affected by construction of the bank barbs. No large conifers, specimen trees, or snags would be removed. Over time, the proposed bank barbs would allow deposition of sediment and the establishment of wetland and riparian vegetation, as well as protecting the streambank between the bank barbs. The bank barbs should provide a long-term beneficial effect on vegetation. WRFs are proposed between MP 0.7 and 0.9 (about 13,500 sq. ft.) and possibly at Graves Creek Road at MP 4.0 if the channel changes course (about 12,375 sq. ft.). Construction of the WRF would have a short-term negligible adverse effect on existing vegetation because vegetation would be removed or buried during construction activities. The planting of native woody riparian

vegetation would, if successful, in the long term, lead to beneficial effects in a localized area at the WRF site.

Construction of the low water crossing proposed between MP 2.3 to 2.5, road repair at MP 3.8, and culvert removal and replacement at MP 4.5 would have a short-term negligible effect on vegetation because of the previous disturbance and lack of vegetation at the sites. Installation of the bridges at MP 3.1 and 3.4, and the removal of existing culverts at MP 3.4 would likely result in short-term negligible adverse effects to vegetation adjacent to the roadway.

Alternative B could increase the likelihood for invasive species to become established in newly disturbed areas. During construction, invasive plants and their seeds may be transported into ONP on vehicles, equipment, and materials. Revegetation, weed-control measures, and other BMPs would minimize the potential for the introduction of invasive plants during and after construction; however, there still is the potential for well-established exotic plants to spread into the construction site from adjacent areas. The potential for the establishment and spread of invasive plant species would be a short-term negligible adverse effect on vegetation.

Cumulative Impacts. Past actions such as road construction and maintenance, emergency road repairs and reroutes, logging, and development have had a long-term moderate to major adverse impact on vegetation resources in the Quinault River Valley by removing vegetation from the area, or by introducing nonnative and invasive exotic species, which has led to changes in species composition. Present and future foreseeable actions, such as future road maintenance and relocations inside and outside the park, and development outside the park, could result in short-term minor adverse effects to vegetation. The QIN's plan for restoration of degraded portions of the Quinault River may benefit vegetation by allowing more wetland and riparian vegetation communities to establish. Alternative B would contribute short-term negligible adverse effects from ground disturbance and potential invasive weed establishment to the overall long-term moderate adverse cumulative effects on vegetation.

Conclusion. Alternative B would have short-term negligible adverse effects to vegetation; along with long-term beneficial effects from streambank stabilization. Cumulative effects would be long-term, moderate, and adverse, with a short-term negligible adverse contribution from Alternative B. Because there would be no major adverse or unacceptable impacts to vegetation, there would be no impairment of park resources or values.

Alternative C—Restore Access with Replacement in Kind

Direct and Indirect Impacts of the Alternative. Alternative C includes installing riprap on streambanks (MP 0.7 to 0.9, 1.2, 1.7, and 4.0), reinstallation or replacement of culverts (MP 0.7 to 0.9, 2.3 to 2.5, 3.1, 3.4, and 4.5), removal of debris (MP 3.4), regrading (MP 2.3 to 2.5 and 3.1), and repairs to the road base and road surface. Construction activities associated with these improvements would have minimal effects on vegetation because of the previous disturbance to the sites and lack of existing vegetation. No large conifers, specimen trees, or snags would be removed.

The banks of the Quinault and East Quinault rivers along the project sites would still be subject to erosion from large flow events. Additional scouring could result in the loss of

existing or future vegetation development. Installation of riprap would not create disturbed conditions conducive to the establishment of invasive plants; however, invasive species may establish on streambanks disturbed by flood flows and the minor disturbance associated with culvert removal and replacement. Revegetation, weed-control measures, and other BMPs would minimize the potential for the introduction of invasive plants during and after construction; however, there still is the potential for well-established exotic plants to spread into the construction site from adjacent areas, resulting in long-term minor effects. Alternative C would result in short-term negligible adverse effects on vegetation.

Cumulative Impacts. Past actions such as road construction and maintenance, emergency road repairs and reroutes, logging, and development have had a long-term moderate to major adverse impact on vegetation resources in the Quinault River Valley by removing vegetation from the area, or by introducing nonnative and invasive exotic species, which has led to changes in species composition. Present and future foreseeable actions, such as future road maintenance and relocations inside and outside the park, and development outside the park, could result in short-term minor adverse effects to vegetation. The QIN's plan for restoration of degraded portions of the Quinault River may benefit vegetation by allowing more wetland and riparian vegetation communities to establish. Alternative C would contribute short-term negligible adverse effects from ground disturbance and potential invasive weed establishment to the overall long-term moderate adverse cumulative effects on vegetation.

Conclusion. Alternative C would have short-term negligible adverse impacts on vegetation. Cumulative effects would be long-term, moderate, and adverse, with a short-term negligible adverse contribution from Alternative C. Because there would be no major adverse or unacceptable impacts to vegetation, there would be no impairment of park resources or values.

WILDLIFE

Affected Environment

The Olympic Peninsula has developed a distinct array of plants and animals after being isolated for eons by glacial ice, and later, the waters of the Pacific Ocean, Puget Sound, and the Strait of Juan de Fuca. Eight types of plants and 15 types of animals are found on the Olympic Peninsula but nowhere else on Earth. Park habitats extend from sea level to glaciers and are diverse, including expansive ocean beaches and rocky intertidal areas, lowland bogs, 11 major inland river systems, extensive tracts of moist-coniferous forest, subalpine meadows, alpine tundra, and glaciers. Lands managed by the NPS provide havens for wildlife because they are more protected and generally less developed than privately owned lands. There are an estimated 61 land mammal species, 10 near-shore marine mammal species, 14 offshore mammal species, 301 bird species, 14 amphibian species, 6 reptile species, and an unknown number of insect species that frequent the park (NPS 1999).

Mammals commonly seen in the Quinault area include Roosevelt elk, black-tailed deer, black bear, raccoon, spotted skunk, Douglas squirrel, beaver, and snowshoe hare. Less common, but regularly present, are coyote, mountain lion, and bobcat. Smaller, less conspicuous or nocturnal mammals are numerous. Conspicuous birds in the area include

great blue heron, osprey, Stellar's jay, kingfisher, water ouzel (dipper), crow, raven, varied thrush, robin, winter wren and several warblers, woodpeckers, kinglets, and sparrows.

Due to the wet, cold, and cloudy climate of ONP, only a few reptile species are found. The most common reptiles are a few species of garter snake. Amphibians are slightly more common and include the northwestern salamander, long-toed salamander, rough-skinned newt, western red-backed salamander, red-legged frog, Pacific treefrog, and tailed frog.

Forests in the project vicinity contain numerous invertebrate species such as slugs and snails. Some of these species are widespread within the Quinault River watershed, while others may be uncommon or locally rare, have restricted and discrete distributions, and may be represented by small isolated populations. Conservation concerns may be increasing for some of these species in the Pacific Northwest. Systematic surveys for invertebrate species have not been conducted at the project area.

Wildlife is currently affected in the road corridor as a result of human activity. Vehicle collisions with wildlife, especially small mammals, occur along the road corridors and locally affect individuals. The roads bisect habitats and restrict movement patterns. Streamside habitat in the project area was disturbed by the 2007 storm and little to no vegetative cover occurs at the project sites.

Environmental Consequences

Alternative A—No Action

Direct and Indirect Impacts of the Alternative. There would be no disturbance to wildlife habitat in the project area. All emergency repairs would remain in place, and the portion of Graves Creek Road above MP 1.0 would be closed to vehicles. Under this alternative, wildlife, wildlife habitat, and nesting sites would not be disturbed or modified. No construction would be done and access through the last six miles of road would be limited to foot traffic. There would be long-term minor to moderate benefits to wildlife from not reopening the road to vehicular traffic. Wildlife would not be at risk from collisions with automobiles if the road remained closed. In addition, wildlife would not be disturbed from the presence of vehicles in their habitat. Wildlife may be disturbed from pedestrians utilizing the roadway. This would result in a short-term negligible adverse impact to wildlife, not resulting in changes to the current status of biotic communities, either in terms of species composition or population dynamics, other than those brought about by natural processes. Over the long term, natural processes would be restored and the riparian habitat would recover, providing beneficial effects to wildlife.

Because Alternative A would not stabilize or improve conditions along the river within the project area, the banks would remain susceptible to future damage. Any ongoing damage to the riparian corridor would likely be a long-term negligible to minor adverse effect on wildlife because of the loss of habitat. Although there would not be future emergency actions/repairs conducted on the Graves Creek Road, in severe situations, future emergency repairs of the South Shore Road could be conducted during particularly vulnerable life stages for wildlife species, such as during breeding periods for amphibians and birds. In severe situations, effects on biotic communities in terms of species composition or population dynamics would be short-term, negligible, and adverse. During and immediately following future flooding, there could be short-term negligible to minor adverse effects to riparian habitat from erosion. However, in the long term, as natural processes were restored and the

riparian habitat recovered, the effects of closing the road would likely be beneficial to wildlife.

Cumulative Impacts. Past actions such as road construction and maintenance, emergency road repairs and reroutes, logging, and development have resulted in long-term moderate adverse impacts to wildlife and wildlife habitat in the Quinault River Valley by removing habitat from the area, and from disturbance associated with human activities. Present and future foreseeable actions, such as future road maintenance and relocations inside and outside the park, and development outside the park, could result in short-term minor adverse effects to wildlife through disturbance and loss of habitat. Wildlife, especially riparian species, may benefit under the QIN's plan for restoration of degraded portions of the Quinault River. Alternative A would contribute short-term negligible to minor adverse effects and long-term beneficial effects to the overall long-term moderate adverse cumulative effects on wildlife.

Conclusion. Alternative A would result in long-term beneficial effects to wildlife by reducing vehicle access and restoration of natural processes, but short-term negligible to minor adverse effects are possible from erosion and pedestrian travel. The cumulative wildlife effects would be long-term, moderate, and adverse, with a long-term beneficial contribution from Alternative A. Because there would be no major adverse or unacceptable impacts to wildlife, there would be no impairment of park resources or values.

Alternative B—Restore Access with Improvements (Preferred)

Direct and Indirect Impacts of the Alternative. Increased human presence and the noise of construction during road repairs would affect resident wildlife, resulting in temporary behavior modification because of fear and avoidance reactions. However, impacts would be avoided during particularly vulnerable life stages for most wildlife species (breeding and rearing periods). Project impacts would occur primarily in areas already degraded or disturbed by the existing road corridor and the effects of the 2007 storm. Direct mortality could occur in the rare circumstances when wildlife is unable to move away from equipment; however, direct mortality and disturbance impacts would not be expected to be outside the natural range of variability of native species' populations, their habitats, or the natural processes sustaining the species. Thus, adverse impacts would be short-term, negligible, and localized. Reopening of the Graves Creek Road to vehicular traffic, would temporarily displace or force relocation of some wildlife, particularly small mammals and birds, outside the project limits. This would increase the potential for predation and competitive stress. The displacement could result in a slight population depression adjacent to the road corridor. There would be long-term 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. The construction of WRFs within the Quinault River under Alternative B could result in an increase in wetland and riparian habitat, resulting in a long-term beneficial effect on wildlife by increasing habitat.

Cumulative Impacts. Past actions such as road construction and maintenance, emergency road repairs and reroutes, logging, and development have resulted in long-term moderate adverse impacts to wildlife and wildlife habitat in the Quinault River Valley by removing habitat from the area, and from disturbance associated with human activities. Present and future foreseeable actions, such as future road maintenance and relocations inside and outside the park, and development outside the park, could result in short-term minor adverse effects to

wildlife through disturbance and loss of habitat. Wildlife habitat may benefit under the QIN's restoration plan for the Quinault River as degraded portions of the river are restored, allowing more wetland and riparian habitat to establish, which would provide more wildlife habitat. Alternative B would contribute short-term negligible to minor adverse and long-term beneficial impacts to the overall long-term moderate adverse cumulative effects on wildlife.

Conclusion. Alternative B would result in short-term negligible adverse impacts to wildlife in the immediate area during the construction period and long-term negligible to minor adverse impacts on wildlife as a result of reopening the road. Measures to protect the road would have long-term localized beneficial effects from stabilization and creation of riparian habitat. Cumulative effects would be long-term, moderate, and adverse, with only a slight negligible to minor adverse contribution from Alternative B. Because there would be no major adverse or unacceptable impacts to wildlife, there would be no impairment of park resources or values.

Alternative C—Restore Access with Replacement in Kind

Direct and Indirect Impacts of the Alternative. Impacts on wildlife from construction activities would be similar to those of Alternative B, resulting in short-term negligible and long-term negligible to minor adverse localized effects. Installation of riprap and culverts would require less time than installing the improvements in Alternative B; therefore, effects to wildlife from construction activity would be slightly less.

Cumulative Impacts. Past actions such as road construction and maintenance, emergency road repairs and reroutes, logging, and development have resulted in long-term moderate adverse impacts to wildlife and wildlife habitat in the Quinault River Valley by removing habitat from the area, and from disturbance associated with human activities. Present and future foreseeable actions, such as future road maintenance and relocations inside and outside the park, and development outside the park, could result in short-term minor adverse effects to wildlife through disturbance and loss of habitat. However, wildlife habitat may benefit under the QIN's restoration plan for the Quinault River as degraded portions of the river are improved, allowing more wetland and riparian habitat to establish. Alternative C would contribute short- and long-term negligible to minor adverse and long-term beneficial impacts to the overall long-term moderate adverse cumulative effects on wildlife.

Conclusion. Alternative C would result in short-term negligible adverse impacts to wildlife in the immediate area during the construction period and long-term negligible to minor adverse impacts on wildlife as a result of reopening the road. Although more limited than Alternative B, measures to protect the road would have long-term localized beneficial effects from stabilization of riparian habitat. Cumulative effects would be long-term, moderate, and adverse, with only a slight negligible to minor adverse contribution from Alternative C. Because there would be no major adverse or unacceptable impacts to wildlife, there would be no impairment of park resources or values.

FISHERY RESOURCES

Affected Environment

Fish Habitat

The Quinault and East Quinault rivers consist of primary and secondary side channels through which the river flows on an annual basis (Reclamation 2005). The rivers are bordered by large conifers and dense underbrush on the fluvial terraces, established and developing floodplains, or gravel bars with pioneer species, including alders and willows. Woody debris, an important component of fish habitat, becomes jammed at various locations along the river, often at the entrances to side channels. The mainstem Quinault and East Quinault rivers, as well as numerous side channels and tributaries, provide excellent spawning and rearing areas for salmonids and other native fishes. In addition, water quality of the rivers is excellent because of minimal human sources of pollutants. Sources of natural turbidity include suspended fine material caused by shifts in the river channel and resulting bank erosion, especially during high flows. Hydrologic characteristics of the Quinault and East Quinault rivers is described in more detail in the "Hydrology and Water Quality" section.

