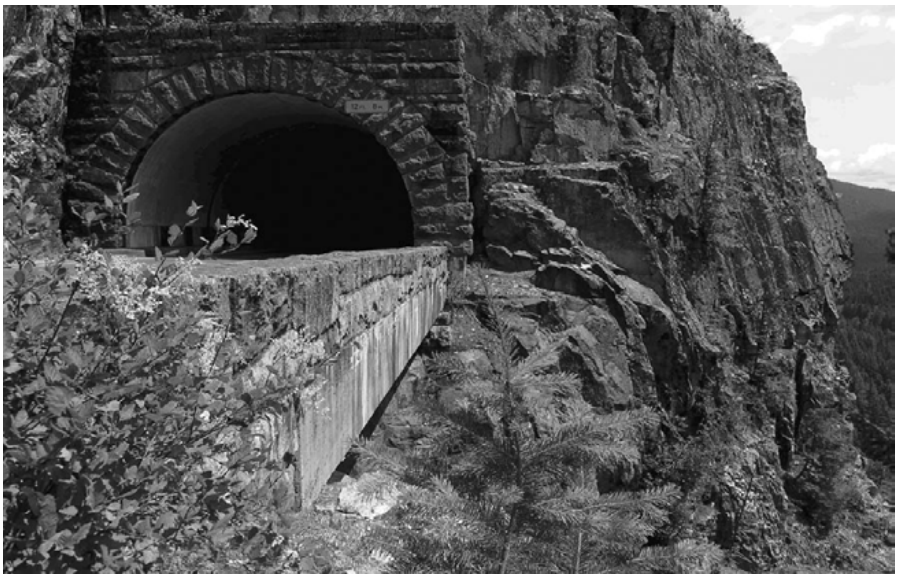
National Park Service
U.S. Department of the Interior
Mount Rainier National Park

ENVIRONMENTAL ASSESSMENT

STEVENS CANYON ROAD REHABILITATION SEGMENTS 1 AND 4

March 2010



Stevens Canyon Tunnel from the West Portal (NPS 2004)

Stevens Canyon Bridge (NPS 2004)

Mount Rainier National Park 55210 238th Avenue East, Ashford, WA 98304

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U.S. Department of the Interior
National Park Service

Environmental Assessment
Stevens Canyon Road Rehabilitation
Mount Rainier National Park

Summary

The National Park Service in cooperation with the Federal Highway Administration, Western Federal Lands Division is proposing to resurface, restore and rehabilitate 10.09 miles of Stevens Canyon Road. This action is needed because of deteriorating road conditions from structural deficiencies in the roadway and embankment fill slopes, which has caused pavement warping and cracking, soft spots, and surface slumps. Unprotected and overly steep side slopes have exacerbated slope creep, which is adversely affecting the road and historic stone retaining walls, guardwalls, culverts, curbs and other associated road features that are part of the Mount Rainier Historic Landmark District.

This environmental assessment examines two alternatives: No Action and the National Park Service Proposed Action Alternative. The Proposed Action Alternative includes: roadway stabilization measures such as embankment reinforcement and stabilization; subexcavation and reconstruction of the road base; removing and recycling asphalt; resurfacing (paving); culvert cleaning, repair and replacement; rehabilitation of turnouts and elimination of informal turnouts; repair of stone retaining walls, guardwalls, and curbs; repair of stone masonry at Stevens Canyon Bride; repair of concrete guardwall approaches and repair/paint metal guardrail at Falls Creek Bridge; resurface deck, repair and clean concrete approach guardwalls, widen sidewalk and repair and paint the metal guardrail at the Ohanapecosh River Bridge; repair the concrete and stone masonry at the Park entrance station near SR 123; extension of the stone barrier, installation of a rock border, stone curbing, and repair of eroded areas at Reflection Lakes.

Notes to Reviewers and Respondents

This document will be available for review and comment for 30 days. If you wish to comment on the environmental assessment, you may mail comments to the name and address below or you can provide electronic comments through the National Park Service Planning and Environment Public Comment (PEPC) website. The public access site is: http://parkplanning.nps.gov/mora. A link to the site is also available from the Mount Rainer National Park website: www.nps.gov.mora. Before including your address, phone number, e-mail address or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we would be able to do so. We would make all submissions from organizations, businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses available for public inspection in their entirety.

Please address written comments to:

Superintendent
Mount Rainier National Park
55210 238th Avenue East
Ashford, WA 98304

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ACRONYMS AND ABBREVIATIONS

3R	resurfacing, restoration, and rehabilitation
ANSI	American National Standards Institute
APE	Area of Potential Effect
AQRV	Air Quality Related Values
BA	Biological Assessment
BMPs	best management practices
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH_4	methane
CLIP	Climate Leadership in Parks
CO	Contracting Officer
CO_2	carbon dioxide
DAHP	Washington Department of Archeology and Historic Preservation
dbh	diameter at breast height
DO	Director's Order
DSC	Denver Service Center
EA	Environmental Assessment
EPA	U.S. Environmental Protection Agency
ESF	Environmental Screening Form
FC	Federal Candidate (species)
FE	Federally Endangered
FHWA	Federal Highway Administration
FLHP	Federal Lands Highway Program
FONSI	Finding of No Significant Impact
FRPOP	Federally Proposed (species)
FSC	Federal Species of Concern
FT	Federally Threatened
GMP	General Management Plan
GWP	global warming potential
km	kilometers
MOA	Memorandum of Agreement
MORA	Mount Rainier National Park
MSE	mechanically stabilized earth (wall)
$MTCO_2E$	metric tons carbon equivalent
N_2O	nitrous oxide
NAWMA	North American Weed Management Association
NEPA	National Environmental Policy Act
NHLD	Mount Rainier National Historic Landmark District
NHPA	National Historic Preservation Act
NPDES	National Pollutant Discharge Elimination System

ACRONYMS AND ABBREVIATIONS (CONTINUED)

NPS	National Park Service
NRHP	National Register of Historic Places
NRI	Nationwide Rivers Inventory
Park	Mount Rainier National Park
SC	State Candidate (species)
SE	State Endangered (species)
SHPO	State Historic Preservation Officer
SM	State Monitor (species)
SOC	species of concern
SR	State Route
SS	State Sensitive (species)
THPO	Tribal Historic Preservations Officer
USACE	United States Army Corps of Engineers
USC	United States Code
USFWS	United States Fish and Wildlife Service
WDM	Wetland Delineation Manual

1. PURPOSE AND NEED FOR ACTION

1.1 INTRODUCTION

The National Park Service (NPS) in cooperation with the Federal Highway Administration/Western Federal Lands Highway Division (FHWA/WFLHD) is proposing to resurface, restore and rehabilitate (3R) a total of 10.09 miles of Stevens Canyon Road in Mount Rainier National Park (MORA or Park). For the purposes of design and budget limitations, the proposed improvements to Stevens Canyon Road were split into 4 road segments. This Environmental Assessment (EA) addresses Segments 1 and 4, which are located at the west and east ends of the road, respectively. These two segments were selected because they are most in need of rehabilitation. Once the 3R work is completed, further work on these road segments is not anticipated to be needed for 25-30 years. Segment 1 includes a 4.83-mile section between the Nisqually Road intersection (Canyon Wye) and the Stevens Creek Bridge. Segment 4 includes a 5.26-mile section between Backbone Ridge Viaduct and the Stevens Canyon Entrance at State Route (SR) 123. Segments 2 and 3 are in good condition and do not warrant full rehabilitation. The entire project is located in Lewis County, Washington (Figure 1).

1.2 PURPOSE AND NEED

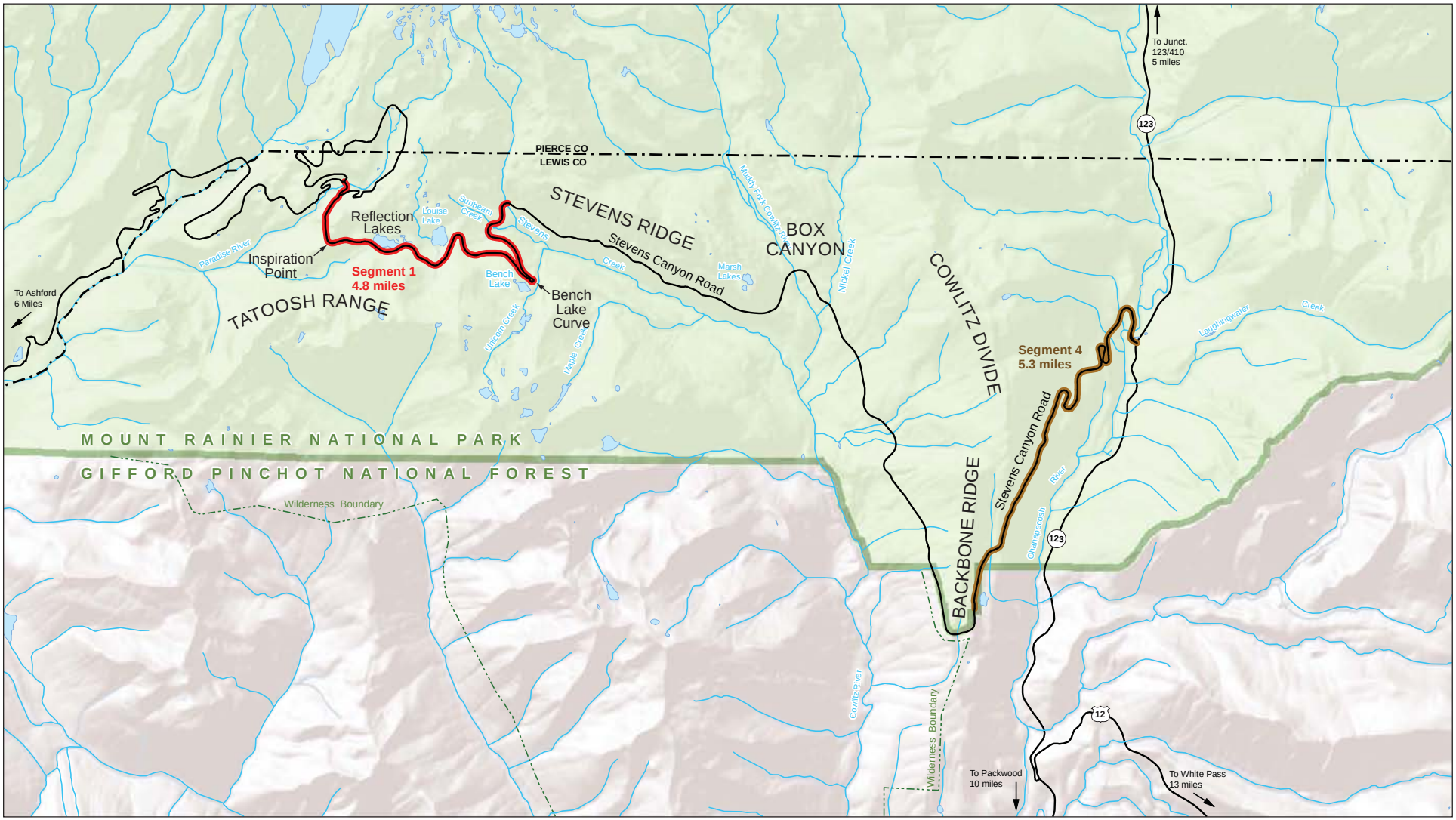
The purpose of the project is to improve the safety for all travelers on Stevens Canyon Road and reduce the possibility of road failures and maintenance costs, while at the same time having little or no impact to the adjacent environment. The project is needed because structural deficiencies in the roadway and embankment fill slopes are accelerating the deterioration of Stevens Canyon Road. These deficiencies include: drainage problems, surface slumps, soft spots, pavement warping and cracking, narrow shoulders, deteriorating historic stone masonry retaining walls and guardwalls, and overly-steep, creeping, unprotected side slopes adjacent to the roadway. Failure to correct structural deficiencies and deteriorating road conditions would result in an increased potential for traffic accidents, a reduction in the quality of the visitor experience, and an increased demand on Park staff and resources. In addition, allowing the road to deteriorate would not meet the intent of the National Historic Preservation Act (NHPA) since Stevens Canyon Road is a contributing element of the Mount Rainier National Historic Landmark District (NHLD).

1.3 LOCATION AND GENERAL DESCRIPTION – MOUNT RAINIER NATIONAL PARK

Mount Rainier National Park is located on the western slope of the Cascade Range, 65 miles southeast of Seattle and 65 miles west of Yakima in Pierce and Lewis counties (Figure 1). In 1899, the Park was recognized as a significant area when the United States Congress established it as the nation's fifth national park (NPS 2001). Subsequent congressional actions included the designation of approximately 97 percent of the Park as wilderness in 1988 (NPS 2001).

Elevations in the Park generally range from 1,700 feet above sea level to 14,410 feet at the summit of Mount Rainier, which is the prominent landmark at the Park and in the Pacific Northwest. This towering snow and ice covered volcano has a base that spans approximately 100 square miles. Moreover, Mount Rainier is the second most seismically active and hazardous volcano in the Cascade Range (NPS 2001).

In addition, there are 26 major glaciers on the mountain that cover approximately 35 square miles, making it the largest single-mountain glacial system in the contiguous 48 states (NPS 2001).



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SCALE IN MILES

Legend

Project Area

Segment 1

Segment 4

Figure 1
Vicinity Map
Stevens Canyon Road EA
Mount Rainier National Park

1.3.1 Park Purpose, Significance and Mission

An essential part of the planning process is to understand the purpose, significance, and mission of the park for which this EA is being prepared. The purposes of Mount Rainier National Park, as stated in the General Management Plan (GMP) (NPS 2001) and derived from legislation are:

- To protect and preserve the Park's natural and cultural resources, processes, and values, while recognizing their increasing importance in the region, the nation, and the world.
- To provide opportunities for visitors to experience and understand the park environment without impairing its resources to maintain wilderness values.
- To provide for wilderness experience.

Mount Rainier's significance and unique characteristics are described in detail in the Mount Rainier National Park Final General Management Plan EIS (NPS 2001). Several important examples include:

- At a height of 14,410 feet, Mount Rainier is the highest volcanic peak in the contiguous United States.
- Mount Rainier has the largest alpine glacial system in the contiguous United States.
- The Park contains outstanding examples of diverse vegetation communities, ranging from old-growth forest to subalpine meadows and ancient alpine heather.
- As urban development expands, the Park continues to be a large island of protected open space where ecosystem processes dominate.
- The Park's comprehensive Mount Rainier National Historic Landmark District - a cultural landscape district that includes buildings, roads, the Wonderland and Northern Loop Trails, and other landscape structures is the most significant and complete example of NPS master planning and park development in the first half of the 20th Century.
- The developed areas of Mount Rainier contain some of the nation's best examples of NPS "rustic" style architecture of the 1920s and 1930s.

1.3.2 The Purpose and Function of Park Roads

An objective of this action is to maintain the purpose of the Park and road network as summarized in the "Park Road Design" memorandum dated February 20, 1986 from then NPS Director Mott:

> "*The purpose of park roads remains in sharp contrast to that of the Federal and State highway systems. Park roads are not intended to provide fast and convenient transportation; they are intended to enhance visitor experience while providing safe and efficient accommodation of park visitors and to serve essential management action needs.*"

As stated in the 1984 NPS Parks Road Standards, among all public resources, those of the National Park System are distinguished by their unique natural, cultural, scenic, and recreational qualities; values that are dedicated and set-aside by public law to be preserved for generations. In general, the protection, use, and enjoyment of park resources in a world of modern technology have necessitated the development of a system of public park roads. In most parks today, the basic means of providing for visitor and park administrative access is the park road system.

The park road system includes roads within or providing access to a park or other units of the NPS. The road system is administered by the NPS or by the NPS in cooperation with other agencies such as FHWA/WFLHD. In defining functional classification, the routes that make up a park road system are grouped into three broad categories, primarily based on use (NPS 2003). These definitions are provided below in Table 1. Stevens Canyon Road is classified as a public use and administrative park road.

Table 1. Functional Classification of Park Roads.

Functional Classification	Definition	Stevens Canyon Road
Public Use Park Road	This classification includes all roads that provide vehicular means of access for visitors, or access to such representative park areas as points of scenic or historic interest, campgrounds, picnic areas, trailheads, and similar features. Examples of these roads include: county, state, and U.S. numbered highways maintained by the NPS.	X
Administrative Park Roads	This includes all public and non-public roads intended primarily to fulfill management objectives for the particular area. This category of roadway includes those routes serving employee residential areas, maintenance areas, and other administrative developments, as well as patrol roads, truck trails, or similar administrative roads.	X
Urban Parkways and City Streets	These are routes and facilities characterized as serving high volumes of park and non-park related traffic and restricted, limited-access facilities in urban areas.	

Source: NPS 2003

1.4 BACKGROUND STEVENS CANYON ROAD AND HISTORIC ROADSIDE CHARACTER

Stevens Canyon Road is approximately 19 miles long and traverses the south slope of Mount Rainier, beginning at the intersection with the Nisqually Road (4,300 feet in elevation) and extending to the intersection with the Eastside Highway (SR 123) (1,928 feet in elevation). Traversing the lower slopes of the Tatoosh Range, the road winds gently, passing Reflection Lakes, Louise Lake and Bench Lake. From below Bench Lake the road begins a rapid descent down the south side of Stevens Canyon towards Stevens Creek and continues along the north face of the canyon at Stevens Ridge to Box Canyon. After Box Canyon, the road skirts the lower slopes of the Cowlitz Divide, cresting at Backbone Ridge, before descending into lowland forest towards the switchbacks that lead to the Ohanapecosh River (NPS 2004).

Stevens Canyon Road serves as the sole east-west access across the Park and provides access to Narada Falls, Paradise, Reflection Lakes, Box Canyon, and the Grove of the Patriarchs, as well as visitor use facilities on the west side of the Park. This roadway is maintained for summer use only and may be used as a through route with other major Park roads: Nisqually Road, SR 123 and SR 410. Traffic data provided by the NPS indicates that the average annual daily traffic is 319 trips and the seasonal average daily traffic is 849 trips (FHWA 2004).

Stevens Canyon Road was the last road to be built resulting from the early master planning for Mount Rainier National Park (design and construction of the road primarily took place from 1931 through 1940). The outbreak of World War II delayed the construction of the final road segment until 1950. The formal ceremony marking the opening of the road occurred on September 4, 1957 (NPS 2004).

Stevens Canyon Road is one of the park roads that contribute to the Mount Rainier NHLD. Stevens Canyon Road received this designation in 1997, and the Cultural Landscapes Inventory completed in 2004 by the NPS provides a "Statement of Significance," which highlights many of Stevens Canyon Road's significant features:

- Significant for its association with the NPS most complete and significant example of park master planning.
- Significant for its naturalistic landscape engineering as a scenic park highway.

From conception to construction, the road primarily functions as a scenic park highway. However, the road also serves an important purpose to the park and provides a destination for visitors and functions as a

principal route through the Park. According to the Cultural Landscapes Inventory (NPS 2004), "The intended use as a scenic park highway is evident in the geometry of the road, which choreographs an intimate experience of park scenery, and in the many rustic and naturalistic features of the road, which add to the scenic qualities of the visitor experience." The road is characterized by a narrow, curvilinear alignment. The slower posted speed limit and indirect route of Stevens Canyon Road highlight the road's intended use as a scenic park highway or as a destination unto itself.

Stevens Canyon Road was also designed to minimize visual and environmental impacts and great efforts were taken to preserve the natural landscape during construction of the road with trees often preserved right up to the paved surface of the roadway (NPS 2004). "Rustic" construction details include several distinct types of crenellated masonry guardwalls and stone retaining walls, which were handcrafted of native stone. This practice achieved a unique match between the color and texture of the masonry and the appearance of the exposed stone faces of road cuts. These and other road features were carefully designed elements of the roadside landscape and are therefore considered contributing elements to the Mount Rainier NHLD (NPS 2004).

1.5 STEVENS CANYON ROAD AND RELATIONSHIP TO OTHER PROJECTS

The Stevens Canyon Road project is related to one other reasonably foreseeable planned transportation project proposed on the Nisqually Road in MORA that is part of the overall Park goal for comprehensive transportation upgrades. However, the Stevens Canyon Road project would occur independently from the other planned project, both in terms of timing and funding. The other planned transportation project is the Nisqually Road 3R work anticipated to start in 2012.

1.6 SCOPING

To begin the planning process, staff at Mount Rainier National Park, resource professionals of the NPS Denver Service Center (DSC), and WLFHD staff conducted initial internal scoping in June 2003 with subsequent internal scoping in August 2008.

A press release initiating the public/agency/tribal scoping process and comment period was issued on October 17, 2008 (Appendix A) with the scoping period open for comments from October 17, 2008, to November 17, 2008. The notice was posted in the Seattle Daily Journal of Commerce (on October 27 and October 30, 2008) and local newspapers. Four written responses were received and included the Cowlitz Tribe, National Parks Conservation Association (NPCA), the Washington Department of Archaeology and Historic Preservation (DAHP), and a private citizen (Appendix A). These comments were incorporated into the issues and impact topics described below.

1.7 ISSUES AND IMPACT TOPICS

The impact topics to be included in this EA were identified from the public scoping comments, legislative requirements, NPS Management Policies, and park-specific resource information. Some of the main issues and concerns that were identified included:

- Potential impacts to threatened and endangered species. The northern spotted owl (a federally protected species) is known to occur within the project area.
- Construction activities have the potential to introduce and spread invasive plant species. Physical disturbance associated with construction activities provides conditions under which many invasive plant species have a competitive advantage relative to native plant species.

- Potential for effects to sensitive amphibian species that are known to occur within the project area.
- Potential for park visitation impacts due to traffic delays and/or road closures.
- Potential for impacts to water quality from construction.
- Protection and avoidance of the wetland located adjacent to the road in the Reflection Lakes area.
- Potential for generation of greenhouse gas emissions.

1.7.1 Impact Topics Selected for Detailed Analysis

NPS staff consolidated the issues and selected the impact topics described below to be addressed in the analysis of environmental consequences. A brief rationale for the selection of each impact topic is given below. In addition, a discussion of impact topics dismissed from further consideration and the rationale for dismissing them is located in the following section. 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
Air Quality	The proposed project would not increase the capacity of the roadway. However, construction would temporarily affect air quality by creating dust from clearing and grading activities and generating greenhouse gas emissions from construction vehicles and equipment exhaust. As a result, this impact topic has been retained for further analysis.	*Clean Air Act of 1963; 1916 Organic Act;* NPS *Management Policies*
Water Resources, Quality, and Quantity	The proposed project would take place in and near surface waters, primarily Stevens Creek, Reflection Lakes, and the Ohanapecosh and Paradise rivers. Soil disturbance may increase the potential for erosion and sedimentation to occur, which may be carried into project waterways by stormwater runoff. This runoff could affect water quality by increasing turbidity. Construction would require water withdrawals for dust control from the Ohanapecosh and Paradise rivers, thus affecting water quantity. As a result, this impact topic has been retained for further analysis.	*Clean Water Act; Fish and Wildlife Coordination Act of 1934* (PL 85-624) as amended; Executive Order 12088; NPS *Management Policies*, NPS-77
Wetlands	Several wetland areas were delineated adjacent to Stevens Canyon Road in the Reflection Lakes area. Placement of boulder, installation of stone curbing, installation of a rockery wall, and repair of eroded areas at the end of the parking area and from social trails is proposed next to the lake to prevent visitors from walking through the wetland area to the shoreline (the wetland has been damaged by visitors). The construction of a rockery wall may result in fill in the wetland. Since construction would affect the wetland, this impact topic was retained for further analysis.	Executive Order 11990 Protection of Wetlands, NPS *Management Policies* and Procedural Manual #77-1: Wetland Protection, *Clean Water Act* Sections 404 and 401

Impact Topic	Reasons for Retaining Impact Topic	Relevant Laws, Regulations, and Policies
Soils	The proposed project involves activities that may disturb up to 6 acres of ground and involve approximately 7,630 cubic yards of excavation. The proposed soil disturbance increases the potential for erosion and sedimentation impacts to occur. As a result, this impact topic has been retained for further analysis.	NPS *Management Policies*
Vegetation and Special Status Plant Species	The proposed project may disturb approximately 6 acres of soil and vegetation (primarily shrubs and forbs) adjacent to Stevens Canyon Road. There is also the potential for one special status plant species to be affected by vegetation removal. The project would also increase the potential for spread of invasive weeds through loss of existing vegetation and soil disturbance. The proposed construction activities are also likely to impact trees. Tree trunks and limbs are frequently damaged during construction in the Park due to the narrow width of roadways and the constrained nature of the work area in which heavy construction equipment must work. As a result, this impact topic has been retained for further analysis.	*1916 Organic Act*; NPS *Management Policies*; Resource Management Guidelines (NPS-77); *Federal Noxious Weed Control Act*; Executive Order 13112; Invasive Species (1999)
Fish, Wildlife and Special Status Fish and Wildlife Species	The proposed project would potentially impact wildlife during construction. These impacts include disturbance to habitat from vegetation removal, annoyance from increased noise levels and human activity (which may result in avoidance of the area by wildlife), and the increased potential for the spread of invasive plant species, which replace native plants that wildlife species rely on for survival. Common wildlife species are addressed in the EA because of these potential impacts. The Endangered Species Act (ESA) and NPS policy requires an examination of impacts from federal projects on all special status species. Special status species such as northern spotted owls exist within or near the project corridor and may be affected by increased noise and human activity during construction activities. As a result, this impact topic has been retained for further analysis.	NPS *Organic Act*; NPS *Management Policies*; Resource Management Guidelines (NPS-77), *Endangered Species Act*
Cultural Resources (Archeology, Historic Resources, and Cultural Landscapes)	The character-defining features of Stevens Canyon Road, a component of the Mount Rainier NHLD, consist of spatial organization, circulation, views and vistas, buildings and structures, topography, vegetation, and small scale features. Archeological sites considered eligible for inclusion in the National Register of Historic Places (NRHP) are located in subsurface deposits adjacent to the Stevens Canyon Road. Because several contributing elements in the NHLD may be affected by construction and unidentified archeologically historic properties may be affected by ground disturbing activities, this impact topic has been retained for further analysis.	*National Historic Preservation Act, Archeological Resources Protection Act, Native American Graves Protection and Repatriation Act*, Secretary of Interior's Standards and Guidelines for Archeology and Historic Preservation and Director's Order 28: Cultural Resource Management, and NPS *Management Policies*

Impact Topic	Reasons for Retaining Impact Topic	Relevant Laws, Regulations, and Policies
Visitor Use and Experience	Stevens Canyon Road provides visitor access to some of the major attractions in the Park including Narada Falls, Paradise, Reflection Lakes, Box Canyon, Grove of the Patriarchs, destination trailheads, and other visitor facilities including the road itself. Additionally, Stevens Canyon is a popular route for visitors traveling through the Park. Operational benefits such as improved turnouts, increased safety, and enhanced visitor facilities would result from the project. However, construction activities would result in impacts on visitor use because of road and lane closures, which would cause travel delays along Stevens Canyon Road or cut off access. As a result, this impact topic has been retained for further analysis.	NPS *Management Policies*
Public Health, Safety, and Park Operations	Construction of the project would require additional oversight by Park staff to monitor the project to ensure visitors can access the Park and natural resources are protected. For example, road closures would require additional communication efforts at the Park entrances and oversight from Park law enforcement staff. Thus park operations would be affected by the project. The project occurs in an area of steep slopes, landslide hazard areas, and avalanche chutes, as well as potential earthquake and volcanic activity. There is also an ongoing problem of rock fall. All of these can potentially affect public safety. Construction activities may temporarily cause some increase in rock fall particularly during bank stabilization activities. Thus, this issue and the increased demand on park staff are addressed in the public health safety and park operations impact topic, and this impact has been retained for further analysis	NPS *Management Policies*

1.7.2 Impact Topics Dismissed From Further Analysis

The following resource topics were dismissed from further analysis in the EA because they did not apply or would not be potentially impacted by the project. The basis for dismissal is provided below.

1.7.2.1 Floodplains

Executive Order (EO) 11988 (Floodplain Management) requires analysis of impacts on floodplains and potential risk involved in placing facilities within floodplains. NPS Management Policies, DO-2 and DO-12 provide guidelines for proposals in floodplains. The Ohanapecosh River and its floodplain are located in the project area. Stevens Canyon Road crosses the river near the Grove of the Patriarchs via a bridge. Some rehabilitation work is proposed on the bridge itself and there would be water withdrawals for dust suppression during construction; however, the proposed project would not involve any work within the floodplain. As a result, this resource was dismissed from further analysis.

1.7.2.2 Prime and Unique Farmlands

The 1980 Council on Environmental Quality's memorandum on prime and unique farmlands states that prime farmlands have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. Unique agricultural land is land other than prime farmland that is

used for production of specific high-value food and fiber crops. No such agricultural sites are found in Mount Rainier National Park due to the rugged terrain and short growing season. Moreover, no unique agricultural soils are believed to exist in the Park (NPS 2001). Since no agricultural activity or soils exist in the Park, this topic was dismissed from further analysis.

1.7.2.3 Natural Lightscapes

In accordance with NPS Management Policies (2006), the National Park Service strives to preserve ambient lightscapes, which are natural resources and values that exist in the absence of human-caused light. Project construction would not be allowed during nighttime hours or require any additional lighting (e.g., for security of construction equipment or at staging areas). Therefore, lightscapes would not be affected by the proposed project. As a result, this topic was dismissed from further analysis.

1.7.2.4 Soundscapes

In accordance with NPS Management Policies and Director's Order – 47: Soundscape Preservation and Noise Management, 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 sound. The road serves as the sole east-west access across the Park and provides access to Narada Falls, Paradise, Reflection Lakes, Box Canyon, and the Grove of the Patriarchs, as well as visitor use facilities on the west side of the Park. The proposed project is on a well-travelled road and would not increase road capacity; therefore, the proposed project would not result in long-term, adverse impacts to soundscapes. However, short-term minor adverse impacts to soundscapes would result from construction equipment noise. Short-term construction equipment noise would also affect wilderness, wildlife and visitors. Potential impacts are described and evaluated under the Fish, Wildlife, and Special Status Fish and Wildlife Species and Visitor Use and Experience impact topics, which have been retained for further analysis. The potential, short-term noise impacts are also briefly described under the Wilderness impact topic below. Since short-term construction impacts on soundscapes do not exceed a minor threshold, and the short-term construction noise impacts to wilderness, wildlife and visitor use and experience are described and evaluated under other impact topics, soundscapes was dismissed from further analysis as a separate impact topic.

1.7.2.5 Geologic Resources

NPS Management Policies (2006) directs that facilities be sited where they will not be damaged or destroyed by natural physical processes such as unstable soils and geologic conditions. If these areas cannot be avoided then facilities should be suitably designed. The roadway is already sited and in-place and would not put facilities into other geologically hazardous areas. The project would increase the stability of the roadway and geologic conditions adjacent to the roadway by stabilizing and reinforcing slopes. Because the project provides a benefit and would not adversely affect geologic conditions, this topic was dismissed from further analysis. There is an ongoing issue of potential geologic hazards including rock fall, and earthquake and volcanic activity, which are addressed in the Public Health, Safety and Park Operations section.

1.7.2.6 Wilderness

In 1988, Congress designated approximately 97 percent (228,480 acres) of Mount Rainier National Park as wilderness under the Wilderness Act of 1964. In the area of potential effect (APE), the wilderness boundary is generally located 200 feet from either side of the centerline of paved roads and 100 feet from the centerline of unpaved roads. All project work would occur within the existing road prism and not encroach into the wilderness area. (The road prism is defined as the road surface, road shoulders, turnouts, and adjacent side slopes.) Thus, there would be no direct disturbance to the wilderness area.

There would be short-term noise generated during construction, which could affect wilderness values, such as solitude for visitors on park trails in the vicinity of the project. The short-term impacts to visitors wanting the wilderness experience are described and evaluated under the Visitor Use impact topic, which has been retained for further analysis. Since there would be no direct disturbance to wilderness, the construction noise impacts would be temporary and of relatively short duration (noise would only be generated during daylight hours for the short construction season), and the impacts to visitors are evaluated under the Visitor Use and Experience impact topic, this topic was dismissed from further analysis.

1.7.2.7 Wild and Scenic Rivers

The Wild and Scenic Rivers Act (16 USC 1271-1287) establishes a National Wild and Scenic Rivers System and prescribes the methods and standards through which additional rivers may be identified and added to the system. The Nationwide Rivers Inventory (NRI) (www.rivers.gov/) is a register of rivers that may be eligible for inclusion in the National Wild and Scenic River System. These rivers were included on the NRI based on the degree to which they are free-flowing and undeveloped and the outstanding natural and cultural characteristics of the rivers and their immediate environments. There are no congressionally authorized wild and scenic rivers in Mount Rainier National Park; however, four rivers – the Carbon River, White River, Muddy Fork of the Cowlitz River, and the Ohanapecosh River have been included on the NRI register and are considered eligible for wild and scenic river status, and are therefore managed so as not to preclude wild and scenic river status. The Ohanapecosh River occurs in the project area.

Section 7 of the Wild and Scenic Rivers Act directs the federal agencies to protect the free-flowing condition and other values of designated rivers and congressionally authorized study rivers. While the Ohanapecosh River is not yet authorized as a study river, it is managed as if listed as stated above. Section 7 requires rigorous evaluation procedures to protect river resources. The *Technical Report of the Interagency Wild and Scenic Rivers Coordinating Council* (USDA 2004) provides evaluation procedures to identify activities that may threaten national wild and scenic river status. Water extraction from the river would be necessary during construction for dust control, and this issue is described and evaluated in the Water Resources section.