Species Potentially Present

Fish species that inhabit the Quinault River basin include summer and winter steelhead trout, rainbow trout, cutthroat trout, bull trout, Dolly Varden, sockeye salmon, pink salmon, coho salmon, spring/summer and fall Chinook salmon, chum salmon, kokanee, mountain whitefish, largescale sucker, peamouth, Olympic mudminnow, redside shiner, and several species of sculpins and lamprey (ONP files). The salmonids have considerable ecological, recreational, tribal, and commercial importance. They are also a key factor in the ecological processes of the biotic communities of the Olympic Peninsula. The current status of the sockeye salmon in the Quinault River basin is of concern to ONP biologists and the QIN (Crain 2008; QIN 2008). In general, the sockeye salmon population in the Quinault River basin showed declines beginning in the 1950s (Reclamation 2005; QIN 2008). It appears that populations have been relatively stable from 1973 to 2005, although at much lower numbers than those that were historically reported. The sockeye run has been as large as 93,700 fish in 2003, but was the lowest on record in 2007 (Crain 2008). The average harvest from 1997 to 2007 was 7,300 sockeye (QIN 2008)

ONP staff conducted snorkel surveys during the summer in the North Fork Quinault River and East Fork Quinault River from 2005 to 2007. Surveys were conducted from the confluence of the two rivers, upstream 5 kilometers. Fish species recorded on the North Fork Quinault River include bull trout, mountain whitefish, resident trout (not identified to species), steelhead trout, and Chinook salmon. Fish species recorded on the East Fork Quinault River include bull trout, mountain whitefish, largescale sucker, resident trout (not identified to species), steelhead trout, sockeye salmon, coho salmon, and Chinook salmon. Mountain whitefish occur with the highest abundance. During the period of the surveys, adult salmon was not found to be abundant. Large scale sucker were present in the East Fork Quinault River only during the 2007 surveys; however, they were observed to be abundant in 2004 (Crain 2008).

The federally listed bull trout is discussed in the "Special Status Species" section. Several of the species documented to occur in the Quinault River basin are considered species of concern by the USFWS or the State of Washington. Species of concern documented to occur in Jefferson County include the Pacific lamprey, the river lamprey, Olympic mudminnow, and the coastal cutthroat trout.

Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fishery Act of 1996 (Public Law 104-267), requires federal agencies to consult with the National Oceanic and Atmospheric Administration (NOAA) Fisheries on activities that may adversely affect Essential Fish Habitat (EFH). Freshwater EFH for salmon applies to all streams, lakes, ponds, and wetlands that support Chinook, coho, and Puget Sound pink salmon. The Quinault River and its tributaries are within the area designated as EFH for Chinook and coho salmon. The NPS sent a letter to the NOAA Fisheries to initiate consultation on EFH and details measures to be taken to mitigate any impacts to EFH.

Coho and Chinook salmon use graveled areas in a variety of stream and river sizes for spawning (NOAA Fisheries 2008a). The sites must have oxygenated flows, sufficient depth, cool temperatures, and stable streambeds. Coho salmon in the Quinault River Basin spawn from November to February, with fry hatching from May through July (Brenkman, pers. comm. 2008). Juveniles will rear in protected stream locations for 1 year or longer before migrating to the ocean (NOAA Fisheries 2008a). In the Quinault River Basin, spring/summer Chinook salmon spawn in August and September, while fall Chinook salmon spawn in October and November (Brenkman, pers. comm. 2008). Fry typically hatch after 3 to 4 months of incubation. Juveniles may immediately migrate to the ocean, although stream-based Chinook will often rear in freshwater for more than a year.

Environmental Consequences

Alternative A—No Action

Direct and Indirect Impacts of the Alternative. There would be no direct disturbance to the Quinault or East Quinault rivers or tributaries; therefore, there would be no adverse effects on fish or EFH. Areas where the road washed out during the 2007 storm would be subject to bank erosion and slumping that could introduce sediment to the Quinault River. The stream channel of tributaries where culverts were plugged or washed out also could contribute sediment from erosion. The washed-out culverts at MP 2.3 to 2.5 could be carried further downstream during future flood events, increasing turbidity in the short term and adversely affecting the natural flow of the East Quinault River. The washed-out culverts could have a minor adverse effect on fish. Increases in suspended sediment could affect juvenile fish downstream by damaging gills, reducing feeding, increasing avoidance of sediment areas, reducing reactive distance, suppressing production, increasing mortality, and reducing habitat capacity (Reiser and Bjornn 1979). These impacts would be long-term, minor, adverse, and localized.

Over the long term, not restoring the road would allow the Quinault River to reach a new equilibrium as the channel adjusts to the condition of the streambanks and erodes or moves within the river floodplain. Large trees could be recruited from erosion of the streambank and would contribute to the creation of logjams, which are naturally occurring in the river,

and which can provide fish habitat. This could result in a long-term beneficial localized effect to fish habitat.

Cumulative Impacts. Past actions such as intensive logging, road and bridge construction, maintenance work, emergency road repairs and reroutes, previous installation of about 2,500 feet of riprap along the Quinault River in the park, and other developments in the watershed have resulted in long-term major adverse impacts to fish and their habitat in the Quinault River. Effects include changes in streamflows and channel morphology, removal of streamside vegetation, introduction of pollutants into the river, and increased sedimentation. As a result of clearing mature forests and large woody debris, the frequency and magnitude of flood events has increased, the channel has become less stable, and the river carries a greater sediment load (Reclamation 2005). Present and future foreseeable actions, such as future road maintenance and relocations inside and outside the park, and development outside the park, could result in short-term minor adverse effects to fish and their habitat through increased sedimentation during construction. Fisheries in the Quinault River would likely benefit under the QIN's plan for restoration of degraded portions of the Quinault River, thus, reducing the impact of past actions. Alternative A would contribute both long-term, minor, adverse, and localized effects and long-term beneficial localized effects to the overall long-term moderate adverse cumulative effects on fish and EFH.

Conclusion. Alternative A would result in long-term minor adverse localized effects to fisheries from road erosion, but as the road remains closed and the system's equilibrium is restored, there would be long-term beneficial effects to fisheries resources. The overall cumulative effects on fish would be long-term, moderate and adverse, with only a slight contribution from Alternative A. Because there would be no major adverse or unacceptable impacts to fisheries, there would be no impairment of park resources or values.

Alternative B—Restore Access with Improvements (Preferred)

Direct and Indirect Impacts of the Alternative. Ten bank barbs are proposed for three locations (MP 0.7 to 0.9, 1.2, and 1.7), and WRFs are proposed for two locations (MP 0.7 to 0.9 and 4.0) in the Quinault and East Quinault rivers. Construction of the bank barbs would require placement of large riprap into the active channel with no excavation required. Placement of material into the active channel for construction of the bank barbs would generate short-term sediment transport downstream. Increases in suspended sediments potentially affect juvenile fish by damaging gills, reducing feeding, increasing avoidance of construction areas, reducing reactive distance, suppressing production, increasing mortality, and reducing habitat capacity (Reiser and Bjornn 1979). Elevated levels of suspended sediments may also degrade nearby spawning habitat and reduce survival from egg to fry emergence. The increase in sediment near the construction sites would have short-term minor adverse effects on fish near these activities. It is assumed that suitable spawning habitat is present at the location of the bank barbs. Direct adverse impacts to individual fish or their eggs would largely be avoided by scheduling instream construction from July 15 to August 30 to coincide with typical low-flow periods and to avoid sensitive reproductive periods for coho and Chinook salmon. However, some individual fish, as well as EFH habitat, could be adversely impacted during the placement of fill material for construction of the bank barbs. The 10 bank barbs would collectively cover about 400 linear feet of habitat near the banks. The loss of habitat from the placement of fill required for construction of the bank barbs would be less than 1 percent of the total linear feet (about 359,040) of streambank habitat available in the Quinault River from the outlet of Lake Quinault upstream. Because the effects on

spawning habitat and EFH are less than 1 percent of the total available habitat, construction of the bank barbs would have a short-term moderate, and long-term minor adverse effect on potential fish spawning habitat within the upper Quinault River. Construction of the bank barbs would result in long-term beneficial effects on fish and fish habitat as the banks are stabilized and vegetation increases, reducing erosion and subsequent sediment transport.

Construction of the two WRFs would require placement of material into the dry stream channel with some excavation. No water typically occurs at the proposed location of the WRF between MP 0.7 and 0.9 at low flows, but a small diversion/berm structure of riverbed material would be constructed if needed to prevent streamflow from entering the area during construction. Because construction of the WRF would occur in dry conditions, there would be no sediment transport, but there would be a loss of potential spawning habitat when flows are high, resulting in short-term moderate and long-term minor adverse impacts to fish and EFH. Currently, the main channel is flowing through the proposed location of the WRF at MP 4.0. Because of the potential damage to fish habitat from construction within the main channel, this WRF would be constructed only if the river changes course; the timing of which is unknown. Once the main flow is away from this area, the WRF would be constructed in a similar manner and with similar impacts as the WRF between MP 0.7 and 0.9 on the South Shore Road. Additionally, about 100 feet of riprap would also be installed along the streambank at MP 4.0 regardless of whether the WRF is constructed. In general, protecting banks with riprap and large rock can be detrimental to aquatic and riparian habitats and salmonid fish (Chad 1997) if there is a decrease in woody debris and spawning gravel, and increased stream velocities. However, the impact of riprap placement at MP 4.0 would be minimized by the presence of bedrock. Because the area of riprap is relatively small, the adverse effect on adult and juvenile fish would be long-term and minor.

Although construction of the bank barbs and WRFs, and installation of the riprap would have short- and long-term adverse localized effects on fish and EFH, impacts on fish would be minimized through implementation of the mitigation measures and BMPs described in the following paragraphs and as noted in Table 5.

Instream work would be scheduled from July 15 through August 30, during periods of low flow and before peak spring Chinook spawning, to minimize impacts to fish. To avoid impacts to spawning spring Chinook, snorkel surveys would be conducted prior to project work in the active channel of the Quinault River, and periodically during construction. If spawning is found, work would be delayed at that particular area. Instream construction should be completed before any Chinook fry hatchings. Work could be extended into the first week of September should snorkel surveys show no fish or spawning in the project area. The use of erosion-control measures such as the installation of silt fences, sediment traps, and a stream diversion (for the WRF at MP 0.7 to 0.9), if necessary, and implementation of spill-protection controls would further minimize potential effects to EFH.

While construction of the bank barbs and WRF would result in short-term moderate adverse effects on fish, the adverse effects on EFH would be a small proportion of the overall EFH in the Quinault River basin (less than 1 percent). Additionally, the WRF are proposed to enhance fish habitat and would result in long-term beneficial effects on fish, which, over time, would offset the initial adverse effects. Both the bank barbs and WRF would promote the establishment of riparian vegetation, which is needed to increase sources of woody debris that create high quality fish habitat. The Quinault River fish populations are of great value to the park and surrounding communities, including the QIN, which maintains treaty fishing

rights. These fish also play an important role in the park, and habitat improvement would contribute to regional fishery and species recovery under the ESA.

Activities planned within tributaries to the Quinault River are removal and installation of new culverts, culvert removal and installation of a low-flow water crossing, culvert removal and construction of bridges, and repair of damaged road sections. These activities could adversely affect fish by disturbing the stream channel and increasing suspended sediment at several locations. However, construction would occur during the low-flow period, and all of the tributaries are intermittent or ephemeral. Although it is assumed that the tributaries would be dry at the time of culvert removal and installation or construction of new bridges, in the event flows are present, the flows would be diverted around the construction area to move streamflow out of the work area and minimize suspension of sediments in the stream. To prevent harm to any fish in the stream, diversions would utilize screens and other methods to protect fish. This would include maintaining water flow, preventing erosion, and hand netting stranded fish.

Installation of bridges at MP 3.1 and 3.4 would restore normal flows in the stream channel. In the long term, this would allow flows to the East Quinault River to return to a more natural condition, allowing fish passage when flows are present. The bridges would allow possible development of spawning grounds and colonization of the streambed by aquatic macroinvertebrates that are a food source for many fish.

There would be no effect to fish from installation of the low water crossing at MP 2.3 to 2.5 and MP 4.5 because no fish habitat is present on this ephemeral drainage. Road repairs at MP 3.8 could potentially result in a short-term negligible effect to fish habitat from the introduction of sediment.

Considering the project timing, and that the mitigation measures described for Fishery Resources (Table 5) and in the preceding paragraphs would minimize adverse effects, implementation of Alternative B would result in short-term minor and moderate adverse localized effects, long-term minor adverse localized effects, and long-term beneficial effects on fish. Adverse effects of Alternative B on Chinook or coho salmon EFH would be short-term and moderate because of the disturbance to potential spawning habitat, but would result in only a long-term minor effect because of the small proportion of effects compared to the overall area of EFH present in the Quinault River basin (less than 1 percent).

Cumulative Impacts. Past actions such as intensive logging, road and bridge construction, maintenance work, emergency road repairs and reroutes, previous installation of about 2,500 feet of riprap along the Quinault River in the park, and other development in the watershed that have resulted in long-term major adverse impacts to fish and their habitat in the Quinault River. Effects include changes in streamflows and channel morphology, removal of streamside vegetation, introduction of pollutants into the river, and increased sedimentation. As a result of clearing mature forests and large woody debris, the frequency and magnitude of flood events has increased, the channel has become less stable, and the river carries a greater sediment load (Reclamation 2005). Present and future foreseeable actions, such as future road maintenance and relocations inside and outside the park, and development outside the park, could result in short-term minor adverse effects to fish and their habitat through increased sedimentation during construction. Fisheries and EFH in the Quinault River would likely benefit under the QIN's plan for restoration of degraded portions of the Quinault River, thus, reducing the impact of past actions. Alternative B would contribute short-term minor and

moderate adverse effects, long-term minor adverse effects, and long-term beneficial effects to the overall long-term moderate adverse cumulative effects on fish and EFH.

Conclusion. Alternative B would have short-term minor adverse localized effects on fish from construction of two bridges and a long-term beneficial effect by making the road crossings fish passable. No fish habitat would be affected with installation of the low water crossing at MP 2.3 to 2.5 and 4.5. There would be short-term moderate adverse localized impacts on fish and EFH during construction of the bank barbs, and WRFs, installation of riprap. However, there would be long-term beneficial effects on fish from construction of project activities that would ultimately increase habitat and reduce potential sedimentation into the system. The overall cumulative effects on fish and EFH would be long-term, moderate, and adverse, but Alternative B would contribute only slightly to these effects. Because there would be no major adverse or unacceptable impacts to fish or their habitat from Alternative B, there would be no impairment of park resources or values.