While a Section 7 determination is not required for this project, potential effects to water resources are addressed in this EA and are considered for discussion here. The activities that might affect the values for which the Ohanapecosh River might become listed include water extraction from the river for dust control during construction, and cleaning and restoration of the Ohanapecosh River bridge surface. These activities are described and evaluated in the Water Resources section of this EA, and are therefore not discussed in detail here. To summarize the effects analysis, and consider the evaluation procedures, water withdrawal and bridge maintenance and resurfacing may affect water quantity and water quality. The specific activities that may potentially affect the qualities of the Ohanapecosh River would have temporary, have no more than minor effects on water quality and water quantity, and would not affect the free-flowing nature of the river, or any of its outstandingly remarkable values, including water quality. Thus, the wild and scenic rivers impact topic is dismissed from further analysis.

1.7.2.8 Environmental Justice

EO 12898 (General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations) requires all agencies to incorporate environmental justice into their missions by identifying and addressing the disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations or communities. The alternatives considered would not have health or environmental effects on minorities or low-income populations or communities. As a result, environmental justice was dismissed from further analysis.

1.7.2.9 Socioeconomics

The proposed action would not impact Gateway Communities, such as Wilkeson and Ashford, because of mitigation to allow for vehicle use and access to visitors along Stevens Canyon Road during construction (except during several scheduled road closures). Project impacts related to visitation and visitor access along Stevens Canyon Road will be addressed in the Visitor Use and Experience section of the EA. As a result, socioeconomics was dismissed from further analysis.

1.7.2.10 Ethnography

Ethnographic resources are landscapes, sites, structures, objects, and natural resources important to people who have had a long-term or traditional association with them. They are considered integral to life and to transmitting cultural knowledge for these people. Without the protection of ethnographic resources, it becomes difficult for people to recall and teach the cultural knowledge with which these resources are associated. Since the proposed road work would generally remain within the existing road prism it is unlikely that there would be more than a negligible adverse effect on ethnographic resources. Since mitigation measures are proposed for the project related to discovery of unknown cultural resources, this topic was dismissed from further analysis. (Note: The Cowlitz Indian Tribe requested some recommended language for inadvertent discovery of cultural resources, which has been included in this document as a mitigation measure.)

1.7.2.11 Paleontology

Paleontological resources are the remains of ancient plants and animals, both organic and mineralized remains in body or trace form that provide information about earth's ancient environment. According to the NPS's Management Policies (2001b), paleontological resources are to be protected, preserved, and managed for public education, interpretation, and scientific research. There are no known paleontological resources within the project area, likely because of the previous disturbance caused by construction of the roadway. However, there are mitigation measures proposed in the event of a discovery of unknown cultural resources. Therefore, paleontological resources were dismissed from further analysis.

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2. ALTERNATIVES

2.1 INTRODUCTION

This EA evaluates two alternatives, a No Action Alternative and a Proposed Action Alternative. This section describes these alternatives in detail and provides a discussion of the environmentally preferred alternative. In addition the proposed mitigation measures for the project are presented in this section.

2.2 NO ACTION ALTERNATIVE

Under the No Action Alternative, there would be no roadway improvements to Stevens Canyon Road. Stevens Canyon Road is suffering from design deficiencies that include drainage problems, surface slumps, soft spots, pavement warping and cracking, narrow shoulders, deterioration of stone retaining walls and masonry guardrails, and steep creeping embankment slopes adjacent to the roadway. If the No Action Alternative is chosen, seasonal maintenance activities would continue when funding is available, but would not keep pace with the worsening road conditions. This alternative does not meet the purpose and need because: the road condition would create safety issues; historic features such as stone retaining walls would continue to degrade; maintenance costs would increase; and the road would adversely affect park operations and visitor experience.

2.3 PROPOSED ACTION ALTERNATIVE

The proposed action is to rehabilitate 10.09 miles of Stevens Canyon Road within the Park. The first segment of the project (Segment 1) begins at the Nisqually-Paradise Road intersection and continues for 4.83 miles to Stevens Creek Bridge. The second segment of the project (Segment 4) begins at the Backbone Ridge Viaduct and continues for 5.26 miles to the intersection with SR 123 (Figure 1). For the purpose of this EA, these two sections (totaling 10.09 miles) constitute the "project area." The 3R work is scheduled for construction in fiscal year 2011 and may extend for 2 work seasons. The following list highlights the proposed improvements, which are discussed in greater detail in the subsequent sections:

- Mill old asphalt surface and reuse material as part of a cold recycled asphalt base course with a new hot asphalt surface course overlay.
- Stabilize roadbed where possible.
- Install additional drainage features in areas of settlement and cracking and other areas as needed.
- Rebuild embankments using mechanically stabilized earth (MSE) walls at two locations including near Inspiration Point and Aztec Wall both in Segment 1.
- Protect or in some cases reestablish the historic height of stone curbs and masonry guardwalls.
- Clean and inspect existing culverts and associated inlets and headwalls. Repair or replace as necessary. Install additional culverts where needed to correct drainage problems.

- Some turnouts would be obliterated and returned to a natural vegetative state. The turnouts to be retained would be paved. Other improvements under consideration at turnouts include improvements to fencing and installation of design features to walkways, parking, and sidewalks for accessibility.
- Where repair of retaining walls and masonry guardwalls that can be seen from the roadway is needed, stone masonry techniques would be used to match existing walls.
- Resurface deck, repair and clean the concrete approach guardwalls, repair and repaint the metal guardrail, and widen the sidewalk of the Ohanapecosh River Bridge.
- Resurface the deck of the Paradise River Bridge.
- Repair/clean concrete guardwall approaches and repair/paint metal guardrail on Falls Creek Bridge.
- Repair stone masonry at Stevens Canyon Bridge.
- Repair the concrete and stone masonry work at the entrance station on the east end of the project.
- Install cut-stone curbing and line road edge with large and medium-sized boulders along the sidewalk-trail between Reflection Lake parking area and the Wonderland Trail trailhead; repair and revegetate social trails; install rockery wall at damaged area at end of parking area. Limit subexcavation to areas of settlement and cracking.
- Replace existing or install new road closure gates (used to close the road during the winter), where needed.

The majority of the construction work would occur within the prism of the roadway, which is defined as the road surface, road shoulders, turnouts, and adjacent side slopes. The only place where construction may be outside the road prism is the wall work at Inspiration Point and the Bench Lake curve, which is described in detail below. It may be necessary to place equipment and stones at the base of the wall as the wall work is completed. The area would be small, less than 0.1 of an acre. Thus, for the purposes of the EA the construction work is described as being within the road prism.

2.3.1 Roadway Stabilization Measures

The *Stevens Canyon Road Geotechnical Evaluation Report* has identified embankment stabilization for 10 sites in Segment 1 and 35 sites in Segment 4 (FHWA 2006). Embankment stabilization is needed to halt roadway embankment creep that has resulted in surface tension cracks and horizontal and vertical displacement.

Of particular note is the embankment stabilization proposed in the area of the Bench Lake curve. This is a large embankment repair that encompasses two sections of Stevens Canyon Road where the road travels through a 180-degree curve. The intent of this repair is to stabilize the slope with the objective of naturalizing the appearance of the rebuilt embankment to match the existing topography. In this way, the embankment repair would not adversely affect the cultural landscape. Other embankment improvement areas have a similar objective.

To address the issue of roadway creep, one or more of the following stabilization measures would be implemented at each site in the Stevens Canyon Road Project:

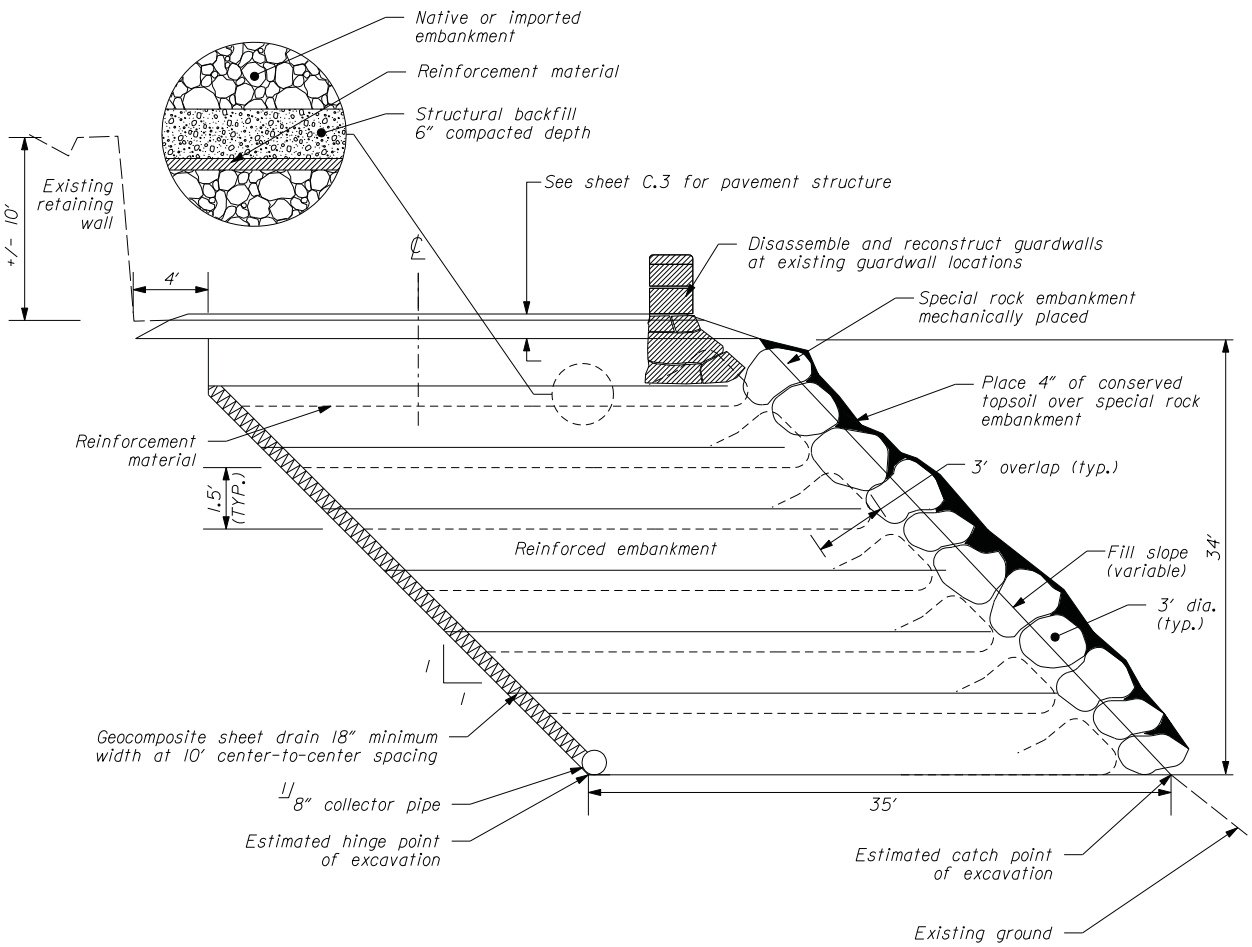
- Embankment stabilization by reinforcing slopes through use of native and imported materials.
- Compaction grouting method of slope stabilization.
- MSE wall with geocomposite sheet drain.
- Soil-nail or reticulated micro pile alternate retaining wall.
- Subgrade reinforcement.
- Deep patch.

Reinforcing embankment stabilization involves constructing a layered embankment consisting of reinforcement material, compacted structural backfill material, and native or imported material on the surface (Figure 2). A geocomposite sheet drain and an 8-inch drain pipe that allows flow of water to the outlet underlies the layered embankment. Rocks are mechanically placed on the slope with a 4-inch layer of topsoil on the surface. This method of slope stabilization may also be constructed with a grout foundation. Reinforced embankment is proposed in the Inspiration Point area where it would be used in combination with the mechanical stabilized earth wall.

The compaction grouting method could be used where loose side-cast fill and shoulder creep is an issue (Figure 3). This method increases the shear strength of soil by increasing the density of soil mass. Soil mass is increased by placing grout columns into the soil that are pumped with grout under pressure to a level of about five feet from the top of the hole. Pumping the grout under pressure causes the hole to expand and the surrounding soil mass is compressed into a denser state. These grout systems are constructed in a grid pattern with five foot center to center spacing.

The MSE wall would be used near Inspiration Point and the Bench Lake curve. The MSE wall consists of reinforcing layers of wire mesh welded, wire forms and either geosynthetic mesh or geotextile fabric (Figure 4). These layers are placed between layers of backfill material and placed across the slope face. After installation of the reinforcing layers, the face of the slope would be covered with soil, boulders, and vegetative plantings and/or seeding mixture. To control groundwater under the slope within and behind the reinforced zone, a subsurface drainage blanket would be installed at the base of the reinforced slope and a geocomposite sheet drain would be installed between the fill and the original reinforced zone and the excavated surface of the slope. The groundwater would be directed to a collector pipe at the bottom back of the reinforced zone and then directed to the face of the slope through an outlet pipe. This method of slope stabilization could also be constructed with a grout foundation.

Construction of the alternate retaining wall may occur at several locations along the project corridor. In these areas, architectural facing would consist of one of two options: either a soil-nail alternate retaining wall or a reticulated micro pile alternate retaining wall (Figure 5). The soil-nail option would consist of installing a pattern of steel bars throughout the slope. These soil nails would be installed in drilled holes and grouted into place. For this project, soil-nail alternate retaining walls would be used above existing stone walls to provide slope stabilization. The existing stone walls would not be disturbed during installation of the soil-nail alternate retaining wall. The reticulated micro pile retaining wall option consists of a series of anchored micropiles placed vertically and tied together at the top. Battered micropiles would anchor the top of the wall. The micropiles would be anchored by drilling through the existing embankment fill and grouted into underlying rock.



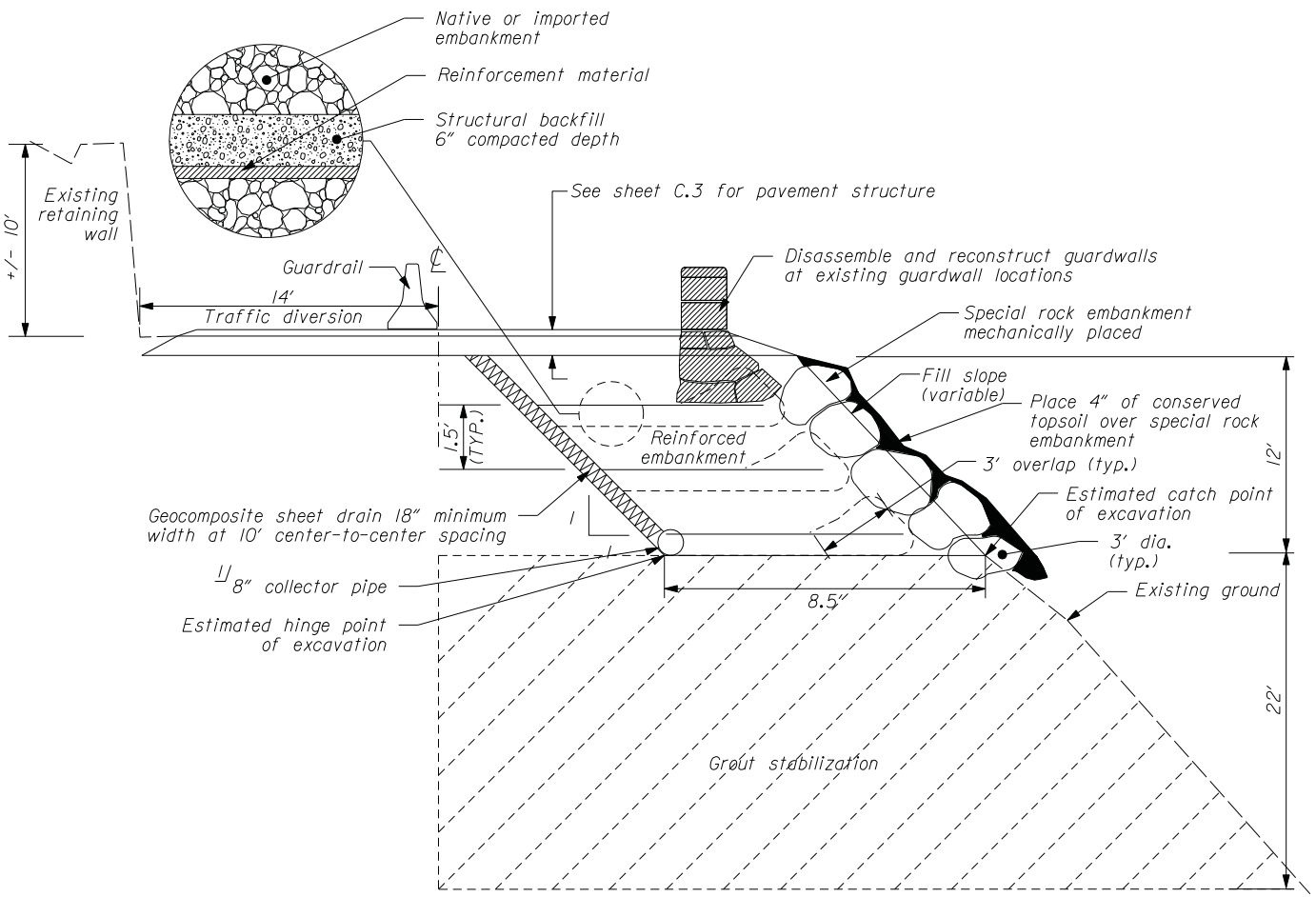
EMBANKMENT STABILIZATION
REINFORCED SLOPE

Not to Scale

Parametrix 233-3072-012/98(01) 7/09 (B)

Source: Robert Peccia and Associates, Helena, Montana.

Figure 2
Embankment Stabilization, Reinforced Slope



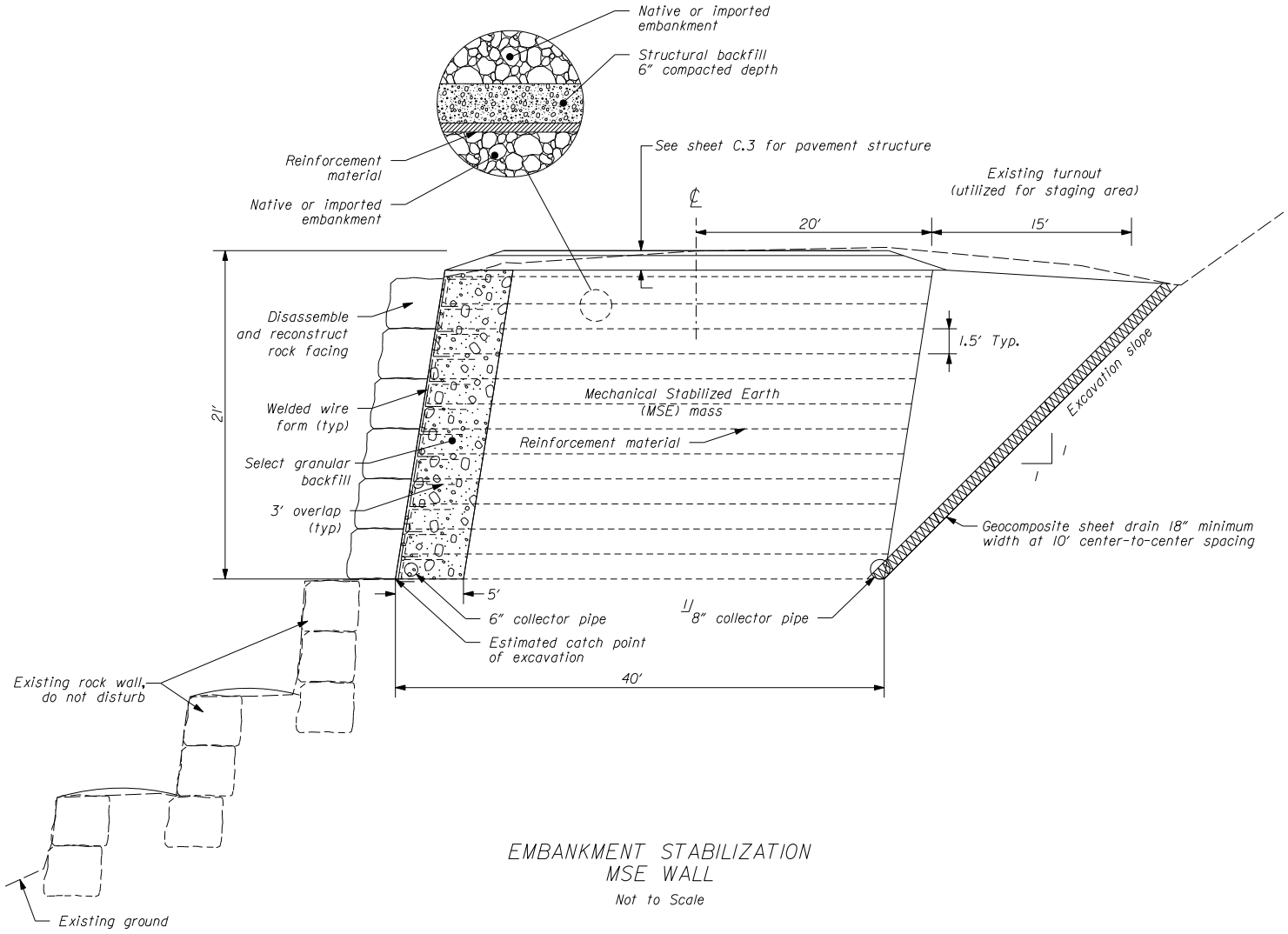
EMBANKMENT STABILIZATION
REINFORCED SLOPE w GROUT STABILIZED FOUNDATION

Not to Scale

Parametrix 233-3072-012/98(01) 7/09 (B)

Source: Robert Peccia and Associates, Helena, Montana.

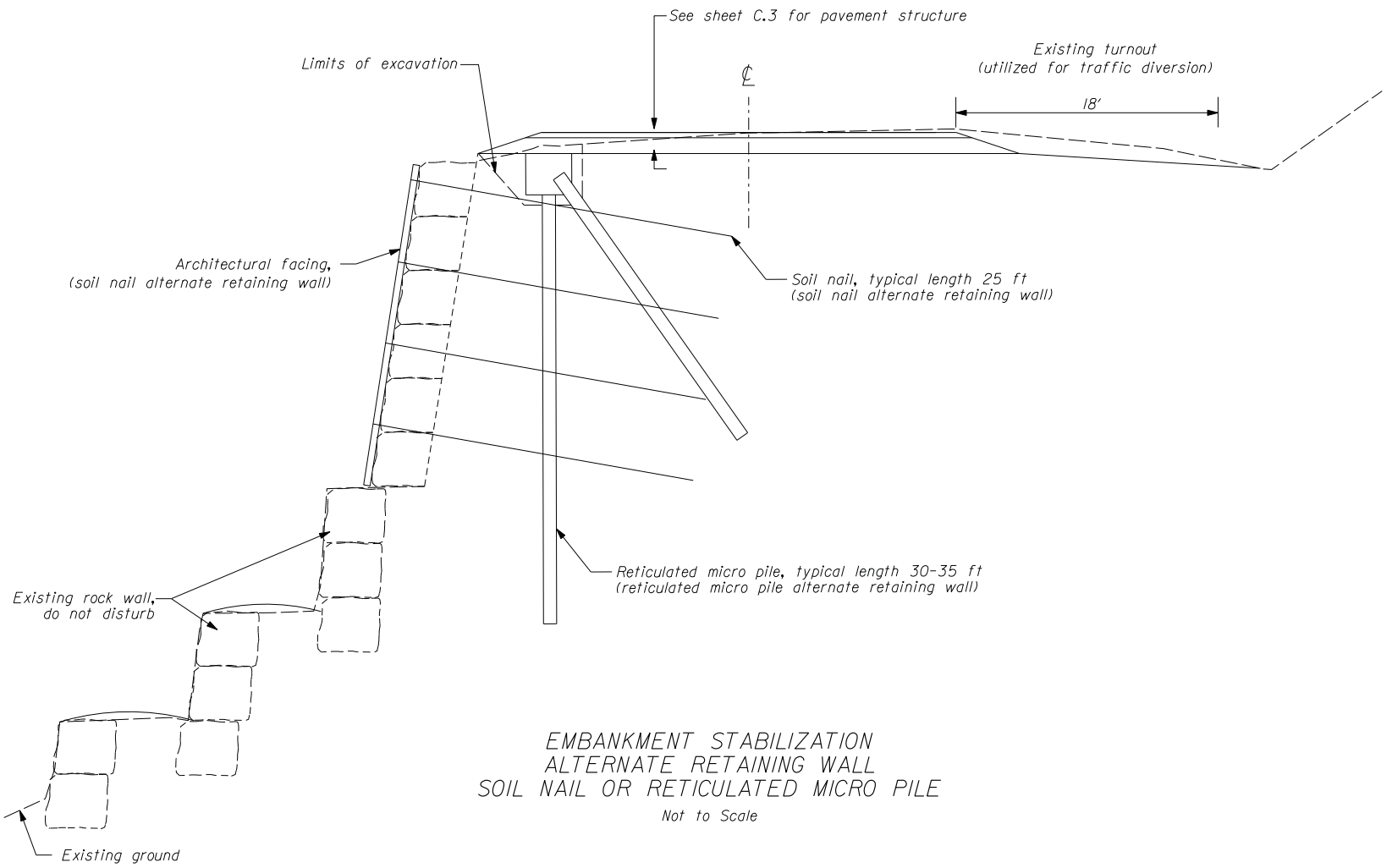
Figure 3
Embankment Stabilization, Compacting Grout Method



Parametrix 233-3072-012/98(01) 7/09 (B)

Source: Robert Peccia and Associates, Helena, Montana.

Figure 4
Embankment Stabilization, Mechanical Stabilized Earth Wall



Parametrix 233-3072-012/98(01) 7/09 (B)

Source: Robert Peccia and Associates, Helena, Montana.

Figure 5
Embankment Stabilization,
Soil Nail or Reticulated Micro Pile

Monitoring devices would be installed in the known problem slumping areas to monitor movement over time to identify and plan for more long-term repair in the future of the most problematic areas. This may eventually lead to rebuilding embankments, using soldier piles, or other methods of stabilization.

Subgrade reinforcement consists of excavating to a depth of approximately 7 inches (Figure 6). Then a geogrid reinforced pavement structure would be constructed over the subgrade. This is a layered construction consisting from bottom to top of an earthwork geotextile, uniaxial geogrid, emulsified asphalt treated aggregate base (7 inches deep), and hot asphalt concrete pavement (3 inches).

Deep patch reinforcement consists of excavating to various depths ranging from several feet to 6 feet below existing grade. Excavated material would be replaced with select borrow material placed over an earthwork geotextile. In some cases underdrains may be placed in the borrow material over the geotextile. Following this work, a geogrid reinforced pavement would be constructed as described above.

2.3.2 Subexcavation, Roadway Excavation, Clearing and Grading

The project would require clearing, grading, and earthwork resulting in a total disturbance of approximately 6 acres. This assumes an average disturbance of 2.5 feet on either side of the road for a distance of 10 miles. It is important to note that in some areas there would be no disturbance beyond the paved portion of the road. Cut and fill slopes for the roadway would range from 1:1 and 1:3, depending on the location and the ability to keep all construction activities within the existing disturbed areas. Based on preliminary engineering, all roadwork would occur within the existing prism of the road corridor as defined in Section 1.2.

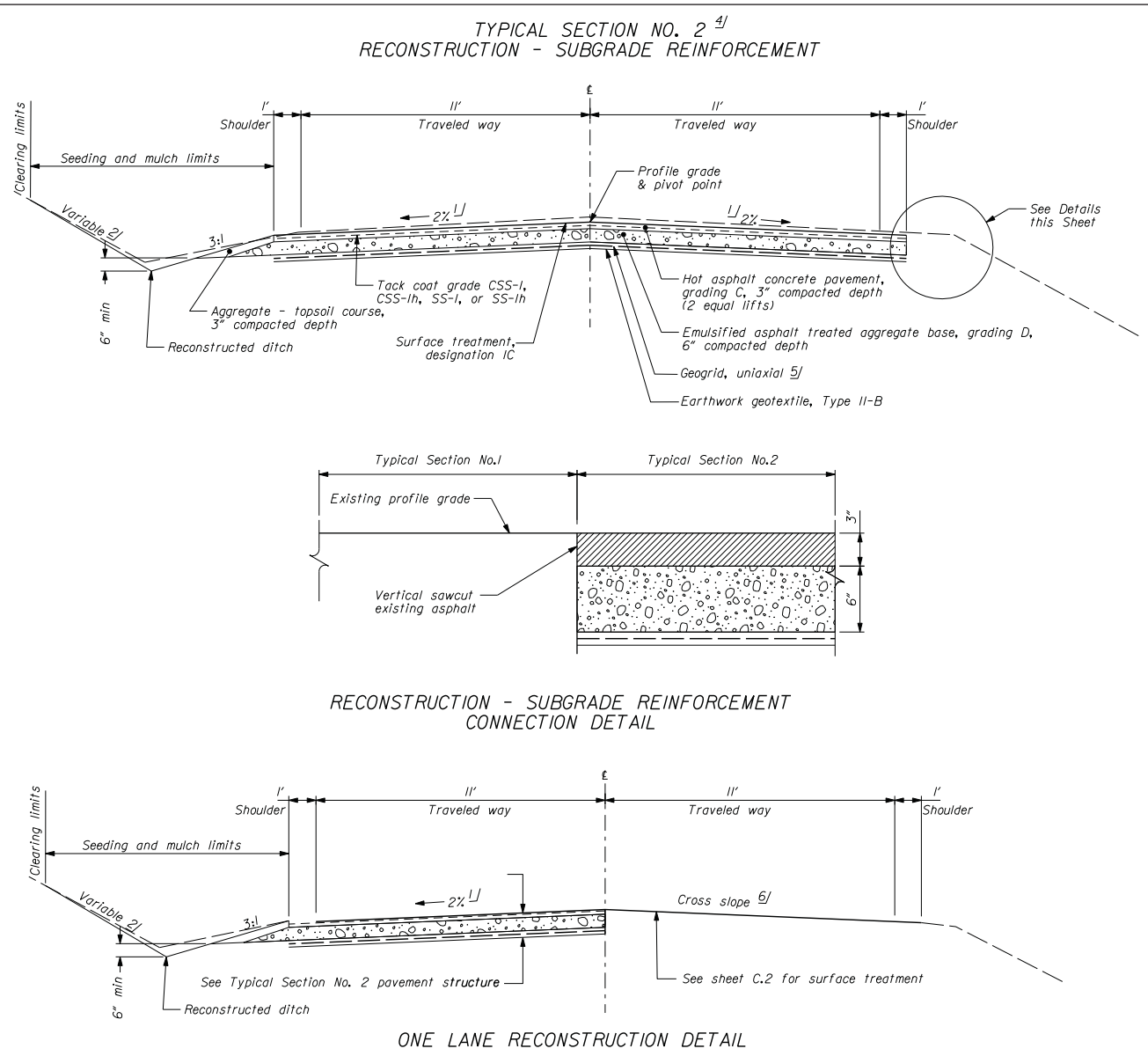
Material excavated from the project would be replaced with select high quality borrow material. Higher quality rocks removed from excavations would be used for stabilized embankment areas. To ensure drainage in these areas, outlet drains would be installed at drainage low points.

2.3.3 Culverts

Culverts, inlets, and stone masonry headwalls would be cleaned and inspected as part of the proposed project. During construction, approximately 77 culverts in Segment 1 and approximately 43 culverts in Segment 2 would be cleaned and inspected. Culverts would be repaired or replaced as needed on a case by case basis. WFLHD did a complete assessment of the culverts on Stevens Canyon Road and found that they were generally in fair to good condition (FHWA 2004). The project also includes placing new culverts in both road segments.

2.3.4 Rehabilitation, Restoration, and Resurfacing of Roadway

Stevens Canyon Road suffers from asphalt tension cracks and horizontal and vertical displacement that results in costly and continuous maintenance activities. This damage is occurring because of the stress being placed on the roadway from embankment creep. To repair this damage, the existing road pavement would be removed and recycled for use in this project. For rehabilitation segments, the road would be milled to a 1-inch depth then a 3-inch overlay of hot asphalt would be applied. For reconstructed segments, 3 inches of hot asphalt would be placed over a 7-inch depth of compacted roadway aggregate.



Parametrix 233-3072-012/01(05) 7/09 (B)

Source: Robert Peccia and Associates, Helena, Montana.

Figure 6
Road Reconstruction Details

2.3.5 Rehabilitation and Improvement of Turnouts

The project plans to eliminate informal turnouts and restore vegetation with locally adapted native species. These turnouts would be entirely obliterated. There are 7 turnouts that would be obliterated and all of these are in Segment 1. This would involve importing topsoil and revegetating these sites. The turnouts that remain would be paved and other improvements added such as fencing to improve safety and walkways for accessibility. There are 21 turnouts that would be paved in Segment 1 and 3 turnouts in Segment 4.

2.3.6 Repair of Stone Retaining Walls, Guardwalls and Stone Curbs

Stone retaining walls, guardwalls and curbs would be repaired to ensure their continued viability for safety and aesthetics. Some sections of the walls and stone curbs have lost height due to settlement, pavement overlays, and embankment creep and would require repair. In these areas, all of the stone walls and stone curbs that can be seen from the road would be repaired using masonry techniques to match the existing walls. The guardwalls at the Stevens Creek bridge have been identified for repair of existing masonry. Several hundred feet of stone wall would be dismantled and reassembled at Inspiration Point because it is rotating outward toward the downslope.