Alternative C—Restore Access with Replacement in Kind

Direct and Indirect Impacts of the Alternative. Construction within the Quinault River under Alternative C would include placement of riprap at MP 1.2, 1.7, and 4.0, which would temporarily increase the amount of suspended sediment during construction. The increase in sediment near the construction sites would have a short-term moderate adverse affect on fish near these activities. In general, protecting banks with riprap and large rock has been found to be detrimental to aquatic and riparian habitats and salmonid fish assemblages (Chad 1997), if there is a decrease in woody debris and spawning gravel, and increased stream velocities. Because the area of riprap is relatively small, and due to the presence of bedrock at MP 4.0, the adverse effect on adult and juvenile fish would be long-term and minor.

Instream work would be scheduled from July 15 through August 30, during periods of low flow and before peak spring Chinook spawning, to minimize impacts to fish. To avoid impacts to spawning spring Chinook, snorkel surveys would be conducted prior to project work in the active channel of the Quinault River, and periodically during construction. If spawning is found, work would be delayed at that particular area. Instream construction should be completed before any Chinook fry hatchings. Work could be extended into the first week of September should snorkel surveys show no fish or spawning in the project area. This scheduling would provide the least impact to coho and Chinook salmon spawning, larval, and early fry stages of their life cycle. However, some individual fish, as well as EFH habitat, could be adversely impacted during the placement of riprap, resulting in a long-term, moderate, adverse effect on spawning habitat (less than 1 percent of available habitat would be affected – see discussion for Alternative B). Removal and replacement of buried culverts is planned within tributaries to the East Quinault River. These activities are expected to have a negligible effect on fish because work would be conducted when the channel is dry. Although it is assumed that the tributaries would be dry at the time of culvert removal and replacement, in the event flows are present, they would be diverted around the construction to minimize the introduction of sediments in the stream. To prevent harm to fish in the stream, diversions would utilize screens and other methods to protect fish. This would include maintaining water flow, preventing erosion, and hand netting stranded fish.

Considering the project timing, and that the mitigation measures described for Fishery Resources (Table 5) and in the preceding paragraphs would minimize adverse effects, implementation of Alternative C would result in short-term moderate adverse localized

effects on fish. Adverse effects on Chinook or coho salmon EFH would be short-term and moderate because of potential effects on spawning habitat from riprap placement, but the long-term effect would be minor because of the small area of disturbance compared to the overall area of EFH present in the Quinault River basin (less than 1 percent).

Under Alternative C, the streambanks where the road washed out in the 2007 storm would be subject to damage from future storm events that could result in streambank erosion and introduction of sediment to the Quinault River. These impacts on fish and EFH would be long-term, minor, adverse, and localized.

Cumulative Impacts. Past actions such as intensive logging, road and bridge construction, maintenance work, emergency road repairs and reroutes, previous installation of about 2,500 feet of riprap along the Quinault River in the park, and other developments in the watershed have resulted in long-term major adverse impacts to fish and their habitat in the Quinault River. Effects include changes in streamflows and channel morphology, removal of streamside vegetation, introduction of pollutants into the river, and increased sedimentation. As a result of clearing mature forests and large woody debris, the frequency and magnitude of flood events has increased, the channel has become less stable, and the river carries a greater sediment load (Reclamation 2005). Present and future foreseeable actions, such as future road maintenance and relocations inside and outside the park, and development outside the park, could result in short-term minor adverse effects to fish and their habitat through increased sedimentation during construction. Fisheries and EFH in the Quinault River would likely benefit under the QIN's plan for restoration of degraded portions of the Quinault River, thus, reducing the impact of past actions. Alternative C would contribute short-term moderate adverse effects and long-term minor adverse effects to the overall long-term moderate adverse cumulative effects on fish and EFH.

Conclusion. Alternative C would have short-term moderate adverse localized effects on fish from placement of riprap along three sections of the Quinault River. Removal and replacement of culverts at road crossings within tributaries to the Quinault River would result in short-term minor adverse effects on fish and EFH. Potential bank erosion on damaged portions of the road that would not be repaired under this alternative would result in a long-term minor adverse effect. The overall cumulative effects on fish and EFH would be long-term, moderate, and adverse, but Alternative C would contribute only slightly to these effects. Because there would be no major adverse or unacceptable impacts to fish or their habitat from Alternative C, there would be no impairment of park resources or values.

SPECIAL STATUS SPECIES

Affected Environment

Special status species include species listed as threatened or endangered under the ESA; state endangered, threatened, sensitive, or candidate species; and USFWS species of concern. WDFW state candidate species are fish and wildlife species that are under review for possible listing as state endangered, threatened, or sensitive. USFWS species of concern are those plant and animal species for which conservation status is of concern to the USFWS, but which requires additional information before listing. Federal- and state-listed species and species of concern potentially occurring in ONP are shown in Appendix C. State-listed fish species are discussed in the "Fishery Resources" section.

Three species federally listed under the ESA potentially occur in the project area: marbled murrelet (*Brachyramphus marmoratus*), northern spotted owl (*Strix occidentalis caurina*), and bull trout (*Salvelinus confluentus*). According to the NOAA Fisheries website (2008b), the ESA status of West Coast salmon and steelhead trout in the project area is "Not Warranted" for the Evolutionary Significant Unit (ESU) that includes the project area for all salmon and steelhead species.

The fisher (*Martes pennanti*) is a candidate species under the ESA and listed as endangered by the state of Washington. The fisher was extirpated from the Olympic Peninsula; however, the NPS and the WDFW are cooperating on a program to restore fishers to the Olympic Peninsula. Eleven fishers were released at remote sites within the Elwha Valley of ONP on January 27, 2008 and seven fishers were released on March 2, 2008 in the same area. Over the next 3 years, approximately 100 fishers will be released within ONP, with some possible releases in the Quinault River basin. Through radio tracking, ONP biologists know that fishers could be foraging in the Quinault River basin.

Federally Listed Species

No critical habitat has been formally designated within ONP for marbled murrelet and northern spotted owl, although much of the park contains high quality habitat that is considered important for the recovery of the species. Critical habitat was not designated because habitat in the park is not thought to require special management consideration or protection by virtue of its national park status. The Quinault and East Quinault rivers contains designated critical habitat for bull trout.

A BA has been prepared as part of this action (Appendix A) and was submitted to the USFWS for informal consultation under Section 7 of the ESA for the marbled murrelet, northern spotted owl, and bull trout. The purpose of the BA is to review the Preferred Alternative in sufficient detail to determine whether any of the federally threatened or endangered species in the project area would be affected. The BA has been prepared in accordance with legal requirements of the ESA (16 U.S.C. 1531 *et seq.*) and follows the standards established by the NPS and FHWA.

Information on life history, habitat requirements, distribution, and potential habitat in the project area, and other characteristics of the three federally listed species potentially occurring in the project area is presented below. More detailed species information is provided in the BA.

Northern Spotted Owl

The northern spotted owl was federally listed as a threatened species in July 1990 due to extensive loss of habitat in old-growth and late-successional forest. The survival of the northern spotted owl in the Pacific Northwest depends on maintaining adequate, well-distributed nesting, roosting, and foraging habitat. The listing is a result of reductions in northern spotted owl populations, habitat loss, and adverse modification of old-growth and late-successional forests due to timber harvest activities, fire, and human development in much of its range.

Northern spotted owls generally require large areas of land containing semicontinuous expanses of old-growth forest to meet their biological needs for nesting, roosting, foraging, and dispersal. Nesting and roosting habitat typically includes a multilayered, multispecies,

moderate to high closure canopy with large trees. Preferred nesting and roosting habitat also contains open space below the canopy for protected flight, large trees with deformities to provide nesting locations, and numerous fallen trees and other ground debris (Thomas et al. 1990). Foraging habitat used by northern spotted owls is often fragmented and includes open forest. In much of the species' northern range, large dense forests are also chosen as foraging habitat. Foraging habitat in the southern lower-elevation locations includes the edges of dense forests and open forests. Dispersal habitat is important for owl movement between nesting habitat, both locally and over the range of the northern spotted owl, and provides critical links between owl populations. Northern spotted owls require forest stands with adequate tree size and moderate canopy closure to provide refuge from predators and for occasional foraging.

Habitat in the project area is physically suitable for northern spotted owl nesting and roosting, and may have been used for these functions years ago; however, the project area is likely no longer used by northern spotted owl for nesting. The one known nest site found within ½ mile of the project locations at Howe Creek (1992) is most likely unoccupied because of the increase of barred owls in the area (Gremel, pers. comm. 2008). A total of 15 known owl nest territories occur within the Quinault Valley, although surveys have not been conducted in most of the drainages. Forests in the immediate vicinity of the road projects are composed of spruce, hemlock, and hardwoods at approximately 400 feet elevation. Mixed forests at this elevation on the west side of the park are unlikely to be used for nesting or roosting by northern spotted owls due to competition with barred owls, but these areas may be used for foraging and dispersal.

For purposes of Section 7 consultation, northern spotted owl breeding season in ONP is broken into two periods: early breeding season from March 1 through July 15, and late breeding season from July 16 to September 30. Chicks on the Olympic Peninsula are usually fledged by July 15, but stay near the nest and are fed by the parents after that date. Construction for this project would start in early August at the end of the late breeding season.

Marbled Murrelet

On October 1, 1992, the marbled murrelet was designated as threatened under the ESA. The listing is largely due to the loss of nesting habitat from timber harvest and fires; the species is particularly vulnerable to the loss of nesting habitat as evidenced by low breeding success rates and sensitive habitat requirements. The marbled murrelet uses old-growth forests for nesting, and the time span for habitat recovery exceeds 100 years. Declining numbers are documented or suspected throughout most of the species' range. The species also is affected by ocean feeding conditions and direct mortality from net fishery and oil spills.

Marbled murrelet—USFWS photo

Marbled murrelets inhabit the Pacific coast of North America from the Bering Sea to central California, just south of San Francisco Bay. In contrast to other seabirds, murrelets do not form dense colonies, and may fly as far as 43 miles or more inland to nest, generally in older coniferous forests with a high canopy closure. This habitat requires trees with large

branches and deformities found in old-growth forests for nesting platforms. Marbled murrelets are more commonly found inland during the summer breeding season, but make daily trips to the ocean to gather food, and have been detected in forests throughout the year. Murrelet detections inland begin in the spring and peak in midsummer before decreasing rapidly after midsummer, presumably because they are undergoing a flightless molt at sea. Daily trips to gather food at sea are observed to occur most frequently in the hours near dawn and dusk. When not nesting, the birds live at sea, spending their days feeding close to shore and then moving several kilometers offshore at night (USFWS 1997).

Portions of his project would take place in suitable habitat for marbled murrelets. In the lower reaches of the project area, along South Shore Road and in the first two miles of Graves Creek Road, the road is greater than 35 yards from suitable habitat. The road is adjacent to the river and riparian habitat to the north and the south side of the road has steep slopes with bedrock, and is not considered suitable murrelet habitat. However, to the east (above mile 2 on Graves Creek Road), the habitat improves south of the roadway and is considered suitable habitat for murrelets. Murrelet surveys have not been conducted in the immediate vicinity of the project sites; however, in recent years, occupied detections were recorded during protocol surveys at four locations upstream from the project, including the Graves Creek campground. Live chicks have been discovered on the ground within the Quinault drainage twice since 1986. Since murrelet presence has been documented at 100 percent of the survey sites throughout the park in recent years, and occupancy has been documented at 80 percent of those sites, it is reasonable to assume that suitable habitat in the project vicinity is also occupied.

For the purposes of Section 7 consultation, marbled murrelet breeding season is broken into two periods: April 1 through August 5 is the early season, and August 6 through September 15 is the late season, with some chicks hatched and approximately 50 percent fledged as early as August 6. Construction outside of the active channel of the Quinault and East Quinault rivers would start in early August at the end of the early breeding season.

Bull Trout

All populations of bull trout are designated as threatened in the coterminous United States under the ESA (64 Fed. Reg. 58910 (November 1, 1999)). Most of the Quinault River and East and North Forks above Lake Quinault have been designated as critical habitat for the Coastal-Puget Sound population (70 Fed. Reg. 56212 (September 26, 2005)). A reach of the Quinault River above Lake Quinault and below the confluence of the North Fork and the mainstem fork is not included as critical habitat because this reach is managed under the Northwest Forest Plan, which provides sufficient protection for bull trout habitat. The project area occurs within the area encompassed by the North and East Fork Quinault River local populations of the Coastal-Puget Sound distinct population segment of bull trout. The decline of bull trout is primarily due to habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, past fishery management practices, and the introduction of nonnative species. Habitat degradation in the Quinault River is largely due to logging and road construction which has severely affected sensitive breeding habitat.

Bull trout appear to have more specific habitat requirements than other salmonids and generally need cold water, complex cover, stable substrate with a low percentage of fine sediments, high channel stability, and stream/population connectivity (Rieman and McIntyre 1993). Adults inhabit cold rivers and large tributary streams with moderate to fast currents.

Spawning occurs in small cold streams. These habitat components, as well as valley form, spawning and rearing substrates, and migratory corridors, influence bull trout distribution and abundance (Pratt 1992; USFWS 2004).

Bull trout exhibit four diverse life history strategies that include: 1) the stream-resident form that inhabits small headwater streams and may reach sexual maturity at a small size; 2) the fluvial form that inhabits large rivers, attains a large size, and typically spawns in tributary streams; 3) the adfluvial form that matures in lakes or reservoirs and migrates into tributaries to spawn; and 4) the anadromous form that spawns in freshwater and live most of their lives in saltwater (Leary et al. 1991; NOAA Fisheries 2007). Anadromous bull trout likely occur in rivers in western Washington, including the Queets, Hoh, and Quinault rivers (USFWS 2004).

Bull trout occur year-round in the Quinault River basin. The mainstem and East Fork of the Quinault River, as well as numerous side channels and tributaries, provide excellent spawning and rearing areas for salmonids and other native fishes. Even though bull trout life histories are complex and remain largely undescribed in Washington coastal rivers, ONP surveys have documented bull trout use of both the North and East Forks of the Quinault River. Bull trout have been documented in the East Fork from just below Anderson Creek downstream to the park boundary (which includes the project sites), and in the North Fork from just below Kimta Creek downstream to the confluence with the East Fork.

Bull trout spawning occurs in late fall through early winter as water temperatures decline. After hatching and emergence from the substrate, juvenile bull trout generally rear in rivers and streams year-round, although an analysis of otolith chemistry from bull trout collected in the nearby Queets River indicated that some migrate to the ocean after rearing for several years (Volk 2000). Bull trout spawning locations are unknown in the Quinault River Basin but may occur anywhere that appropriate conditions (e.g., temperature, depth, velocity, and substrate) are found. Seasonal bull trout presence in the Quinault River is shown in Table 19.

TABLE 19. BULL TROUT PRESENCE

Species	Life Stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Bull Trout	Adult	X	X	X	X	X	X	X	X	X	X	X	X
	Young-of-Year and Juvenile	X	X	X	X	X	X	X	X	X	X	X	X
	Eggs	X	X	X	X						X	X	X

Source: ONP 2002.