The method used to repair historic stone walls and other stone features would be to carefully remove the stonework. Each stone would be numbered and stockpiled. A new reinforced concrete foundation would be poured and the wall or other stone feature reconstructed in-kind, using the numbered stone and the same historic crenellated design.

2.3.7 Bridge Repair

Based on structural engineering analysis, the Ohanapecosh River Bridge and the Paradise River Bridge are in need of bridge deck rehabilitation. These repairs would consist of removal of the existing surface and an overlay treatment consisting of a latex-modified asphalt overlay. Additional work planned at the Ohanapecosh Bridge would include adding a barrier free sidewalk on the north side of the bridge and bridge rail enhancements (repairing and painting the metal guardrail). The metal rail at the Falls Creek Bridge would also be repaired.

2.3.8 Reflection Lakes

The Wonderland Trail runs along the shoulder of Stevens Canyon Road adjacent to the Reflection Lakes area. Trail users regularly go down to the lakeshore, which compacts the soil along the shoreline, degrades lakeside wetland vegetation, and causes erosion and migration of fill slope gravels toward the lakeshore. In an effort to repair existing resource damage, reduce continued lakeshore impacts and to provide a viewing surface along the roadside, a cut-stone curb would be installed along the length of the sidewalk between the Reflection Lakes parking area and the Wonderland Trail trailhead. The length of the sidewalk/trail would be lined with large and medium-sized boulders on the lake-side, and the social trails and denuded areas that lead down to the lakeshore would be repaired using a mixture of boulders and silt bars designed to create pockets for vegetation establishment. These denuded areas will be actively revegetated, like the denuded area at the top of the bank beside the sidewalk/trail. The line of large and medium boulders would appear naturalistic, and would also be interplanted with vegetation. The damaged area near the end of the parking area sidewalk (with the exposed culvert) will be repaired with a rockery wall along with a boulder barrier at the top, consistent with the rest of the sidewalk/trail. The rockery wall will also be vegetated by planting into soil pockets between the boulders and rocks. All proposed work would be done within the road prism.

2.3.9 Water Extraction

Water would be needed during construction for dust control. It is proposed that water be extracted from the Ohanapecosh and Paradise Rivers. Water extraction would be limited to approved areas and no more than 30,000 gallons per day or 15 percent of available flow, whichever is less would be extracted. However, no withdrawals would be allowed below the minimum flow criteria, which would be established and monitored by the Park biologist.

2.3.10 Road Closures

Construction would require single lane closures, traffic stoppages, pilot cars, and in some locations complete road closures. It would be necessary to completely close approximately 3.1 miles in Segment 1 for up to 30 days during repairs at Inspiration Point and the Aztec Wall. Closures may begin in early August. Six additional locations were identified for complete road closures for a few hours where a paved width of 12 feet is not available for construction activities (FHWA 2006).

2.3.11 Project Schedule

Construction is anticipated to start in 2011 and be completed in either 2011 or 2012 (it may be necessary to do the construction over two work seasons). The construction season and construction locations would vary depending on elevation, vegetation coverage, and slope aspect. In the higher elevations, the construction season would not start until June at the earliest or when the snowpack has melted. It is anticipated that the construction season would last until early to the middle of fall 2011 and/or 2012. In addition, seasonal stipulations for special status species would limit construction activities at certain locations to prevent construction impacts to northern spotted owls, breeding birds, and roadside amphibian use.

2.4 COMPARATIVE SUMMARY OF THE NO ACTION AND PROPOSED ACTION ALTERNATIVES

Table 3 provides a summary that describes the actions that would or would not occur with each alternative.

Table 3. Comparative Summary of No Action and Proposed Action Alternatives.

No Action	Proposed Action
No improvements to Stevens Canyon Road would occur. Maintenance and repair would continue and would increase due to deterioration of the roadway. Continued degradation of the roadway would result in safety issues, limited operational effectiveness, increased maintenance costs, and overall impacts to park operations and visitor use at the Park. In addition, this alternative would lead to continued degradation of historic elements within the NHLD such as stone walls at the Park. This alternative would not address slope issues that would contribute to continued road problems.	Approximately 10.09 miles of Stevens Canyon Road would be resurfaced, restored and rehabilitated to improve the overall roadway function. Improvements would include roadway overlay and slope stabilization (several methods are proposed including mechanical stabilized earth wall, compaction grouting, soil nail or reticulated micro pile, or reinforcing through use of native and imported materials), culvert cleaning (and repair where necessary), repair of stone retaining walls, guardwalls and curbs, closure of informal turnouts, improvements of other turnouts, bridge deck repair, shoulder and shoreline repair at Reflection Lakes. Selection of this alternative would improve the function of the road and improves the ability of the Park to provide for a high quality visitor experience. In addition, it would retain and preserve examples of early park architectural design with repair of historic stone features.

2.5 ENVIRONMENTALLY PREFERRED ALTERNATIVE

In accordance with the criteria outlined in NEPA and DO-12 an Environmentally Preferred Alternative must be identified, which must meet the following criteria:

1. Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
2. Ensure 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 of health or safety, or other undesirable and unintended consequences;
4. Preserve important historic, cultural, and natural aspects of national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice;
5. Achieve a balance between population and resource use that would permit high standards of living and wide sharing of life's amenities; and
6. Enhance the quality of renewable resources and approach the maximum attainable recycling of resources.

The Proposed Action Alternative meets all of the criteria (1-6) listed above and is therefore the Environmentally Preferred Alternative for this project. This alternative was chosen based on the proposed improvements benefitting park maintenance operations, improving public safety and visitor use and experience at Mount Rainier National Park. In addition, the Proposed Action Alternative would preserve important historic, cultural, and natural aspects of the natural heritage by conducting all construction activities within the existing road prism. This would eliminate and minimize impacts to important park resources.

The No Action Alternative does not meet any of the criteria. It fails to meet the other criteria because: (1) Public safety would be compromised from a failing/deteriorating road; (2) Drainage features such as damaged culverts would continue to hold sediment in large quantities with the potential to blow-out and contribute to waterway pollution; (3) Increasing maintenance costs would divert money from other important programs; (4) Park visitation could decline due to poor roadway conditions; and (5) Allowing the road and its historic features to fall into a state of disrepair would be considered an adverse effect under Section 106 of the NHPA. Therefore, the No Action Alternative is not the Environmentally Preferred Alternative.

2.5.1 Sustainability

New development and existing facilities in the National Park system are located, built and modified according to the NPS *Guiding Principals of Sustainable Design*. The objectives of the NPS sustainability guidelines are to design facilities to: (1) Minimize adverse effects on cultural and natural values, (2) Reflect their environmental setting, (3) Maintain and encourage biodiversity, (4) Construct and retrofit facilities using energy-efficient materials and building techniques, (5) Operate and maintain facilities to promote their sustainability, and (6) Illustrate and promote conservation principals and practices through sustainable design and ecologically sensitive use.

The Proposed Action Alternative meets the NPS guidelines for sustainability because of the following design and construction practices:

- Minimizes impacts to natural and cultural resources by conducting work within the existing road prism.

- Preserves the historic integrity of stone retaining walls, guardwalls, curbs and culvert headwalls.
- Preserves topsoil for use in post construction reclamation.
- Transplants and reuses shrubs and trees in post construction reclamation.
- Reuses and recycles existing road material in the roadway rehabilitation.

2.6 RESOURCE PROTECTION MEASURES

To prevent and minimize potential adverse effects associated with the Proposed Action Alternative, Best Management Practices (BMPs) and mitigation measures would be implemented during the construction and post construction phases of the project. General and resource specific BMPs and mitigation measures for the project are listed below. (Note: This list is not all-inclusive as there would be additional mitigation measures included in the contractor's specifications.)

2.6.1 General Measures

The following general measures were prepared by Park staff in consultation with FHWA/WFHLD staff:

- The NPS project manager or project specialist and Park Superintendent in cooperation with the FHWA/WFHLD Project Engineer would ensure that the project remains within the construction limits and parameters established in the compliance and contract documents and that mitigation measures are properly implemented.
- Construction limits would be clearly marked with stakes prior to the beginning of ground disturbing activities. No disturbance would occur beyond these limits other than protection measures for erosion/sediment control (these are typically placed just outside the clearing limit stakes). Temporary construction fencing would only be installed where determined necessary by FHWA/WFHLD and NPS project coordinators.
- All protection measures would be clearly stated in the construction contract documents or the FHWA's Project Engineer's Notebook as appropriate.
- All tools, equipment, barricades, signs, surplus materials, and rubbish would be removed from the project work limits upon project completion. Any asphalt surfaces damaged due to work on the project would be repaired to their original condition. All demolition debris would be removed from the project site, including all visible concrete and metal pieces.
- Contractors would be required to properly maintain construction equipment (i.e. mufflers) to minimize noise from use of the equipment.
- A Hazardous Spill Plan or Spill Prevention, Control and Countermeasures Plan, whichever is determined appropriate, would be in place, stating what actions would be taken in the event of a spill, notification measures, and preventative measures to be implemented, such as the placement of refueling facilities, storage, and handling of hazardous materials, etc. The plan must be submitted at least 2 days before beginning construction work. Other measures related to the spill plan include:

- ➞ All equipment on the project would be maintained in a clean and well-functioning state to avoid or minimize contamination from automotive fluids. All equipment would be checked daily and any leaks would be immediately repaired upon discovery. Vehicles or equipment leaking oil, gas or anti-freeze would not be stored in the Park. Oil, hydraulic fluids, anti-freeze or other chemicals would not be drained to the ground.
- ➞ Equipment or vehicles would not be refueled within 100 feet of rivers, streams or identified wetlands. If on-site fuel tanks are used, approved containment devices would be required.
- ➞ A supply of acceptable absorbent materials would be kept at the job site in the event of spills. Acceptable absorbent materials are those that are manufactured specifically for the containment and cleanup of hazardous materials. Any spills would be cleaned up immediately.
- ➞ In the event of a spill, the Contracting Officer (CO) must be notified immediately.

- Vegetable oil-based hydraulic fluids would be used in all heavy equipment to minimize potential impacts to water quality from spills.
- Materials, including removed stumps, unusable stone masonry headwall material, unusable pipe, signs, guardrail, and weed-infested soil would be disposed of outside the Park, according to local, county, state, and federal regulations.
- Debris would not be burned or buried in the Park.
- BMPs for drainage and sediment control, as described in the FHWA and NPS Stormwater Pollution Prevention Plan, would be implemented to prevent or reduce nonpoint source pollution and minimize soil loss and sedimentation in drainage areas. Use of BMPs in the project area for drainage area protection would include all or some of the following actions, depending on site-specific requirements:
  - ➞ Disturbed areas would be kept as small as practical to minimize exposed soil and the potential for erosion.
  - ➞ Waste and excess excavated materials would be located outside of drainages to avoid sedimentation.
  - ➞ Excavated material would be covered with water-repellent, breathable material during storage to prevent erosion/sedimentation.
  - ➞ Silt fences, sediment logs, temporary earthen berms, temporary water bars, sediment traps, stone check dams, or other equivalent measures would be installed (including monitoring to ensure that erosion-control measures are properly installed and are functioning effectively).
  - ➞ Chemicals, fuels, and other toxic materials would be stored, used, and disposed of in a proper manner.
- Delays for emergency response vehicles would be kept to a minimum by having the emergency responders notify the traffic monitors via the Park radio/frequency immediately when the vehicle is dispatched, thus allowing approximately 10 minutes to clear the road before the arrival of the emergency

vehicle. Emergency response providers and the contractor would need to coordinate on any road closures (for example, it may be necessary to temporarily stage emergency vehicles on both sides of a road closure).

- The contractor would provide temporary portable toilets for use by employees.
- Construction debris would be hauled from the Park to an appropriate disposal location.

2.6.2 Air Quality

- Dust control (i.e., use of water as a dust suppressant) would occur, as needed, on active work areas where dirt or fine particles are exposed.
- Construction equipment/vehicles would not be allowed to idle longer than 15 minutes when not in use.

2.6.3 Water Resources, Quality and Quantity

- Sediment traps, erosion checks, and /or filters would be constructed above or below all culvert drains (if such drains would be required) and in all other ditches before the runoff leaves the project construction limits.
- Surface restoration and revegetation of disturbed soils would be implemented to minimize long term soil erosion.
- A tarp/pump system would be hung under the Ohanapecosh River bridge during bridge painting work to capture contaminants that would otherwise fall into the river below and damage water quality. Procedures for water quality protection will comply with Washington Department of Transportation (WSDOT) standards and guidelines.
- Except as authorized by this contract, mechanized equipment would not be operated or material discharged or placed in within the boundaries of any U.S. waters as identified by the ordinary high water mark or edge of a wetland. This includes wetlands, unless authorized by a permit issued by the U.S. Army Corps of Engineers according to 33 USC § 1344, and if required by the state agency having jurisdiction over the discharge of material into the waters of the U.S. In the event of an unauthorized discharge:
  - ➞ Immediately prevent further contamination.
  - ➞ Immediately notify appropriate authorities.
  - ➞ Mitigate damages as required.
- Work areas would be separated, including material sources by the use of a suitable barrier that prevents sediment, petroleum products, chemicals, other liquids, or solid materials from entering the waters of the U.S. Construct and remove barriers to avoid discharge of material into the waters of the U.S. Remove and properly dispose of sediment or other material collected by the barrier.
- Water extraction would only be allowed once minimum flow criteria have been established for the Ohanapecosh and Paradise rivers. No water extraction from the Ohanapecosh or Paradise rivers would be allowed below the minimum flow criteria which would be established and monitored by the Park biologist.

- Water extraction from the Paradise River at the Stevens Canyon Y would be allowed only when sufficient data has been collected to determine a minimum flow criterion and a 15 percent of flow daily allowable volume, which may be less than 30,000 gallons per day due to the river being much smaller in size than the Ohanapecosh River.
- The contractor may only extract water from the Park at approved sites on the Ohanapecosh and Paradise rivers. For example, on the lower Ohanapecosh River located at the pullout at approximately milepost 18.4. In order to reduce impacts to the riverbank, the Park would designate where pumping equipment would be located at the extraction sites 14 days before using this water source. The contractor must use muffled pumping equipment (i.e., pump and generator) to reduce sound to less than that of the average ambient noise level of roadway traffic on Stevens Canyon Road. Pumping equipment must be staged away from the rivers; except for the pump hose, which may extend down to the edge of the rivers. The contractor must provide a screen (filtration size 0.08 inches maximum) on the end of pump hose to filter out aquatic organisms. This screen would be cleaned of debris periodically. The contractor would provide a spill containment enclosure around the pump and or generator to contain gas, oil or other fluids. The contractor would provide a wattle or other filter barrier around the outside edge of the staging area to prevent siltation into the river. The park would be notified 14 days prior to drawing water to determine the presence of threatened or endangered species. The streambed and streambank vegetation would not be disturbed when drawing water. All Federal, state, and local permits, if required, would be obtained before drawing water.
- The contractor would be required to have the Park's approval to install culverts at any location that differs from the approved plan.

2.6.4 Wetlands

- Prior to construction work at Reflection Lakes, twelve-inch diameter certified weed-free (as defined below) excelsior logs would be installed to form a filter barrier around the rockery wall construction area to trap sediments from running downslope into the wetland during construction. Construction fencing around limits of the rockery wall area to keep visitors off of the eroded slope would be installed.

2.6.5 Soil

- Topsoil would not be mixed with subsoil. Topsoil refers to the uppermost soil horizon, usually 6 to 18 inches deep, which includes duff and other materials capable of supporting vegetation.
- Twelve-inch diameter, certified weed-free coir logs or certified weed-free wood excelsior sediment logs would be installed for filtering sediment from runoff and reducing the velocity of sheet flow. Logs would be installed according to plans and as directed by FHWA and the Park to address erosion concerns. Logs would be placed in drainages that pass through work areas to limit erosion of exposed soils.
- Silt fencing would be installed around the perimeter of pullouts, which would be used for the storage of erodible materials. If materials are to be stored on the

roadway, then sediment logs would be placed around the perimeter. Straw or hay bales would not be used as filter barriers. For silt fences: silt fence would be installed according to plans; fencing would consist of one continuous piece of semi-permeable fabric or steps would be taken to join sections so there would be no gaps; fence would remain in an upright position after installation; materials and equipment would not be leaned against fencing to avoid fence collapse; and fencing would be repaired to ensure an effective barrier within 24 hours of deficiency notification.

- When working in "wet" ditch lines, weed-free wattles, coir logs or sand bags filled with pea gravel across ditch line would be used at either end of the work area to filter siltation and would be staked firmly in place. If water is running in one direction, a barrier would be needed at the downhill end of work area only.
- Excavated material that is suitable for growth of native vegetation as determined by the Park would be salvaged.
- Erosion and sediment control devices would be installed and vegetation cleared prior to salvaging topsoil for storage. Topsoil would be salvaged and stockpiled according to Park stipulations before any additional construction work took place.
- All conserved topsoil in the soil zone from which it originated would be used before furnishing manufactured topsoil.
- Weed-free certification would meet or exceed the North American Weed Management Association (NAWMA) standards. For a material source provider to be considered certified weed-free, all staging areas, work areas, and facilities associated with producing the material would be inspected by a qualified government inspector, qualified park employee or other proper officials or authority: a representative of that State's Department of Agriculture, a Weed Supervisor or Weed Superintendent, a University Extension Agent, or an individual designated by that State's law or regulations and determined to be free of all noxious weed and invasive plant species.
- A 3-inch depth of aggregate-topsoil course would be placed on roadway shoulders to promote the establishment of native plant vegetation. The mixture would consist of 50% aggregate and 50% topsoil mix that would meet the Park's manufactured topsoil specifications. Manufactured topsoil for aggregate mix would be certified weed-free (as defined below) and conform to Park manufactured topsoil specifications.
- Manufactured topsoil would be obtained from a source that has up to date weed-free (as described above) certification for all topsoil ingredients.
- All imported rock and topsoil material for the project would be inspected and accepted by the Park. Subsurface rock that has not been exposed to a weed source may be acceptable upon inspection by the Park. Park would inspect all proposed material sources prior to use or transport of materials into the Park.

2.6.6 Vegetation and Special Status Plant Species

- No vegetation would be disturbed outside of the construction limits unless prior approval is obtained from the Park. Any unauthorized disturbance would result

in the contractor paying for the restoration of that area using the methods set forth in the contract documents.

- The hydroseeding method of choice would be a two-step process that applies seed in a slurry of water, seed and tackifier on a prepared seedbed as the first step. The second step would apply wood fiber mulch and tackifier in a slurry of water over the first application. Tackifiers used in the process would be derived from plant materials to have no residual effects on the soil, seed or germinating plants. The mulch and tackifier would serve to hold sediment in place until growing plants are able to hold soils in place.

  All imported rock, topsoil, and erosion control materials that are capable of harboring plant seed would be certified weed-free.

- Due to the presence of noxious weeds and exotic species within the project limits, the contractor would comply with the following measures:

  ➞ FHWA/WFLHD would inspect all contractor vehicles and equipment prior to their entry into the Park for mud, weeds and other unwanted substances. All vehicles (includes hydroseeder truck and inside of tank), heavy equipment, hauling vehicles and trailers would be pressure-washed before their first entry into the Park. Hauling vehicles that have previously transported weed contaminated material would be pressure-washed before transporting clean material. Subsequent entries of hauling vehicles into the Park would not require pressure washing unless the vehicle shows signs of mud, plant material, or as requested by the FHWA or the Park.

  ➞ Vehicle loads would be covered to reduce exposure to noxious weeds when transporting rock or soil to or from the Park boundary. Manufactured topsoil, conserved topsoil, conserved rock/soil and sub-excavation material stockpiles would be covered with a breathable water repellent fabric, which would be anchored around the perimeter to hold it in place.

  ➞ The top 4 inches of weed infested material at the pullout on the corner of Backbone Ridge would be removed, waste would be disposed of outside the Park and the surface of the pullout would be covered with a 4-inch depth of aggregate before it would be used as a stockpile area.

  ➞ The project would be divided into soil isolation zones to prevent the spreading of noxious weeds by limiting the movement of weed infested materials and equipment. The Park would identify the starting and ending points for each zone to be included in the contract. The beginning and ending point of these zones would be clearly marked on the roadway as directed by the FHWA and the Park. Rock, conserved topsoil or stockpiled manufactured topsoil would not be transferred between the zones unless approved by the Park. Excavated materials must be retained in the zone where it originated at all times, unless approved by the Park or wasted at a disposal site outside the Park with the Park's approval. All vehicles and construction equipment showing signs of mud or plant material would be cleaned before moving them between different zones or leaving the project site to reduce noxious weeds from spreading. Equipment would be cleaned by brushing to remove material deposited on wheels, bumpers and other exposed surfaces. Cleaning would not required when moving vehicles and construction equipment between zones provided they are clean and free of mud and/or plant material.

- ➞ Proposed locations for soil and rock stockpiles and turnaround areas would be inspected and approved by the Park resource advisor or biologist before use. The Park would remove noxious weeds from soil at the storage sites prior to project work to ensure area is free of noxious weeds. The Park would review proposed sites for acceptance. If the Park does not approve the proposed site then an alternative site would be provided.

- Parking of equipment and private vehicles would be restricted to hardened surfaces, such as pullouts, concrete ditch lines, and closed lanes of the roadway to limit disturbance of roadside vegetation. All pullouts to be used as parking would be fenced around the perimeter with temporary construction fencing.
- The Park would review and approve construction limits within which clearing and grubbing would occur as identified in the project plans and contract documents and as staked on-site prior to construction commencing.
- Removal of any tree 18-inches or greater in diameter at breast height would require Superintendant's approval.
- Vegetation and root zones designated to remain would be fenced off for protection.
- Ropes, cables, or guy wires would not be fastened to trees.
- Limbs, branches, and shrubs would be pruned according to the American National Standards Institute (ANSI) (A300 Part 1).
- Tree paint or tree wound dressing would not be used on cut or scarred areas of trees. The wound would be left uncovered.
- Tree roots would be protected from injury. Any exposed roots would be kept moist until covered with soil. Tree root removal would require Park approval.
- Vegetation would be removed in a manner that would not injure the vegetation around it or compact or gouge the topsoil.
- To limit disturbance to vegetation, temporary road signs would be installed with a post-hole digger or other handtools.
- Whenever possible designated trees, stumps, and snags to be cleared would be salvaged to be used for erosion control or natural litter on finished slopes. All salvaged woody debris would be stockpiled at the closest storage site within the same soil isolation zone by July 1st or by a Park-approved deadline to avoid contamination from windborne weed seed.
- Pullout areas designated for restoration would be revegetated. Asphalt would be removed. The existing ground would be scarified. A 4-inch depth of topsoil would be applied and then hydroseed and mulch would be applied to the cleared surface to encourage revegetation.
- All impacted areas would be hydroseeded and mulched to establish native plants, control erosion, and limit growth of invasive plant species.

2.6.7 Fish, Wildlife, and Special Status Fish and Wildlife Species

- Construction personnel would be informed of the occurrence and status of special status species and would be advised of the potential impacts to the species and potential penalties for taking or harming a special status species.

- Noise-generating activities above ambient noise would not be performed between two hours after sunrise and two hours before sunset to prevent impacts to sensitive wildlife. Night construction work would not be allowed in marbled murrelet or spotted owl habitat.
- No project activities that generate noise 92 decibels or above would be allowed within known owl territories (described as within 0.7-mile northern spotted owl activity centers) or unsurveyed suitable owl habitat between March 15 and July 31 unless current surveys confirm that no northern spotted owls are nesting within the noise affected area.
- No project activities that generate noise 92 decibels or above would be allowed within suitable marbled murrelet habitat, between April 1 and August 5. Segment 4, from Backbone Ridge to Highway 123 is considered suitable marbled murrelet habitat, Segment 1 is not.
- Northern spotted owl surveys are ongoing, and the Park would provide mile-markers for each exclusion zone by June 1st. Exclusion zones would be based on the most recent information available and may change within a season as new information is gained.
- The following measures would be taken to limit noise and disturbance from vehicles and construction equipment:
  - ➞ Equipment would not be allowed to idle longer than 15 minutes when not in use.
  - ➞ All motor vehicles and equipment would have mufflers conforming to original manufacturer specifications that are in good working order and are in constant operation to prevent excessive or unusual noise, fumes, or smoke.
  - ➞ Mufflers and sound attenuation devices (such as rubber strips or sheeting) would be installed and maintained on all equipment. This would include truck tail and other gate dampeners (both opening and closing) for all dump trucks on the project.
  - ➞ Use of un-muffled engine brakes or Jake Brakes is prohibited in the Park unless required for safety.
  - ➞ Use of air horns within the Park would be limited to emergencies only.
  - ➞ No asphalt batch plants or rock crushing plants would be allowed within the Park boundaries.
- Any roadkill or wildlife collisions would be reported to the Park immediately.
- Imported soil material would be certified weed free as defined above, and seed would be provided from the Park's native seed base for use in hydroseeding.
- Construction vehicle speeds would not exceed construction zone posted speed limits to decrease wildlife/vehicular incidents, as the existing over steepened road edge provides little escape terrain for wildlife using the road corridor. Speed limits outside the construction zone would default to the posted speed limit.
- All work in ditches and culverts and below the Aztec Wall (Station 170+00 to 195+00) and on Segment 4 from Station 790 to 807+20 would be avoided to minimize impacts to SOC amphibian species.

- Where ditch or culvert inlet cleaning is absolutely necessary (meaning drainage is impaired), work would be limited to the dry season (July and August). Parking and storage of equipment and materials in these areas would also be avoided. Disturbed areas would be documented for post-project monitoring by the Park Biologist.
- As soon as possible and at least one week before culvert or ditch cleaning, repair or replacement activities, inform the Resource Advisor assigned to the project. Amphibian surveys would be done by Park resource staff to determine if SOC amphibian species are present in culverts, and along wet ditches. Areas of particular concern are above and below the Aztec Wall (Station 170+00 to 190+00), and Segment 4, from Station 790+00 to 807+20. If Cascade frogs, tailed frogs, or western toads are detected, they would be moved to a safe location or a plan of action would be developed based on circumstances. If Larch Mountain or Van Dyke's salamanders are detected, they would not be moved and construction activity would not be permitted to disturb these areas. Salamander habitat would be delineated and marked for construction crews to avoid; no construction or staging/storage activities would occur in these areas. Park resource advisor(s) assigned to this project would monitor construction in Larch Mountain and Van Dyke's salamander habitat.
- Feeding or approaching wildlife would be prohibited.
- The Park wildlife ecologist would be notified if bears loiter in the project area.
- A litter control program would be implemented during construction to eliminate the accumulation of trash. All food items would be stored inside vehicles, trailers, or wildlife-resistant receptacles except during actual use to prevent attracting wildlife.
- Visitors in traffic delays would be educated by NPS staff, when available, to not approach or feed wildlife.

2.6.8 Cultural Resources

- Protection of Archeological Remains: In the event of the inadvertent discovery of historic properties such as archeological resources, suspected human remains, funerary objects, sacred sites, or objects of cultural patrimony, the Park archeologist and Superintendent would immediately be notified. Work in the affected area(s) would stop immediately until the historic properties are reviewed by the Park. As appropriate, consultation with the DAHP and any affected Native American Tribes would also take place regarding disposition of affected artifacts and remains. During consultation, reasonable measures would be taken to protect the discovery site, including any appropriate stabilization or covering; to ensure the confidentiality of the discovery site; and to restrict access to the site of discovery.
- Monitor Construction During Excavation of Sensitive Archeological Sites: An Archeological Monitor and/or Resource Advisor would be present during the project when work activity takes place in areas of archeological sensitivity. These would be defined as areas where archeological resources recommended or determined eligible for inclusion on the National Register of Historic Places have been documented adjacent to the area of potential impact. The Park Archaeologist would provide a list of sensitive sites to be included in the

contract. The Contractor would notify the Park two weeks in advance before doing excavation, drilling or other work in sensitive archeological areas.

- Protection of Road Cultural Landscape: A Historical Landscape Architect would be part of the design team to ensure the design meets the Secretary of the Interior's Standards for Rehabilitation (i.e., that all historic features are preserved, repaired or replaced in-kind, and that any alterations are compatible with the historic character and cultural landscape of the road). During construction, a Historical Landscape Architect would provide technical assistance to the government inspector to ensure the design is implemented accurately and with a level of craftsmanship that meets the design specifications.

2.6.9 Visitor Use and Experience

- Generally road travel delays would be kept to a maximum of 20 minutes with a ten minute travel time for a total maximum one-way delay of thirty minutes, except during temporary road closures.
- Local newspapers, the Mount Rainier National Park newsletter, and the Park website would post updated information regarding construction delays and closures at the Stevens Canyon Road.

2.6.10 Public Health, Safety and Park Operations

- During construction, signs would inform visitors of construction activities and closures along Stevens Canyon Road.
- Appropriate barriers and barricades would be used to clearly delineate work areas and provide for safe vehicle travel through construction areas.
- Trucks hauling debris and other loose materials would be covered to maintain adequate freeboard to prevent spillage to paved surfaces.
- Construction workers would wear appropriate attire such as hard hats, gloves, and goggles to protect themselves from natural hazards such as falling rocks. Visitors would not be allowed outside their vehicles in a construction zone. Park staff would also be required to wear protective gear if they are working outside in the construction zone.

2.6.11 Construction Activities Outside the Construction Limits

This section addresses measures for any construction related activities that would occur outside the Park or where construction limits may need to be expanded. Before beginning construction all activities outside the construction limits (such as material sources, disposal sites, or waste areas) that would require ground disturbance, occupation, clearing, or other environmental impacts would require Park or other appropriate land management agency approval. The following items would also be required.

The following requirements would not apply to commercial sources that are established, have provided material to public and private entities on a regular basis over the last two years, have appropriate State and local permits, and would not require expansion outside their currently established and permitted area.

Proposed Activity Description: A description, schedule, and location of the proposed activities would be submitted to FHWA or the Park for approval. Maps of the area and other relevant information would be included.

Endangered Species Act - Written documentation satisfactory to the FHWA or the park that the proposed action would have no effect to any threatened or endangered species or their critical habitat would be required. The following would be required:

- A current list of all potential threatened or endangered species located at the site of the proposed activities from the U.S. Fish and Wildlife Service (USFWS); and a recommendation of a "no effect" determination according to Section 7 of the ESA prepared by a biological specialist with a minimum of 3 years of experience in ESA compliance or other qualifications acceptable to the park. Up to 30 days would be allowed to obtain the current list of all threatened or endangered species from the USFWS; or
- Documentation showing the proposed activities have previously been determined to comply with the ESA and this determination remains valid. This documentation would be from the State, Tribal Government or Federal Land Management Agency responsible for the land. Evidence of compliance, including correspondence with the USFWS would be attached.

Clean Water Act and Executive Order 11990 - Wetlands: Written documentation satisfactory to FHWA or the Park would be submitted, that the proposed action would comply with Section 404 of the Clean Water Act, Executive Order 11990, and would not affect any wetlands. Documentation would be prepared by a wetland specialist with a minimum of 3 years of experience in wetland delineation using the Wetland Delineation Manual (as described in NPS 77-1).

National Historic Preservation Act - Cultural Resources: Written documentation satisfactory to the FHWA or the Park would be submitted for a finding of either "no historic properties affected" or “no effect” according to 36 CFR 800.4(d)(1) for historic properties on or eligible for listing in the National Register of Historic Places. The following would be provided:

- Documentation showing there are no cultural resources present, and a finding of either "no historic properties affected" or “no effect” according to 36 CFR 800.4(d)(1). Documents would be prepared by an individual qualified under the Secretary of the Interior’s Standards and Guidelines for Archeology and Historic Preservation, 48 FR 44716-44740. Documentation would be satisfactory to the State Historic Preservation Officer (SHPO) or Tribal Historic Preservation Officer (THPO) as appropriate, according to 36 CFR 800.3(c). The FHWA or the Park would forward the documentation a minimum of 30 days from receipt of the documentation by the SHPO or THPO before use of the site may be approved; or
- Documentation showing a finding of either "no historic properties affected" or “no effect” according to 36 CFR 800.4(d)(1) has been previously obtained for the proposed activities from the State, Tribal Government or Federal Land Management Agency responsible for the land. Include attached copies of SHPO concurrence, or Memorandum of Agreement (MOA) where concurrence is not required.
- Tribal, State and Local Approvals: Applicable laws regarding the proposed activities would be complied with. Copies of required clearances, including hazardous waste compliance, Tribal, State and local permits and approvals would be submitted.

2.7 COMPARATIVE SUMMARY OF THE ENVIRONMENTAL IMPACTS OF THE NO ACTION AND PROPOSED ACTION ALTERNATIVES

Table 4 summarizes the short- and long-term impacts that would potentially occur to each impact topic under the No Action Alternative and Proposed Action Alternative. A more detailed analysis is found in the Environmental Consequences chapter.

Table 4. Comparative summary of potential environmental impacts.