Other Species of Concern

Other species of concern that may occur in ONP (see Appendix C) that are not federally listed, but that potentially occur in or near the project area, include:

- Long-eared myotis (*Myotis evotis*)
- Long-legged myotis (*Myotis volans*)
- Pacific Townsend's big-eared bat (*Corynorhinus townsendii townsendii*)
- Northern goshawk (*Accipiter gentilis*)
- Olive-sided flycatcher (*Contopus cooperi*)
- Peregrine falcon (*Falco peregrinus*)

- Tailed frog (*Ascaphus truei*)
- Van Dyke's salamander (*Plethodon vandykei*)
- Western toad (*Bufo boreas*)
- Tall bugbane (*Cimicifuga elata*)

Environmental Consequences

Alternative A—No Action

Direct and Indirect Impacts of the Alternative. There would be no project-related ground disturbance with the potential to adversely impact northern spotted owl or marbled murrelet habitat. No large, mature trees that could be used for nesting would be removed. There would be no change in noise disturbance levels and, therefore, there would be no change from current conditions. All emergency repairs would remain in place, and the portion of Graves Creek Road above MP 1.0 would be closed to vehicles. Although vegetation may increase along the margins of the portion of the road closed to vehicles, this long-term benefit for spotted owl or the marbled murrelet would likely be negligible. Removal of vehicle traffic and associated noise on the road would also provide a long-term beneficial effect on these species. Thus, Alternative A would result in a "no effect" determination for northern spotted owls and marbled murrelets.

There would be no direct disturbance to the Quinault and East Quinault rivers or tributaries under Alternative A; therefore, there would be no direct adverse effects on bull trout habitat. The streambanks where the roads were damaged in the 2007 storm would be subject to slumping and erosion and could introduce increased sediment to the river. Increases in suspended sediment could affect juvenile bull trout downstream by damaging gills, reducing feeding, increasing avoidance of sediment areas, reducing reactive distance, suppressing production, increasing mortality, and reducing habitat capacity (Reiser and Bjornn 1979). These impacts would be long-term, minor, adverse, and localized.

Over the long term, not restoring the road would allow the Quinault River to reach a new equilibrium as the channel adjusts to the condition of the streambanks and erodes or moves within the river floodplain. Large trees could be recruited from erosion of the streambank and would contribute to the creation of logjams, which are naturally occurring in the river, and which can provide bull trout habitat. This could result in a long-term beneficial effect to fish habitat, on a localized basis.

The washed-out culverts at MP 2.3 to 2.5 could be carried further downstream during future flood events, increasing turbidity in the short term and adversely affecting the natural flow of the East Quinault River. The long-term minor impact from the washed-out culverts could have a minor adverse effect on bull trout. Thus, Alternative A may affect but is not likely to adversely affect bull trout.

Alternative A would not result in direct effects on species of concern. Because there would be no project-related ground disturbance that would impact vegetation or construction activity, there would be no effect on terrestrial species of concern. Closing the road above Graves Creek Road at MP 1.0 would benefit many of the terrestrial species of concern reducing the disturbance associated with vehicle noise and road maintenance activities, resulting in a long-term benefit. There would be no direct effect on amphibian species of concern from Alternative A.

Cumulative Impacts. Past actions such as road construction and maintenance, emergency road repairs and reroutes, logging, and development have resulted in long-term moderate adverse impacts to spotted owls and murrelets and their habitat in the Quinault River Valley by removing, fragmenting, or degrading habitat from the area, and by creating disturbance associated with human activities. Present and future foreseeable actions, such as future road maintenance and relocations inside and outside the park, and development outside the park, could result in short-term minor adverse effects to spotted owls and murrelets through disturbance and loss of habitat. Alternative A would contribute long-term beneficial effects from road closure to the overall long-term moderate adverse cumulative effects on spotted owl and marbled murrelet.

Past actions such as road and bridge construction and maintenance, emergency road repairs and reroutes, intensive logging, previous installation of about 2,500 feet of riprap along the Quinault River in the park, and development have resulted in long-term major adverse impacts to bull trout and their habitat in the Quinault River due to changes in streamflows and channel morphology, removal of streamside vegetation, introduction of pollutants into the river, and increased sedimentation. As a result of clearing mature forests and large woody debris, the frequency and magnitude of flood events has increased, the channel has become less stable, and the river carries a greater sediment load (Reclamation 2005). Present and future foreseeable actions, such as future road maintenance and relocations inside and outside the park, and development outside the park, could result in short-term minor adverse effects to bull trout and their habitat through increased sedimentation during construction. Bull trout in the Quinault River would likely benefit under the QIN's plan for restoration of degraded portions of the Quinault River, thus, reducing the impact of past actions. Alternative A would contribute long-term, minor, adverse, and localized effects and long-term beneficial localized effects to the overall long-term moderate cumulative effects on bull trout.

Present, past and future activities in the Quinault River Valley such as logging and road construction that fragmented and degraded habitat may adversely affect species of concern, especially at a local scale; however, these effects are likely to be short-term and moderate. Alternative A would contribute only slightly to the overall cumulative effects on species of special concern.

Conclusion. Alternative A would result in long-term beneficial effects on spotted owl, marbled murrelet, and terrestrial species of concern; long-term minor adverse localized effects on bull trout habitat; and negligible effects on amphibian species of concern. The cumulative effects on terrestrial species would be long-term, negligible, and adverse, with only a slight contribution from Alternative A. Alternative A would result in long-term minor adverse localized effects to bull trout as erosion continues as a result of flood events, but as the road remains closed and the system's equilibrium is restored, there would be beneficial effects to bull trout. The overall cumulative effects on bull trout would be long-term, moderate, and adverse, with only a slight contribution from Alternative A. Because there would be no major adverse or unacceptable effects on spotted owl, marbled murrelet, bull trout, or species of concern, there would be no impairment of park resources or values.

Alternative B—Restore Access with Improvements (Preferred)

Direct and Indirect Impacts of the Alternative

Northern Spotted Owl. No suitable nesting or critical northern spotted owl habitat would be modified or removed under Alternative B. Foraging owls may be disturbed by machinery noise during construction, causing owls to temporarily avoid the project area. Mobilization of heavy equipment and site preparation beginning after July 15 would create noise above ambient levels and visual disturbance in the project area during the late breeding season (after July 15) when breeding owls and their young would be less vulnerable to disturbance. However, cliff faces, mature trees and thick foliage at the project area provide a high degree of natural screening, which would reduce the intensity of noise and visual impacts. In addition, northern spotted owls forage primarily at night when there would be no construction activity. There would also be some increased noise and activity at the staging areas along the roadway between the project sites, and construction traffic on the South Shore and Graves Creek roads. The northern spotted owl is unlikely to occur near the project area and no suitable habitat would be modified or removed under Alternative B. No known nest sites occur within a mile of the project area. The project would start after July 15, during the late breeding season, when breeding owls and their young would be less vulnerable to disturbance. In addition, northern spotted owls forage primarily at night when there would be no construction activity. Thus, Alternative B would have short-term negligible adverse localized effects on foraging owls, resulting in a determination of "may affect, but not likely to adversely affect" for northern spotted owls.

Marbled Murrelet. Activities associated with Alternative B would occur near suitable habitat for marbled murrelets, but would not result in a loss of identified habitat because no trees large enough to contain suitable habitat for murrelets would be cut. Mobilization of heavy equipment and site preparation beginning in early August would create noise above ambient levels and visual disturbance. However, mature trees and thick foliage at the project area provide a high degree of natural screening, which would reduce the intensity of noise and visual impacts.

To avoid adverse impacts to breeding murrelets, construction activities within 35 yards of suitable murrelet habitat would not begin until August 6, during the murrelet late breeding season (August 6 to September 15). Any work that generates noise above ambient levels prior to September 15 would not take place at night or within 2 hours of sunrise and sunset during the periods when murrelets are known to be most active. The noise of construction could temporarily affect murrelets in the area in the form of aversion responses. However, construction timing restrictions to avoid disturbances during murrelet high-activity periods would minimize effects to the species. Therefore, Alternative B would have short-term minor adverse localized impacts on the marbled murrelet, resulting in a determination of "may affect, but not likely to adversely affect" for marbled murrelets.

Bull Trout. Direct impacts from Alternative B to bull trout would be similar to those described for Fishery Resources. Instream work would be scheduled from July 15 through August 30, avoiding high-flow periods and prime bull trout spawning and egg-laying periods. To avoid impacts to spawning bull trout, snorkel surveys would be conducted prior to project work in the active channel of the Quinault River, and periodically during construction. If spawning is found, work would be delayed at that particular area. Instream construction should be completed before any bull trout fry hatchings. Work could be

extended into the first week of September should snorkel surveys show no fish or spawning in the project area.

The increase in sediment near the construction sites would have short-term minor adverse effects on bull trout near these activities. It is assumed that some suitable bull trout spawning habitat is present at the location of the bank barbs and the WRF. In general, protecting banks with riprap and large rock can be detrimental to aquatic and riparian habitats and salmonid fish (Chad 1997) if there is a decrease in woody debris and spawning gravel, and increased stream velocities. However, the impact of riprap placement at MP 4.0 would be minimized by the presence of bedrock. Because the area of riprap is relatively small, the adverse effect on adult and juvenile fish would be long-term and minor. Bull trout habitat would be affected by the placement of fill material for construction of the bank barbs, but the adverse effects would be less than 1 percent of the total linear feet (about 359,040) of bull trout critical habitat available in the Quinault and East Quinault rivers from the outlet of Lake Quinault upstream. Because the effects on bull trout habitat are less than 1 percent of the total available habitat (as determined for an adfluvial life history), construction of the bank barbs would have short-term moderate, and long-term minor adverse impacts to bull trout spawning habitat within the Upper Quinault River basin. The WRF would enhance fish habitat and could result in long-term beneficial effects on bull trout, which over time would offset the initial adverse effects. Both the bank barbs and WRF would promote the establishment of riparian vegetation, which is needed to increase sources of woody debris that create high quality bull trout habitat. However, Alternative B would result in short-term moderate adverse impacts to bull trout, resulting in a determination of "may affect, and is likely to adversely affect" for bull trout.

Species of Concern. Short-term minor adverse effects could occur to species of concern in the project vicinity during the construction period in the form of aversion behavior and temporary relocation of individuals. Impacts to amphibian species of concern resulting from physical disturbance of the streambed and noise disturbance would be short-term, negligible, adverse, and localized. Construction activities associated with Alternative B could result in the inadvertent mortality of some individuals of smaller species of concern, such as reptiles, amphibians, and small mammals. However, impacts would be avoided during particularly vulnerable life stages for most sensitive species (breeding and rearing periods) because construction activities would occur from August 6 to March 30. Also, impacts would not be expected to be outside the natural range of variability of native species' populations, their habitats, or the natural processes sustaining the species. In the long term, this alternative would increase the stability of damaged areas, which could benefit water-dependent species. Species of concern displaced during construction would most likely return to the area once construction is completed. Thus, adverse impacts on species of concern resulting from Alternative B would be short-term, minor, and highly localized.

Cumulative Impacts

Cumulative impacts are similar to those described under Alternative A, except for the following effects.

Northern Spotted Owl. Alternative B, in combination with the impacts of other reasonably foreseeable actions as described above under Alternative A, would result in short-term negligible adverse cumulative impacts on the northern spotted owl. Alternative B would

add a relatively slight increment to the overall cumulative effects on the northern spotted owl.

Marbled Murrelet. Alternative B, in combination with the impacts of other reasonably foreseeable actions as described above under Alternative A, would result in short-term negligible adverse cumulative impacts on the marbled murrelet. Alternative B would add a relatively slight increment to the overall cumulative effects on the marbled murrelet.

Bull Trout. Impacts of other actions are described above for Alternative A under "Current and Future Actions". Alternative B would contribute short-term moderate and long-term minor adverse effects and long-term beneficial effects to the overall long-term moderate cumulative effects on bull trout.

Species of Concern. Alternative B would add a relatively slight increment to the overall cumulative effect on species of concern. Alternative B would result in short-term minor adverse cumulative impacts on terrestrial Special Status Species. Cumulative effects to amphibian species of concern would be long-term, minor, and beneficial, with Alternative B contributing long-term beneficial effects.

Conclusion

Alternative B may affect, but is not likely to adversely affect, northern spotted owls, marbled murrelets; and is likely to affect bull trout. This alternative would result in short-term adverse localized effects but would provide long-term benefits for bull trout and other water-dependent special status species. Alternative B would result in short-term negligible adverse effects to other species of concern during the construction period. Impacts to water-dependent species resulting from physical disturbance of the streambed and noise disturbance would be negligible, temporary, and localized. Cumulative effects to bull trout and water-dependent species would be short-term, moderate, and adverse; and long-term and beneficial, with Alternative B contributing long-term beneficial effects. Alternative B would result in short-term negligible adverse cumulative impacts on the northern spotted owl, marbled murrelet, and other terrestrial Special Status Species. There would be no impact on federally listed plants in the project area because there are none present. Because there would be no major adverse or unacceptable impacts to Special Status Species, there would be no impairment of park resources or values.

Alternative C—Restore Access with Replacement in Kind

Direct and Indirect Impacts of the Alternative

Northern Spotted Owl. Construction-related impacts on spotted owls are similar for those described under Alternative B. Alternative C would result in short-term negligible adverse localized impacts on the spotted owl, resulting in a determination of "may affect, but not likely to adversely affect" for northern spotted owl.

Marbled Murrelet. Construction-related impacts on marbled murrelets are similar for those described under Alternative B. Alternative C would have short-term minor adverse localized impacts on the marbled murrelet, resulting in a determination of "may affect, not likely to adversely affect" for marbled murrelet.

Bull Trout. Riprap installed at several locations along the Quinault River would result in long-term adverse effects on bull trout. Installation of riprap would increase the amount of suspended sediment, which would result in a short-term moderate adverse effect on bull trout. In general, protecting banks with riprap and large rock has been found to be detrimental to aquatic and riparian habitats and salmonid fish assemblages (Chad 1997), if there is a decrease in woody debris and spawning gravel, and increased stream velocities. Because the area of riprap is relatively small, and due to the presence of bedrock at MP 4.0, the adverse effect on adult and juvenile fish would be long-term and minor. Alternative C does not include the streambank/road protection measures used in Alternative B and, therefore, would not result in any of the long-term beneficial effects that would help mitigate the adverse effects. Instream work would be scheduled from July 15 through August 30, avoiding high-flow periods and prime bull trout spawning and egg-laying periods. To avoid impacts to spawning bull trout, snorkel surveys would be conducted prior to project work in the active channel of the Quinault River, and periodically during construction. If spawning is found, work would be delayed at that particular area. Instream construction should be completed before any bull trout fry hatchings. Work could be extended into the first week of September should snorkel surveys show no fish or spawning in the project area. Although adverse effects would be mitigated by the proposed mitigation measures and BMPs described for Fishery Resources, Alternative C would result in short-term, moderate, and long-term minor adverse, localized impacts to bull trout, resulting in a determination of "may affect, and is likely to adversely affect" for bull trout.