Impact Topic	No Action Alternative	Proposed Action Alternative
Air Quality	Air quality impacts would occur from ongoing maintenance and repair of the road surface. Increases in greenhouse gas emissions would result from vehicles and equipment used in road maintenance activities. This would cause short-term, but recurring increases in emissions to air, resulting in negligible to minor adverse impacts to this resource. Adverse cumulative effects to air would similarly be short-term, recurring and negligible to minor in intensity due to increased greenhouse gas emissions from maintenance activities and construction associated with the cumulative projects. The No Action Alternative would add a negligible adverse increment to overall cumulative effects.	Air quality impacts would occur as a result of fugitive dust generated during construction and increased greenhouse gas emissions from construction vehicles and equipment. Construction impacts to air quality would be short-term, negligible to minor and adverse. There would be no increase in greenhouse emissions from the Proposed Action Alternative during operation since the project would not increase capacity on the roadway. However, operation of the road would have a long-term, negligible adverse impact on air quality Adverse cumulative effects to air quality would be short- and long-term and negligible. The Proposed Action Alternative would add a negligible adverse increment to overall cumulative effects.
Water Resources, Quality and Quantity	Existing impacts on water resources such as localized flooding and poor drainage from undersized, damaged or clogged culverts would continue. Erosion near the Reflection Lakes parking area would continue to cause silt and sediment to be carried by stormwater into the lakes. The No Action Alternative would have long-term, minor to moderate impacts on water resources, particularly water quality. Adverse cumulative effects associated with the No Action Alternative would be short- and long-term minor. The No Action Alternative would add a slight adverse increment to overall cumulative effects.	The Proposed Action Alternative has the potential to cause short-term, negligible to minor, adverse impacts on water quality during construction. Construction would also require water extraction from the Ohanapecosh and Paradise rivers for dust control, thus there would be a short-term minor adverse impact on water quantity. However, there would also be long-term beneficial effects during operations because of improvements to the stormwater drainage system and the placement of boulders, installation of trail curbing, repair of eroded areas, and revegetation, which would discourage visitors from causing erosion along the shoreline of Reflection Lakes. Adverse cumulative effects associated with the Proposed Action Alternative would be short-term, negligible and adverse and long-term beneficial. The Proposed Action Alternative would add a negligible adverse increment and a beneficial increment to overall cumulative effects.

Impact Topic	No Action Alternative	Proposed Action Alternative
Wetlands	There would be long-term, minor to moderate adverse impacts from road runoff and visitors walking through the wetland area to view Reflection Lakes. Adverse cumulative effects would be short- and long-term minor and adverse. The No Action Alternative would add a slight adverse increment to overall cumulative effects.	Proposed actions under this alternative such as placing boulders and installing curbing to delineate the Wonderland Trail, repairing eroded areas, and revegetation at the Reflection Lakes parking area would cause short-term, negligible to minor and long-term, negligible adverse impacts on wetlands from construction activities such as clearing/grading near the wetland. However, these actions would provide long-term benefits because they would better protect the wetland and wetland buffer from visitor intrusions. Cumulative effects would be short- and long-term, negligible adverse and long-term, beneficial. The Proposed Action Alternative would add a negligible adverse increment and a beneficial increment to overall cumulative effects.
Soils	There would be ongoing maintenance of the road surface that could affect soils and erosion would continue to be a problem at the Reflection Lakes parking area and in areas where culverts are clogged, undersized, or damaged (causing localized flooding and potentially erosion). This constitutes a short-term moderate and long-term, minor to moderate, adverse impact on soils. Adverse cumulative effects resulting from the No Action Alternative would result in short- and long-term, minor impacts to project area soils. The No Action Alternative would add a perceptible adverse increment to overall cumulative effects to project area soils.	Short-term negligible to minor adverse impacts to soils would occur during construction because of the need for earth disturbance during clearing and grading. However, the improvements at the Reflection Lakes parking area would prevent the ongoing erosion problem from visitors walking down to the shoreline. In addition, culvert cleaning and repair would lessen the chance for localized flooding to occur with resulting erosion, which would result in long-term, beneficial effects to soils. Cumulative effects associated with the Proposed Action Alternative would be short-term, negligible and adverse as well as long-term beneficial. The Proposed Action Alternative would add a negligible adverse increment and a beneficial increment to overall cumulative effects.
Vegetation and Special Status Plant Species	Ongoing erosion, vegetation disturbance and soil compaction would result in short- and long-term, negligible to minor adverse effects to vegetation and special status plant species. Adverse cumulative effects associated with the No Action Alternative would be short- and long-term, minor and adverse. The No Action Alternative would add a negligible adverse increment to overall cumulative effects to project area soils.	The Proposed Action Alternative would have short-term, minor effects on vegetation during construction as approximately 6 acres of vegetation may be disturbed and there is potential for spread of noxious weeds. A long-term, beneficial effect would occur where habitat is restored through revegetation and the removal of noxious weeds, particularly in the areas where turnouts would be obliterated and along the lakeshore of Reflection Lakes. Adverse cumulative effects associated with the Proposed Action Alternative would be short-term, minor adverse and long-term, beneficial. The Proposed Action Alternative would add a negligible adverse increment and a beneficial increment to overall cumulative effects.

Impact Topic	No Action Alternative	Proposed Action Alternative
Fish, Wildlife and Special Status Fish and Wildlife Species	Ongoing work and maintenance to repair Stevens Canyon Road (crack sealing, asphalt overlays, etc.) would cause short-term periodic noise and human presence that would have negligible to minor impacts on wildlife, and the *may affect but would not likely adversely affect* the Northern spotted owl, marbled murrelet, and bull trout. There would be *no effect* on other federally listed species. Cumulative effects on fish and wildlife would be short-term, minor and adverse and *may affect but would not likely adversely affect* the northern spotted owl, the marbled murrelet or bull trout. The project would have *no effect* on other federally listed species. The No Action Alternative would add a negligible adverse increment to overall cumulative effects.	Construction would cause short-term increases in noise and vibration, vehicle traffic, and human activity, which has the potential to disturb nesting or foraging wildlife including special status species. However, there are mitigation measures that would be imposed particularly timing restrictions on construction to minimize any impacts on nesting special status species. Generally there would be short- and long-term negligible to minor adverse impacts on fish, wildlife and special status fish and wildlife species. The proposed action *may affect, but would not likely adversely affect* the Northern spotted owl, marbled murrelet, and bull trout during project construction. The proposal would have *no effect* on other federally listed species. The project would provide a benefit to habitat by returning several turnout areas to native conditions. Cumulative effects would generally be short-term, negligible and adverse and long-term, beneficial. The Proposed Action Alternative would add a negligible adverse increment and a beneficial increment to overall cumulative effects.
Cultural Resources (Archeology, Historic Resources, and Cultural Landscapes)	There would be no adverse impacts (*no adverse effect*) to archeological resources. There would be long-term, moderate adverse impacts *(adverse effect)* on historical resources and the cultural landscape due to deteriorating historic features such as stone retaining walls and guardwalls, culverts and curbs that make up the cultural landscape. Adverse cumulative effects associated with the No Action Alternative would result in long-term negligible to minor impacts (*no adverse effect*) to archeological resources. Adverse cumulative effects resulting from the No Action Alternative would result in long-term, moderate impacts (*adverse effect*) on historic structures and cultural landscapes.	There would be no effect to known archeological resources from construction; however, there is potential to disturb unknown archeological resources during construction. Thus, there would be long-term negligible to minor adverse impacts (*no adverse effect*) on archeological resources. Construction would cause long-term negligible to minor impacts (*no adverse effect*) on historic structures and the cultural landscape. The project would provide long-term beneficial effects on historic structures and the cultural landscape because of the repair and rehabilitation of the road itself and the associated historic features such as stone retaining walls, guardwalls, culverts and curbs. Operation of the road would have no adverse impacts (*no adverse effect*) on archeological resources, historic structures, or the cultural landscape. Cumulative effects resulting from the Proposed Action Alternative would result in long-term negligible impacts (*no adverse effect*) to archeological resources, historic structures and cultural landscapes.

Impact Topic	No Action Alternative	Proposed Action Alternative
Visitor Use and Experience	The existing roadway condition and ongoing maintenance would result in recurring short-term, minor to moderate and potentially, long-term, moderate adverse effects from traffic delays for repair work in the roadway. Cumulative effects would be recurring short- and long-term, minor adverse impacts to visitor use and experience. The No Action Alternative would contribute a slight adverse increment to overall cumulative effects.	The Proposed Action Alternative would result in short-term, minor to moderate adverse impacts to visitor use and experience during construction because of travel delays associated with road closures and construction roadwork. However, there would also be long-term, beneficial effects by improving visitor conditions and reducing travel delays associated with maintenance. Cumulative effects would be short-term, minor adverse and long-term, beneficial. The Proposed Action Alternative would contribute a slight adverse increment as well as a long-term beneficial increment to overall cumulative effects.
Public Health, Safety and Park Operations	Ongoing maintenance creates a burden on staff time and park resources. Potential events such as a road failure caused by the deteriorating road conditions would cause an immediate disruption in park operations and could compromise public safety. Thus, the No Action Alternative would result in short- and long-term, minor to moderate impact. Overall cumulative effects would be short- and long-term, minor and adverse. The No Action Alternative would add a detectable adverse increment to overall cumulative effects.	The Proposed Action Alternative would result in short-term, minor to moderate impacts because of the need to supply park staff to oversee construction. However, once completed the project would reduce the need for staff time and resources for ongoing road maintenance. Thus, there would be long-term beneficial effects during operation. Overall cumulative effects would be short- and long-term, minor, adverse, and long-term beneficial. The Proposed Action Alternative would add a slight adverse increment and a beneficial increment to overall cumulative effects.

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3. AFFECTED ENVIRONMENT

3.1 INTRODUCTION

This chapter describes the existing environmental resources potentially impacted by the Proposed Action. Natural resource topics addressed in this section include air quality, water resources and water quality and quantity, wetlands, soils, vegetation and special status plant species, and fish and wildlife and special status fish and wildlife special status species. Cultural resource topics addressed in this section include archeology, historic structures, and cultural landscapes. Other topics retained for analysis include visitor use and experience, and public health, safety and park operations (geologic hazards are included in this last section). Resource topics dismissed from further consideration were discussed in Chapter 1 and include floodplains, prime and unique farmlands, natural lightscapes, soundscapes, geologic resources, wilderness, wild and scenic rivers, environmental justice, socioeconomics, ethnography, and paleontology.

3.2 AIR QUALITY

Mount Rainier National Park is designated a Class I area under the Clean Air Act of 1977. Class I area designation is granted to national parks over 6,000 acres, designated wilderness areas, memorial parks over 5,000 acres, and international parks. This designation maintains the highest air quality and allows only small increments of pollutants above the existing park levels. In addition, the designation requires protection of air quality related values (AQRV) important to the overall park visitor experience. AQRVs include visibility or a specific scenic, cultural, physical, ecological or recreational resource. For example, pollutants in the air can create haze that obscures or diminishes scenic views. Air pollution such as acid rain can also damage soils and vegetation and affect water quality. Air quality in the project area is generally considered good depending on the time of year and regional conditions. However, relatively high levels of sulfur and nitrogen compounds and low pH levels have been detected in precipitation samples. Episodic acidification occurs at some lakes in the Park during spring snowfall (Clow 2008). Most of the air pollutants at Mount Rainier are generated by outside sources such as power plants and paper mills (for example, the Centralia power plant located 50 miles southwest of the Park has been shown to contribute higher sulfur dioxide emissions at the Park), urban transportation in the Seattle and Tacoma area, and slash burning associated with logging on forest lands surrounding the Park.

Vehicles are the primary source of air pollution within Park boundaries. Vehicles contribute particulate and nitrogen oxide pollutants to the air. Nitrogen oxide is converted to ozone in a process that is termed photochemical smog. In this process, nitrogen oxide reacts with sunlight to produce ozone. Ozone and particulate pollution are occasionally measured at high levels in the Park. However, the level of vehicle traffic in the Park is not considered to be a major contributor to ambient air pollutant levels. Other sources of emissions within the Park include generators, heating systems, a few wood stoves in Park buildings, and campfire smoke.

The NPS has formed a partnership with the U.S. Environmental Protection Agency (EPA) to collaborate on controlling greenhouse gases and climate change. This program is called the Climate Friendly Parks Program, which provides management tools and resources to address climate change. The program approach involves: measuring existing emissions; developing strategies to mitigate emissions and adapt to impacts; sharing information; and educating the public about measures they can use to lessen their effect on climate change.

The NPS has developed a tool called the Climate Leadership in Parks (CLIP) tool to determine the baseline levels of greenhouse gases in the National Park system. In Mount Rainier National

Park, there are three greenhouse gases that require consideration: carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Each of these greenhouse gases has a different global warming potential (GWP) per metric ton produced. Nitrous oxide has far greater GWP than methane, which has far greater GWP than carbon dioxide. In order to accurately assess greenhouse gas emissions emitted by the Park, the metric tons of each gas is converted to metric tons carbon dioxide equivalent (MTCO2E) using the GWP factor. For CO_2, the reference gas, 1 metric ton is equal to 1 MTCO2E. For CH_4, 1 metric ton is equal to 21 MTCO2E. And for N_2O, 1 metric ton is equal to 310 MTCO2E.

Using CLIP it was determined that, the 2006 annual greenhouse gas emissions in the park for each of these greenhouse gases is as follows: CO_2 – 11,954 MTCO2E, CH_4 – 529 MTCO2E, and N_2O – 203 MTCO2E. The Park uses these estimated figures as the baseline information against which it evaluates the effectiveness of its efforts to reduce greenhouse gas emissions.

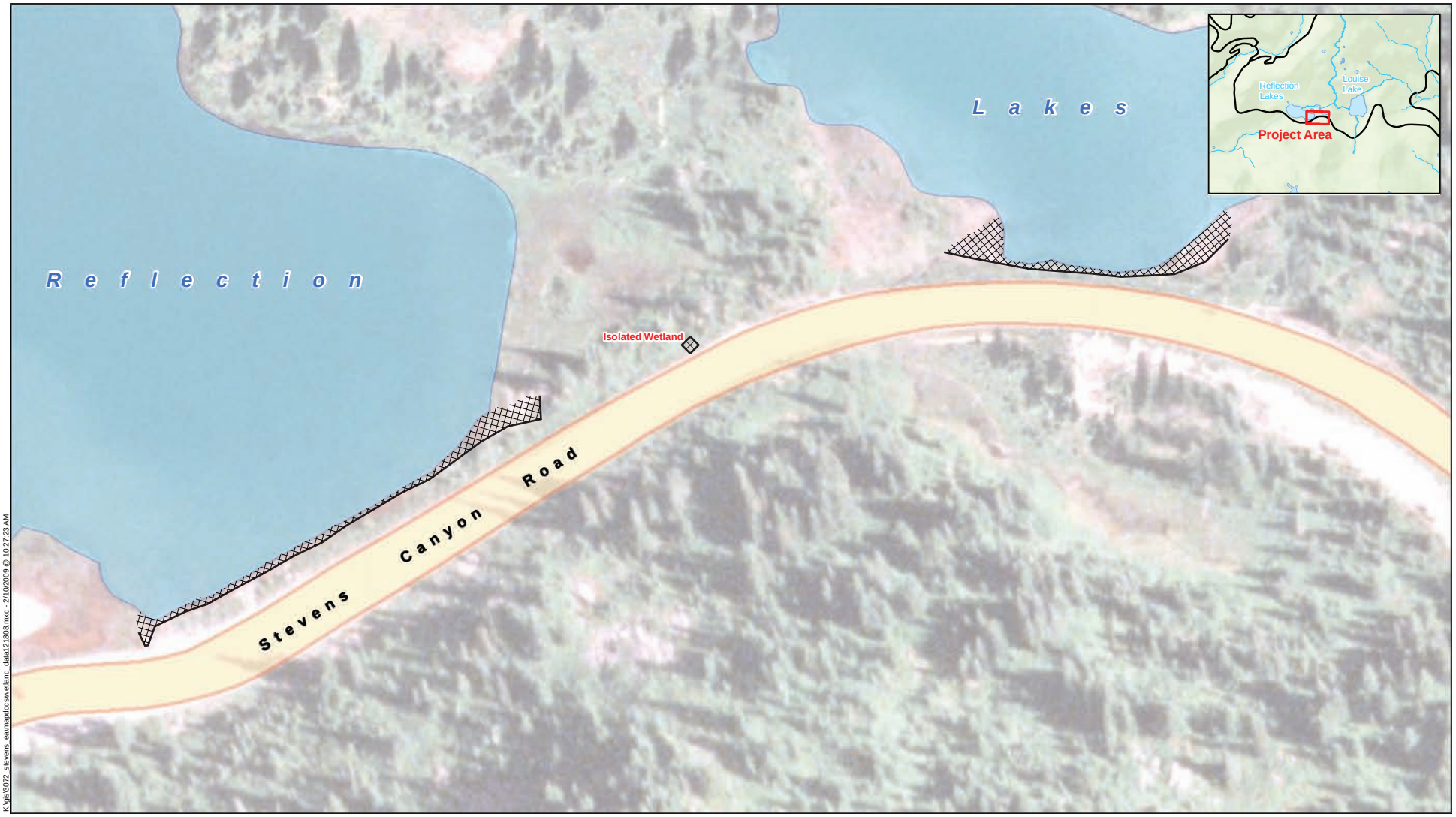
3.3 WATER RESOURCES, QUALITY AND QUANTITY

Mount Rainier National Park contains nine major rivers that originate on Park's slopes from rain, snow and glacial meltwater. In total, the mountain has 26 major glaciers, covering approximately 35 square miles, which constitute the largest single glacial system in the contiguous 48 states (NPS 2001). Within the Park there are approximately 400 mapped lakes and 470 mapped streams, several unique mineral and thermal springs, and about 3,000 acres of palustrine and riverine wetlands.

Within Segment 1, the main waterways include: the Paradise River, Reflection Lakes, and Stevens Creek. Louise Lake and Bench Lake are also in vicinity of Segment 1. They are outside the actual project area, but could potentially be affected by the project. Segment 4 includes the following waterways: the Ohanapecosh River and Fall Creek (in addition to several smaller unnamed tributaries and drainages). The water quality of these waterbodies is generally good and supports a diverse array of aquatic life (NPS unpublished report).

3.4 WETLANDS

The Park contains three major types of wetlands: riverine, lacustrine, and palustrine. In the project area there are wetland areas located on the shoreline edge of Reflection Lakes and one isolated wetland also located near Reflection Lakes (Figure 7). The wetlands along the shoreline are jurisdictional and any work in these wetlands would require a Clean Water Act Section 404 permit from the U.S. Army Corps of Engineers. The isolated palustrine wetland is non-jurisdictional because it is not hydrologically connected to other waters. The wetland along the shoreline area is a palustrine wetland situated at the toe of a fill slope for Stevens Canyon Road and consists of the wetted edge of the lake shore and associated wet meadow. The wetland boundary was identified as the contact point of the toe of the fill slope and the wet meadow. The wetland area is dominated by obligate and facultative wetland species. The soil is volcanic in nature, and these soils produce a low chroma, which complicates the identification of hydric soils. As a result other indicators such as a dark layer of peat at the surface and soil saturation were used to conclude that wetland soil conditions existed at the site. The wetland delineation report and wetland data sheets have been provided in Appendix B.



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Legend

Wetland Boundary Adjacent to Reflection Lakes

Wetland

Figure 7
Wetland Delineation
Stevens Canyon Road EA
Mount Rainier National Park

The project would not require a Statement of Findings because the project qualifies as an exception under DO #77-1 (Wetland Protection). According to the NPS Procedural Manual #77-1: Wetland Protection, scenic overlooks, including signs, where primary purpose include public education, interpretation, or enjoyment of wetland resources and where total wetland impacts from fill placement are 0.1 acre or less may be excepted from a statement of findings and compensation requirements. It is also excepted if the project is intended to restore wetlands as long as the long-term cumulative impact is limited to 0.25 acres of fill. Both requirements would be met by the project, thus there is no Statement of Findings required for the project.

3.5 SOILS

No systematic soil mapping has been conducted in the Park. The best soils information available for the Park is a general description of a classification system for forest soils that was completed as a master's thesis (Hobson 1976) and some soil texture data from restoration sites. These soil types generally include: tephra, colluvial, alluvial, and mudflow (NPS 2001). Tephra soils are pyroclastic deposits identified by individual ash layers. This soil type is found in the subalpine and alpine meadows. Colluvial soils are unstable, rapidly drained soils, and are coarse and unconsolidated having mixed parent materials. This soil type is predominantly found on slopes at all elevations, but especially on steep slopes and south-facing aspects. The dominant soil group in the Park consists of colluvial soils (Franklin et al 1988). Soils within the project area (five to ten feet from the edge of pavement) have been disturbed by previous construction activities when the road was originally built. In addition, surface soils five to ten feet from the edge of pavement remain disturbed to maintain drainage and provide a recovery zone.

3.6 VEGETATION AND SPECIAL STATUS PLANT SPECIES

Plant surveys were conducted for special status species, invasive plants and plant associations to document species and habitat composition (see Appendices C and D). The affected area for vegetation generally lies within the road prism (e.g. from cut bank to toe of fill slope). Within the road prism, vegetation was established on soil substrates that were extensively modified when the road was originally built in the late 1930's. Moreover, five to ten feet from the edge of the road generally remains open and disturbed to maintain drainage and provide a recovery zone.

The forests of Mount Rainier have been shaped by periodic disturbances, such as avalanches, lahars, and fire. As a result, the Park is comprised of a mosaic of age stands and forest types. The project area has primarily been affected by fires and avalanches. Moreover, within historic buttress limits, the habitat is often open and rocky with little or no tree cover. Many of the buttresses created by road building in the Park in the 1920s and 30s are still treeless. These open, rocky slopes provide habitat for pioneer species and species which cannot regenerate under a closed canopy forest. In addition, these areas also create opportunity for the colonization of exotic species.

Segment 1 generally falls into the silver-fir (*Abies amabilis*)/Fool's huckleberry (*Menziesia ferruginea*) forest classification described by Franklin et al. (1988). This association is found on cool, moist sites with moderate to heavy snowpack at elevations of 3,500-5,000 feet throughout the Park and is represented by subalpine forest types with meadow openings near Reflection Lakes (the highest elevation within the project area). Silver-fir is generally the dominant tree species both in canopy and regeneration, but mountain hemlock (*Tsuga mertensiana*) may be a major associate. The plant survey documented approximately 30-68 percent of shrub cover on the reference plots. Dominant shrub species within the first 4.83 miles of the project area include: Fool's huckleberry (*Menziesia ferruginea),* big huckleberry *(Vaccinium membranaceum),* and

Cascade azalea (*Rhododendron albiflorum).* Higher shrub cover is associated with younger stands of this forest type. Herb cover ranged from 30-50 percent and featured Dwarf bramble (*Rubus lasiococcus),* five-leaved bramble (*Rubus pedatus),* Queen's cup (*Clintonia uniflora),* and avalanche lily (*Erythronium montanum)*. Sitka valerian (*Valeriana sitchensis)* and vanilla leaf (*Achlys triphylla)* were locally abundant (Koepke et al 2004).

Segment 4 is located at a lower elevation (2,200-3,300 feet) and is generally typified by mid-elevation montane forest types. This section of the project area starts at the higher elevation with the silver-fir/Alaska huckleberry association, then transitions to silver-fir/western coolwort forest, to Western hemlock (*Tsuga heterophylla*)/salal forest, and to the silver fir/Oregon grape classification as the elevation drops (NPS 2001).

The silver-fir/Alaska huckleberry plant association is the most extensive within the boundary of the Park (Franklin et al 1988) and is primarily dominated by a coniferous canopy of silver-fir, western hemlock, Douglas fir (*Pseudotsuga menziesii*), and Western red-cedar (*Thuja plicata*). This forest type also supports a moderately dense understory of these conifer species. The shrub layer is generally moderate to low in cover and is commonly dominated by Alaska huckleberry, but can also include vine maple (*Acer circinatum*), red huckleberry (*Vaccinium parvifolium*), and saplings of Western hemlock and silver-fir. These tree and shrub species are common throughout Segment 4.

The herb layer within Segment 4 is comprised of dry tolerant species on open slopes, with shade loving herbs growing under shrub cover. Typical dry tolerant herbs include: white-flowered hawkweed (*Hieracium albiflorum),* broad petal strawberry (*Fragaria virginiana*), slender wintergreen (*Gaultheria ovatifolia*), pearly everlasting (*Anaphalis margaritacea*), and fireweed (*Epilobium angustifolium*). Grasses such as blue wild rye (*Elymus glaucus*) and red fescue (*Festuca rubra*) are also common on dry slopes. Shade loving herbs (generally found under the shrub layer) include: twinflower (*Linnaea borealis*), vanilla leaf, woods strawberry (*Fragaria vesca*), western starflower (*Trientalis latifolia),* and coolwort foamflower (*Tiarella trifoliata*). A complete list of native plants occurring within the project area can be found in Appendix C.

Exotic and Noxious Plant Species

Approximately 54 exotic and noxious species are located within the project area based on surveys conducted in 2004 and 2008 (Koepe et al 2004 and Clegg 2008). Fifteen of these species are designated as "noxious" in the State of Washington. Appendix D provides a complete list of exotic and noxious species found within the project area (Clegg 2008).

Many noxious and exotic weeds have a competitive advantage in areas with disturbed ground. In addition, seeds can be transported along highways and roads by construction equipment and vehicles. Roads also provide habitat characteristics that are favorable to many exotics, such as exposed mineral soils and open canopy conditions. Within the project area the construction of buttresses removed native vegetation, which created a large open area of disturbed soil. These conditions are favorable for the establishment of exotic species. In addition to the buttress area, five to ten feet from the edge of the road remains disturbed and is a favorable location for establishment of exotic/noxious plant species.

Special Status Plant Species

One special status plant species that may potentially occur within the project area is the Noble polypore (*Bridgeoporus nobillissimus*). While suitable habitat may be present (and populations of this species are located within the Park); to date no individuals have been found within the project area.

3.7 FISH, WILDLIFE, AND SPECIAL STATUS FISH AND WILDLIFE SPECIES

A variety of general wildlife is found throughout the Park and has been observed adjacent to the project area including small and large mammals, birds, fish, and amphibians. Small mammals generally include: deer mouse (*Peromyscus maniculatus*) and Douglas squirrel (*Tamiasciurus douglasii*). Other disturbed portions of the project area contain open and rocky habitat with little or no trees that mimics natural talus slopes. These areas provide suitable habitat for marmots and pikas (*Ochotona princeps*), which are commonly observed in suitable habitat. Small and medium-sized carnivores that may occur in the project area include: long-tailed weasel (*Mustela frenata*), pine marten (*Martes americana*), raccoons (*Procyon loto*), bobcat (*Lynx rufus*), and coyote (*Canis latrans*). Large mammals includes the black bear (*Ursus americanus*), black-tailed deer (*Odocoileus hemionus columbianus*), and mountain lion (*Felis concolor*).

There are over 229 species of birds listed for the Park, with approximately 80 of these known to nest in the Park (Checklist of Birds of MORA 1995). Approximately 13 species of amphibians occur in the Park and the project area includes habitat for Cascades frog, tailed frogs, Larch Mountain, redback and Van Dykes salamanders, Western toad and ensatina. Fourteen native species/subspecies of fish occur in Park streams.

3.7.1.1 Special Status Fish and Wildlife Species

Special status species are defined as federally-listed or proposed threatened, endangered or candidate species, as well as state-listed threatened, endangered, candidate, rare and declining species. These are further defined as follows:

- Listed Species: An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future.
- Proposed Species: Species for which the U.S. Fish and Wildlife Service or National Marine Fisheries Service has published a proposal to list as endangered or threatened in the Federal Register.
- Candidate Species: Species for which the U.S. Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

In addition, NEPA (42 USC 4321 et seq.) mandates an examination of a project's potential impacts on all components of affected ecosystems. According to the NPS Management Policies, the NPS strives to maintain all components and processes of naturally evolving park unit ecosystems, including the natural abundance, diversity, and ecological integrity of plants and animals (NPS 2006).

Information regarding the potential occurrence of special status species on and adjacent to the project area was obtained from a variety of sources including MORA staff, the USFWS, and the Washington Department of Fish and Wildlife's (WDFW) Priority Habitats and Species List. Tables 5 and 6 list the State and Federal special status species that are known to or are likely to occur in the Park, respectively.

State Species

Table 5 lists the State special status species (this list also provides the federal listed status if applicable). Moreover, this table also lists habitat needs for each species, as well as occurrence potential within and adjacent to the project area. The species that are likely or known to occur on or adjacent to the project area are further discussed below.

Table 5. Washington Department of Fish and Wildlife Priority Habitats and Species List.

SPECIES NAME (Scientific name)	Federal Status	State Status	Habitat Needs	Occurrence Potential*
BIRDS				
Northern goshawk (*Accipiter gentillis*)	FSC	SC	Preferred habitat includes: mature stands of coniferous, deciduous, and mixed forests.	Likely- they are known to occur in the Park. However, no known nesting occurs adjacent to the project area.
Golden eagle (*Aquila chrysaetos)*	--	SC	Commonly associated with open, arid plateaus deeply cut by streams and canyons, western shrub-steppe, and grassland communities. Also associated with transition zones between shrub, grassland, and forested habitat. Nests are located on cliffs and occasionally on trees.	Likely- they are known to occur in the Park. However, no known nesting occurs adjacent to the project area. This species is generally more common east of the Cascades.
Vaux's swift (*Chaetura vauxi)*	--	SC	Strongly associated with old-growth forests. They require hollow chambers in large snags or live trees with broken tops for nesting and night roosting.	Likely- they are common in forested areas and may nest in the Park.
Pileated woodpecker *(Dryocopus pileatus)*	--	SC	Inhabit mature and old growth forests and second-growth forests with large snags and fallen trees. Large snags and large decaying live trees in older forests are used for nesting and roosting.	Likely- pileated woodpeckers are relatively common in low elevation forests within the Park.
Peregrine falcon (*Falco peregrinus)*	FSC	SS	Breeding range generally includes suitable cliffs that overlook water.	Possible- in the spring and fall, migrant peregrine falcons may be present for short periods. Nesting peregrines occur on the southwest corner of the Park.
Bald eagle (*Haliaeetus leucocephalus)*	FSC	SS	Nesting, foraging, and perching habitat for bald eagles is typically associated with water features such as rivers, lakes, and coastal shorelines where eagles prey upon fish, waterfowl, and seabirds.	Unlikely- this species migrates through the Park but there is no record of bald eagles nesting in the Park. Wintering eagles may occur in the vicinity of the Park from October 31st through March 31st.
Lewis' woodpecker (*Melanerpes lewis*)	--	SC	Prefers a forested habitat with an open canopy and a shrubby understory with snags available for nest sites and perches.	Likely- this woodpecker has been observed in the Park.
MAMMALS				
Townsend's big-eared bat (*Corynorhinus townsendii*)	FSC	SC	Big-eared bats hibernate in caves and use caves and abandoned buildings for breeding and roosting.	Possible- no roosting concentrations are known to occur near the project area.
Myotis bats (*Myotis* spp.)	FSC	SS	They inhabit forests and chaparral. They are known to forage over ponds, streams, open meadows, and forest edges and roost in caves or mines.	Possible- state is concerned with roosting concentrations of these species. These species do occur in the Park but no roosting concentrations are known to occur near the project area.

SPECIES NAME (Scientific name)	Federal Status	State Status	Habitat Needs	Occurrence Potential*
AMPHIBIANS				
Tailed frog (*Ascaphus truei)*	FSC	SM	Tailed frogs live and breed in clear, cold, fast-flowing streams with rock or gravel bottoms.	Likely- tailed frogs are found in fast moving streams throughout the Park.
Western toad (*Bufo boreas*)	FSC	SC	Western toads use three different types of habitat: breeding habitats, terrestrial summer range, and winter hibernation sites. They are mostly terrestrial and live in habitats ranging from mountain meadows to desert flats. They are most common around marshes and small lakes.	Possible- formerly more abundant in the Park; recently found only in and around a few lakes and wetlands. This species has not been documented within the project area.
Larch mountain salamander (*Plethodon larselli*)	FSC	SS	This species inhabits forested and talus environments in cool, moist conditions under wood or rock.	Present- this species has been found in a few locations in the project area. Recent field surveys have observed this species within the project area (NPS 2008b).
Van Dyke's salamander (*Plethodon vandykei*)	FSC	SC	This species inhabits streambanks, upland forests, talus areas, and seeps.	Likely- this species has been documented in the Park. Habitat is found within the project area. However, field surveys conducted to date have not detected the presence of this salamander within suitable habitat located adjacent to Stevens Canyon Road (NPS 2008b).
Cascades frog (*Rana cascadae)*	FSC	SM	Cascades frogs occur in mountainous areas, marshes, ponds, small streams, roadside ditches and culverts.	Present- they are found throughout the Park and presence has been confirmed in suitable habitat located within the project area (NPS 2008c).
FISH				
Coastal cutthroat trout (*Oncorhynchus clarki clarki*)	FSC	--	Inhabits small rivers, gravelly streams, and isolated mountain lakes. Spawning occurs in gravel stream riffles where the females dig a nest (redd) in the gravel.	Present- native coastal cutthroat trout occur in the Ohanapecosh and Paradise rivers and Stevens and Falls creeks. There are also hybrids of coastal cutthroat – Westslope cutthroat, rainbow and brook trout in these rivers and streams.
MOLLUSK				
California floater mussel *(Anodonta californiensis)*	FSC	SC	This freshwater mollusk inhabits permanent waters of all sizes.	Unlikely- this species has not yet been documented in the Park.
ARTHROPODS				
Taylor's checkerspot *(Euphydryas editha taylori)*	FC	SE	The Taylor's checkerspot is found in open grasslands and oak balds where food plants for larvae and nectar sources for adults are available.	Unlikely- presence has not been confirmed in Lewis County, Washington.
Fender's soliperlan stonefly (*Soliperlan fenderi*)	FSC	--	Fender's soliperlan stonefly nymphs are exclusively found in seeps in the headwaters of small streams. Adults are found along the shores of streams.	Possible- this species has been documented in the Park in several areas. Surveys have been conducted but no species have been identified within the project area.