Species of Concern. Under Alternative C, construction-related impacts on Special Status Species are similar for those described under Alternative B. Thus, adverse impacts on species of concern resulting from Alternative C would be short-term, minor, and localized.

Cumulative Impacts

Cumulative impacts are similar to those described under Alternative A except for the following.

Northern Spotted Owl. Alternative C, in combination with the impacts of other reasonably foreseeable actions as described above under Alternative A, would result in short-term negligible adverse cumulative impacts on the northern spotted owl. Alternative C would add a relatively slight increment to the overall cumulative effects on the northern spotted owl.

Marbled Murrelet. Alternative C, in combination with the impacts of other reasonably foreseeable actions as described above under Alternative A, would result in short-term negligible adverse cumulative impacts on the marbled murrelet. Alternative C would add a relatively slight increment to the overall cumulative effects on the marbled murrelet.

Bull Trout. Impacts of other actions are described above for Alternative A under "Current and Future Actions." Alternative C would contribute short-term moderate and long-term minor adverse effects to the overall long-term moderate cumulative effects on bull trout.

Species of Concern. Alternative C would add a relatively slight increment to the overall cumulative effect on species of concern. Alternative C would result in short-term minor adverse cumulative impacts on terrestrial Special Status Species. Cumulative effects to water-

dependent Special Status Species would be short-term, negligible, and adverse, with Alternative C contributing short-term adverse effects.

Conclusion

Alternative C may affect, but is not likely to adversely affect, northern spotted owls and marbled murrelets, and is likely to adversely affect bull trout. Alternative C would result in short-term negligible adverse effects to other species of concern during the construction period. Impacts to water-dependent species resulting from physical disturbance of the streambed and noise disturbance would be short-term, negligible, and localized. Cumulative effects to bull trout and water-dependent species would be short-term, moderate, and adverse; and long-term, minor, and beneficial. Alternative C would result in short-term negligible adverse cumulative impacts on the northern spotted owl, marbled murrelet, and other terrestrial Special Status Species. Because there would be no major adverse or unacceptable impacts to special status species, there would be no impairment of park resources or values.

SOILS

Affected Environment

The soils of the Olympic Peninsula reflect a varied environment and complex history, but are generally quite young. The complex geologic history of the Olympic mountains has created a diversity of parent materials for soils. Much of the lowlands and valley bottoms, such as the lands bordering the Quinault River area, were covered with glacial sediment following retreat of the glaciers. The Quinault River has reworked these glacial sediments in the valley bottom and has deposited layers of clay, silt, sand, gravel or other material along the river course. Soil development in the Olympic Peninsula is greatly influenced by the amount of moisture in the soil. Sufficient water is present over most of the Olympic Peninsula to cause both rapid weathering and leaching of nutrients; therefore, the soils tend to be relatively infertile. Forest soils adjacent to the Quinault and East Quinault rivers have a thick organic horizon and support a diversity of trees, shrubs, and herbaceous species. Alluvial soil material in the floodplain of the rivers contain silts and clays mixed with coarse sand, gravel, and boulders. The erosion hazard for alluvial soils adjacent to the road is generally high because the soil material is unconsolidated, often lacking in vegetation cover, and subject to periodic high flows from adjacent streams.

Environmental Consequences

Alternative A—No Action

Direct and Indirect Impacts of the Alternative. No direct disturbance to soil resources would occur because there would be no there would be no construction-related actions. Areas of the Graves Creek Road adjacent to the East Quinault River that were damaged by high flows would continue to erode and slide into the river. In some locations, this erosion could occur until constrained by bedrock. The natural erosion process also would continue on tributaries damaged by the storm. Though short-term, erosion would continue at the damaged sites and would create additional damage to area soils, over the long term, the area would stabilize and the natural processes would be restored, leading to a beneficial effect.

Cumulative Impacts. Past actions such as road construction and maintenance, emergency road repairs and reroutes, logging, and development have had a long-term minor adverse impact on soil resources in the Quinault River Valley from excavation and erosion, which has led to a loss in soil productivity. Present and future foreseeable actions, such as future road maintenance and relocations inside and outside the park, and development outside the park, could result in continued adverse effects to soils. The QIN's plan for restoration of degraded portions of the Quinault River may benefit soils by stabilizing the stream channel and reducing bank erosion and soil loss. Alternative A would contribute a long-term beneficial effect to soil resources from restoration of natural processes, but the cumulative effect from past and reasonable foreseeable action would be long-term, minor, and adverse.

Conclusion. Alternative A would have a long-term beneficial effect to soils following a short-term period of erosion as natural processes are restored in the absence of road use and maintenance. Cumulative effects would be long-term, minor, and adverse. Because there would be no major adverse or unacceptable impacts to soils, there would be no impairment of park resources or values.

Alternative B—Restore Access with Improvements (Preferred)

Direct and Indirect Impacts of the Alternative. Installation of bank barbs and riprap along the Quinault and East Quinault rivers would result in short-term adverse effects to soils adjacent to the road. The majority of this soil material is not currently productive because it is part of the road, shoulder, or unvegetated streambank. Stabilization of the roadbank would allow soil development and reduce the potential for future erosion. Construction of WRF would be within the river substrate and would not directly impact productive soils. Incidental soil disturbance is possible with installation of new bridges, a low water crossing, culvert removal and replacement, and other road repair work. Overall, Alternative B would result in short-term minor adverse effects to soils with the implementation of BMPs.

Cumulative Impacts. Past actions such as road construction and maintenance, emergency road repairs and reroutes, logging, and development have had a long-term minor adverse impact on soil resources in the Quinault River Valley from excavation and erosion, which has led to a loss in soil productivity. Present and future foreseeable actions, such as future road maintenance and relocations inside and outside the park, and development outside the park, could result in continued adverse effects to soils. The QIN's plan for restoration of degraded portions of the Quinault River may benefit soils by stabilizing the stream channel and reducing bank erosion and soil loss. Alternative B would contribute long-term beneficial effects to soil resources from erosion-protection measures, but the cumulative effects from past and reasonable foreseeable action would be long-term, minor, and adverse. Because Alternative B would result in short-term minor adverse effects, and long-term benefits, it would contribute slightly to the overall cumulative effects on soils.

Conclusion. Alternative B would have short-term minor adverse effects on soils during construction with long-term benefits by stabilizing the roadbank and reducing erosion. Cumulative effects would be long-term, minor, and adverse. Because there would be no major adverse or unacceptable impacts to soils, there would be no impairment of park resources or values.

Alternative C—Restore Access with Replacement in Kind

Direct and Indirect Impacts of the Alternative. Installation of riprap along the East Quinault River at MP 1.2, 1.7, and 4.0 would result in short-term minor adverse effects to soil resources on the road bank. Soil productivity is minimal in these locations because of steep slopes and ongoing erosion. Removal and installation of culverts on tributaries damaged by the storm would have short-term negligible to minor adverse effects to soils during construction with implementation of BMPs during construction. All of the restoration activities would have a long-term beneficial benefit to soils by reducing erosion.

Cumulative Impacts. Past actions such as road construction and maintenance, emergency road repairs and reroutes, logging, and development have had a long-term minor adverse impact on soil resources in the Quinault River Valley from excavation and erosion, which has led to a loss in soil productivity. Present and future foreseeable actions, such as future road maintenance and relocations inside and outside the park, and development outside the park, could result in continued adverse effects to soils. The QIN's plan for restoration of degraded portions of the Quinault River may benefit soils by stabilizing the stream channel and reducing bank erosion and soil loss. Alternative C would contribute short-term minor adverse effects and long-term benefits to the overall long-term minor adverse cumulative effects on soils.

Conclusion. Alternative C would have short-term minor adverse effects on soils during construction with long-term benefits by stabilizing the roadbank and reducing erosion. Cumulative effects would be long-term, minor, adverse, with long-term beneficial contributions from Alternative C. Because there would be no major adverse or unacceptable impacts to soils, there would be no impairment of park resources or values.

HYDROLOGY AND WATER QUALITY

Affected Environment

The Quinault River drains from the Olympic mountains in Northwest Washington State. About 11 miles upstream of Lake Quinault, the North and East forks of the Quinault River join. The South Shore Road, located along the Quinault River to about 1 mile below the confluence of the two branches, sustained damage near the upper end of the road during the storm that began on December 3, 2007. Graves Creek Road, which sustained damage at numerous locations during the storm, follows the East Fork of the Quinault River. The North Fork has a drainage area of about 80 square miles and the East Fork has a drainage area of about 90 square miles. The average annual precipitation measured at the Quinault Ranger Station is 146 inches, with monthly precipitation varying from 3 to 24 inches.

Settlement in the Quinault River Valley began between 1900 and 1920 (Reclamation 2005). A number of land management practices since that time have influenced the condition of the watershed and the Quinault River. The clearing of old-growth forest on terraced streambanks in the channel migration zone of the Quinault River is believed to be the most significant factor affecting river processes (Reclamation 2005). Logging occurred in the Quinault River Valley from the early 1900s to about 1950. Homesteaders, as well as others, have attempted to manage the Quinault River by removing natural logjams from the river, installing riprap for bank protection, or taking measures to redirect river flow. Road and

bridge construction have also influenced river-forming processes in the valley. Previous repairs and streambank stabilization on the South Shore Road and Graves Creek Road from other storm events have contributed to both short- and long-term disturbances to the existing river system.

Quinault River flows have been measured by the U.S. Geological Survey (Reclamation 2005) from 1911 until present. The gage is located at the outlet of Lake Quinault, where the drainage area for the Quinault River is 264 square miles. The average annual flow of the river at this location is about 2,900 cfs. The highest flows (up to a maximum daily average of 5,600 cfs) occur during November through February and the lowest flows (down to a minimum daily average of about 800 cfs) occur in August and September. Annual peak flows during the USGS period of record (1911 to 2007) have nearly always occurred between mid-October and mid-March, and have ranged from 6,670 cfs to 50,500 cfs. Peak flows exceeding 30,000 cfs have occurred 23 times during the 93-year period of record (about 1 in every 7 years). In the 1950s and 1980s, peak flows exceeded 30,000 cfs in 5 of 10 years. Lake Quinault dampens peak and low flows between the inlet to the lake and the outlet where the USGS gaging station is located. Lake Quinault is a natural unregulated reservoir. The USGS analyzed the potential dampening effect on peak flows once they entered Lake Quinault to develop discharge estimates at the inlet to the lake. It was determined that peak flows in the Quinault River may be about 30 to 40 percent higher upstream of the lake. The storm event that began on December 3, 2007 resulted in a maximum instantaneous peak flow on December 4 of 41,600 cfs at the USGS gage, the sixth largest flow on record. Assuming an equal distribution of runoff from the watershed above Lake Quinault, the estimated peak flow from the East Fork of the Quinault River could have been between 18,500 and 20,000 cfs.

The Quinault River has a wide, aggrading channel with numerous gravel bars (Reclamation 2002). There are often two to three distinct channels in the river, with four or five channels in short sections. The slope of the river at the confluence of the two forks is 0.0035 feet/feet; the slope of the East Fork of the river in the project area is about 0.006 feet/feet (Reclamation 2005). The active channel migrates laterally on average between about 30 and 50 feet per year at the confluence of the forks. The 100-year floodplain has not been mapped on the Quinault River. The estimated width of the floodplain of the East Fork averages about 1,500 feet in the area of the road damage, but is as narrow as about 565 feet and as wide as about 2,500 feet. The floodplain is restricted on both sides by steep mountainous terrain that consists of bedrock or small drainages that contain debris flow deposits (Reclamation 2002).

The water quality of the Quinault River is excellent, with minimal human sources of pollutants to the river. At the USGS gage site, the water is very soft, high in dissolved oxygen, and contains very low dissolved solids, nutrient, and metals concentrations. There are several sources of natural turbidity in the stream, including normal suspended fine material caused by shifts in the river channel and resulting bank erosion (Reclamation 2005). High-flow events cause significant turbidity in the stream.

Environmental Consequences

Alternative A—No Action

Direct and Indirect Impacts of the Alternative. High streamflow in the East Quinault River in the future would likely cause additional erosion of the road at MP 1.2, 1.7, and 4.0 if

roadbank protection measures are not installed. Emergency road repairs completed at MP 0.7 to 0.9 should prevent erosion and road washout at this location under normal hydrologic conditions, but at flows similar to the December 2007 storm, road washout is possible. Slumping, erosion, and future washouts could introduce increased debris flows and sediment to the Quinault River at the locations of damaged streambanks and tributaries with plugged culverts. Over the long term, slight changes in the morphology of the stream channel would occur as the Quinault River and tributaries reach a new equilibrium if the road is not restored, as the channel adjusts to the condition of the streambanks and erodes or moves within the river floodplain. Large trees could be recruited from erosion of the streambank and would contribute to the creation of logjams, which are naturally occurring in the river. Alternative A would result in a long-term minor adverse effect on water quality and streamflow characteristics. However, over a longer period of time after the river and tributaries have reached a new equilibrium and more natural conditions, Alternative A would result in a long-term minor beneficial effect on water quality and streamflow characteristics.

Cumulative Impacts. Past actions such as road construction and maintenance, emergency road repairs and reroutes, previous installation of about 2,500 feet of riprap along the Quinault River in the park, logging, and development have resulted in changes to streamflows and channel morphology. As a result of clearing mature forests and large woody debris, the frequency and magnitude of flood events has increased, the channel has become less stable, and the river carries a greater sediment load (Reclamation 2005). Retreating of the glaciers at the headwaters of the Quinault River would be expected to result in a release of more sediment to the river, but there are no data to support this, only an observation of certain areas of rapid bank erosion in the upper watershed (Reclamation 2005). Past actions have resulted in moderate adverse impacts to hydrology and water quality. Present and future foreseeable actions, such as future road maintenance and relocations inside and outside the park, and development outside the park, could result in minor adverse effects to water resources. Planned floodplain and fish habitat improvements by the QIN to restore degraded sections of the Quinault River would result in beneficial impacts to streamflow and water quality. Because Alternative A would result in minor adverse impacts, this alternative would contribute slightly to the overall long-term moderate cumulative effects on hydrology and water quality. Alternative A would contribute minor adverse impacts to overall cumulative effects, but other current and future restoration projects would be designed to improve the hydrology and water quality of the Quinault River. While it is unlikely that floodplain and fish habitat improvements would restore the river to pre-settlement conditions, it is anticipated that overall cumulative impacts would be beneficial relative to recent conditions.

Conclusion. Alternative A would have long-term minor adverse impacts by leaving the Quinault River vulnerable to erosion, debris flows, and sedimentation where the road was damaged and tributaries flooded; however, after the river and its tributaries have reached a new equilibrium and more natural conditions, Alternative A would have long-term minor beneficial impacts. Cumulative effects would be long-term, moderate, and adverse, with Alternative A contributing short-term minor adverse effects and long-term beneficial effects. Because there would be no major adverse or unacceptable impacts to hydrology and water quality, there would be no impairment of park resources or values.

Alternative B—Restore Access with Improvements (Preferred)

Direct and Indirect Impacts of the Alternative. The road improvements at each of the damaged road sections would be designed to provide additional protective measures to

reduce the potential for damage from future storm events. Bank barbs at MP 0.7 to 0.9, 1.2, and 1.7 would serve to deflect flow away from the streambank and capture sediment that would eventually support riparian vegetation, which would further protect the streambank. Installation of a WRF at MP 0.9 would protect the streambank and road, and deflect flows away from the road. A similar effect would occur at MP 4.0 if a stream channel shift allows installation of a WRF at that location. The WRFs would be installed only when there is no flow at the construction sites. Installation of low water crossings at MP 2.3 to 2.5 would prevent future culvert plugging and reduce the potential for road damage and sediment delivery to the Quinault River. Installation of bridges at MP 3.1 and 3.4 would greatly expand the channel capacity by allowing normal and high flows to pass unimpeded under the bridges and would reduce the potential for erosion and impacts to water quality. Having adequately sized culverts or bridges would result in more natural streamflows and reduced erosion of the channels and banks. Installation of the bridges would require excavation of the channel to provide capacity, but this work would be done when the channel is dry to minimize short-term adverse effects to water quality. About 100 feet of riprap streambank armoring would be installed along the Quinault River adjacent to the Graves Creek Road at MP 4.0 and would reduce the potential for erosion. The riprap would extend about 18 to 22 feet into the river. The new culvert at Graves Creek Road at MP 4.5 would be designed to meet hydrologic flows and to protect the inlets and outlets with riprap.

The placement of bank barbs, WRF, and bank armor in the Quinault River would result in slight changes is channel morphology and stream velocity in a small portion of the river system. These structural measures are designed to protect the roadbank from the erosive forces of the river by deflecting flows. Roadbank protection measures would improve water quality downstream of the project area by reducing the potential for sediment movement into the Quinault River. Installation of two bridges would allow natural hydrologic characteristics to be maintained. Low water crossings and culvert replacement and repairs would provide capacity for most hydrologic conditions similar or better than conditions prior to the storm.

Construction activity would likely generate short-term erosion and sediment transport to the Quinault River at each location until the site is stabilized. Best management erosion control practices for drainage and sediment control would be implemented including regular inspections and repairs or improvements as needed to prevent or reduce nonpoint source pollution and minimize soil loss and sedimentation in drainage areas. All road repairs would occur during low-flow periods. If weather conditions during project operations generate sediment that may be transported to the stream channel, operations would cease until weather conditions improve. Spills of fuel or other products associated with road construction and improvements could enter the stream channel. BMPs would be implemented to prevent spills from entering the Quinault River and minimize water quality impacts to the river or its tributaries. After construction is completed, the disturbed area would be revegetated and stabilized as soon as possible.

Road repairs may result in short-term increases in sedimentation to the Quinault River drainage. The water quality of the river may be temporarily degraded due to increased sediment concentrations or the unlikely event of spilled fuel or other construction products. The road repairs would result in fewer future road washouts and, therefore, there would be less potential for erosion, debris flows, and sedimentation to the Quinault River at those locations.

Cumulative Impacts. Past actions such as road construction and maintenance, emergency road repairs and reroutes, previous installation of about 2,500 feet of riprap along the Quinault River in the park, logging, and development have resulted in changes to streamflows and channel morphology. As a result of clearing mature forests and large woody debris, the frequency and magnitude of flood events has increased, the channel has become less stable, and the river carries a greater sediment load (Reclamation 2005). Current and future actions include road repairs downstream outside of ONP, as well as floodplain and fish habitat improvements by the QIN. Past actions have resulted in moderate adverse impacts to hydrology and water quality. Present and future foreseeable actions, such as future road maintenance and relocations inside and outside the park, and development outside the park, could result in minor adverse effects to water resources. Planned floodplain and fish habitat improvements by the QIN to restore degraded sections of the Quinault River would result in beneficial impacts to streamflow and water quality. Alternative B would contribute short-term minor adverse effects and long-term minor beneficial effects to overall long-term moderate cumulative effects on hydrology and water quality by reducing future road washouts. While it is unlikely that floodplain and fish habitat improvements would restore the river to pre-settlement conditions, it is anticipated that overall cumulative impacts would be beneficial relative to recent conditions.

Conclusion. Alternative B would have short-term minor adverse impacts to water quality and streamflow characteristics during construction. There would be long-term minor beneficial effects to hydrology and water quality from additional protective measures designed to reduce future erosion of the roads, streambanks, and tributary channels. Cumulative effects would be long-term, moderate, and adverse, with short-term, minor, and adverse, with long-term beneficial contributions from Alternative B. Because there would be no major adverse or unacceptable impacts to hydrology and water quality, there would be no impairment of park resources or values.

Alternative C—Restore Access with Replacement in Kind

Direct and Indirect Impacts of the Alternative. The road improvements would be designed to repair the roads to conditions similar to that prior to the storm. This includes installing riprap on streambanks (MP 1.2, 1.7, and 4.0), reinstallation or replacement of culverts (MP 2.3 to 2.5, 3.1, 3.4, and 4.5), and repairs to the road base and road surface. About 100 feet of riprap streambank armoring would be installed along the East Quinault River adjacent to the road at each of the three locations (MP 1.2, 1.7, and 4.0) and would extend about 20 feet into the river, narrowing the river channel slightly (in Alternative A, no riprap would be installed and in Alternative B, riprap would be installed only at MP 4.0). Damaged culverts at tributary stream crossings would be replaced with new culverts designed to accommodate a normal range of flows, but future washouts are possible for larger storm events.

Construction would likely generate short-term erosion and sediment transport to the Quinault River until the site is stabilized. Use of best management erosion control practices as described for Alternative B for drainage and sediment control would be implemented to prevent or reduce nonpoint source pollution and minimize soil loss and sedimentation in drainage areas.

Road repairs may result in short-term increases in sedimentation to the Quinault River drainage. The water quality of the river may be temporarily degraded due to increased

sediment concentrations and the unlikely event of spilled fuel or other construction products. After construction is completed, water quality and streamflows would not be affected. Road repairs would provide less protection than those in Alternative B and could be subject to future damage during high flows, which could result in erosion and stream sedimentation.

Installation of riprap bank protection would result in a slight change in streamflow characteristics from existing conditions where the riprap was washed out by the storm, but would restore these small areas to a condition similar to what they were prior to the storm. The roadbank armor would deflect flows, thus improving water quality downstream of the project area by reducing the potential for sediment movement into the Quinault River.

Cumulative Impacts. Cumulative impacts would be similar to those described under Alternative B. Alternative C would result in short-term minor adverse impacts during construction and long-term beneficial effects; therefore, this alternative would contribute slightly to the overall long-term moderate adverse cumulative effects on streamflow and water quality.

Conclusion. Alternative C would have short-term minor adverse impacts to water quality and streamflow characteristics during construction. There would be long-term beneficial effects to hydrology and water quality from repairing the streambanks, improving streamflow by removing debris, and installing culverts. Cumulative effects would be long-term moderate and adverse, with a short-term, minor, and adverse and long-term and beneficial contribution from Alternative C. Because there would be no major adverse or unacceptable impacts to hydrology and water quality, there would be no impairment of park resources or values.

FLOODPLAIN

Affected Environment

The project area is within the floodplain of the Quinault River, which ranges from 450 to more than 2,500 feet wide in the project area. The floodplain of the Quinault River is well developed and clearly confined by steep bedrock terrain on either side of the floodplain. The 2-year bankfull flow of the Quinault River at the USGS gage at the outlet of Lake Quinault averaged 24,500 cfs between 1951 and 2004 (Reclamation 2005). The 100-year peak flow at the gage averaged 56,800 cfs between 1911 and 2002. The USGS determined that peak flows in the Quinault River may be about 30 to 40 percent higher upstream of the lake. Assuming an equal distribution of runoff from the watershed above Lake Quinault, the 2-year bankfull flow would be about 11,000 cfs and the 100-year peak flow would be about 25,000 to 27,000 cfs in the East Fork of the Quinault River.

Executive Order 11988 (*Floodplain Management*) requires an examination of impacts to floodplains and potential risks involved in placing facilities within floodplains. EO 11988 directs that, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains are to be avoided when there is a practicable alternative. In this case, occupation and modification of the floodplain cannot be avoided; therefore, NPS Order #77-2: Floodplain Management states that a Statement of Findings (SOF) must be prepared and approved, in accordance with procedures described in NPS

Procedural Manual 77-2. The Floodplain SOF is found in Appendix B. In addition, the NPS would take all reasonable actions to minimize impacts to the natural resources of floodplains and ensure that structures are designed to be consistent with the intent of the standards and criteria of the National Flood Insurance Program (44 CFR Part 60).

Environmental Consequences

Alternative A—No Action

Direct and Indirect Impacts of the Alternative. No direct effect to the floodplain of the Quinault River would occur if the damaged road areas are not repaired. However, damaged areas of road would continue to slump and erode resulting in changes to the channel morphology within the floodplain. Tributaries with buried or washed culverts would continue to change course or erode in response to runoff events. This would be an indirect long-term negligible adverse effect. The ability of the floodplain to convey and store floodwaters would not change. Over the long term, slight changes in the morphology of the stream channel would occur as the Quinault River and tributaries reach a new equilibrium, if the road is not restored, as the channel adjusts to the condition of the streambanks and erodes or moves within the river floodplain. Large trees could be recruited from erosion of the streambank and would contribute to the creation of logjams, which are naturally occurring in the river. After the river and its tributaries have reached a new equilibrium, with natural floodplain processes restored, Alternative A would have long-term minor beneficial impacts.

Cumulative Impacts. Past actions such as road construction and maintenance, emergency road repairs and reroutes, logging, and development have resulted in changes to the river floodplain. As a result of clearing of mature forests and large wood debris, the frequency and magnitude of flood events has increased, the channel has become less stable and the river carries a greater sediment load (Reclamation 2005). Current and future actions include road repairs downstream outside of the ONP, as well as floodplain and fish habitat improvements planned by the QIN. Past actions have resulted in adverse impacts to the Quinault River floodplain and reasonably foreseeable future planned actions to restore degraded sections of the river would result in beneficial impacts to the floodplain. Because Alternative A would have a long-term minor beneficial effect, it would contribute slightly to the overall cumulative effects on the floodplain. Alternative A would contribute minor adverse impacts to overall cumulative effects, but other current and future restoration projects would be designed to improve the floodplain conditions of the Quinault River. While it is unlikely that floodplain and fish habitat improvements would restore the river to pre-settlement conditions, it is anticipated that overall cumulative impacts would be beneficial relative to recent conditions.

Conclusion. Alternative A would initially have long-term negligible adverse impacts on the Quinault River floodplain from not repairing the damaged roads, but in the long term would have minor beneficial impacts. Cumulative effects would be long-term and beneficial. Because there would be no major adverse or unacceptable impacts to floodplains, there would be no impairment of park resources or values.

Alternative B—Restore Access with Improvements (Preferred)

Direct and Indirect Impacts of the Alternative. The road improvements at each of the damaged sections would be designed to provide additional protective measures to reduce the potential for damage from future storm events, but would introduce material or structures within the Quinault and East Quinault rivers and tributary floodplains. Installation of bank barbs at MP 0.7 to 0.9, 1.2, and 1.7 would serve to deflect flow away from the streambank and capture sediment that would eventually support riparian vegetation to further protect the streambank. Installation of a WRF at MP 0.9 also would serve to protect the streambank and road and deflect flows away from the road. A similar effect would occur at MP 4.0 if the stream channel shifts allowing installation of a WRF at that location. Riprap streambank armoring at MP 4.0 would be installed along the Quinault River adjacent to the road and would extend about 20 feet into the river. The road improvements result in a long-term minor beneficial effect to the Quinault River floodplain because they would reduce slumping, erosion, and future washouts that could introduce debris flows to the Quinault River at the locations of damaged streambanks. However, the riprap bank armor, bank barbs, and WRFs would reduce the width of the floodplain and alter the natural movement of the active channel and the aggradation and degradation of sediment within the floodplain, resulting in a long-term minor adverse effect to the floodplain. It is expected that changes in floodplain values and functions would be barely measurable and localized. Overall, these measures would result in both long-term minor adverse effects and minor beneficial effects to the floodplain.

Installation of low water crossings at MP 2.3 to 2.5 would allow stormflows to move unimpeded in this ephemeral drainage and would reduce the potential for road damage and sediment delivery to the Quinault River. Construction of bridges at MP 3.1 and 3.4 would substantially increase the flow capacity in these intermittent streams to better carry high flows. The new culvert at Graves Creek Road MP 4.5 would be designed to meet hydrologic flows and the inlets and outlets protected with riprap to reduce damage during high flows. Installation of new crossing structures at these tributaries would have a long-term minor beneficial effect on the floodplains of the tributaries by increasing the capacity to carry stormflows.

The placement of bank barbs, WRF, and bank armor in the Quinault River would result in slight changes in the floodplain by introducing structural measures in the channel. These small structures would not appreciably affect channel capacity and the ability of the river to accommodate flood flows. Road improvements would not change the ability of the floodplains to convey and store floodwaters, and rehabilitation of the roads would not contribute to flooding during or after construction. Floodplain values would not be adversely affected at any of the road improvement sites.

Cumulative Impacts. Cumulative impacts are the same as described under Alternative A. Past actions such as road construction and maintenance, emergency road repairs and reroutes, logging, and development have resulted in adverse impacts to the Quinault River floodplain and current and future actions would result in beneficial impacts to the floodplain. Alternative B would result in long-term minor adverse impacts and long-term beneficial effects that would contribute slightly to the overall cumulative effects on the Quinault River floodplain. Overall long-term cumulative impacts to the floodplain would be beneficial.

Conclusion. Alternative B would have a long-term minor adverse effect to the Quinault River floodplain by slightly reducing the width of the floodplain where riprap bank armor, bank barbs, and WRFs are installed. Long-term minor beneficial effects would occur with improvements to the drainage crossings on tributaries. Cumulative effects would be long-term and beneficial. Because there would be no major adverse or unacceptable impacts to floodplains, there would be no impairment of park resources or values.