*Occurrence potential based upon presence of suitable habitat, known distribution, NPS MORA records, and field surveys conducted by natural resources staff at MORA.

FC= Federal Candidate
FSC= Federal Species of Concern
SM – State Monitor
SE= Washington State Endangered
SC= Washington State Candidate Species
SS= Washington State Sensitive Species Mammals

Birds

Six sensitive bird species may potentially be found on or near the project area. These include northern goshawk, golden eagle, Vaux's swift, pileated woodpecker, peregrine falcon, and Lewis' woodpecker. However, no known nesting sites for these species occurs within or adjacent to the project area.

Mammals

Townsend's big eared bats and four species of Myotis bats are known to occur within the Park and these bat species may occur in the project area (especially near the Ohanapecosh River Bridge and Falls Creek Bridge). However, no roosting concentrations of these bat species are known to occur near the project area.

Amphibians

Five sensitive amphibian species may potentially occur in the Park including tailed frog, western toad, Van Dyke's salamander, Cascades frog and Larch Mountain salamander. The western toad is unlikely to occur near the project area, but the tailed frog and Van Dyke's salamander are likely to occur near the project area. Two amphibian species, the Cascades frog and Larch Mountain salamander, have been documented in recent field surveys as occurring within the project area. These two species are further discussed below:

Cascades Frog

The Cascades frog lives in the Cascade Mountain Range in a band from Washington south to the Oregon-California border with additional scattered populations in the mountains of Northern California. This species can be found in the water and surrounding vegetation of mountain lakes, small streams, and ponds in meadows from approximately 2,000 feet in elevation up to timberline (NatureServe 2008). Distribution of the Cascades frog in Mount Rainier National Park is well known. In July 2008, a survey was conducted that found the presence of egg masses, juvenile, and adult Cascades frogs within the project area in drainage ditches and culverts (NPS 2008c).

Larch Mountain Salamander

Larch Mountain salamanders were once thought to be restricted to the Columbia River Gorge. However, in recent years they have been found further north in the State of Washington. While their distribution appears to be patchy, the full extent of their range and habitat affinities are not known. Park staff has conducted surveys for Larch Mountain salamanders for monitoring purposes and NEPA compliance due to the proposed road improvements along Stevens Canyon Road during 2006, 2007, and 2008. The surveys confirmed the presence of Larch Mountain salamander within the project area. Moreover, suitable habitat within the project area may constitute the highest population density of Larch Mountain salamanders in Mount Rainier National Park (NPS 2008b).

Fish

The only documented sensitive fish species (other than federally-listed species described later) that occurs within the vicinity of the project area is the coastal cutthroat trout, which inhabit small rivers, gravelly streams, and isolated mountain lakes. Coastal cutthroat trout have been documented approximately 650 feet downstream of Stevens Canyon Road in the Ohanapecosh River.

Mollusk

The California floater is a mussel that lives in the shallow areas of clean, clear lakes, ponds and large rivers. They prefer lower elevations and a soft, silty substrate to burrow into. Verified sightings in Washington are limited to a few sites in Curlew Lake (Ferry County). It is unlikely that they are located in the Park since there have been no discoveries of this species to date.

Anthropods

Taylor's checkerspot is a medium-sized colorfully checkered butterfly. It was once found throughout grasslands in the Willamette Valley, Vancouver Island and Puget Sound. There are now only four known populations, three in Washington and one in Oregon. Three of the populations contain fewer than fifty individuals based on recent surveys. The species is in serious decline and in imminent danger of extinction. It is unlikely to occur in the Park since there have been no observations in either Pierce or Lewis counties.

Fender's soliperlan stonefly spends a majority of its life as an aquatic nymph (larvae). It requires clean, clear water with an adequate supply of dissolved oxygen to survive because they breathe underwater through gills. They are usually found in cold, fast-flowing streams. This species has been documented in the Park; however, it has not been identified within the project area.

Federally-Listed Threatened and Endangered Species

The following section identifies species occurring in Mount Rainier National Park that are federally-listed as candidate, threatened, or endangered and protected under the ESA. Table 6 identifies all federally-listed species potentially occurring within the park. Note that many are also State special status species. The project is not expected to impact federally-listed anadromous fish/fish habitat. However, Park data suggest there is the potential to affect the following federally listed species: Northern spotted owls, which have been documented nesting in close proximity to the project area, most recently as 2006, 2008, and 2009, marbled murrelets, which may occur in suitable habitat near the Ohanapecosh entrance to the Park, and bull trout, which may potentially occur in the Ohanapecosh downstream of the project area.

Table 6. Federally Listed Threatened and Endangered Species Occurring in Mount Rainier National Park.

SPECIES NAME (Scientific Name)	Federal Status	Habitat present in or near project area?	Species documented in or near project area?	Effect Summary – Action Alternative
Northern Spotted Owl (*Strix occidentalis caurina*)	FT	Yes	Yes	NLAA
Marbled Murrelet *(Brachyramphus marmoratus marmoratus)*	FT	Yes	Suspected	NLAA
Fisher *(Martes pennanti)*	FC	No	No	No impact
Gray Wolf *(Canis lupus)*	FE	Yes	No	No effect
Canada Lynx *(Lynx canadensis)*	FT	No	No	No effect
Grizzly Bear (Ursus arctos horribilis)	FT	No	No	No effect
Chinook Salmon *(Oncorhynchus tshawytscha)*	FT	No	No	No effect
(Puget Sound Evolutionarily Significant Unit)				
Bull Trout *(Salvelinus confluentus)*	FT	Yes	Unlikely but possible	NLAA
Steelhead *(Oncorhynchus mykiss)*	FT	No	No	No effect

SPECIES NAME (Scientific Name)	Federal Status	Habitat present in or near project area?	Species documented in or near project area?	Effect Summary – Action Alternative
Dolly Varden *(Salvelinus malma)*	FPROP	No	No	No effect

FT= Federally Threatened ST= Washington State Threatened
FE= Federally Endangered SE= Washington State Endangered
FC= Federal Candidate SC= Washington State Candidate Species
NLAA=May affect, not likely to adversely affect

Northern Spotted Owl

The northern spotted owl is a medium-sized nocturnal owl that preys primarily on small mammals. The owl is strongly associated with old growth forests that are structurally complex (characterized by multi-storied canopies, several species of trees, sizes, and ages, and standing and downed dead trees). Moreover, the birds require large amounts of suitable habitat. Median home range sizes are typically on the order of 3,000 to 5,000 acres per pair. Spotted owls nest in cavities or platforms in trees and pairs are typically spaced about one to two miles apart. Northern spotted owls are long-lived, territorial birds and often spend their entire adult life in the same territory. Critical habitat has not been formally designated for northern spotted owls in Mount Rainier National Park.

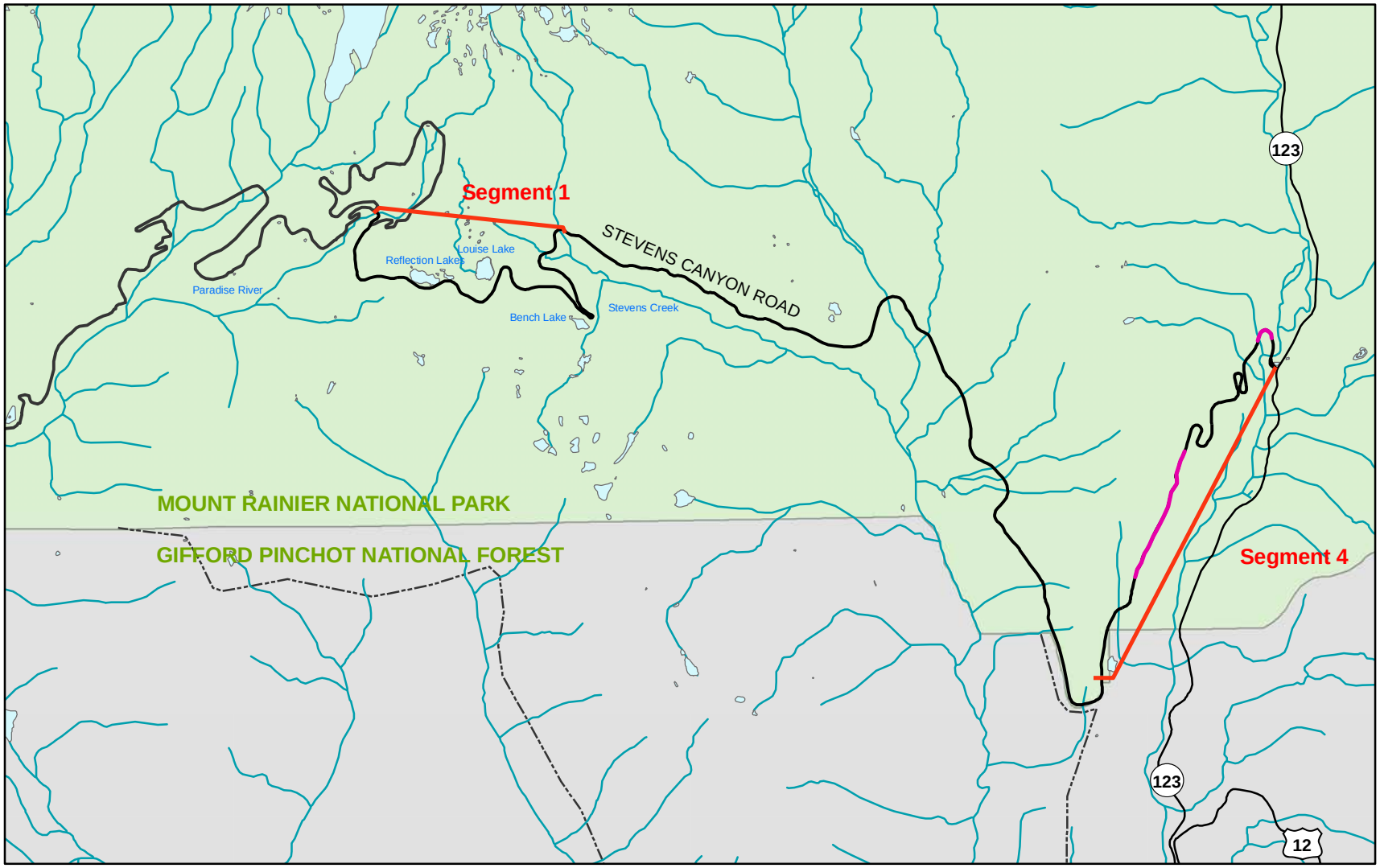
Northern spotted owl pairs begin to nest in February or March. In late March or early April, the female will lay one to three eggs. Young are fed by both parents until August or September, although fledging may occur in May or June, and by October the young disperse from the nest site. Northern spotted owls' nesting and fledging season extends from March 15th through September 30th. Nest trees may include: Douglas-fir, grand-fir, Pacific silver-fir, and other species. Nests are usually found in forests up to 4,800 feet in elevation. Mount Rainier National Park contains a mosaic of old-growth forest ecosystems, which encompasses an estimated 33,208 hectares (80,060 acres) of suitable spotted owl habitat within the Park (Myers and Schaberl 2008).

Surveys of northern spotted owls have been conducted at the Park with varying degrees of effort from 1983 through 2009 with consistent monitoring beginning in 1997. In 2008, approximately 26 territories, and 5 potential territories (for a total of 31) were monitored in the Park to determine occupancy and reproductive status. In 2008, productivity for the Park (measured in the numbers of fledged young per territorial female) was 0.64 (Unpublished MORA Territories Summary 2008). This was in contrast to the 2007 nesting productivity of zero. This trend generally follows the expected alternating year nesting sequence of the owl (Myers and Schaberl 2008).

There are two known spotted owl territories that overlap with the project area. In 2009, various segments of Stevens Canyon Road (within the project area) were within a spotted owl territory (which consists of a 0.7-mile radius circle). It is important to note that the affected road segments within the project area can change from year to year. Figure 8 has been provided to give a general indication of where owl territories overlap with the roadway. These areas would be subject to seasonal construction stipulations. A field survey would be required prior to construction to determine which segments of the roadway would potentially affect northern spotted owl territory.

Marbled Murrelet

Marbled murrelets are marine birds that forage in near-shore environments from northern California up through Alaska and are year round residents on coastal waters. They typically nest high in the canopy of old growth forests or stands of large trees infected with mistletoe. Within the Park, approximately 23,000 acres of forested area is defined as suitable murrelet nesting



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1,750 875 0 1,750 Meters

Owl territory proximity to the roadway shown on this figure is based on 2009 survey results and is subject to change. A survey will be conducted prior to construction.

Legend

Northern Spotted Owl

Wilderness Boundary

Figure 8
Spotted Owl Territory Proximity
Stevens Canyon Road EA
Mount Rainier National Park

habitat (Figure 9). High quality habitat is distributed along the western boundary of the Park in valleys running east and west separated by high elevation ridges. Lower quality, but suitable habitat, continues along the southern and southeastern areas of the park. Critical habitat for the species has been designated within Lewis and Pierce Counties, but the designation does not include the Park because these lands are protected. Within the Park, the presence of murrelets has been documented within four river corridors: the Carbon, Mowich, Puyallup, and Nisqually Rivers (NPS 2008d). It is assumed that nesting is occurring. No active nests have been identified within the Park; however nest surveys have been few and limited to the Carbon River drainage.

USFWS has designated suitable habitat for marbled murrelet to include parts of Stevens Canyon and the Ohanapecosh River (See Figure 9). On 3 November 2009, Vince Harke, USFWS Wildlife Biologist for the Ecological Services Field Office in Lacey, Washington, and Mason Reid, the Park Wildlife Ecologist, visited the area and concluded that Stevens Canyon did not contain suitable marbled murrelet habitat along the road corridor due to a lack of forest structure preferred by murrelets. The area from Backbone Ridge to the junction with Hwy 123 (Segment 4) did, however, contain suitable habitat for marbled murrelets.

Audiovisual surveys for murrelets were conducted along the Ohanapecosh River near Chinook Creek in 1994 and at the Grove of the Patriarchs in 1998 (Myers 2003). No detections were recorded. For murrelets to get to Segment 4 they would have to cover 67 to 73 miles up the Nisqually River drainage and cross a subalpine pass at 4800 feet. Repeated radar surveys along the Nisqually River at Kautz Creek and Tahoma Creek confluences have detected very few (mean 4.7 per day, range 1-12) murrelet targets, suggesting that the Nisqually River contains few murrelets (Hamer 2000, ABR, Inc. 2005, 2008, 2009). Thus, the likelihood of murrelets inhabiting the Ohanapecosh River drainage is low, or contains very few birds.

Gray Wolf

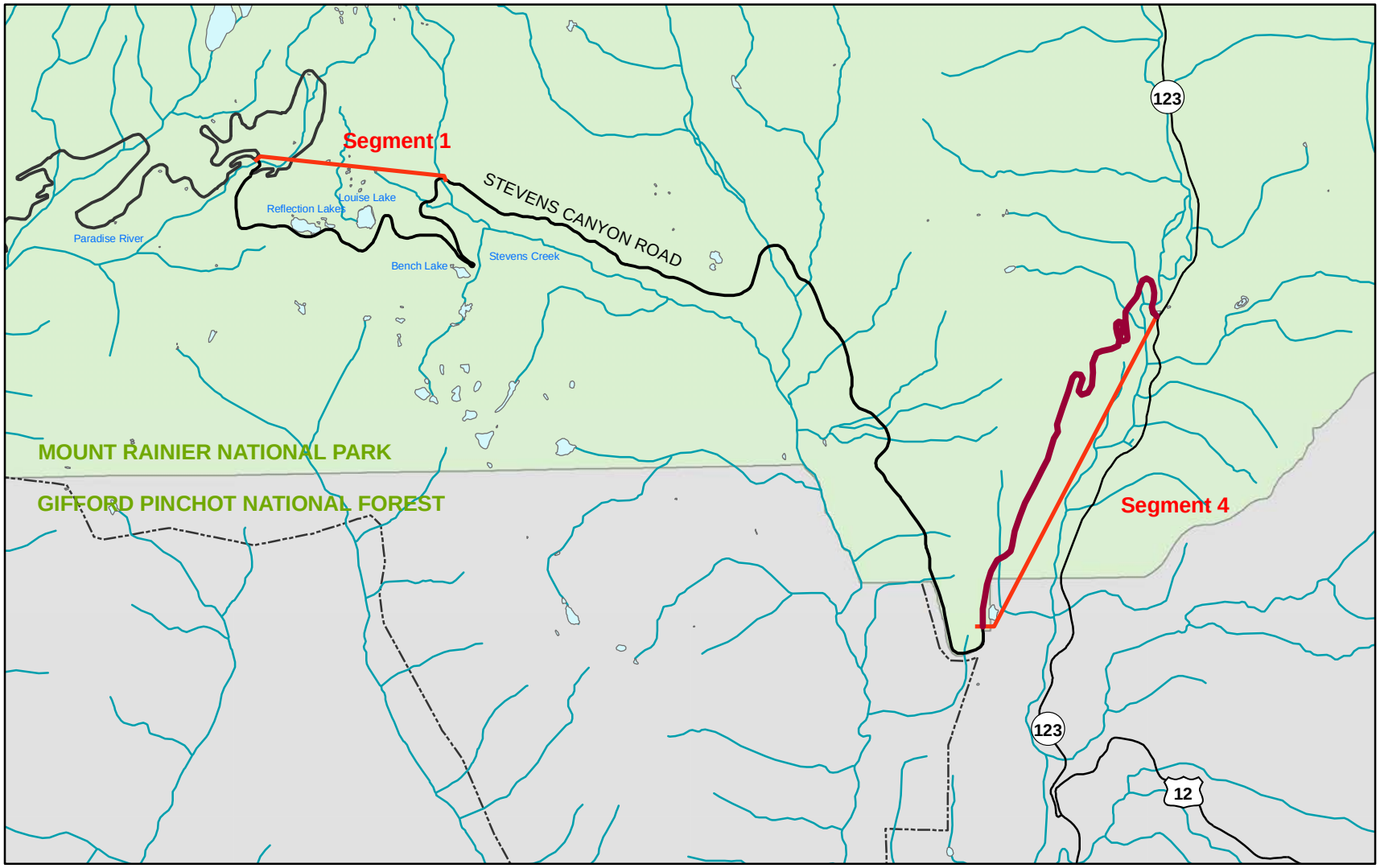
Gray wolves are wide ranging carnivores that inhabit forests. They were eliminated from Washington State by the early 20th Century, but now appear to be naturally re-colonizing from Canada. Exact population trends in Washington are currently unknown due to the lack of data and difficulty tracking individual wolves. Numerous observations of gray wolves have occurred within the Park; however, none have been confirmed by state or federal biologists (NPS 2008d).

Canada Lynx

The lynx is the rarest of three cat species native to Washington (lynx probably number fewer than 100 individuals in the state). They are primarily associated with subalpine and boreal forest types in the mountains of north-central and northeastern Washington and formerly occurred in the southern Cascades. Topographic relief gives these forests a patchy distribution which in turn affects their potential to support lynx (Stinson 2001). Mount Rainier National Park contains suitable habitat for lynx and their favorite prey, the snowshoe hare, in subalpine areas below the tree line. However, there have been no confirmed reports of this species in the Park since 1934 (NPS 2008d).

Grizzly Bear

Grizzly bear populations in Washington are rare, but a limited number are still present. This species prefers open shrub communities, alpine and low elevation meadows, riparian areas, seeps, alpine slab rock areas, and avalanche chutes. The Park contains suitable grizzly bear habitat. However, there has never been a confirmed sighting of grizzlies in the Park. In 1993, grizzly bear tracks were identified by the WDFW adjacent to the west side of the Park (NPS 2008d).



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1,750 875 0 1,750 Meters

A survey would be conducted prior to construction.

Legend

Suitable Marbled Murrelet Habitat Proximity

Wilderness Boundary

Figure 9
Suitable Marbled Murrelet Habitat Proximity Stevens Canyon Road EA Mount Rainier National Park

Fisher

Historically, fishers were widely distributed in Washington in dense, mesic forests at low- to mid-elevations. While suitable fisher habitat is present within the Park, they have not been documented in the Park since 1947. However, unconfirmed observations of the fisher occurred at the Park in the 1990s (NPS 2008d).

Fish

Anadromous salmonids. Two anadromous fish species (the Chinook salmon and steelhead) have the potential to occur within the Park. However, anadromous fish are not known to occur in any of the drainages located in the project area.

Bull trout. In Mount Rainier National Park, bull trout are known to exist in the White, West Fork, Carbon, Mowich and Puyallup rivers and their tributaries. Park staff has indicated that bull trout may be present in the Ohanapecosh River; however, bull trout have not been documented as occurring in drainages within the project area. The Ohanapecosh River is a tributary to the Cowlitz River. Downstream of NPS lands, the Forest Service maintains that there are no known populations of bull trout in the Cowlitz River basin. Upstream passage for migratory fish to the Cowlitz basin is blocked at the Barrier Dam at RM 49.5, located below Mayfield Dam. Despite many fish surveys in the tributaries of the upper Cowlitz basin completed by the Forest Service, Park Service, and WDFW, no verified bull trout have ever been documented in the upper Cowlitz basin. No migratory bull trout have been reported at the Barrier Dam fish trap or at fishtraps at the Mossyrock or Mayfield dams. Based on this information there appears to be a low likelihood of bull trout presence in the Cowlitz River basin, and therefore, the Ohanapecosh River.

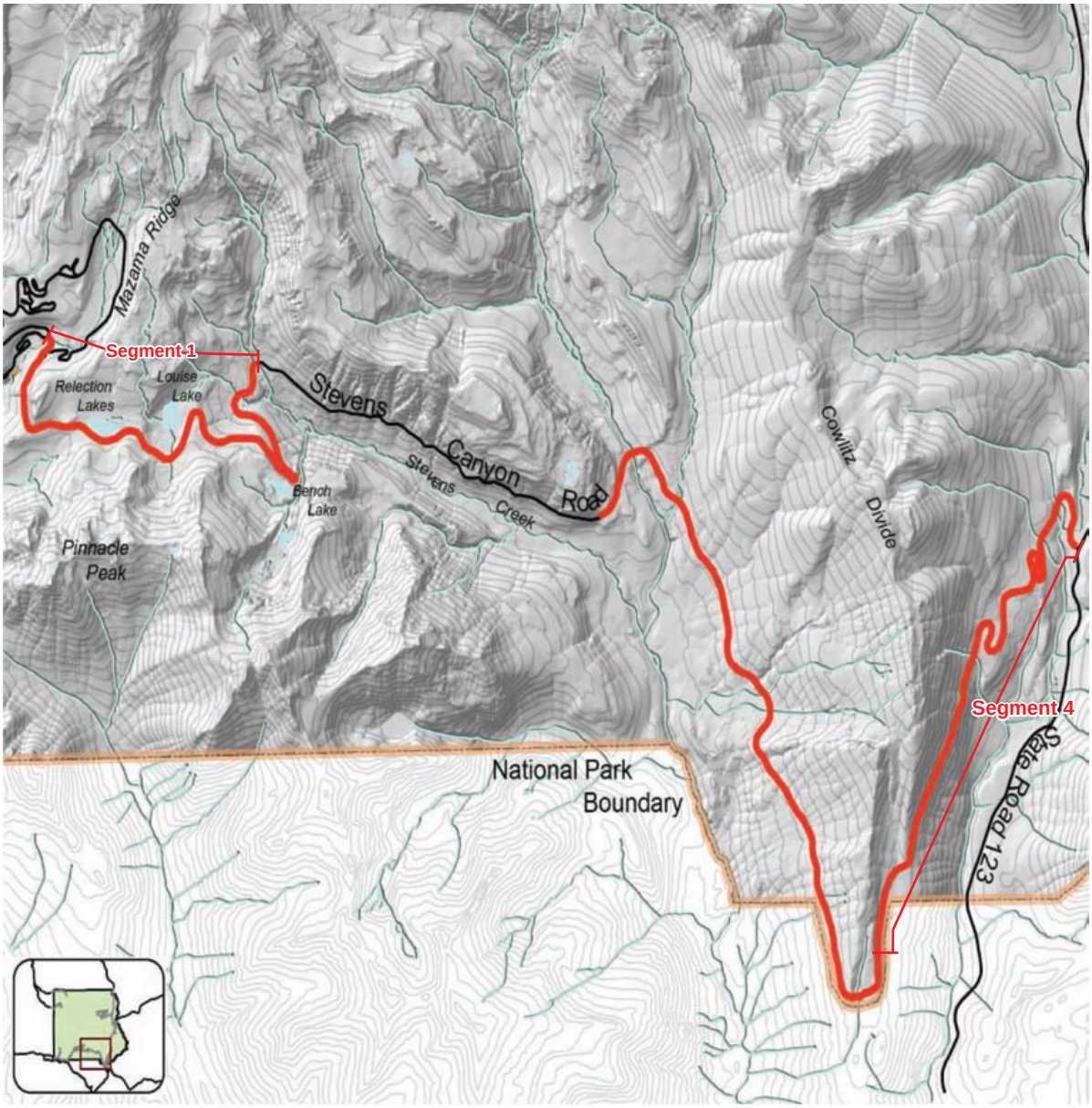
Historically the Cowlitz basin would have been accessible to migratory bull trout, and there is some anecdotal evidence that bull trout were present in the Cowlitz basin. Dolly Varden are listed as one of the species caught by the Taitnapam (upper Cowlitz) tribe in subsistence fisheries in the upper Cowlitz River, however the validity of this account is considered questionable. The most recent report of a bull trout in the Cowlitz basin is that of a WDFW biologist who reported catching a small bull trout (6 to 8 inches length) in the Cispus River near the mouth of Yellowjacket Creek in 1991. No photographs of this fish are known to exist for species verification. Based on these anecdotal reports, the bull trout recovery planning team has identified the Cowlitz River as a research needs area (USFWS 2002). Critical habitat for bull trout has not been proposed or designated in the Cowlitz River basin.

The Dolly Varden trout is proposed for federal listing because of the “similarity in appearance provision” of the ESA (66 FR 1628) to bull trout. They occupy the same habitats and have nearly indistinguishable characteristics from bull trout and belong to the same genus (*Salvelinus* or also known as Char). Recent DNA analysis conducted on native char in the Park suggests that only bull trout are present in the Park streams today (NPS 2008d).

3.8 CULTURAL RESOURCES (ARCHEOLOGY, HISTORIC RESOURCES, AND CULTURAL LANDSCAPES)

Archeological Resources

Archeological surveys were conducted in 2005 and 2007 along the 18-mile Stevens Canyon Road corridor including the 4.83 miles of Segment 1 (Upper Stevens Canyon Road) and the area from the Box Canyon picnic area to the Stevens Canyon park entrance, which includes the 5.26 miles of Segment 4 (Lower Stevens Canyon Road). Figure 10 shows the areas of Stevens Canyon Road that were surveyed. This section summarizes the natural resources and archeological background



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0 1.5

SCALE IN MILES

Legend

- Surveyed Areas
- Main Road
- Stream
- Park Boundary
- Lake

Figure 10
Locations of Cultural Surveys for the Rehabilitation of Steven Canyon Road

and basic understanding of where and what prehistoric and historic artifacts are likely to be found within the upper and lower Stevens Canyon Road project areas.

Upper Stevens Canyon Road Archeological Survey

To some extent, the character of, and potential for, archeological remains can be expected to vary with wildlife habitat conditions and slope characteristics of the landforms through which the corridor passes. For example, Reflection, Louise and Bench Lakes are perched on the low-gradient areas of upper Stevens Canyon and contribute to the cultural resource significance of this area as wild game populations are higher around lakes and ponds in a subalpine context. This would have increased the value of these areas to prehistoric hunter/gatherers. Thus, it is more likely that these areas are potential locations for archeological resources. All three of these lakes are located within 328 feet of the Stevens Canyon Road corridor.

The park's first archeological reconnaissance was conducted in 1963 (Daugherty 1964) in the Reflection to Bench Lakes area where an isolated prehistoric biface eroding from the cut-bank of the newly constructed parking pull-out was found (Nelson and Rice n.d.)(Table 7). No additional archeological materials have been recovered from the site.

A second systematic survey of the area was completed in 1995 in conjunction with fieldwork for Mount Rainier's first park-wide archeological overview and research design (Burtchard 1998)(Table 7). That effort included a 160-acre reconnaissance level survey in the vicinity of Reflection Lakes, Lake Louise, and Bench Lake, and a 15-acre survey near Narada Falls below the Stevens Canyon and Paradise Road intersection. No surface-evident cultural resources were located at that time.

In 1996, several limited surveys were completed in the upper Stevens Canyon area that involved re-inspection of social trails at Reflection Lakes and Lake Louise (Table 7). Two archeological sites were located: a dense charcoal stained area with highly fragmented burned bone; and a chert biface flaked tool fragment with small concentration of burned bone. Several additional limited surveys of 96 acres were conducted in 1996 on the bench approximately 2,950 feet to 3,280 feet north of Reflection and Louise Lakes.

In 2001, an intensive survey and subsurface testing of the social trails and landscapes around Reflection Lakes was conducted on approximately 300 acres in conjunction with a vegetation restoration program for that area (Table 7). Constant volume sampling (CVS) units successfully recovered prehistoric chipped stone artifacts. Combined with discovery in 1963, the results confirm human use of the area between Reflection Lakes and Bench Lake began more than 3,400 years ago.

The most recent inventory of upper Stevens Canyon Road was conducted in 2005 and relied primarily on systematic pedestrian survey of the highway corridor consisting of 80.5 acres. The survey area was restricted by bedrock cliffs, rock-cuts, riprap toe-slopes, slopes with over 45 percent gradient along the east and west sides of the road near the Bench Lake hairpin turn, the east and west sides of the road near Inspiration Point where the corridor narrows, and by thick vegetation cover and low surface visibility. Despite the conditions hampering discovery, the pedestrian survey procedures resulted in documentation of nine new historic-period archeological sites and one isolated find.

Table 7. Summary of Archeological Resources and Surveys through 2004.

Project	Inventory	Sites	Description	National Register Status
1963 Daugherty, Nelson & Rice - roadside survey	Limited coverage, Reflection to Bench Lakes	Prehistoric Isolate	Large dart (atl atl) sized hafted biface or preform eroded from below 3400 BP. St Helens Yn tephra	Not eligible
1995 Burtchard & Hamilton – Mount Rainier Overview (Burtchard 1998)	160 acres recon-naissance survey Reflection, Louise & Bench Lakes	None	N/A	N/A
1995 Sullivan - Narada Falls Water Line	15 acres recon-naissance survey	None	N/A	N/A
1996 Hungar & Stumbo -- Survey of Reflection Lakes and Louise Lake	113 acres, limited coverage focusing	Multi-component	Chert biface thinning flake and burned bone scatter west of Reflection Lake	Unevaluated
		Historical	Charcoal stained dirt & burned bone concentration south of Reflection Lake	Not eligible
1996 Hungar & Sullivan – Survey north of Reflection Lakes	96 acres, limited coverage on south Mazama Ridge	None	N/A	N/A
2001 CWU Field School research, (McCutcheon & Smith 1963)	300 acres intensive survey and testing at Reflection Lakes	Prehistoric	Low density, lithic assemblage in situ below 3400 BP. St Helens Yn tephra	Eligible

Source: National Park Service 2005.

In total, ten new sites and two isolated finds have been documented along the upper Stevens Canyon Road corridor. These are shown in Table 8. Eight of the ten sites are associated with historic-period activities. The remaining two sites have prehistoric components. Seven of the ten sites are recommended eligible for inclusion in the NRHP.

Table 8. Summary of Newly Recorded Archaeological Resources for Upper Stevens Canyon Road.

Site Name	Site Type	Description / Condition / NRHP Recommendation
Reflection Lakes Spring Boxes	Historic Pit features	Historic site consisting of two wood lined “Spring boxes.” Related to FS2005-19. Features filled with water causing some natural deterioration. *Condition Fair- Recommendation undetermined*
Sunbeam Creek Camp	Historic Campsite	Historic camp consisting of three pit features and associated artifacts. Some erosion over bank into Sunbeam Creek. *Condition Fair - Recommended eligible*
Reflection Lakes Trail and Road Grade #1	Historic Transportation Route	Historic trail and road grade site running east-west and connecting to the Pinnacle Peak trail. No noticeable deterioration. *Condition Good - Recommended eligible*

Site Name	Site Type	Description / Condition / NRHP Recommendation
Stevens Creek Spring Box	Historic Storage Feature	Historic site consisting of a pit "Spring Box" feature, metal pipes and cut stumps. Little to no noticeable deterioration. *Condition Good - Recommendation undetermined*
Sunbeam Creek Historic Pit #1	Pit Feature	Historic site consisting of three pits with associated artifacts. No noticeable deterioration. *Condition Good - Recommended eligible*
Sunbeam Creek Historic Pit #2	Pit Feature	Historic site consisting of one large pit with associated artifacts. *Condition Good - Recommended eligible*
Reflection Lakes Historic Telephone and stockpile	Historic Other	Historic site consisting of a feature of the 1920s telephone line and a log stockpile. No noticeable deterioration. *Condition Good - Recommended eligible*
Reflection Lakes Trash Pits	Historic Dump	Historic site consisting of two pit features with associated artifacts and a trail tread. Placed four CVS units in area. No cultural material was found. No noticeable deterioration. *Condition Good - Recommended ineligible*
Stevens Canyon Road Historic Trail/ Road Grade Segments 1 and 2	Historic Transportation Route	Historic site consisting of a trail tread and road grade with associated features. No noticeable deterioration. *Condition Good - Recommended eligible*
Reflection Lakes Rainier Isolate	Historic Artifact	Historic isolate consisting of one Rainier Beer can. *Condition Good - Recommended ineligible*

Source: National Park Service 2005.

Lower Stevens Canyon Road Archeological Survey

From the Stevens Canyon entrance at 2,200 ft to Box Canyon at 3,000 ft, the road winds through the silver fir/Alaska huckleberry forest community described previously (Franklin et al 1988). This montane forest is presently dominated by Douglas fir, western hemlock, and western red cedar with an understory dominated by huckleberry and vine maple. Smith's (2006) ethnography of Mount Rainier National Park describes this as the Humid-Transitional ecological zone that appears to occur exclusively in the Stevens Canyon/Cowlitz Ridge area. Historical faunal data describes black-tailed deer, black bear, mountain beaver, Pacific beaver, varying hare, whistling marmot, California grouse, and Oregon ruffed grouse present in the zone (Smith 2006). These faunal resources, as well as huckleberries would have been subject to seasonal hunting by the surrounding Indian groups historically and prehistorically.

To date, no prehistoric resources have been documented in the lower Stevens Canyon area. Variables such as low surface visibility in the montane forest ecozone and the low intensity of previous surveys focused on the mountain's lower elevations should be considered when predicting the absence of a prehistoric record.

Little archeological work has been conducted along the 18-mile stretch of lower Stevens Canyon Road and only three previous archeological surveys have been completed in the area adjacent to the road corridor. In 1995, a survey was conducted from Box Canyon up Stevens Ridge for approximately one mile. The survey area was approximately 134 acres and no archeological resources were documented. In 1996, a survey of approximately 87 acres extended north from the Backbone Ridge curve and up the ridge crest for approximately two miles. The survey yielded no archeological resources and no official reconnaissance report was filed. In 1998, a survey of the Stevens Canyon entrance consisted of approximately 1.5 acres and yielded no archeological resources.

Several archeological finds have been made in the general area unassociated with the three surveys noted above. Four archeological sites, two isolated finds, and one ethnographic site were documented in the general lower Stevens Canyon area. These finds show the diverse assemblage of the resource types and distribution one would expect to discover in the lower Stevens Canyon area.

The 2007 survey was hindered by thick vegetation common to middle to low elevation montane ecozones, creating poor surface visibility and greatly decreasing the possibility of discovering prehistoric archeological resources. Much of the road corridor was super elevated creating large fill slopes, which limited the possibility of discovering surface archeological resources close to the shoulders of the road. However, the 2007 archeological survey documented 10 sites and 13 isolated finds along the corridor of the lower Stevens Canyon Road (Tables 9 and 10). Five of the 10 sites are considered potentially eligible for inclusion in the NRHP. These five sites consist of historic surface artifact scatters that require subsurface testing to recommend eligibility.

Table 9. Summary of Newly Recorded Archaeological Resources for Lower Stevens Canyon Road.

Site Name	Site Type	Description / Condition / NRHP Recommendation
Box Canyon Sewer	Historic Utility	Two utility trees; a historic roadbed; and a portion of the Box Canyon Sewer System
		Good Condition - Recommended ineligible
Lower Stevens Canyon Pit I	Pit Feature	Single rectangular pit, no artifacts noted
		Good Condition – Recommended Undetermined
Lower Stevens Canyon Boundary Marker	Cairn	Single boundary marker and cairn
		Good Condition - Recommended ineligible
Lower Stevens Canyon Pit II	Pit Feature	Single rectangular pit, no artifacts noted
		Good Condition – Recommended Undetermined
Lower Stevens Canyon Trail	Transportation Route	Abandoned Trail
		Good Condition – Recommended Ineligible
Lower Stevens Canyon Marten Trap	Culturally Modified Tree	Notch cut into tree for marten trap
		Good Condition – Recommended Ineligible
Cowlitz Divide Dump	Artifact Dump	Cans and metal; likely more subsurface artifacts
		Good Condition – Recommended Undetermined
Cowlitz Divide Cut Trees	Culturally Modified Trees	Blazed tree, peeled cedar, axe cut stump and wire
		Good Condition – Recommended Ineligible
Lower Stevens Canyon Car Parts I	Artifact Dump	Old automobile parts and a pit feature
		Good Condition – Recommended Undetermined
Lower Stevens Canyon Car Parts II	Artifact Dump	Old automobile parts
		Good Condition – Recommended Undetermined

Source: National Park Service 2008.

Table 10 lists the isolated finds made during the 2007 survey of the Lower Stevens Canyon Road. Isolated finds are not eligible for the National Register.

Table 10. Summary of Newly Discovered Isolated Finds for Lower Stevens Canyon Road.

Site Name	Site Type	Description / Condition
Box Canyon Milk Can	Artifact	Metal milk jug
		Good Condition
Stevens Canyon Road Bucket	Artifact	Metal bucket
		Good Condition
Stevens Canyon Drums	Artifact Scatter	Metal drums
		Good Condition
Lower Stevens Canyon Drums II	Artifact	Metal drum
		Good Condition
Lower Stevens Canyon Metal Band	Artifact	Metal band
		Good Condition
Stevens Canyon Cable	Artifact	Metal cable
		Good Condition
Lower Stevens Canyon Debris I	Artifact Scatter	Automobile parts
		Good Condition
Lower Stevens Canyon Bottle	Artifact	Glass bottle
		Good Condition
Cowlitz Divide Barrel	Artifact	Metal barrels
		Good Condition
Lower Stevens Canyon Can I	Artifact	Metal can
		Good Condition
Lower Stevens Canyon Headlight	Artifact	Automobile Part
		Good Condition
Boot and Bottle Isolate	Artifact Scatter	Artifact dump
		Good Condition
Stevens Canyon Six Pack	Artifact Scatter	Artifact dump
		Good Condition

Source: National Park Service 2008.

Historic Structures

The Mount Rainier NHLD boundary is located between 30 to 100 feet on either side of the centerline of Stevens Canyon Road for a distance of approximately 19 miles and incorporates all of the features associated with the road including the road bed, shoulders, turnouts, rock cuts, vegetation, bridges, tunnels, retaining walls, guard walls, viaducts, curbs, culverts, headwalls, rock barriers, and the curvilinear alignment of the road. Of these features, historic structures include bridges, tunnels, retaining walls, guardwalls, rock barriers, viaducts, stone pilaster and wood rail fences, comfort stations, and the park entrance stations, which are unifying elements that add to the historic character of the Mount Rainier NHLD. Use of materials such as native stone, along with strict design principles and construction standards, ensured the structures blended with the scenery, matching the color and character of natural rock outcrops and surrounding terrain. The consistency in design and materials among the different structures along the road creates a visual unity that helps define the character of the road landscape. “Rustic” construction details, including several distinct types of crenellated masonry guardwalls, were

handcrafted of native stone. This practice achieved a unique match between the color and texture of the masonry and the appearance of the exposed stone faces of road cuts. Concrete bridges typically were finished with a masonry veneer to match the construction of masonry guardwalls and retaining walls. Where culverts were used to handle drainage, the same native stone was used to build masonry headwalls, concealing the outfall culverts of steel or concrete (NPS 2001).

Contributing historic structures in Segment 1 include 4 retaining walls with guardwalls, 3 retaining walls (without guardwalls), 1 stone pilaster and wood rail fence, and the Stevens Canyon Bridge.

Contributing historic structures in Segment 4 include 6 retaining walls with guardwalls, 1 viaduct, 9 rock barriers, Falls Creek and Ohanapecosh River bridges, and the Stevens Canyon Entrance Station and Comfort Station.

Cultural Landscapes

The character-defining features of the Stevens Canyon Road cultural landscape consist of spatial organization, circulation, views and vistas, buildings and structures, typography, vegetation, and small scale features. Because several of these contributing elements in the NHLD may be affected by construction, these elements (described extensively in the Cultural Landscape Inventory) are summarized here to provide a basis for understanding the potential impacts and proposed mitigation measures.

Spatial organization relates to the composition and sequence of outdoor spaces within the NHLD. The spatial organization of the Stevens Canyon Road is best understood as the way in which the road interacts with its immediate environment. The naturalistic style was incorporated into a holistic design for the highway that included the blending of structures with natural features providing destination and viewing points for visitors, as well as interpreting outstanding natural features. Stevens Canyon Road exhibits a high level of spatial organization.

Circulation is based on the means and patterns of movement through the district. The entire roadway corridor and its associated features were designed to meet the overarching design philosophy of the NPS that required the road to fit the landscape. The design principles for the circulation of Stevens Canyon Road include its unique ability to serve as both a thoroughfare and as a destination. This park road was designed for leisurely driving and is classified as a scenic highway with a narrow road width (typically 11-foot travel lanes and 1-foot shoulders), and curvilinear alignment (many curving super elevations and <25 mph curves). The presence of numerous turnouts provides the visitor with ample opportunities to view the wide variety of natural landscapes associated with the highway. There are 15 turnouts in Segment 1 and 3 turnouts in Segment 4 that are considered contributing features of the cultural landscape. There is one non-contributing turnout in the project area, which is in Segment 1.

Views and vistas along Stevens Canyon Road provide visitors spectacular views of surrounding mountains, ridges, valleys, and rivers. Views along the highway are categorized as framed views, panoramic views, and vistas, which are constrained views directly ahead of the driver. Framed views are often achieved through manipulation of vegetation such as at Backbone Ridge and Inspiration Point. Panoramic views are often located at turnouts adjacent to exposed sections of fill slopes. Framed and sweeping views, as well as a constantly changing perspective, were achieved through careful consideration of the road's horizontal and vertical alignment. During the 1930s, views were actively maintained by clearing vegetation or creating a frame within which the scene was manipulated. Views and vistas continue to be a major component of the experience of driving the road. There are 3 contributing viewpoints in Segment 1 and 2 contributing viewpoints in Segment 4.

Historic Structures are also part of the cultural landscape and are discussed in Section 3.8.3.

Topography is the landscape characteristic that refers to the manipulation of landforms that occurred during the building of Stevens Canyon Road. Stevens Canyon Road traverses some of the most rugged terrain found within the Park. Achieving an average grade of six percent was a major engineering feat. The manipulation of the topography is evidenced in the constructed features of rock cuts, waterfalls, cut/fill, and berms. The historic rock cuts retain a high level of integrity and contribute to the historic cultural landscape. Cuts and fills are an integral part of the geometry of an engineered road and are found along the entire length of Stevens Canyon Road. The rock cuts, cuts and fills, and berms also retain high integrity and contribute to the significance of Stevens Canyon Road. In Segments 1 and 4 there are 5 and 16 contributing rock cuts, respectively.

Vegetation is an important feature of the Stevens Canyon Road, which travels through a diverse range of vegetative zones because of elevation change. These include subalpine, montane, and lowland vegetation zones. Historic vegetation patterns, including many of the historic specimens, remain today and continue to contribute to the historic character of the road. Special features include specimen and old growth trees located at or near the shoulders, which were retained during construction, as well as vegetated ditches, shoulders, and banks ("naturalized" by the Civilian Conservation Corps) with vegetation directly adjacent to the paved surface. The highway follows the same alignment and visitors are able to enjoy the spectacular views of the canyon and surrounding peaks that characterized the road after it opened in 1957. Specimen trees are comprised of two species, western hemlock and Douglas fir. The prevalence of specimen trees along the highway is a result of the NPS design intent to enhance the naturalistic character of the road and blend the highway with the natural landscape. There are 12 contributing specimen trees and 3 groupings of specimen trees in Segment 1. In Segment 4, there are 5 contributing specimen trees and 6 specimen tree groupings.

Small scale features include culverts with headwalls, curbs, signs, water fountains, fences, strip drains, and rock-lined avalanche chutes (there are no contributing avalanche chutes, strip drains, or fences in Segments 1 and 4). There are many culverts on the Stevens Canyon Road, comprised of box culverts, culverts with stone headwalls, culverts with stone-faced concrete headwalls, and culverts with concrete headwalls. Although numerous culverts have been altered or replaced, their overall integrity is high. There are 25 culverts in Segment 1 and 35 culverts in Segment 4 that are considered contributing elements.

There are a variety of curbs associated with tunnels, bridges, medians, turnouts, and sidewalks, which are constructed from either granite or exposed aggregate concrete. There are 3 curbs in Segment 1 and 2 curbs in Segment 4 that are considered contributing to the historic district.

There is also a historic park sign and water fountain located in Segment 4 at the Stevens Canyon Park Entrance Station and the Grove of the Patriarchs comfort station, respectively.

3.9 VISITOR USE AND EXPERIENCE

Located close to the Seattle Metropolitan area, Mount Rainier National Park attracts visitors from the region, as well as national and international locations. Visitor use peaks between July and September when the weather conditions are most favorable for visitation. On average, two million visitors visit the Park annually. During the summer season, visitors to the Park may experience crowded conditions at facilities and along Park roads and trails. Visitation during the peak period has reached or exceeded one million visitors during summers with good weather conditions.

Overall, the Mount Rainier road system is used by visitors to view the many and varied scenic areas at the park. Parking lots and turnouts provide places for visitors to enjoy the park scenery and access trails. A 1990 survey of park visitors identified driving to view scenery as the most popular park activity, followed by taking photographs.

Stevens Canyon Road provides visitor access to Narada Falls, Paradise, Reflection Lakes, Box Canyon, Grove of the Patriarchs, and destination trailheads. The trailheads provide access to the Wonderland Trail and other wilderness locations within the Park. The road is also a destination in itself. The roadway is used for summer travel and connects with SR 123, SR 410, and the Nisqually Road (the road is closed during the winter because of snow). Traffic counts show that Stevens Canyon Road accounts for 20 percent of the typical peak weekend traffic (NPS 2001). Additionally, Stevens Canyon is a popular exit for Park visitors as approximately 43 percent of all vehicles using Nisqually exited at this entrance. Approximately 60 percent of all park visitors exited at the southern part of the Park (NPS 2001).

3.10 PUBLIC SAFETY, HEALTH AND PARK OPERATIONS

Park staff provide the full scope of functions and activities to accomplish the management objectives of the park, including interpretation and education, resource protection, law enforcement, emergency services, public health and safety, science, visitor services, utilities, maintenance, and management support.

Stevens Canyon Road is an important park road that allows visitors to access many park attractions. Continued deterioration of the roadway has led to the need for increased maintenance and use of park staff to monitor these activities. Maintenance activity requires park law enforcement, administrative staff, and natural resources specialists to oversee and manage activities so they do not affect park visitors and natural resources.

Stevens Canyon Road is characterized in many places by rugged and steep terrain that experiences extreme weather conditions. This results in frequent rock fall and occasional small avalanches of material onto the road. Park staff monitors road conditions and keeps the road clear of fallen debris. Parking areas such as turnouts are located on the opposite side of the road from potential rock fall areas to improve the safety of visitors. However, falling debris is a relatively common occurrence.

Mount Rainier has a long history of geologic activity including earthquakes lava flows, ash eruptions, and debris/mudflows. Although a major eruption has not occurred for several thousand years, there was a minor eruption in the late 1800s and there have been recurring earthquakes over time. A 3.2 magnitude earthquake struck one mile beneath the summit crater of Mount Rainer in 2004, and a large 6.8 magnitude earthquake occurred in 2001 (Nisqually Earthquake). Because of the extensive glacial cap, a volcanic event could trigger large debris flows. Stevens Canyon Road is located in close proximity to the Mount Rainier volcano and is potentially vulnerable to volcanic hazards such as pyroclastic and debris/mud flows.

4. ENVIRONMENTAL CONSEQUENCES

This chapter describes the environmental consequences that would result from implementation of the alternatives. The purpose of this chapter is to analyze and disclose potential impacts of the Proposed Action on the natural and human environment.

4.1 METHODOLOGY FOR ASSESSING IMPACTS

4.1.1 General Methodology for Assessing Impacts to Natural Resources

Potential impacts (direct, indirect and cumulative) are described in terms of type (are the effects beneficial or adverse), context (are the effects site-specific, local, or regional), duration (are the effects short-term or long-term), and intensity (is the degree or severity of the effects negligible, minor, moderate, or major). Because definitions of intensity vary by topic, intensity definitions are provided separately for each impact topic analyzed in the EA.

4.1.2 Methodology for Assessing Impacts to Cultural Resources

In this EA impacts to cultural resources are described in terms of type, context, duration, and intensity, which is consistent with the regulations of the CEQ that implement NEPA. These impact analyses are intended, however, to comply with the requirements of both NEPA and Section 106 of the NHPA. In accordance with the Advisory Council on Historic Preservation's regulations implementing Section 106 (36 CFR Part 800), impacts to cultural resources were also identified and evaluated by: (1) Determining the area of potential effects; (2) Identifying cultural resources present in the area of potential effects that are either listed in or eligible to be listed in the National Register of Historic Places; (3) Applying the criteria of adverse effect to affected, National Register eligible or listed cultural resources; and (4) Considering ways to avoid, minimize or mitigate adverse effects.

Under the Advisory Council's regulations a determination of either *adverse effect* or *no adverse effect* must also be made for affected National Register listed or eligible cultural resources. An *adverse effect* occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the National Register, e.g. diminishing the integrity (or the extent to which a resource retains its historic appearance) of its location, design, setting, materials, workmanship, feeling, or association. Adverse effects also include reasonably foreseeable effects caused by the alternatives that would occur later in time, be farther removed in distance or be cumulative. A determination of *no adverse effect* means there is an effect, but the effect would not diminish the characteristics of the cultural resource that qualify it for inclusion in the National Register.

CEQ regulations and the DO-12 also call for a discussion of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact (e.g., reducing the intensity of an impact from major to moderate or minor). Any resultant reduction in intensity of impact due to mitigation; however, is an estimate of the effectiveness of mitigation under NEPA only. It does not suggest that the level of effect as defined by Section 106 is similarly reduced. Cultural resources are non-renewable resources and adverse effects generally consume, diminish, or destroy the original historic materials or form, resulting in a loss in the integrity of the resource that can never be recovered. Therefore, although actions determined to have an adverse effect under Section 106 may be mitigated, the effect remains adverse.

A Section 106 summary is included in the impact analysis sections. The Section 106 summary is an assessment of the effect of the undertaking (implementation of the alternative), based upon the criterion of effect and criteria of adverse effect found in the Advisory Council's regulations.

For the purposes of Section 106, the Area of Potential Effect (APE) includes the linear extent of Segments 1 and 4 (10.09 miles of roadway) and the road prism (defined as the road surface, road shoulders, turnouts, and adjacent side slopes.) The APE broadens out beyond the road prism in several areas where intensive construction work would occur and includes the areas near Inspiration Point, Reflection Lakes, and the Bench Lake Curve in Segment 1.

4.1.3 Impairment of Mount Rainier National Park Resources or Values

In addition to determining the environmental consequences of the preferred and other alternatives, the 2006 *NPS Management Policies* and DO-12, require analysis of potential effects to determine if actions would impair Mount Rainier National Park resources.

The fundamental purpose of the National Park system, established by the 1916 Organic Act and reaffirmed by the 1970 General Authorities Act, as amended, begins with a mandate to conserve park resources and values. NPS managers must always seek ways to avoid or minimize, to the greatest degree practicable, adverse impacts on park and monument resources and values. However, the laws do give NPS management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. That discretion is limited by statutory requirements that the NPS must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including opportunities that otherwise would be present for the enjoyment of those resources or values. An impact to any park resource or value may constitute impairment. However, an impact would more likely constitute impairment to the extent that it affects a resource or value whose conservation is:

- Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park.
- Key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park.
- Identified as a goal in the Mount Rainier National Park 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 the park. In this "Environmental Consequences" section, a determination on impairment is made in the conclusion statement of each impact topic under each alternative. The NPS does not analyze recreational values/visitor experience (unless impacts are resource based), socioeconomic values, or public safety, health and park operations for impairment.

4.1.4 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 those that, individually or cumulatively, would:

- Be inconsistent with the Park's purposes or values;
- Impede the attainment of the Park's desired future conditions for natural and cultural resources as identified through the Park's planning process;
- Create an unsafe or unhealthful environment for visitors or employees;
- 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, an appropriate use, the atmosphere of peace and tranquility, the natural soundscape maintained in wilderness and natural, historic, or commemorative locations within the Park, or NPS concessionaire or contractor operations or services.

Unacceptable impacts for the No Action and Proposed Action Alternatives are discussed in Section 4.3.

4.1.5 Cumulative Effects

CEQ regulations require assessment of cumulative impacts in the decision-making process for federal projects. 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 non-federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts are considered for all alternatives, including the no-action alternative.

Cumulative impacts were determined by combining the impacts of the alternatives with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects at Mount Rainier National Park and, if applicable, the surrounding region.

Past, present, and reasonably foreseeable projects being considered for this cumulative impact analysis include:

- Past, present, and future Stevens Canyon Road and parkwide routine road maintenance activities.
- Stevens Canyon Road tunnels 1 and 2 repair and stabilization work, located between Segments 1 and 4. Activities would include the repair and stabilization of tunnel linings and portals and the stabilization of loose rock.
- Highway 123 Panther Creek Bridge repair of existing cracks in tee beams, sealing of exposed reinforcing bar with protective coating, and debris removal from bearing seats and bents.
- Nisqually Road rehabilitation work, anticipated to start in 2012.
- State Route 410 road rehabilitation work, anticipated to start in 2014.

4.2 EVALUATION OF IMPACTS

4.2.1 Air Quality

The following definitions will be used to assess the intensity of potential air quality impacts:

- **Negligible:** The effects to air quality would be below or at the lower levels of detection with only a small amount of greenhouse gases released into the environment.
- **Minor:** An action's effects on air quality would be detectable with a minor increase in greenhouse gases. The effects would be localized and short-term. Measurable or anticipated degree of change would have a slight effect, causing a slightly noticeable change of approximately less than 20 percent compared to existing conditions. If mitigations 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 or alteration of the air quality. Measurable or anticipated degree of change is readily apparent and appreciable and would be noticed by most people, with a change likely to be between 21 and 50 percent compared to existing conditions. The effects can be localized or widespread. Mitigation measures would probably be necessary to offset adverse effects and would likely be successful. The project would create greater than minor amounts of greenhouse gases.
- **Major:** An action would result in a change in air quality over a relatively large area. Measurable or anticipated degree of change would be substantial, causing a highly noticeable change of approximately greater than 50 percent compared to existing conditions. Key ecological processes would be altered and landscape-level changes would be expected. Mitigation measures to offset adverse effects would be necessary, extensive, and may not be successful. The project would create more than moderate amounts of greenhouse gases that could affect the local atmosphere.
- Duration:
  - ➞ Short-term – Effects last only for the duration of project implementation.
  - ➞ Long-term – Effects last beyond the period of project implementation.

4.2.1.1 No Action Alternative

Direct and Indirect Effects

Ongoing maintenance and repair of the road surface would occur under the No Action Alternative. Some maintenance activities may require lane closures and traffic delays on Stevens Canyon Road. Traffic delays would result in temporary localized increases in air pollutants and greenhouse gases from idling vehicles. Greenhouse gas would also be generated from the exhaust emissions of vehicles and equipment involved in the maintenance activity. There may be some dust generated if maintenance involves soil disturbance. The increase in pollutants would be short-term, localized, and likely to disperse quickly, particularly if meteorological conditions are favorable (e.g. wind and precipitation). However, maintenance would need to be repeatedly performed because of the deteriorating nature of the roadway. Thus, the No Action Alternative would cause recurring short-term, negligible to minor adverse air quality impacts.

Cumulative Effects

The future work on Nisqually Road, the Stevens Canyon Road tunnel work between Segments 1 and 4, the work on the Highway 123 Panther Creek Bridge, and the State Highway 410 work would result in short-term, localized, and negligible to minor adverse air quality impacts. None of the roadway projects that have been completed in the past, present, and reasonably foreseeable future would increase roadway capacity, resulting in increased traffic and vehicle emissions. However, ongoing maintenance activities would cause recurring short-term negligible to minor adverse impacts to air quality. Overall, when the impacts of the cumulative actions are combined with the short-term, negligible to minor adverse impacts of the No Action Alternative, there would be short-term, negligible to minor adverse cumulative effects to air quality.

Conclusion

Air quality impacts resulting from the No Action Alternative would be recurring and short-term, resulting in negligible to minor adverse impacts to this resource. Cumulative effects resulting from the No Action Alternative would be recurring having a short-term, negligible to minor adverse impact. The No Action Alternative would add a negligible adverse increment to overall cumulative effects.

Because there would be no major adverse impacts on air quality, there would be no impairment of park resources and values. Because the impacts previously described: (1) are not inconsistent with the park's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts to air quality under the No Action Alternative.

4.2.1.2 Proposed Action Alternative

Direct and Indirect Effects

Greenhouse gas emissions for the construction phase of the project were estimated by calculating the number and types of construction equipment that may be used on the project for the construction period, which were based on previous road construction projects in the Park. The hours of operation were estimated and commuting miles travelled included only mileage from the Highway 123 park entrance to the construction site. The estimated greenhouse gas emissions were then compared to the 2006 baseline greenhouse gas emission data calculated using the CLIP tool. Construction associated with the Proposed Action Alternative would result in emissions of (given in $MTCO_2E$): carbon dioxide – 99.6, methane – 0.1 and nitrous oxide – 0.8 (Table 11). Compared to the baseline levels, the proposed project would increase greenhouse gas levels by less than 1 percent. Thus, the increase in greenhouse gas would generate minor adverse impacts.

Table 11. Greenhouse Gas Inventory Calculations (Summer 2009).

Equipment Used	Hours	Gallons per Hour	Total Fuel Consumed
Excavator	800	4	3,200
Truck (10 cy)	800	2	1,600
Loader (3.5 cy bucket)	800	4	3,200
5-Ton Roller	800	2	1,600
Total			9,600

Commuting/Vehicle Type	Miles Traveled	Days	Number of Vehicles
Tractor-Trailer	19.6	2	4
Trucks	19.6	30	7
Emissions ($MTCO_2E$)*	**CO_2**	**CH_4**	**N_2O**
Equipment	97.4	0.1	0.8
Tractor-Trailer	0.1	Negligible	Negligible
Trucks for Commuting	2.1	Negligible	Negligible
Total	99.6	0.1	0.8

*Metric Tons of Carbon Dioxide Equivalent.

Dust would also be generated by ground disturbing activities during construction, which would contribute to the adverse effects to air quality. Mitigation measures are proposed in Section 2.6.2 to avoid or minimize the potential for construction impacts to air quality. However, exhaust emissions from construction vehicles and equipment would result in short-term, negligible to minor adverse impacts to air quality because of the increase in greenhouse gases.

The completed project would not increase air emissions because the road improvements would not increase capacity on Stevens Canyon Road. Thus, operation of the road would have a long-term negligible adverse impact on air quality.

Cumulative Effects

The future work on Nisqually Road, the Stevens Canyon Road tunnel work between Segments 1 and 4, and the work on the Highway 123 Panther Creek Bridge would result in short-term, localized, and negligible to minor adverse air quality impacts. None of the roadway projects that have been completed in the past, present, and reasonably foreseeable future would increase roadway capacity, resulting in increased traffic and vehicle emissions. Overall, when the impacts of the cumulative actions are combined with the short-term negligible to minor and long-term negligible adverse impacts of the Proposed Action Alternative, there would be short- and long-term negligible adverse cumulative effects on air quality.

Conclusion

There would be short-term, negligible to minor and long-term negligible adverse impacts to air quality resulting from construction activities and roadway operations. Cumulative effects would be short- and long-term negligible and adverse as a result of implementation of the Proposed Action Alternative. The Proposed Action Alternative would add a negligible adverse increment to overall cumulative effects.

There would be no major adverse impacts on air quality, therefore there would be no impairment of park resources and values. Because the impacts previously described: (1) are not inconsistent with the park's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts to air quality under the Proposed Action Alternative.

4.2.2 Water Resources, Quality and Quantity

The following definitions will be used to assess the intensity of potential water resource impacts:

- **Negligible:** An action would have no measurable or detectable effects on water quality or the timing or intensity of stream flows.
- **Minor:** An action would have measurable effects on water quality or the timing or intensity of stream flows. Water quality effects could include increased or decreased loads of sediment, debris, chemical or toxic substances, or pathogenic organisms.
- **Moderate:** An action would have clearly detectable effects on water quality or the timing or intensity of flows and potentially would affect organisms or natural ecological processes. Alternatively, an impact would be visible to visitors.
- **Major:** An action would have substantial effects on water quality or the timing or intensity of flows and potentially would affect organisms or natural ecological processes. Alternatively, an impact would be easily visible to visitors.
- Duration:
  - ➞ Short-term – Following completion of the project, recovery would take less than one year.
  - ➞ Long-term – Following completion of the project, recovery would take more than one year.

4.2.2.1 No Action Alternative

Direct and Indirect Effects

Existing impacts on water resources would continue under the No Action Alternative. These include localized flooding due to undersized, damaged, or clogged culverts, and from poor drainage conditions under Stevens Canyon Road. Poor drainage may also contribute to continued degradation of the roadway such as pavement cracking, slumping, etc. Erosion is the likely result of local flooding and roadway slumping. Eroded sediment from these conditions may be carried into nearby receiving waters in the project area, particularly Stevens Creek, Ohanapecosh River, Fall Creek, Louise Lake and Reflection Lakes and adversely impact water quality from increases in sediment and turbidity. The increased erosion would be episodic occurring mainly during larger storm events. In addition, stormwater runoff from the road has the potential to carry small amounts of contaminants from the road surface such as oil, grit and materials from tire and brake wear into adjacent waters.

At the Reflection Lakes parking area, pedestrians walk down to the shoreline damaging vegetation and causing erosion (see Section 4.2.4). This results in associated water quality impacts such as increased siltation, sedimentation, and turbidity. Existing impacts to water resources would constitute long-term, minor to moderate, adverse impacts. There would be no impact to water quantity under this alternative.

Cumulative Effects

Past actions include periodic maintenance activities such as pothole paving, pavement crack sealing, shoulder repair and culvert cleaning, some of which likely resulted in short-term, negligible to minor releases of sediment into areas adjacent to the roadway including receiving

waters. Present and future actions anticipated to occur if the No Action is chosen include ongoing maintenance of the roadway, the Stevens Canyon tunnel work between Segments 1 and 4, the work on the Highway 123 Panther Creek Bridge, potential failure of culverts, and continued water quality issues from erosion and sediment associated with public access at Reflection Lakes. Overall, when the impacts of the cumulative actions are combined with the long-term, minor to moderate, adverse impacts of the No Action Alternative, there would be a short- and long-term, negligible to minor adverse cumulative effects to project area water quality.

Conclusion

The No Action Alternative would have long-term, minor to moderate adverse impacts on water quality. There would be no adverse impact to water quantity. Adverse cumulative effects associated with the No Action Alternative would be short- and long-term, minor. The No Action Alternative would add a slight adverse increment to overall cumulative effects.

Because there would be no major adverse impacts on water resources, there would be no impairment of park resources and values. Because the impacts previously described: (1) are not inconsistent with the park's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts to water resources under the No Action Alternative.

4.2.2.2 Proposed Action Alternative

Direct and Indirect Effects

The greatest potential impacts to water resources from this alternative would be temporary erosion from clearing and grading during construction earthwork and silt/sediment release from culvert cleaning, repair and/or replacement. Water resources may also be impacted by removal of vegetation, soil compaction, and soil exposure to wind and water erosion. It is estimated that up to 6 acres of ground may be disturbed by construction. There would be 25 culverts in Segment 1 and 35 culverts in Segment 4 that would be cleaned in place. These direct short-term adverse impacts would be negligible to minor, but may increase surface run-off and contribute to sediment loading in waterways. Other, less likely impacts could occur from spills or leaks, such as petroleum products during refueling or maintenance operations. Construction would result in short-term, negligible to minor adverse impacts to water quality.

The Ohanapecosh River Bridge work would include repairing the deck and wing walls and adding a barrier free sidewalk on the north side of the bridge and bridge rail enhancements, including painting the bridge. The Paradise River Bridge work would also include repairing the deck. This work could potentially result in adverse impacts to water quality from bridge material and paint falling in the water. Mitigation in Section 2.6.3 would be implemented to prevent material and paint from falling in the water resulting in short-term, negligible adverse impacts.

Construction would also require water extraction from the Ohanapecosh and Paradise rivers for dust control. The extraction would be limited by the Park to 15 percent of existing flow, not to exceed 30,000 gallons per day (this amount may be less in Paradise River) and not to exceed the minimum flow requirements as determined by the Park biologist. Thus the Proposed Action Alternative may have a short-term minor adverse impact on water quantity. Mitigation measures are proposed in Section 2.6.3 to avoid or minimize the potential for construction impacts to water resources.

Operationally, the road improvement project would improve the drainage system under the road and along drainages near the road, as well as discourage access to Reflection Lakes and Louise Lake from the roadway. There would be approximately 30 lineal feet of new culvert in Segment 1 and 173 lineal feet of new culvert in Segment 4 (18 and 24-inch pipe culvert). These improvements would have a long-term beneficial effect on water quality under this alternative. Operation of the road would still result in contaminants such as oil, grit and materials from brakes and tire wear being deposited on the road surface, which could be carried offsite in stormwater runoff. This is an ongoing long-term negligible adverse impact on water quality.