Alternative C—Restore Access with Replacement in Kind

Direct and Indirect Impacts of the Alternative. The road improvements at each of the damaged sections of the roads would be designed to repair the roads to a condition similar to that prior to the storm. This includes installing riprap on stream banks (MP 1.2, 1.7, and 4.0), installation of replacement culverts (MP 2.3 to 2.5, 3.1, 3.4, and 4.5) at damaged tributary road crossings. Riprap streambank armoring would be installed along the East Quinault River adjacent to the road and would extend about 20 feet into the river, narrowing the river channel slightly, but reducing slumping and erosion. Damaged or buried culverts at tributary stream crossings would be replaced with new culverts designed to accommodate a normal range of flows, but future washouts are possible for larger storm events. The road improvements would result in a long-term negligible to minor adverse effect to the Quinault River floodplain and a slight beneficial effect on the tributary floodplains.

Installation of riprap bank protection would result in a slight change in the floodplain from existing conditions where the riprap was washed out by the storm, but would restore these localized areas to a condition similar to what they were prior to the storm. The road improvements would accommodate flood flows and would not change the ability of the floodplains to convey and store floodwaters. Rehabilitation of the roads would not contribute to flooding during or after construction.

Cumulative Impacts. Cumulative impacts would be similar to those described under Alternative B. Past actions such as road construction and maintenance, emergency road repairs and reroutes, logging, and development have resulted in adverse impacts to the Quinault River floodplain and current and future actions would result in beneficial impacts to the floodplain. Alternative C would result in long-term minor adverse impacts; and would have a slight beneficial effect to the overall cumulative effects on the Quinault River floodplain. Overall long-term cumulative impacts to the floodplain would be beneficial.

Conclusion. Alternative C would have long-term minor adverse effects to the Quinault River floodplain and slight beneficial effects on the tributary floodplains. Cumulative effects would be long-term and largely beneficial. Because there would be no major adverse or unacceptable impacts to floodplains, there would be no impairment of park resources or values.

ETHNOGRAPHIC RESOURCES AND TREATY RESOURCES

Affected Environment

Ethnographic resources are expressions of human culture and the basis of continuity of cultural systems (NPS Director's Order #28). Ethnographic resources can include sites, structures, objects, traditional landscapes, or a natural resource feature assigned traditional

legendary, religious, subsistence, or other significance in the cultural system of a traditionally associated group.

Park ethnographic studies have found that the Olympic Peninsula and its waters are crucial for subsistence activities, as well as important as a place of power and identity for the Native American groups on the peninsula. Indian life includes harvesting river and ocean fisheries and traveling into the mountains to gather plant products. Both riverine and marine fisheries resources continue to be important to the QIN, whose lands are located along the Quinault River downstream from the project area. Fishing is an important part of the tribal economy and maintaining healthy salmon and trout populations that spawn in the upper Quinault River and East and North Forks is important to the tribe. The tribe currently monitors the fish and water quality in the river and uses the Graves Creek Road to access their monitoring stations. The NPS maintains ongoing consultation and coordination with the QIN to ensure that park operations and decisions consider tribal concerns.

Environmental Consequences

Alternative A—No Action

Direct and Indirect Impacts of the Alternative. Permanent closure of the Graves Creek Road to vehicle traffic would make access to traditional areas and access to research and monitoring sites for the QIN more difficult, resulting in minor to moderate adverse impacts to the QIN and affiliated tribes. However, tribal members could still hike into the area. The QIN believes that closing the road to vehicular traffic and eventually restoring the area above the intersection of South Shore and North Shore roads would be beneficial to tribal treaty resources such as salmon. Alternative A would result in minor to moderate adverse impacts to the QIN and affiliated tribes.

Cumulative Impacts. Other road closures outside the park may have led to reduced access to traditional use areas. Existing development and visitor use may interfere with traditional access. This has likely resulted in short- or long-term moderate adverse effects. Alternative A would contribute slightly to the short- and long-term moderate adverse cumulative effects.

Conclusions. Reduced traditional access by the QIN and affiliated tribes would result in long-term moderate adverse effects. However, the QIN believes that closing the Graves Creek Road to vehicular traffic and eventually restoring the Quinault River above the intersection of South Shore and North Shore roads would be beneficial to tribal treaty resources such as salmon. Alternative A would contribute slightly to the short- and long-term moderate adverse cumulative effects. Because there would be no major adverse or unacceptable impacts to ethnographic resources and treaty resources, there would be no impairment of park resources or values.

Alternative B—Restore Access with Improvements (Preferred)

Direct and Indirect Impacts of the Alternative. Restoring vehicle access on Graves Creek Road would allow tribal members access for traditional use, fisheries management, and research. This would result in long-term beneficial effects to the affiliated tribes. However, tribal access would likely be limited during construction resulting in a short-term minor adverse effect. The effects to fisheries (a tribal treaty resource) are evaluated in the Fishery Resources section discussed previously.

Cumulative Impacts. Other road closures outside the park may have led to reduced access to traditional use areas. Existing development and visitor use may interfere with traditional access. This has likely resulted in short- and long-term moderate adverse effects. Alternative B would reopen access and would provide a long-term beneficial contribution to cumulative effects by restoring access to a portion of the park that has traditionally been open.

Conclusions. Restoring access to the Graves Creek Road would result in a long-term beneficial effect to affiliated tribes. This alternative would have a long-term beneficial contribution to the overall short-and long-term cumulative adverse effects. Because there would be no major adverse or unacceptable impacts to ethnographic resources and treaty resources, there would be no impairment of park resources or values.

Alternative C—Restore Access with Replacement in Kind

Direct and Indirect Impacts of the Alternative. Restoring vehicle access on Graves Creek Road would allow tribal members access for traditional use, fisheries management, and research. This would result in long-term beneficial effects to the affiliated tribes. However, tribal access would likely be limited during construction resulting in a short-term minor adverse effect. The effects to fisheries (a tribal treaty resource) are evaluated in the Fishery Resources section discussed previously.

Cumulative Impacts. Other road closures outside the park may have led to reduced access to traditional use areas. Existing development and visitor use may interfere with traditional access. This has likely resulted in short- and long-term moderate adverse effects. This alternative would reopen access and would have a long-term beneficial contribution to cumulative effects by restoring access.

Conclusions. Restoring access to the Graves Creek Road would result in long-term beneficial effects to affiliated tribes. Alternative C would have a long-term beneficial contribution to the overall short- and long-term cumulative adverse effects. Because there would be no major adverse or unacceptable impacts to ethnographic resources and treaty resources, there would be no impairment of park resources or values.

VISITOR EXPERIENCE AND RECREATIONAL RESOURCES

Affected Environment

ONP hosted almost 3 million visits in 2007, with most visitors coming during the months of June through September. The Quinault Rain Forest is one of the prime destination points for visitors to the west side of the Olympic Peninsula and received about 70,000 visitors in 2007 (NPS 2008b). The Quinault Valley is open to year-round public use and provides a variety of visitor activities, including hiking, camping, fishing, and wildlife and scenic viewing. Attractions include the popular Quinault Loop drive, which utilizes the South Shore and North Shore roads around Lake Quinault. The Graves Creek Road provides access to a major park wilderness trailhead that allows hikers to reach Anderson Pass and Sundown Pass and destinations on the east side of the park. A campground and ranger station are also located at the end of the Graves Creek Road. The campground has 30 sites, with picnic tables, fire rings,

and accessible restrooms. In the summer, the ranger station provides visitor information, exhibits, book and map sales, and wilderness permits.

Traffic on the South Shore Road is greatest at the west end near Quinault Lodge. In July 2007, the South Shore Road averaged about 1,175 vehicles per day (Esses, pers. comm. 2008). Traffic decreases further east and about 5 miles east of U.S. 101 in July 2007 traffic averaged 417 vehicles per day. Average daily traffic reported at the Grays Harbor and Jefferson County line was about 110 vehicles per day in 2005 (Peters, pers. comm. 2008). No traffic volume data is available for the Graves Creek Road, but it is likely to range around 50 to 100 vehicles per day during the summer months. The South Shore Road and Graves Creek Road were closed to vehicle access following the December 3, 2007 storm. The South Shore Road was reopened to vehicles on April 1, 2008 following emergency repairs. The Graves Creek Road remains closed to vehicles at a gate about 1 mile north of the Quinault River bridge. The Graves Creek Road is open to pedestrians, bicycles, and stock travel. The campground is open for walk-in use.

Environmental Consequences

Alternative A—No Action

Direct and Indirect Impacts of the Alternative. The nature and quality of the visitor experience in the Quinault Rain Forest would change if the Graves Creek Road remains closed to vehicle traffic. Park visitors would be able to walk or bike along the closed road, but the 5 mile trip to the campground and trailhead would reduce the number of visitors to this area. Campground facilities may remain open, but services could change because of the difficulty in maintaining those facilities. The ranger station would also be closed, which would reduce opportunities for park staff to interact with visitors. Use of the Graves Creek Road as a trail could be discontinued if the road continues to erode and becomes unsafe for pedestrian travel. Alternative A would have a long-term moderate effect on the visitor experience as a result of reduced visitor access and reductions in recreational opportunities for some activities. However, those visitors who wish the road to remain closed and be converted to a trail would benefit from Alternative A.

Cumulative Impacts. Visitors to the Olympic Peninsula have been displaced in the region by past activities or events, including road closures due to washouts or flooding, closures for resource protection, or logging. Other short-term road closures outside the park have occurred and would likely occur in the future from road work, bridge construction, culvert replacement, and other maintenance activities. Currently, the Hurricane Ridge Road is undergoing repairs that require traffic delays and the road to Dosewallips is closed because of storm damage on National Forest lands. Past actions have resulted in short- to long-term moderate adverse impacts from restrictions and delays in accessing the Quinault Rain Forest and other portions of the park. Current and future actions would result in long-term moderate adverse cumulative impacts. Alternative A would have an appreciable contribution to the overall cumulative impact.

Conclusion. Alternative A would have long-term moderate adverse effects to visitors who wish to experience the Quinault area resources by vehicle, and beneficial effects to those visitors wanting to use the road for hiking or biking without the presence of vehicles. This alternative would alter recreation use in the area and may increase visitor numbers to other areas of the park. These effects would cause long-term moderate adverse impacts to the

visitor experience. Cumulative effects would be moderate and adverse. Closure of the road would result in unacceptable impacts to the visitor experience and recreational resources because it would be inconsistent with the park's purpose, would diminish opportunities for current or future generations to enjoy, learn about, or be inspired by park resources or values, and would unreasonably interfere with park programs and activities.

Alternative B—Restore Access with Improvements (Preferred)

Direct and Indirect Impacts of the Alternative. Alternative B would reopen permanent vehicle access to the Graves Creek Trailhead, campground, and ranger station. Visitors, including those with limited mobility, would be able to access upper Quinault Rain Forest by vehicle. This alternative would restore vehicle access and reduce the potential for future road closures, thus improving the visitor experience and public use. Recreational resources, such as the trails at Graves Creek and campground, would remain readily accessible, resulting in beneficial effects to visitor use. Overall, this alternative would result in long-term beneficial effects to the visitor experience and public use in the upper Quinault area. However, those who wish the road to remain open only to bicycles and pedestrians would be adversely affected if the road is reopened to vehicular traffic.

Cumulative Impacts. Visitors to the Olympic Peninsula have been displaced in the region by past activities or events, including road closures due to washouts or flooding, closures for resource protection, or logging. Other short-term road closures outside the park have occurred and would likely occur in the future from road work, bridge construction, culvert replacement, and other maintenance activities. Currently, the Hurricane Ridge Road is undergoing repairs that require traffic delays, and the road to Dosewallips is closed because of storm damage on National Forest lands. Past actions have resulted in short- to long-term moderate adverse impacts from restrictions and delays in accessing the Quinault Rain Forest and other portions of the park. Current and future actions would result in short-term moderate adverse cumulative impacts. Alternative B would have a beneficial contribution to the overall cumulative impact by restoring access and recreational opportunities.

Conclusion. Under Alternative B, the effects to visitor experience and public use would be long-term and beneficial. This alternative would have a long-term beneficial contribution to the overall moderate adverse cumulative effects in the park. Those who wish the road to remain open only to bicycles and pedestrians would be adversely affected if the road is reopened to vehicular traffic. There would be no unacceptable impacts to the visitor experience and recreation resources.

Alternative C—Restore Access with Replacement in Kind

Direct and Indirect Impacts of the Alternative. Alternative C would reopen permanent vehicle access to the Graves Creek Trailhead, campground, and ranger station with the same long-term beneficial effects to the visitor experience and public use in the upper Quinault area as Alternative B. This alternative lacks the more extensive road repairs included in Alternative B; therefore, the potential for road closure following high flows or storm events would be greater. However, those who wish the road to remain open only to bicycles and pedestrians would be adversely affected if the road is reopened to vehicular traffic.

Cumulative Impacts. Cumulative effects would be similar to Alternative B. Alternative C, in combination with the impacts of other previously described current and future actions,

would result in a long-term beneficial contributions to visitor experience and recreation cumulative effects.

Conclusion. Under Alternative C, the effects to visitor experience and public use would be long-term and beneficial. Current and future actions would result in short-term moderate adverse cumulative impacts. This alternative would have a long-term beneficial contribution to the overall moderate adverse cumulative effects in the park. Those who wish the road to remain open only to bicycles and pedestrians would be adversely affected if the road is reopened to vehicular traffic. There would be no unacceptable impacts to the visitor experience and recreation resources.

PUBLIC HEALTH, SAFETY, AND PARK OPERATIONS

Affected Environment

Maintenance of South Shore Road and Graves Creek Road within ONP is the responsibility of the park's maintenance staff. Park personnel use the road to access portions of the park for visitor services, maintenance, law enforcement, search and rescue, and resource management purposes.

Environmental Consequences

Alternative A—No Action

Direct and Indirect Impacts of the Alternative. The South Shore and Graves Creek roads provide access to park visitor and operation facilities. Allowing for emergency access to these areas is important for effective NPS response to medical emergencies, search and rescues, and fires; and would allow access for facility and trail maintenance. If the road remains closed to vehicles, it would add an additional 6 miles to the trail maintenance program if the decision were made to keep the road open to trail users; and it would be difficult for park staff to respond to emergencies and maintain the campground, trails, and other facilities at the end of the Graves Creek Road. Access for research and resource management in the area would be more challenging. Alternative A constitutes a long-term moderate adverse impact on park operations.

Cumulative Impacts. Future road work, bridge construction, and other maintenance activities along the South Shore Road may result in short-term traffic delays, but long-term beneficial improvements to road conditions. These future actions would have a beneficial effect on park operations over the long term. Alternative A would result in moderate adverse contributions to the overall cumulative effects on park operations. Overall long-term cumulative impacts to public health, safety, and park operations would be moderately adverse as a result of restricted access on the Graves Creek Road.

Conclusion. Alternative A would result in a change to park operations because vehicle access on Graves Creek Road would be closed beyond about 1 mile. A long-term moderate adverse impact to park operations related to emergency response, campground, trail, facility maintenance, resource management, and research would occur from access restrictions. Cumulative effects to park operations would be long-term, moderate, and adverse. Closure of the road would result in unacceptable impacts to the park health, safety, and park

operations because it would create an unsafe or unhealthful environment for visitors and employees and would unreasonably interfere with park programs and activities.

Alternative B—Restore Access with Improvements (Preferred)

Direct and Indirect Impacts of the Alternative. Restoring vehicle access on Graves Creek Road into the Quinault Rain Forest would allow NPS response to medical emergencies, search and rescues, and fires; and would allow access for research, resource management, and facility and trail maintenance. Maintenance operations would continue as they had before the road was closed. Proposed road improvements reduce the potential for future road closure and disruption in park operations. Alternative B would result in long-term beneficial effects to park operations.

Cumulative Impacts. Future road work, bridge construction, and other maintenance activities along the South Shore Road may result in short-term traffic delays, but long-term beneficial improvements to road conditions. These future actions would have a beneficial effect on park operations over the long term. Alternative B would result in long-term beneficial contributions to the overall cumulative effects on park operations. Overall long-term cumulative impacts to public health, safety, and park operations would be beneficial with implementation of Alternative B and reasonably foreseeable actions.

Conclusion. Alternative B would result in long-term beneficial effects to park operations by restoring vehicle access on Graves Creek Road. The cumulative effects to park operations would be long-term and beneficial. There would be no unacceptable impacts to the park health, safety, and park operations.

Alternative C—Restore Access with Replacement in Kind

Direct and Indirect Impacts of the Alternative. Restoring vehicle access on Graves Creek Road into the Quinault Rain Forest would provide the same benefits as described for Alternative B. This alternative lacks the more extensive road repairs included in Alternative B; therefore, the potential disruption in park operations from road closure following high flows or storm events would be greater. Alternative B would result in long-term beneficial effects to park operations.

Cumulative Impacts. Future road work, bridge construction, and other maintenance activities along the South Shore Road may result in short-term traffic delays, but long-term beneficial improvements to road conditions. These future actions would have a beneficial effect on park operations over the long term. Alternative C would result in long-term beneficial contributions to the overall cumulative effects on park operations. Overall long-term cumulative impacts to public health, safety, and park operations would be beneficial with implementation of Alternative C and reasonably foreseeable actions.

Conclusion. Alternative C would result in long-term beneficial effects to park operations by restoring vehicle access on Graves Creek Road. The cumulative effects to park operations would be long-term and beneficial. There would be no unacceptable impacts to the park health, safety, and park operations.

SOCIOECONOMICS

Affected Environment

ONP hosted 3 million recreation visits in 2007. Park visitors spent $100.5 million in the local area, generating $38.4 million in direct personal income (i.e., wages and salaries) for local residents and supporting about 2,080 jobs in area tourism businesses (Stynes 2006). In 2000, tourism accounted for approximately 10% of area employment, park visitors accounted for approximately 28% of all tourist spending in the region, and 62% of tourism spending in Clallam and Jefferson counties (Stynes et al. 2001). Access to the Quinault Rain Forest area is popular and important part of the park that visitors enjoy.

Environmental Consequences

Alternative A—No Action

Direct and Indirect Effects of the Alternative. Closing the Graves Creek Road to vehicle access is likely to reduce the number of visitors to this area. Some visitors would enjoy hiking or biking the closed road, while other visitors could choose to visit other areas of the park. Decreased visitor numbers would result in long-term moderate adverse effects to socioeconomic resources. A decrease in tourism-related spending would affect local motels, restaurants, and other businesses.

Cumulative Impacts. Recent road closures and road damage from the December 2007 storm have affected visitor access and associated tourism-related spending in the Quinault area and other sections of the park. Other past, present, and foreseeable future actions would likely result in short-term moderate adverse impacts to socioeconomics from reduced visitor spending. However, future planned county road work, bridge construction, and other maintenance activities along the South Shore Road would cause some disruption and delays, but is unlikely to substantially impact tourism and local spending. The impacts of Alternative A, in combination with the impacts of other actions described above and under "Current and Future Actions," would result in long-term moderate adverse cumulative impacts to socioeconomics. Alternative A would have a substantial contribution to the overall cumulative impact.

Conclusion. Alternative A would have long-term moderate adverse effects to socioeconomics if park visitation decreases because of closure of the Graves Creek Road. Cumulative effects would be long-term, moderate, and adverse. Because there would be no major adverse or unacceptable impacts to socioeconomics, there would be no impairment of park resources or values.

Alternative B—Restore Access with Improvements (Preferred)

Direct and Indirect Impacts of the Alternative. Implementation of repairs that restore vehicle access on Graves Creek Road would allow park visitors to continue recreational use in the upper Quinault Rain Forest. Socioeconomic benefits to local businesses also would be restored similar to what they were prior to road closure. Road improvements that reduce the potential for future road closure would reduce the risk of adverse socioeconomic effects. Road work could also result in short-term employment opportunities and increased spending in the area. Overall, Alternative B would have long-term beneficial localized effects on socioeconomics.

Cumulative Impacts. Recent road closures and road damage from the December 2007 storm have affected visitor access and associated tourism-related spending in the Quinault area and other sections of the park. Other past, present, and foreseeable future actions would likely result in short-term moderate adverse impacts to socioeconomics from reduced visitor spending. However, future planned county road work, bridge construction, and other maintenance activities along the South Shore Road would cause some disruption and delays, but is unlikely to substantially impact tourism and local spending. The impacts of Alternative B, in combination with the impacts of other actions described above and under "Current and Future Actions," would result in long-term beneficial socioeconomic effects. Alternative B would have a substantial beneficial contribution to the overall cumulative impact.

Conclusion. Alternative B would have long-term beneficial effects to local socioeconomics by ensuring visitor access to a popular destination in the park. Construction-related spending would also benefit the local economy. Cumulative effects would be long-term and beneficial. Because there would be no major adverse or unacceptable impacts to socioeconomics, there would be no impairment of park resources or values.

Alternative C—Restore Access with Replacement in Kind

Direct and Indirect Impacts of the Alternative. Restoring vehicle access on Graves Creek Road into the Quinault Rain Forest would provide the same socioeconomic benefits as described for Alternative B. This alternative lacks the more extensive road repairs included in Alternative B; therefore, the potential road closure and the associated economic effects to the local gateway communities would be greater. Alternative C would result in long-term beneficial effects to park operations.

Cumulative Impacts. Cumulative effects would be the same as described for Alternative B. The impacts of Alternative C, in combination with the impacts of other actions described above and under "Current and Future Actions," would result in long-term beneficial socioeconomic effects. Alternative C would have a substantial beneficial contribution to the overall cumulative impact.

Conclusion. Alternative C would have long-term beneficial effects to local socioeconomics by ensuring visitor access to a popular destination in the park. Construction-related spending would also benefit the local economy. Cumulative effects would be long-term and beneficial. Because there would be no major adverse or unacceptable impacts to socioeconomics, there would be no impairment of park resources or values.

CONSULTATION AND COORDINATION

SCOPING/CONSULTATION

ONP conducted public scoping from January 31 to March 5, 2008 via posting on the park website and on the NPS Planning, Environment and Public Comment (PEPC) website, and with a news release provided to about 80 individuals, park neighbors, organizations, area tribes, and agencies on the park's mailing list. The purpose of public scoping was to gain input on the issues or comments related to the proposed project and identify potential projects in the area that could lead to cumulative impacts.

An article providing project information and requesting public input was published in the Peninsula Daily News on February 6, 2008, on the Tacoma News Tribune website, and on the Washington Trails Association website on February 7, 2008.

Informal consultation was initiated with the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration (NOAA) Fisheries Division in February 2008. Information was provided to the U.S. Army Corps of Engineers (COE) and the Washington State Department of Ecology (DOE) on the emergency actions and to request input for the long-term repairs. In April 2008 the park consulted with the Washington Department of Archeology and Historic Preservation and the area of potential effect for the proposed project. The park conducted a site review with the USFWS and Quinault Tribe on May 21, 2008 to review proposed actions and potential issues and areas of concern.

Tribal input was initiated with the QIN directly after the storm. Site visits occurred on December 14, 2007, January 8 (the QIN was invited, but did not attend), and February 8, 2008. A letter was sent to the QIN on January 29, 2008 to formally request tribal input and to offer opportunities for government-to-government consultations. The QIN requested formal consultation with the park, and a meeting was held at the QIN headquarters on April 25 with the QIN President and staff, and the ONP Superintendent and staff. The QIN requested that the park participate in long-term planning for Quinault River restoration and requested that the NPS collaborate with the QIN throughout the planning process. The QIN submitted a letter to the park on May 5 requesting their participation in the development of short-term alternative for repairs, and in the development of a long-term plan for the Graves Creek and other park roads in the Quinault River Valley and Upper Quinault River watershed.

The park met with the tribal representative in the project area on May 12 and May 21, 2008 to discuss rehabilitation alternatives and mitigation plans. Consultation and coordination continued through the development of the EA to determine tribal concerns related to the project and to develop alternatives and mitigation to protect area fisheries.

Agencies and organizations contacted to assist in identifying issues and provided an opportunity to review or comment on this EA include, but are not limited to, the following:

Federal Agencies

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

Department of Commerce
National Oceanic and Atmospheric Administration

Department of Interior
U.S. Fish and Wildlife Service, Western Washington Office

Department of Transportation
Federal Highway Administration

U.S. Army Corps of Engineers

Congressional Representatives

Senator Parry Murray
Senator Maria Cantwell
Senator Jim Hargrove
Rep. Norm Dicks
Rep. Lynn Kessler

State Agencies

Department of Natural Resources
Department of Ecology
Department of Fish and Wildlife
Department of Parks and Recreation
Office of Archeology and Historic Preservation

Local Agencies

Forks Chamber of Commerce
Grays Harbor Chamber of Commerce
Grays Harbor County Commissioners
Jefferson County Commissioners
City of Sequim
City of Forks
City of Hoquiam

American Indian Tribes

Quinault Indian Nation

Organizations and Businesses

Eastern Washington Steelhead Foundation
Federation of Fly Fishers
Institute for Policy Research
National Audubon Society
National Parks and Conservation Association-NW Regional District
Northwest Ecosystem Alliance
Olympic Forest Coalition
Olympic Park Associates

Olympic Peninsula Intertribal Cultural Advisory Committee
Protect the Peninsula's Future
Quinault Community Action Forum
Sierra Club-Cascade Chapter
Sunnydell Shooting Grounds
The Wilderness Society
Washington Environmental Council
Washington's National Park Fund
Wilderness Watch

Area Libraries

North Olympic Library System
- Port Angeles Branch
- Sequim Branch
- Forks Branch

Timberland Regional Library
- Aberdeen Branch
- Amanda Park Branch
- Hoquiam Branch

COMPLIANCE WITH FEDERAL AND STATE REGULATIONS

The NPS and FHWA would comply with all applicable federal and state regulations when implementing Alternative B to rehabilitate the South Shore and Graves Creek roads. Permitting and regulatory requirements for Alternative B are listed in Table 20.

In addition, there are a number of executive orders that provide management direction for the National Park Service. The Presidential Memorandum of April 29, 1994 addresses the unique legal relationship with Native American tribal governments as set forth in the Constitution of the United States, treaties, statutes, and court decisions. In accordance with the April 29, 1994 memorandum, as executive departments and agencies undertake activities affecting Native American tribal rights or trust resources, such activities should be implemented in a knowledgeable, sensitive manner respectful of tribal sovereignty. Each executive department and agency shall assess the impact of federal government plans, projects, programs, and activities on tribal trust resources and ensure that tribal government rights and concerns are considered during the development of such plans, projects, programs, and activities.

Executive Order 13175 of November 6, 2000 established the fundamental principles in formulating or implementing policies that have tribal implications, including: The United States has a unique legal relationship with Indian tribal governments as set forth in the Constitution of the United States, treaties, statutes, Executive Orders, and court decisions.

The United States recognizes the right of Indian tribes to self-government and to exercise inherent sovereign powers over their members and territory. In accordance with this Executive Order, the United States will continue to work with Indian tribes on a government-to-government basis to address issues concerning Indian self-government, tribal trust resources, and Indian tribal treaty and other rights.

Washington State Department of Ecology (DOE) – A Joint Aquatic Resource Permit Application Form will be completed and submitted to the DOE. Under Washington's program, activities must comply with the State Program: the Shoreline Management Act; the State Environmental Policy Act; the Clean Water Act; the Clean Air Act; the Energy Facility Site Evaluation Council; the Ocean Resource Management Act; and the Federal Coastal Zone Management Act of 1972. The selected alternative would be reviewed under the requirements of the Shoreline Management Act, the Clean Water Act and the Clean Air Act. Since ONP has exclusive federal jurisdiction on the lands within the park, the Shoreline Management Act requirements are used as a guideline for any development activities within the park.

TABLE 20. ENVIRONMENTAL COMPLIANCE REQUIREMENTS

Agency	Statute, Regulation, or Order	Purpose	Project Application
Federal			
National Park Service	National Environmental Policy Act	Applies to federal actions that may significantly affect the quality of the environment	Environmental review of proposed action and decision to prepare a FONSI or EIS
	National Historic Preservation Act, Section 106	Protection of historic and cultural resources in coordination with the State Historic Preservation Office	No cultural resources present; the park consulted with State Historic Preservation Officer (SHPO)
	Executive Order 11990, Protection of Wetlands	Requires avoidance of adverse wetland impacts where practicable and mitigation, if necessary	No wetlands present
	Executive Order 11988, Floodplain Management	Requires avoidance of adverse floodplain impacts were practicable and mitigation, if necessary	Activities within stream floodplains
	NPS Order No. 77-2 Floodplain Management	Protection of natural resources and floodplains	The park prepared a statement of floodplain findings
National Oceanic & Atmospheric Administration (NOAA)	Magnuson-Stevens Fishery Conservation Management Act and Sustainable Fisheries Act	Protection of essential fish habitat (EFH)	The park consulted NOAA on effects to EFH and submitted an EFH Assessment.
U.S. Army Corps of Engineers (Corps)	Clean Water Act – Section 404 Permit to discharge dredge and fill material	Authorizes placement of fill or dredge material in waters of the U.S. including wetlands	The park would seek a Nationwide 404 Permit (NW Permit 14, Linear Transportation Project) per communication with the Corps for channel work
U.S. Fish and Wildlife Service	Endangered Species Act	Protection of federally listed threatened or endangered species	The park prepared and submitted a BA to the U.S. Fish and Wildlife Service as part of informal consultation.
State of Washington			
Washington Department of Fish and Wildlife and Department of Ecology	Joint federal and state permit application for activities in aquatic habitat; addresses habitat protection, 401 water quality certification, and 404 permitting	Protection of aquatic habitat	The park prepared a Joint Aquatic Resource Permit Application Form for a Nationwide Permit

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As the nation's principal conservation agency, the Department of the Interior has the responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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