The project is expected to slightly decrease the amount of impervious surface by reclaiming some of the turnouts and reducing others in size. Even though remaining turnouts would be paved, the unpaved turnouts have compacted soils that would be considered impervious. Thus, it is anticipated that there would be a slight decrease in stormwater runoff from the completed project resulting in long-term beneficial impacts.

Cumulative Effects

Past and present actions that have impacted water resources and water quality include periodic road maintenance activities and visitors accessing Reflection Lakes and Louise Lake. Road maintenance such as shoulder and turnout repair or other activities that disturbed soil may have resulted in some short-term, negligible impacts to project area waterways from eroded sediment (i.e., increased turbidity and siltation). Visitors walking to the shoreline of area lakes have damaged vegetation, disturbed soils, and increased the rate of erosion causing minor adverse impacts to water quality. The Nisqually Road improvements would be in a different watershed than the Stevens Canyon, so there would be no cumulative impacts to project area waterways. The Panther Creek Bridge repairs would also not impact project area waterways because the Panther Creek joins the Ohanapecosh River downstream of the project area. Overall, cumulative adverse impacts to project area water resources from these projects, in combination with the impacts of the Proposed Action Alternative, would be short-term and negligible in intensity. There would also be long-term beneficial cumulative effects from the decrease in stormwater runoff from the completed project.

Conclusion

The Proposed Action Alternative would have short-term, negligible to minor, adverse impacts on water quality and water quantity during construction and long-term beneficial effects during operation. Cumulative effects associated with the Proposed Action Alternative would be short-term, negligible and adverse and long-term, beneficial. The Proposed Action Alternative would add a negligible adverse increment and a beneficial increment to overall cumulative effects.

Because there would be no major adverse impacts on water resources, there would be no impairment of park resources and values. Because the impacts previously described: (1) are not inconsistent with the park's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts to water resources under the Proposed Action Alternative.

4.2.3 Wetlands

The following definitions will be used to assess the intensity of potential wetland impacts:

- Negligible- No measurable or perceptible changes in wetland size, integrity or continuity would occur.
- Minor- Any impact would be measurable or perceptible but slight. A small change in size, integrity or continuity could occur due to short-term indirect effects such as construction related runoff. However, the overall viability of the resource would not be affected.
- Moderate- Any impact would be sufficient to cause a measurable change in the size, integrity or continuity of the wetland or would result in a small, but permanent loss or gain in wetland acreage.
- Major- The action would result in a measurable change in all three parameters (size, integrity and continuity) or a permanent loss of large wetland areas. The impact would be substantial and highly noticeable.
- Duration:
  - ➞ Short-term – Following completion of the project, recovery would take less than one year.
  - ➞ Long-term – Following completion of the project, recovery would take more than one year.

4.2.3.1 No Action Alternative

Direct and Indirect Effects

The only wetland areas are located at Reflection Lakes, which lie adjacent to Stevens Canyon Road and receive runoff from the road surface, which likely contains minor amounts of oil and grit from vehicles. The disturbance to soils from visitors parking and walking to the shoreline of Reflection Lakes has resulted in moderate amounts of sediments entering the wetland through stormwater runoff (see Section 4.2.4). Visitors also stop along the road and walk through the wetland area to view Reflection Lakes, thus disturbing wetland vegetation and causing some localized erosion. Sediment loading and damage to wetland vegetation can reduce the effectiveness of several wetland functions such as water storage and uptake and assimilation of sediment and chemicals. Under the No Action Alternative, these impacts would continue and constitute long-term, minor to moderate, adverse impacts to the wetland areas.

Cumulative Effects

Past actions include periodic maintenance activities such as pothole paving, pavement crack sealing, shoulder repair and culvert cleaning, some of which likely resulted in short-term, negligible to minor releases of sediment into areas adjacent to the roadway including wetlands. Other past actions include visitors walking through the wetland area. Present and future actions anticipated to occur if the No Action Alternative is chosen include ongoing maintenance of the roadway, continued impacts from erosion and sediment associated with public access at Reflection Lakes and road runoff. Overall, when the impacts of the cumulative actions are combined with the long-term, minor to moderate adverse impacts of the No Action Alternative, there would be short- and long-term, minor adverse cumulative effects to wetlands.

Conclusion

The No Action Alternative would have long-term, minor to moderate impacts on wetlands. Overall cumulative effects of the No Action Alternative would be short- and long-term, minor and adverse to wetlands. The No Action Alternative would add a slight adverse increment to overall cumulative effects.

Because there would be no major adverse impacts on wetlands, there would be no impairment of park resources and values. Because the impacts previously described: (1) are not inconsistent with the park's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts to wetlands under the No Action Alternative.

4.2.3.2 Proposed Action Alternative

Direct and Indirect Effects

Lining the trail with large and medium-sized boulders on the lake-side, installing a cut-stone curb along the whole length between the Reflection Lakes parking area and the Wonderland Trail trailhead, repairing the eroded area at the end of the parking area and the social trails, and revegetation activities have the potential to cause short-term disturbance to wetland vegetation and temporarily increase erosion/siltation from clearing, grading, and earthwork. These direct short-term adverse impacts would be negligible to minor in intensity. Mitigation measures are proposed in Section 2.6.4 to avoid or minimize the potential for construction impacts to wetlands. There would also be a very slight loss of palustrine wetland area from building the rockery wall in the eroded area at the end of the parking area. The rockery wall base may be in the wetlands (less than 10 ft^2), which would constitute a negligible but long-term impact.

Operationally, the proposed project would help protect the wetlands along Reflection Lakes by reducing the direct visitor access to the shoreline area. This would allow wetland vegetation to become reestablished in those areas previously disturbed by visitors. Thus, the Proposed Action Alternative would also provide long-term beneficial effects on wetlands.

Cumulative Effects

Past actions that have impacted wetlands include visitors walking through the wetland area disturbing and compacting wetland vegetation and causing localized erosion. Past, present and future maintenance activities may include road shoulder work and culvert cleaning in the vicinity of wetland areas, which could cause some localized siltation and sedimentation impacts. Combining the impacts of past, present, and future actions with the impacts of the Proposed Action Alternative would result in periodic short- and long-term, negligible adverse impacts to wetlands. However, there would also be long-term beneficial cumulative effects on wetlands because of the reduction in direct impacts to the Reflection Lakes wetland areas from visitors.

Conclusion

The Proposed Action Alternative would have short-term, negligible to minor adverse and long-term, negligible adverse impacts on wetlands during construction and long-term beneficial effects during operations. Overall cumulative effects would be short- and long-term, negligible adverse and long-term, beneficial cumulative impacts. The Proposed Action Alternative would add a negligible adverse increment and a beneficial increment to overall cumulative effects.

Because there would be no major adverse impacts on wetlands, there would be no impairment of park resources and values. Because the impacts previously described: (1) are not inconsistent with the park's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts to wetlands under the Proposed Action Alternative.

4.2.4 Soils

The following definitions will be used to assess the intensity of potential soil impacts:

- **Negligible:** The effects to soils would be below or at the lower levels 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 of limited extent. 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.
- Duration:
  - ➞ Short-term – Following completion of the project, recovery would take less than one year.
  - ➞ Long-term – Following completion of the project, recovery would take more than one year.

4.2.4.1 No Action Alternative

Direct and Indirect Effects

Under the No Action Alternative, there would be ongoing erosion occurring at Reflection Lakes from visitors walking down to the shoreline, which disturbs vegetation and soils. This erosion is adversely impacting water quality in the lakes by increasing turbidity and affecting the shoreline wetland area by increasing inputs of silt and sediment (see Sections 4.2.2 and 4.2.3).

Existing drainage problems would continue, which include localized flooding due to undersized, damaged, or clogged culverts, and from poor drainage conditions under Stevens Canyon Road, which may be contributing to road slumping. Local flooding and roadway slumping have the

potential to increase soil erosion. Thus, this alternative would result in long-term minor to moderate adverse impacts to soil from erosion.

In the event that there was a slope failure as a result of road slumping, adverse impacts on soil could be moderate in intensity. This would likely be a short-term impact, because it would be necessary at that point to repair the road.

Cumulative Effects

Past, present and future actions have resulted in recurring short-term erosion of soils for activities such as ditch cleaning, road shoulder repair, removal of weeds, etc. associated with maintaining the road. There are ongoing tourist-related activities causing erosion, vegetation disturbance and compaction of soils including using informal turnouts and walking to the shoreline along Reflection Lakes (where there is no formal trail). Overall, when the impacts of past, present and reasonably foreseeable actions are combined with the short-term, moderate adverse and long-term, minor to moderate adverse impacts of the No Action Alternative, there would be short- and long-term minor adverse cumulative effects to project area soils.

Conclusion

The No Action Alternative would result in short-term moderate adverse and long-term minor to moderate adverse impacts to soils from ongoing erosion, vegetation disturbance and soil compaction. Cumulative effects resulting from the No Action Alternative would result in short- and long-term minor adverse impacts to project area soils. The No Action Alternative would add a perceptible adverse increment to overall cumulative effects to project area soils.

Because there would be no major adverse impacts on soils, there would be no impairment of park resources and values. Because the impacts previously described: (1) are not inconsistent with the park's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts to soils under the No Action Alternative.

4.2.4.2 Proposed Action Alternative

Direct and Indirect Effects

The majority of work would take place within the existing road prism; however, it is estimated that approximately 6 acres of soil may be disturbed. Moving, covering, and compaction of soils by equipment and workers within the construction work zone would be expected. Existing vegetation cover would also be removed exposing soil to accelerated wind and water erosion. Localized soil compaction would temporarily decrease soil permeability, change soil moisture content, and lessen the water storage capacity. Mitigation measures are proposed in Section 2.6.5 to avoid or minimize the potential for construction impacts to soils. These actions with the implementation of mitigation measures would result in a short-term, negligible to minor adverse impacts on soils.

The completed project would reduce existing soil impacts. The proposed improvements to the visitor area at Reflection Lakes (i.e., placing boulders, installing stone curb to delineate the Wonderland Trail, stabilizing the eroded areas and social trails, and revegetating the shoreline and bank) would provide a long-term beneficial effect on soils by keeping visitors out of the sensitive shoreline area. This would allow vegetation to reestablish, avoid soil compaction, and

minimize further soil disturbance in this area. Repairing the road and cleaning culverts would lessen the likelihood for localized flooding and reduce the potential for road slumping, both of which would reduce the potential for erosion. In addition, the road would require less maintenance thereby minimizing the need to disturb soils for an extended period of time (20-25 years). Overall, the Proposed Action Alternative would have a long-term beneficial effect on soils.

Cumulative Effects

Past, present and future actions that disturbed soils include roadway maintenance activities, drainage problems, such as culvert clogging and inadequately sized culverts, and visitor impacts to soils at Reflection Lakes. Overall, when the impacts of the cumulative actions are combined with the short-term negligible to minor adverse and the long-term beneficial impacts of the Proposed Action Alternative, there would be short-term negligible adverse and long-term beneficial cumulative effects on soils.

Conclusion

Construction activities associated with the Proposed Action Alternative would result in short-term, negligible to minor adverse impacts and long-term beneficial impacts on soils in the project area. Cumulative adverse impacts would be short-term and negligible in intensity, but there would also be long-term beneficial cumulative effects. The Proposed Action Alternative would add a negligible adverse increment and a beneficial increment to overall cumulative effects.

Because there would be no major adverse impacts on soils, there would be no impairment of park resources and values. Because the impacts previously described: (1) are not inconsistent with the park's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts to soils under the Proposed Action Alternative.

4.2.5 Vegetation and Special Status Plant Species

The following definitions will be used to assess the intensity of potential vegetation and special status plant species impacts:

- **Negligible:** The action could result in a change to a population or individuals of a species or designated critical habitat, but the change would be so small that it would not be of any measurable or perceptible consequence and would be well within natural variability. This impact intensity equates to a U.S. Fish and Wildlife Service "may affect, not likely to adversely affect" determination.
- **Minor:** The action could result in a change to a population or individuals of a species or designated critical habitat. The change would be measurable, but small and localized and not outside the range of natural variability. Mitigation measures, if needed to offset the adverse effects, would be simple and successful. This impact intensity equates to a U.S. Fish and Wildlife Service "may affect, not likely to adversely affect" or "may affect, likely to adversely affect" determination.
- **Moderate:** Impacts on special status species, their habitats, or the natural processes sustaining them would be detectable and occur over a large area. Mitigation measures, if needed to offset adverse effects, would be extensive and

likely successful. This impact intensity equates to a U.S. Fish and Wildlife Service "may affect, likely to adversely affect" determination.

- **Major:** The action would result in a noticeable effect to viability of a population or individuals of a species or resource or designated critical habitat. Impacts on a special-status species, critical habitat, or the natural processes sustaining them would be detectable, both in and out 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. This impact intensity equates to a U.S. Fish and Wildlife Service "may affect, likely to jeopardize the continued existence of a species or adversely modify critical habitat for a species" determination.
- Duration:
  - ➞ Short-term – Following completion of the project, recovery would take less than one year.
  - ➞ Long-term – Following completion of the project, recovery would take more than one year.

4.2.5.1 No Action Alternative

Direct and Indirect Effects

Near the Reflection Lakes parking area, wetland vegetation between Stevens Canyon Road and the lakes has been disturbed by visitors walking to the shoreline. This activity has created trails through the wetland area resulting in loss of vegetation and has compacted the soil making it harder for vegetation to become reestablished causing long-term, minor adverse impacts on vegetation.

Plant surveys were conducted for special status species, invasive plants and plant associations as discussed in this section and no species of concern were found (Appendix C). Ongoing work to repair Stevens Canyon Road (crack sealing, asphalt overlays, etc.) would be necessary. These activities may include repairs in shoulder areas, which could result in the removal or disturbance of vegetation. Removal or disturbance to vegetation also has the potential to increase the spread of invasive and noxious weeds. The maintenance activities would cause short-term, negligible to minor adverse impacts and mitigation measures could be used to largely negate any long-term effects.

Cumulative Effects

Past, present and future actions impacting vegetation include ongoing maintenance activities that could result in short-term, negligible to minor adverse impacts to vegetation. Overall, when the impacts of the cumulative actions are combined with the short-term, negligible to minor adverse and long-term, minor adverse impacts of the No Action Alternative, there would be short- and long-term, negligible to minor adverse cumulative effects on vegetation and plant special status species.

Conclusion

The No Action Alternative would result in short-term, negligible to minor adverse and long-term, minor adverse impacts. Overall cumulative effects would be short- and long-term, negligible to minor and adverse. The No Action Alternative would add a negligible adverse increment to overall cumulative effects to project area soils.

Because there would be no major adverse impacts on vegetation or special status plant species, there would be no impairment of park resources and values. Because the impacts previously described: (1) are not inconsistent with the park's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts to vegetation or special status plant species under the No Action Alternative.

4.2.5.2 Proposed Action Alternative

Direct and Indirect Effects

The Proposed Action Alternative would have short-term, minor adverse impacts on native vegetation during construction. The project would require some clearing, grading and earthwork resulting in a total disturbance of approximately 6 acres (loss of vegetation would primarily include shrubs and forbs). Moreover, within the road prism, the vegetated area generally remains open and disturbed to maintain drainage and provide a recovery zone. The intent of this project is to enhance safety and rehabilitate the roadway surface with little or no impact to the existing roadside vegetation. Plant surveys were conducted for special status species, invasive plants and plant associations as discussed in this section and no species of concern were found (Appendix C). Mitigation measures are proposed in Section 2.6.6 to avoid or minimize the potential for construction impacts to vegetation.

Clearing existing vegetation could lead to increasing populations of noxious weeds in three ways: (1) removal of established native plants that compete with weeds, (2) exposing mineral soil as a substrate for weed germination, and (3) dispersal of existing or new weed seed or plants by earth moving activities. Noxious weeds have the ability to dominate or disrupt natural communities or restoration projects. They spread rapidly and are very difficult to eradicate from an area once established. The best means of control is to isolate known populations and prevent them from establishing in new areas. Project construction activities resulting in disruption of soils could result in long-term minor impacts from noxious weed invasion. In order to prevent spread of noxious weeds, the mitigation measures discussed in Section 2.6.6 would be implemented for the project.

Operation of the road would have no adverse effect on vegetation. The project would result in the reestablishment of vegetation along the Reflection Lakes visitor area and at turnouts that are obliterated. There would also be removal of noxious weeds along the project corridor (e.g., at the pullout at the corner of Backbone Ridge) and disturbed soil areas would be replanted with native vegetation. Thus, the Proposed Action Alternative would provide a long-term, beneficial effect on vegetation and plant special status species.

Cumulative Effects

Past, present and future maintenance activities would result in recurring short-term, negligible to minor adverse impacts to vegetation. Construction of the Nisqually Road would likely cause short-term minor impacts to vegetation. These actions when combined with the Stevens Canyon Road Rehabilitation Project could result in short-term adverse cumulative effects that are negligible to minor in intensity. However, both the Nisqually Road and Stevens Canyon Road projects would provide long-term beneficial effects from removing noxious weeds, returning previously disturbed areas (such as turnouts) to a natural state and planting disturbed areas with native vegetation. Overall, when the impacts of the cumulative actions are combined with the short-term minor adverse and long-term beneficial impacts from the Proposed Action Alternative,

there would be short-term, negligible to minor adverse and long-term beneficial cumulative effects to vegetation and special status plant species.

Conclusion

The Proposed Action Alternative would have short-term, minor adverse impacts on vegetation. However, it would also provide a long-term beneficial effect during operations. The cumulative effects associated with the Proposed Action Alternative would be short-term, minor adverse and long-term, beneficial. The Proposed Action Alternative would add a negligible adverse increment and a beneficial increment to overall cumulative effects for vegetation and special status plant species.

Because there would be no major adverse impacts on vegetation or special status plant species, there would be no impairment of park resources and values. Because the impacts previously described: (1) are not inconsistent with the park's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts to vegetation or special status plant species under the Proposed Action Alternative.

4.2.6 Fish, Wildlife and Special Status Fish and Wildlife Species

The following definitions will be used to assess the intensity of potential fish, wildlife and special status fish and wildlife species impacts:

- **Negligible:** The action could result in a change to a population or individuals of a species or designated critical habitat, but the change would be so small that it would not be of any measurable or perceptible consequence and would be well within natural variability. This impact intensity equates to a U.S. Fish and Wildlife Service *no effect* determination.
- **Minor:** The action could result in a change to a population or individuals of a species or designated critical habitat. The change would be measurable, but small and localized and not outside the range of natural variability. Mitigation measures, if needed to offset the adverse effects, would be simple and successful. This impact intensity equates to a U.S. Fish and Wildlife Service *may affect, not likely to adversely affect* determination.
- **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 such as migration or juvenile stages; mortality or interference with activities necessary for survival can be expected on an occasional basis, but is not expected to threaten the continued existence of the species in the park unit. Mitigation measures, if needed to offset adverse effects, would be extensive and likely successful. This impact intensity equates to a U.S. Fish and Wildlife Service *may affect, not likely to adversely affect* or *may affect, likely to adversely affect* determination.
- **Major:** The action would result in a noticeable effect to viability of a population or individuals of a species or resource or designated critical habitat. Impacts on a special-status species, critical habitat, or the natural processes sustaining them would be detectable, both in and out 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. This impact intensity equates to a U.S. Fish and Wildlife Service *may affect, likely to jeopardize the continued existence of a species or adversely modify critical habitat for a species* determination.

4.2.6.1 No Action Alternative

Direct and Indirect Effects

Ongoing work to repair Stevens Canyon Road (crack sealing, asphalt overlays, etc.) would cause short-term periodic increases in noise and human presence, which would adversely affect fish, wildlife and special status fish and wildlife species. For example, increased noise and human presence would likely cause wildlife and special status wildlife species to temporarily avoid the area. Thus, under the No Action Alternative impacts to wildlife would be short-term and negligible to minor in intensity. The No Action Alternative may affect but is not likely to adversely affect the northern spotted owl, the marbled murrelet, or bull trout. The No Action Alternative would have no effect on other federally listed species.

Cumulative Effects

Past projects such as building roads, turnouts, and other visitor facilities has resulted in the long-term loss of wildlife habitat however, this effect is static in nature, in the sense that increasing the developed footprint of these facilities is not planned in the foreseeable future. Past, present and future road maintenance causes periodic increases in noise and human activity, which has the potential to disturb wildlife and cause wildlife to temporarily avoid the area. Other road rehabilitation projects that are planned in the foreseeable future, including the Nisqually to Paradise Road, and State Route 410, would also result in increased noise and human activity during construction with similar impacts to wildlife. Combining the No Action Alternative with past, present and future actions would produce minor adverse cumulative impacts on wildlife. Under the No Action Alternative, maintenance activities will continue to occur annually – and therefore cumulative effects of annual activities have the potential to consistently disturb wildlife, and affect water quality and aquatic species. However, these activities are limited to the existing developed corridor – and given the scale of the activity relative to the surrounding landscape, and the limited duration and intensity of the activity, cumulative effects resulting from the No Action Alternative are expected to continue to be negligible to minor and adverse.

Conclusion

Ongoing work and maintenance to repair Stevens Canyon Road (crack sealing, asphalt overlays, etc.) would cause short-term periodic noise and human presence that would have negligible to minor impacts on wildlife, and *may affect but would not likely adversely affect* special status species. Cumulative effects on wildlife would generally be short-term and minor in intensity and *may affect but would not likely adversely affect* the northern spotted owl, the marbled murrelet, or bull trout. The project would have *no effect* on other federally listed species. The No Action Alternative would add a negligible adverse increment to overall cumulative effects.

Because there would be no major adverse impacts on fish, wildlife or special status fish and wildlife species, there would be no impairment of park resources and values. Because the impacts previously described: (1) are not inconsistent with the park's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or

concessioner or contractor operations, there would be no unacceptable impacts to fish, wildlife or special status fish and wildlife species under the No Action Alternative.

4.2.6.2 Proposed Action Alternative

Direct and Indirect Effects

The project would require some clearing, grading and earthwork, resulting in habitat disturbance of approximately 6 acres for the entire project. However, habitat within the road prism generally would remain open and disturbed to maintain drainage and provide a recovery zone. The direct habitat disturbance would not reduce habitat availability for a variety of common small mammals, birds, and their predators, because native vegetation would be reestablished. The obliteration and restoration of several turnouts would increase habitat and provide a long-term beneficial effect.

Construction techniques, such as asphalt grinding, excavation, paving, and heavy machinery operation would create significant noise and vibration disturbance beyond ambient levels associated with habitual road use. Construction equipment noise levels can range from 70 decibels (dBA) to 98 dBA at a distance of 50 feet. Ambient noise levels in the project area likely range from 50 to 65 dBA and are mostly due to vehicles traveling on Stevens Canyon Road, airplanes passing overhead and natural processes such as wind.

Sound levels generally decrease with distance at a rate of approximately 6 dBA with every doubling of distance. However, intervening topography, trees and weather conditions can decrease noise levels by absorbing the sound. Peak construction noise levels of 98 dBA would decrease to around 70 dBA (assuming no intervening barriers) at a distance of 1/4 mile from the sound source. Species that are sensitive to indirect human disturbance (noise and visual disturbance) would be impacted most during the construction activity. Mitigation measures are proposed in Section 2.6.7 to avoid or minimize the potential for noise disturbance during construction including timing restrictions to minimize impacts on nesting listed species (see discussion below). Construction activities would result in short-term minor adverse impacts to wildlife.

Northern spotted owl nesting areas have been documented adjacent to the project area as recently as 2006, 2008, and 2009. There are two known northern spotted owl territories that overlap with the project area. In 2009, segments of Stevens Canyon Road (within the project area) were within 0.7 miles from the center of a spotted owl territory (See Figure 8). In addition, one section of the road was within 0.25 miles from the center of a spotted owl territory. It is important to note that owl territories within the project area can change from year to year, thus affecting different segments of the road corridor.

Any area along the road corridor that is within an occupied or un-surveyed historical northern spotted owl territory would be subject to seasonal construction stipulations to prevent any adverse impacts (see Section 2.6.7). No project activities that generate noise above ambient levels would be allowed within these owl territories (within 0.7 miles of an activity center) between March 15th and September 30th. Surveys would be ongoing during the construction period, and affected areas may increase or decrease as information is obtained. Because of these survey efforts and restrictions, no spotted owl habitat would be directly impacted as a result of the project. Construction activity and associated noise represent the project impacts that have the most potential effects on the owl (see discussion below of construction effects on wildlife).

The Proposed Action Alternative would not result in the removal of large trees that provide potential owl nest sites. In addition, vegetation that would be removed is located mostly along the roadway, and this vegetation is not considered important owl foraging habitat. The project also plans to eliminate several turnouts and return them to their natural state. This would involve

importing topsoil and revegetation with native species. This would provide a slight benefit to the owl by reclaiming these areas and providing increased habitat for prey species. Impacts on nesting success would be avoided by timing construction so it does not occur during the nesting season.

Construction debris (including trash and food) can provide an unnatural attractant to birds and other types of wildlife. Predators of spotted owl eggs and young include common ravens (who are opportunistic and feed on discarded roadside trash and food). Specific mitigation measures are listed for trash disposal and food storage in Section 2.6.7 to prevent unnatural attractants to birds, which could indirectly affect the northern spotted owl. Overall construction disturbances to northern spotted owls would result in minor adverse impacts, which *may affect, but is not likely to adversely affect* the northern spotted owl.

Marbled murrelets. The USFWS has identified suitable marbled murrelet habitat in parts of the Stevens Canyon and the Ohanapecosh River areas, as previously discussed. It has been determined that Stevens Canyon does not contain suitable marbled murrelet habitat along the road corridor due to a lack of forest structure preferred by murrelets; however, the area from Backbone Ridge to the junction with Hwy 123 (Segment 4) does contain suitable habitat for marbled murrelets (See Figure 9). It has been determined that the likelihood of murrelets inhabiting the Ohanapecosh River drainage is low or contains very few birds. While the likelihood is low, their presence is possible – therefore, it is appropriate to assume that for similar reasons stated above for the northern spotted owl, the proposed action *may affect, but is not likely to adversely affect* marbled murrelets.

Bull trout. Historically, the Cowlitz basin would have been accessible to migratory bull trout, and there is some anecdotal evidence that bull trout were present in the Cowlitz basin. Therefore, it is assumed that bull trout may inhabit the Ohanapecosh River, within and downstream of the Park.

Ongoing work to repair Stevens Canyon Road, including culvert cleaning and bridge deck repair, may cause short-term water quality impacts to adjacent water bodies impacting potential bull trout habitat. While highly unlikely, it is possible that bull trout inhabit, or have the potential to inhabit the Ohanapecosh River. Based on this assumption, the proposed action *may affect but is not likely to adversely affect* bull trout.

State-listed special status avian species, such as goshawks, golden eagles, and peregrine falcons may be present in the project area. These species would likely be disturbed by project-related construction and preferentially opt for alternative habitat. No active nests for these species are known to occur adjacent to the project area; however, surveys have not been performed. No loss of avian habitat would result from the Proposed Action Alternative. Noise and vibration exceeding habitual ambient levels could drive prey species away from the project area during construction. The result of such disturbance could result in short-term, indirect minor adverse impacts to predatory species persisting in close proximity to construction-related disturbance.

Bat species. Myotis bat species and Pacific Townsend's big-eared bats may be present in the project area, located under bridges or roosting under bark or leaves. Both noise and vibration associated with construction-related activities could constitute a short-term, minor adverse impact on these species roosting or foraging behavior. No roosting concentrations of sensitive bat species are known to occur near the project area.

Amphibians. Amphibians, such as the Cascade frog, and Larch Mountain and Van Dyke's salamander have been documented in and near ditches and wet areas in the project area in recent surveys. Of these species, Larch Mountain salamanders are likely the most threatened by the proposed road work because of the relatively higher numbers in the project area as compared to

the rest of the Park. Road-related work could increase siltation and sedimentation into their habitat and construction workers could compact habitat as they work next to the road prism. Long-term, negligible to minor adverse impacts are anticipated to result from proposed construction disturbance. Mitigation measures for amphibians, such as waiting for ditches to dry out prior to construction and surveying for the presence of amphibians are listed in Section 2.6.7.

Cumulative Effects

Past and present maintenance and future projects such as the Nisqually Road 3R project would also create construction-related effects such as increased noise, vehicle traffic, and human activity that may potentially affect the foraging or nesting activities of wildlife. Because of timing restrictions and other mitigation measures implemented by the Park for past and present projects (and would be required of future projects), such as those described in the Section 2.6.7, it is unlikely that breeding/nesting activity has been or would be adversely impacted. There have been short-term impacts on foraging, but there is an abundance of foraging habitat within the Park. Combining the impacts of past, present and future actions with the short-term, minor adverse and the long-term, negligible to minor adverse impacts, and long-term beneficial of the Proposed Action Alternative, would result in short- and long-term negligible adverse cumulative and long-term, beneficial cumulative impacts on fish, wildlife and special status fish and wildlife species.

Conclusion

Operation of the road would not adversely impact fish, wildlife or special status fish and wildlife species because there would be no increase in capacity on the roadway. The Proposed Action would have a long-term beneficial effect on wildlife and wildlife special status species because it would reduce the periodic requirements for road maintenance. There would also be some slight gain in wildlife habitat at the locations where existing turnouts are obliterated and returned to a natural state.

The Proposed Action Alternative is expected to produce short-term, minor adverse and long-term, negligible to minor adverse impacts on fish, wildlife, and special status fish and wildlife species that *may affect but is not likely to adversely affect* the northern spotted owl, marbled murrelet, and bull trout during construction. There would be *no effect* on other federally listed species.

Cumulative effects on fish, wildlife, and special status fish and wildlife species associated with the Proposed Action Alternative would be short- and long-term negligible adverse cumulative, and long-term, beneficial cumulative impacts on fish, wildlife and special status fish and wildlife species. The Proposed Action Alternative would add a negligible adverse increment and a beneficial increment to overall cumulative effects.

Because there would be no major adverse impacts on fish, wildlife, or special status fish and wildlife species, there would be no impairment of park resources and values. Because the impacts previously described: (1) are not inconsistent with the park's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts to fish, wildlife, and special status fish and wildlife species under the Proposed Action Alternative.

4.2.7 Cultural Resources (Archeological Resources, Historic Structures, and Cultural Landscapes)

The APE for the cultural resources section includes the linear extent of Segments 1 and 4 (10.09 miles of roadway) and the road prism (defined as the road surface, road shoulders, turnouts, and adjacent side slopes). Thus, in most areas the APE encompasses a fairly narrow corridor. However, the APE broadens out beyond the road prism in several areas where intensive construction work would occur, which includes the areas near Inspiration Point, Reflection Lakes, and Bench Lake curve in Segment 1.

Archeological Resources

The following definitions will be used to assess the intensity of potential archeological resource impacts:

- **Negligible:** Impact(s) is at the lowest levels of detection with neither adverse nor beneficial consequences. The determination of effect for §106 would be *no adverse effect*.
- **Minor:** Disturbance of a site(s) results in little, if any, loss of integrity. The determination of effect for §106 would be *no adverse effect*.
- **Moderate:** Disturbance of a site(s) results in loss of integrity. The determination of effect for §106 would be *adverse effect*. A memorandum of agreement is executed among the National Park Service and applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the MOA to minimize or mitigate adverse impacts reduce the intensity of impact under NEPA from major to moderate.
- **Major:** Disturbance of a site(s) results in loss of integrity. The determination of effect for §106 would be *adverse effect*. Measures to minimize or mitigate adverse impacts cannot be agreed upon and the National Park Service and applicable state or tribal historic preservation officer and/or Advisory Council are unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b).
- **Duration:** Because archeological resources are essentially non-renewable, any effects on archeological resources would be long-term.

4.2.7.1 No Action Alternative

Direct and Indirect Effects

There would be no adverse impacts (*no adverse effect)* to archeology under this alternative.

Cumulative Effects

Past, present and future actions that could potentially impact archeological resources include work that would be associated with the Nisqually Road project. It is not anticipated that there would be any disturbance to archeological resources from maintenance work under the No Action Alternative since it typically does not involve extensive excavation. Park staff typically conducts surveys for resources prior to authorizing any extensive excavation. However; if there is slope stabilization work associated with the Nisqually Road project, then there is some potential to disturb unknown resources. It is anticipated that cumulatively the No Action Alternative would have long-term negligible to minor adverse impacts (*no adverse effect*) on archeological resources.

Conclusion

There would be no adverse impacts (n*o adverse effect)* to prehistoric or historic archeological resources from the No Action Alternative. Cumulative effects associated with the No Action Alternative would result in negligible to minor adverse long-term impacts (*no adverse effect*) to archeological resources.

Because there would be no major adverse impacts on archeological resources, there would be no impairment of park resources and values. Because the impacts previously described: (1) are not inconsistent with the park's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts to archeological resources under the No Action Alternative.

4.2.7.2 Proposed Action Alternative

Direct and Indirect Effects

The Proposed Action Alternative would not affect any known archeological resources. However, because archeological remains are difficult to document with reconnaissance procedures alone, the Park archaeologist or archeological technician should periodically monitor the APE during the construction activities. Monitoring would be particularly important where construction work involves side slope stabilization, bank-cuts along present side-slopes, and extension of the toe of the fill slope. There would be long-term negligible to minor adverse impacts (*no adverse effect*) to archaeological resources during construction. Mitigation measures are proposed in Section 2.6.8 to avoid or minimize the potential for construction impacts to archeological resources.

NRHP eligible sites documented by survey or found through the monitoring processes would be protected by avoidance. Sites previously identified but unevaluated for NRHP should be considered eligible and protected until a determination can be made. Since these sites would not be damaged by the rehabilitation process, a determination of eligibility should not be required prior to construction, unless plans change.

Operation of the roadway would have no adverse impact (*no adverse effect*) on archeological resources.

Cumulative Effects

Past, present and future actions that could potentially impact archeological resources include work that would be associated with the Nisqually Road and Stevens Road projects. No known archeological resources would be impacted, but there is potential for unknown resources to be disturbed during construction for these two projects. It is anticipated that cumulatively the Proposed Action Alternative would have long-term negligible to minor adverse impacts (*no adverse effect*) on archeological resources from construction.

Conclusion

There would be long-term negligible to minor adverse impacts (*no adverse effect*) during construction and no adverse impacts from operation. Cumulative effects associated with the Proposed Action Alternative would result in long-term negligible to minor adverse impacts (*no adverse effect*).

Because there would be no major adverse impacts on archeological resources, there would be no impairment of park resources and values. Because the impacts previously described: (1) are not

inconsistent with the park's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts to archeological resources under the Proposed Action Alternative.

Historic Structures

The following definitions will be used to assess the intensity of potential historic structure impacts:

- **Negligible:** Impact(s) is at the lowest levels of detection; barely measurable with no perceptible consequences. The determination of effect for §106 would be *no adverse effect*.
- **Minor:** Alteration of a feature(s) would not diminish the overall integrity of the resource. The determination of effect for §106 would be *no adverse effect*.
- **Moderate:** Alteration of a feature(s) would diminish the overall integrity of the resource. The determination of effect for §106 would be *adverse effect*. A memorandum of agreement (MOA) is executed among the National Park Service and applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the MOA to minimize or mitigate adverse impacts reduce the intensity of impact under NEPA from major to moderate.
- **Major:** Alteration of a feature(s) would diminish the overall integrity of the resource. The determination of effect for §106 would be *adverse effect*. Measures to minimize or mitigate adverse impacts cannot be agreed upon and the National Park Service and applicable state or tribal historic preservation officer and/or Advisory Council are unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b).
- **Duration:** Because historic resources are essentially non-renewable, any effects on historic resources would be long-term.

4.2.7.3 No Action Alternative

Direct and Indirect Effects

Historic structures in the APE, such as stone retaining walls and guardwalls, bridges, rock walls, viaducts, etc. would continue to deteriorate under this alternative. Regular cyclic maintenance has not been able to keep up with the rate of deterioration for many of these historic features. A good example is the stone wall at Inspiration Point which is rotating out towards the downhill. Maintenance would not stop this from occurring and at some point the wall would collapse. The only way to fix this is to rebuild the foundation of the wall. Thus, there would be long-term moderate adverse impacts (*adverse effect*) on historic resources from the No Action Alternative.

Cumulative Effects

The historic structures within the APE were mostly established when the road was constructed and some have been damaged due to the weather extremes in the park, through aging, or from accidents with vehicles. Present and future actions that could potentially impact historic structures include ongoing maintenance activities on Stevens Canyon Road and future rehabilitation work on Nisqually Road; but these would generally result in some beneficial effect as long as no

change to historic integrity occurs. However, rehabilitation would still cause long-term impacts. The combined cumulative effects associated with past, present, and future actions, and the No Action Alternative, would result in moderate long-term adverse impacts (*adverse effect*) to historic structures.

Conclusion

Long-term moderate adverse impacts (*adverse effect*) to historic structures would occur under this alternative. Cumulative effects resulting from the No Action Alternative would result in moderate long-term adverse impacts (*adverse effect*) as well.

Because there would be no major adverse impacts on historic structures, there would be no impairment of park resources and values. Because the impacts previously described: (1) are not inconsistent with the park's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts to historic structures under the No Action Alternative.

4.2.7.4 Proposed Action Alternative

Direct and Indirect Effects

The rehabilitation work is being designed to meet the *Secretary of the Interior's Standards for Rehabilitation*, which includes preserving and protecting historic features, repairing and replacing features in-kind, and using compatible designs when adding new features. Short-term impacts on vegetation and landscaping from removal of small trees and replanting would be minor, lasting only until new vegetation has become established. There also would be rehabilitation of native stone masonry walls, which would protect the features from further deterioration. This would result in some beneficial long-term, minor effects to historic structures under this alternative. Mitigation measures are proposed in Section 2.6.8 to avoid or minimize the potential for construction impacts to historic structures. Overall, construction would cause long-term negligible to minor adverse impacts (*no adverse effect*) on historic structures.

Operation of the road would not impact any historic structures. Thus, there would be *no adverse effect* on historic structures during operation.

Cumulative Effects

Past events such as extreme weather and vehicle accidents, as well as aging has caused some historic structures within the APE to be damaged or deteriorate. Present and future actions that could potentially impact historic structures include ongoing maintenance and rehabilitation activities, which would provide some benefit to these resources. The combined cumulative effects associated with past, present, and future actions, and the Proposed Action Alternative, would result in long-term negligible adverse impacts (*no adverse effect*) to historic structures.

Conclusion

Overall, if properly mitigated during design and construction, there would be long-term, minor adverse impacts (*no adverse effect*) to historic structures under the Proposed Action Alternative. Rehabilitation of native stone masonry guardwalls and culverts would be a beneficial long-term, minor effect for historic structures located in the project area. Cumulative effects resulting from the Proposed Action Alternative would result in long-term negligible adverse impacts (*no adverse effect*) to historic structures.

Because there would be no major adverse impacts on historic structures, there would be no impairment of park resources and values. Because the impacts previously described: (1) are not inconsistent with the park's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts to historic structures under the Proposed Action Alternative.

Cultural Landscape

The following definitions will be used to assess the intensity of potential cultural landscape impacts:

- **Negligible:** Impact(s) is at the lowest levels of detection; barely measurable with no perceptible consequences. The determination of effect for Section 106 would be *no adverse effect*.
- **Minor:** Alteration of a pattern(s) or feature(s) of the landscape would not diminish the overall integrity of the landscape. The determination of effect for Section 106 would be *no adverse effect*.
- **Moderate:** Alteration of a pattern(s) or feature(s) of the landscape would diminish the overall integrity of the landscape. The determination of effect for Section 106 would be *adverse effect*. A memorandum of agreement is executed among the National Park Service and applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the MOA to minimize or mitigate adverse impacts reduce the intensity of impact under NEPA from major to moderate.
- **Major:** Alteration of a pattern(s) or feature(s) of the landscape would diminish the overall integrity of the landscape. The determination of effect for Section 106 would be *adverse effect*. Measures to minimize or mitigate adverse impacts cannot be agreed upon and the National Park Service and applicable state or tribal historic preservation officer and/or Advisory Council are unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b).
- Duration:
  - ➞ Short-term - Effects on the natural elements of the cultural landscape may be less than a year until new vegetation grows or historic plantings are restored.
  - ➞ Long-term - Effects on the cultural landscape would persist for more than one year.

4.2.7.5 No Action Alternative

Direct and Indirect Effects

The existing cultural landscape, which includes Stevens Canyon Road, would continue to be adversely affected by the deteriorating conditions of the roadway and associated historic features such as guardwalls, stone curbs, turnouts, etc in the APE. Thus, there would be long-term moderate adverse impacts (*adverse effect)* to the cultural landscape.

Cumulative Effects

Past and ongoing maintenance activity has likely had little effect on the cultural landscape and may have helped to delay the deterioration of important elements such as historic structures, as well as preserving access to views, vistas, etc. Future project such as the Nisqually Road project would provide beneficial effects by restoring historic structures and small scale features such as curbs, culverts, etc., improving access to views and vistas, maintaining native vegetation by removing noxious weeds, and preserving the spatial organization of the highway design. Under the No Action Alternative no rehabilitation would take place on Stevens Canyon Road, thus long-term moderate adverse impacts would occur caused by aging or deteriorating elements of the cultural landscape in the APE. Cumulatively, there would be long-term, moderate adverse impacts (*adverse effect*) on the cultural landscape.

Conclusion

There would be long-term moderate adverse impacts (*adverse effect*) to the cultural landscape under this alternative. Cumulative effects resulting from the No Action Alternative would also result in long-term moderate adverse impacts (*adverse effect*) to the cultural landscape.

Because there would be no major adverse impacts on the cultural landscape, there would be no impairment of park resources and values. Because the impacts previously described: (1) are not inconsistent with the park's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts to the cultural landscape under the No Action Alternative.

4.2.7.6 Proposed Action Alternative

Direct and Indirect Effects

The rehabilitation work is being designed to meet the *Secretary of the Interior's Standards for Rehabilitation*, which includes preserving and protecting historic features, repairing and replacing features in-kind, and using compatible designs when adding new features. Short-term impacts on vegetation and landscaping from removal of small trees and replanting would be minor, lasting only until new vegetation has become established. Trees removed during construction would be replaced in-kind. There also would be rehabilitation of native stone retaining walls and guardwalls and proposed closure and revegetation of informal turnouts, which would result in beneficial long-term, minor effects to the cultural landscape. Mitigation measures are proposed in Section 2.6.8 to avoid or minimize the potential for construction impacts to cultural landscapes. Overall, there would be a negligible impact (*no adverse effect*) to the cultural landscape during construction.

Operation of the road would have *no adverse effect* on the cultural landscape.

Cumulative Effects

Generally over time there have been few changes to the cultural landscape. Park policies have protected the elements that make up the cultural landscape including views and vistas, vegetation, historic structures, and the spatial organization of the road itself that was designed to fit the topography and blend in with its surroundings. Thus, there are few past actions that have adversely affected the cultural landscape. Similarly, present and future actions such as road, bridge, and culvert rehabilitation, retaining wall construction, or improvements to turnouts would only have short-term negligible to minor impacts on the cultural landscape since these are very

limited in their area of extent. Proposed closing of informal turnouts and revegetating these areas would also provide a beneficial effect to the cultural landscape. The Stevens Canyon Road and Nisqually Road projects would provide beneficial effects. Therefore, the past, present and future actions combined with the Proposed Action Alternative would have negligible adverse impacts (*no adverse effect*) on the cultural landscape or the Mount Rainier NHLD.

Conclusion

Overall, if properly mitigated during design and construction, short-term negligible adverse impact (*no adverse effect*) would occur to cultural landscapes or the Mount Rainier NHLD under the Proposed Action Alternative. The project would provide long-term beneficial effects on the cultural landscape. Cumulative effects resulting from the Proposed Action Alternative would result in short-term negligible adverse impacts (*no adverse effect*) to the cultural landscape.

Because there would be no major adverse impacts on the cultural landscape, there would be no impairment of park resources and values. Because the impacts previously described: (1) are not inconsistent with the park's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts to the cultural landscape under the Proposed Action Alternative.

4.2.8 Visitor Use and Experience

The following definitions will be used to assess the intensity of potential impacts to visitor use and experience:

- **Negligible:** Visitors would not be affected or changes in visitor use and/or experience would be below or at level of detection. Any effects would be short-term. The visitor would not likely be aware of the effects associated with the alternative.
- **Minor:** Changes in visitor use and/or experience would be detectable, although the changes would be slight and likely short-term. The visitor would be aware of the effects associated with the alternative, but the effects would be slight.
- **Moderate:** Changes in visitor use and/or experience would be readily apparent and likely long-term. The visitor would be aware of the effects associated with the alternative and would likely be able to express an opinion about the changes.
- **Major:** Changes in visitor use and/or experience would be readily apparent, severely adverse or exceptionally beneficial, and have important long-term consequences. The visitor would be aware of the effects associated with the alternative and would likely express a strong opinion about the changes.
- Duration:
  - ➞ Short-term – Effects occur only during project implementation activities.
  - ➞ Long-term – Effects extend beyond the project implementation activities.

4.2.8.1 No Action Alternative

Direct and Indirect Effects

Under the No Action Alternative, Stevens Canyon Road would continue to deteriorate and require periodic maintenance to repair damage to the roadway. Roadway damage may create unsafe driving conditions and repair work would create lane closures that cause short-term, minor adverse impacts to visitors from traffic delays.

Failing culverts, flooding, road slumping and/or other maintenance issues may result in roadway damage that requires more extensive repairs. In these instances the No Action Alternative would result in a short-term minor to moderate adverse impacts to visitor use and experience depending on the damage. There is a slightly higher risk of more extensive road damage, which may result in longer-term impacts from closure of Stevens Canyon Road, causing a long-term, moderate adverse impact to visitor use and experience.

Cumulative Effects

Past, present, and reasonably foreseeable future actions, including road maintenance and the Nisqually Road rehabilitation scheduled for 2012 have affected and would affect visitor use and experience from construction noise, traffic delays and possible road closures. These actions have resulted in short-term negligible adverse effects and would result in short-term, minor to moderate adverse cumulative effects to visitor use and experience. The overall cumulative effects to visitor use and experience from past, present, and reasonably foreseeable future projects, in combination with the impacts of the No Action Alternative, would result in short- and long-term, minor adverse cumulative effects to visitor use and experience.

Conclusion

The existing roadway condition and ongoing maintenance results in recurring short-term, minor to moderate adverse and, potentially, long-term, moderate impacts to visitor use and experience. Cumulative effects would be short- and long-term, minor adverse effects to visitor use and experience. Therefore, the No Action Alternative would contribute a slight adverse increment to overall cumulative effects on visitor use and experience.

Because the impacts previously described: (1) are not inconsistent with the park's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts to visitor use and experience under the No Action Alternative.

4.2.8.2 Proposed Action Alternative

Direct and Indirect Effects

Adverse impacts to visitor use and experience from proposed roadway improvements would occur primarily during the construction phase of the project. Construction activity would result in minor to moderate, short-term adverse impacts from complete or partial road closures, reduced speeds through the construction area, and associated travel delays caused by construction. Approximately 3.1 miles of Stevens Canyon Road in Segment 1 would be completely closed for up to 30 days. This would cut off access to Inspiration Point, Snow Lake Trailhead, Cowlitz Divide/Wonderland Trailhead, and Reflection Lakes. Other road closures would extend the travel time to hiking trails, Grove of the Patriarchs, and other visitor destinations along Stevens Canyon

Road. This would likely result in some visitors not visiting the Park or could concentrate visitors at other park attractions. Mitigation measures are proposed in Section 2.6.9 to avoid or minimize the potential for construction impacts to visitor use and experience.

Short-term, minor adverse impacts would also result from construction noise. For those visitors coming to the park to experience the solitude of the wilderness located 200 feet from either side of the centerline of Stevens Canyon Road this may be noticeable. However, the impact would occur only during the construction period, and the impact would not exceed a minor threshold.

After construction is completed, the operational condition of the roadway would improve for park visitors. In addition, other planned improvements such as parking and turnout paving, improving the Wonderland Trail at Reflection Lakes and rehabilitation of historic structure would improve visitor access and experience along Stevens Canyon Road. The result would be a long-term, beneficial effect to the visitor experience along Stevens Canyon Road.

Cumulative Effects

Past, present, and reasonably foreseeable future actions, including road maintenance and the Nisqually Road rehabilitation scheduled in 2012 have affected and would affect visitor use and experience from construction noise, traffic delays and possible road closures. These actions have resulted in short-term, negligible and will result in short-term, minor to moderate adverse cumulative effects impacts to visitor use and experience. The overall cumulative effects to visitor use and experience from past, present, and reasonably foreseeable future projects, in combination with the impacts of the Proposed Action Alternative would result in short-term, minor adverse and long-term beneficial cumulative effects to visitor use and experience.

Conclusion

The Proposed Action Alternative would result in short-term minor to moderate adverse impacts to visitor use and experience during construction, but would also provide a long-term beneficial effect. Cumulative effects would be minor and adverse in the short term, and beneficial in the long-term. Therefore, the Proposed Action Alternative would contribute a slight adverse increment as well as a long-term beneficial increment to overall cumulative effects on visitor use and experience.

Because the impacts previously described: (1) are not inconsistent with the park's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts to visitor experience under the Proposed Action Alternative.

4.2.9 Public Health, Safety and Park Operations

The following definitions will be used to assess the intensity of potential public health, safety, and park operations impacts:

- **Negligible:** The action would have no measurable impact to park operations.
- **Minor:** Actions with minor impacts would affect park operations in a way that would prove extremely difficult to measure. To the normal observer, such impacts would not be apparent, such as levels of increase in the park's budget and current staffing of less than ten percent.

- **Moderate:** Actions would measurably affect park operations such as levels of increase in the park's budget between 10-30 percent or an increase in personnel of 10-30 percent. Impacts would include additional visitor services, protection and emergency response services, facility maintenance, and administrative support.
- **Major:** Actions would significantly affect park operations such as an increase in the park's budget and personnel of greater than 30 percent. Impacts would be providing additional visitor services, protection and emergency response services, facility maintenance, and administrative support.
- Duration:
  - ➞ Short-term – Effects occur only during project implementation activities.
  - ➞ Long-term – Effects extend beyond the project implementation activities.

4.2.9.1 No Action Alternative

Ongoing maintenance of Stevens Canyon Road would place a burden on park staff and resources, and there would be no long-term improvements to the road under the No Action Alternative. There may be localized flooding due to clogged, undersized or damaged culverts, slope failures, or other damage to the roadway or safety hazards, such as rock fall that staff may not be available to address as quickly because of increased demand on staff time. Potential events such as earthquakes, volcanic activity, or slope failure that could damage the road could produce an immediate disruption in park operations and compromise public safety. Thus, the No Action Alternative would result in both short- and long-term, minor to moderate adverse impacts to public health, safety and park operations.

Cumulative Effects

Past, present, and reasonably foreseeable future actions, including road maintenance and the Nisqually Road rehabilitation scheduled in 2012 have affected and would affect public health, safety and park operations from construction noise, traffic delays and possible road closures. Present and future maintenance activities for Stevens Canyon Road would impact park staff responsible for managing these actions. These actions have resulted in short-term, negligible and will result in short-term, minor to moderate adverse cumulative effects to public health, safety, and park operations. The overall cumulative effects to public health, safety, and park operations from past, present, and reasonably foreseeable future projects, in combination with the impacts of the No Action Alternative would result in short- and long-term, minor adverse cumulative effects.

Conclusion

The No Action Alternative would result in short- and long-term, minor to moderate adverse impacts. Overall cumulative effects would be short- and long-term, minor and adverse to public health, safety, and park operations. The No Action Alternative would add a detectable adverse increment to overall cumulative effects.

Because the impacts previously described: (1) are not inconsistent with the park's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts to public safety, health and park operations under the No Action Alternative.

4.2.9.2 Proposed Action Alternative

Direct and Indirect Effects

Construction activities associated with the project would require some existing park staff to reallocate some of their time to manage the project. This would cause short-term minor impacts on park operations. After completion of the project, road maintenance activities would decrease and result in a cost savings for the park, as well as reduce the burden on staff time. The stability of some slopes would be enhanced, which would decrease the likelihood for rock fall to occur in these areas and improve safety. Thus, operation of the road would provide a beneficial long-term effect on park operations and result in a negligible adverse impact on public safety, health and park operations.

Similar to the No Action Alternative, potential volcanic activity, earthquakes or other geologic events, such as rock fall may adversely impact the public's health and safety while traveling on Stevens Canyon Road. However, the road is in keeping with NPS management policies to provide visitors access to enjoy the Park despite any potential hazards. Park staff does provide warnings of potential hazards.

Cumulative Effects

Past, present, and reasonably foreseeable future actions, including road maintenance and the Nisqually Road rehabilitation scheduled in 2012 have affected and would affect public health, safety and park operations from construction noise, traffic delays and possible road closures. Present and future maintenance activities for Stevens Canyon Road would decrease after completion of the Stevens Canyon Road improvements. These actions have resulted in short-term, negligible and would result in short-term, minor to moderate adverse cumulative effects to public health, safety, and park operations. However, future road projects would also reduce long-term costs and staff necessary to maintain these roadways, thus providing a long-term benefit to park operations. The overall cumulative effects to public health, safety, and park operations from past, present, and reasonably foreseeable future projects, in combination with the impacts of the Proposed Action Alternative would result in short- and long-term, minor adverse and long-term, beneficial cumulative effects to public health, safety, and park operations.

Conclusion

Overall, the construction phase of the project would result in short-term, minor to moderate impacts on public health, safety and park operations. Operation of the project would provide beneficial effects to park operations and result in long-term negligible adverse impacts on public health, safety, and park operations. Overall cumulative effects would be short- and long-term, minor, adverse, and long-term beneficial. The Proposed Action Alternative would add a slight adverse increment and a beneficial increment to overall cumulative effects.

Because the impacts previously described: (1) are not inconsistent with the park's purpose and values, (2) do not prevent the attainment of desired future conditions for natural and cultural resources, (3) do not create an unsafe environment, (4) do not diminish opportunities for future enjoyment of the park, and (5) do not unreasonably interfere with park programs or activities, an appropriate use, or concessioner or contractor operations, there would be no unacceptable impacts to public safety, health and park operations under the Proposed Action Alternative.

5. CONSULTATION AND COORDINATION

Mount Rainier National Park conducted internal scoping with appropriate NPS staff and external scoping with the public and interested and affected groups, agencies, and tribes to determine the range of issues to be discussed in this EA. This interdisciplinary process defined the purpose and need, identified potential actions to address the need, determined the likely issues and impact topics, and identified the relationship of the alternatives to other planning efforts in the park. All alternatives and associated issues raised during the scoping process were considered and/or evaluated in this document.

Consultation with the State Historic Preservation Officer (SHPO) was initiated on October 27, 2008 and is ongoing (see Appendix E). The SHPO will review the EA and then make their determination on the Park's findings on cultural resources.

The U.S. Fish and Wildlife Service was sent a letter October 10, 2008, initiating informal Section 7 consultation (see Appendix A). A biological assessment was sent to the U.S. Fish and Wildlife Service for review on October 5, 2009. Based on the U.S. Fish and Wildlife Service's comments, an amendment, including additional information on marbled murrelet and bull trout was written and sent to the U.S. Fish and Wildlife Service on December 28, 2009. The U.S. Fish and Wildlife Service concurred with the determination of *may affect, not likely to adversely affect* for northern spotted owl, marbled murrelet, and bull trout on January 21, 2010 (see Appendix A).

Consultation with Tribes was initiated during the scoping process. To date, one Tribe (Cowlitz) responded with mitigation recommendations (see Appendix A). Those recommendations have been accepted and incorporated in the project. The Tribes will be provided an opportunity to review the EA and submit comments.

If comments during consultation with agencies and tribes do not identify substantial environmental impacts, this EA would be used to prepare a Finding of No Significant Impact (FONSI) that would be sent to the Regional Director, Pacific West Region for final signature. For additional information or copies of this EA, please contact Karen Thompson, Environmental Protection Specialist, at (360) 569-2211, extension 3376.

This EA will be available for a 30-day public review. A press release announcing the availability of the document will be distributed to local news media, individuals, agencies, and organizations that have expressed an interest in Mount Rainier National Park proposed actions and events. This document will be posted on the park website at http://www.nps.gov/mora and on the National Park Service's Planning, Environment and Public Comment (PEPC) website at: http://parkplanning.nps.gov/mora.

Permit Requirements

Section 401 of the *Clean Water Act* requires a permit for any activity which may result in any discharge into the navigable waters of the United States. As per the U.S. Army Corps of Engineers, the project would also need a permit under Section 404 of the *Clean Water Act*. A National Pollutant Discharge Elimination System (NPDES) permit under Section 402 of the *Clean Water Act* would also be required. Therefore, Section 401, NPDES, and 404 permits would be required for this project.

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6. COMPLIANCE WITH FEDERAL AND STATE REGULATIONS

No permits would be required under the No Action Alternative.

The following approvals and permits from jurisdictional agencies would be required for the Proposed Action Alternative:

- U.S. Fish and Wildlife Service Section 7 Consultation and Concurrence. A species list has been received and a biological assessment has been submitted to address project impacts to Species listed under the ESA. The Northern spotted owl, marbled murrelet, and bull trout are the only federally listed species identified as being potentially impacted by proposed project activities.
- Washington State Department of Archaeology and Historic Preservation – The Washington State DAHP houses the Washington State Historic Preservation Office (SHPO) and was consulted in compliance with Section 106 of the National Historic Preservation Act during the preparation of this EA.
- NPDES Construction Stormwater General Permit from the U.S. Environmental Protection Agency would be required since there will be more than one acre of land disturbance.

Should any of the culvert replacement work occur within waters of the U.S., a permit from the USACE and compliance with Section 401 of the Clean Water Act (401 Water Quality Certification) will be required.

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7. LIST OF PREPARERS AND CONSULTANTS

This EA was prepared by Parametrix in coordination with staff from Mount Rainier National Park, the NPS Pacific West Regional Office, and the Federal Highways Administration.

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8. LIST OF RECIPIENTS OF THE NOTICE OF AVAILABILITY FOR THE ENVIRONMENTAL ASSESSMENT

Organizations receiving a notice of availability for the environmental assessment include, but are not limited to, the following:

Federal Agencies

Advisory Council on Historic Preservation
Federal Highway Administration, Western Federal Lands Highway Division
National Marine Fisheries Service
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service – Western Washington Office
U.S. Forest Service – Gifford Pinchot National Forest
U.S. Forest Service – Mt. Baker/Snoqualmie National Forest
U.S. Forest Service – Wenatchee National Forest
U.S. Forest Service – Olympic National Forest

Native American Tribes

Confederated Tribes and Bands of the Yakama Nation
Cowlitz Indian Tribe
Muckleshoot Indian Tribe
Nisqually Indian Tribe
Puyallup Tribe of Indians
Squaxin Island Tribe

U.S. Congressional Delegation

Washington State Congressional Delegation

State Agencies

Office of Archaeology and Historic Preservation
Washington Department of Fish and Wildlife
Washington Natural Heritage Program – Forest Resources Division
Washington State Department of Ecology
Washington State Department of Transportation
Washington State Historic Preservation Office
Washington State Parks and Recreation Commission

Libraries

Puyallup Library
Enumclaw City Library
Buckley Library
Tacoma Public Library
Yakima Valley Regional Library
Eatonville Library

Non-governmental Organizations

National Audubon Society
Tahoma Chapter Audubon Society

The Wilderness Society
The Nature Conservancy
The Sierra Club – Cascade Chapter
The Mountaineers
The Mountaineers – Tacoma Branch
Mount Rainier National Park Associates
Wilderness Watch
Mazamas Conservation Committee
National Parks Conservation Association
Public Land Users Society
The American Alpine Club
Olympic Park Associates
Washington Trails Association
Skagit Alpine Club
Washington Native Plant Society
The National Outdoor Leadership School
Washington Public Interest Resources Group
The Wilderness Institute

Colleges and Universities

Huxley College of Environmental Studies, Western Washington University
Northwest Association for Environmental Studies – The Evergreen State College
University of Montana

A hard copy of the EA is available upon request.

9. REFERENCES

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NPS 2008b. Larch Mountain Salamander (Plethodon larselli) Surveys East of Backbone Ridge on the Stevens Canyon Road. Mount Rainier National Park. Ashford, Washington.

NPS 2008c. Amphibian NEPA Compliance Survey of Miles 0-5 of Stevens Canyon Road. Mount Rainier National Park. Ashford, Washington.

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APPENDIX A

Public Scoping Press Release and Agency Letters

October 17, 2008
For Immediate Release
Contact: Sue Jennings, 360-569-2211, x3376

Mount Rainier Seeks Public Comments on Stevens Canyon Road Repair

Mount Rainier National Park Superintendent Dave Uberuaga has announced the park is initiating the preparation of an *Environmental Assessment* (EA) for proposed road rehabilitation work along two segments of Stevens Canyon Road. In accordance with the National Environmental Policy Act (NEPA) and Section106 of the National Historic Preservation Act (NHPA), the EA will present alternatives for the work and analyze and disclose associated environmental impacts.

The first segment begins at the Nisqually-Paradise Road intersection (Canyon Wye) and continues for 5.0 miles along Steven's Canyon Road to Stevens Creek Bridge. The second segment includes a 5 mile segment from Backbone Ridge Viaduct to the roadway's intersection with State Route 123 at the Stevens Canyon Entrance. Road deficiencies include drainage problems, surface slumps, soft spots, pavement warping and cracking, narrow shoulders, deteriorating historic stone masonry retaining and guard walls. Additionally, there is a pedestrian and circulation conflict at Reflection Lakes causing dangerous conditions for visitors parking and walking to viewing areas. The current layout and grading are also contributing to erosion and associated water quality impacts. If approved, construction would occur in 2011, and could include water withdrawal from park waters for dust control, culvert replacements, and removal and/or addition of parking turn-outs within the above segments.

The 19 mile Stevens Canyon Road serves as the sole east-west access across the park, linking the Nisqually–Paradise Road to State Route 123 and cross-park access to the popular Paradise area and Henry M. Jackson Memorial Visitor Center. The road also provides access to numerous day-use areas (Box Canyon, Reflection Lake, Backbone Ridge, Inspiration Point, etc.) as well as various trailheads leading to the historically significant Wonderland Trail. The road and stone masonry walls are contributing elements to the National Historic Landmark District. The current character of the road and the visitor driving experience are key considerations when evaluating possible alternatives for road rehabilitation. Wetlands and sensitive wildlife species are also abundant in these areas. The park's intent is to avoid or minimize impacts to these resources and to visitor experiences to the best of our ability.

Mount Rainier National Park was established to protect and preserve the park's natural and cultural resources and to provide opportunities for visitors to safely experience and understand the park environment in a manner that does not impair park resources and values. The park's approved General Management Plan (2002) allows for general road maintenance and minor modifications for resource protection and visitor safety.

An early step in the NPS planning process is to involve the public. The park is inviting comments from individuals, organizations and other agencies to help identify the range of issues to be addressed in the EA, as well as potential alternatives for reducing impacts to park resources, visitor access and safety. Those wishing to provide comments should submit them in writing to: Superintendent, Mount Rainier National Park, 55210 238th Ave. E., Ashford, Washington 98304; or electronically at http://parkplanning.nps.gov/ and choosing Mount Rainier National Park from the drop down menu. Your comments should be post marked or electronically date stamped no later than November 17, 2008. Additional opportunities for public review and comment on the EA will be announced in the winter of 2009.

Your comments, including your personal identifying information (name, address, telephone, e-mail address) – may be made publicly available at any time, if requested under the Freedom of Information Act. While you can request your personal identifying information (name, address, telephone, e-mail address) be withheld from public review, we cannot guarantee that we will be able to do so.

-NPS-

United States Department of the Interior

NATIONAL PARK SERVICE
Mount Rainier National Park
55210 238th Avenue East
Ashford, Washington 98304-9751

IN REPLY REFER TO:
L76

October 17, 2008

William Iyall, Chairman
Cowlitz Indian Tribe
P.O. Box 2547
Longview, Washington 98632-8596

Reference: Stevens Canyon Road Rehabilitation Project, Mount Rainier National Park

Dear Chairman Iyall:

Mount Rainier National Park is initiating preparation of an *Environmental Assessment* (EA) for proposed road rehabilitation work along two segments of Stevens Canyon Road on the southern slope of Mount Rainier. In accordance with the National Environmental Policy Act (NEPA) and Section 106 of the National Historic Preservation Act (NHPA), the EA that will analyze and disclose potential impacts and alternatives for the proposed work. We are interested in your comments.

The first segment begins at the Nisqually-Paradise Road intersection (Canyon Wye) and continues for 5.0 miles along Steven's Canyon Road to Stevens Creek Bridge. The second segment includes a 5 mile segment from Backbone Ridge Viaduct to the roadway's intersection with State Route 123 at the Stevens Canyon entrance. The attached map shows both road sections for which road repairs are planned. Road deficiencies in these areas include drainage problems, surface slumps, soft spots, pavement warping and cracking, narrow shoulders, deteriorating historic stone masonry retaining and guard walls. Additionally, there is a pedestrian and circulation conflict at Reflection Lake causing dangerous conditions for visitors parking and walking to viewing areas. The current layout and grading are also contributing to erosion and associated water quality impacts. If approved, construction would occur in 2011, and could include water withdrawal from park waters for dust control, culvert replacements, and removal and/or addition of parking turn-outs within the above segments.

The 19 mile Stevens Canyon Road serves as the sole east-west access across the park, linking the Nisqually–Paradise Road to State Route 123 and cross-park access to the popular Paradise area and Henry Jackson Memorial Visitor Center. The road also provides access to numerous day-use areas (Box Canyon, Reflection Lake, Backbone Ridge, Inspiration Point, etc.) as well as various trailheads leading to the historically significant Wonderland Trail. The road and stone masonry walls are contributing elements to the National Historic Landmark District. The road's right-of-way also has been surveyed for precontact and historic-period archaeological remains. Protection of archaeological resources, maintenance of the road's historic character and preservation of the visitor driving experience are key considerations when evaluating possible alternatives for road rehabilitation. The park's intent is to avoid or minimize impacts to these resources and to visitor experiences to the best of our ability.

In accordance with the Advisory Council on Historic Preservation regulations, 36 CFR Part 800: *Protection of Historic Properties*, the National Park Service complies with section 106 of the National Historic Preservation Act of 1966 (as amended). This notice serves to officially initiate section 106 consultation with your tribe. Formal section 106 consultation has also been initiated with the Washington Department of Archaeology and Historic Preservation as well as other concerned organizations, and individuals. In addition, in accordance with 36 CFR Part 800.8(c): *Use of the NEPA process for section*

106 purposes, this letter also serves to notify you of our intention to use the NEPA process for all subsequent section 106 consultation on this project. We have already identified consulting parties both for NEPA and section 106 purposes and are now working to identify all applicable historic properties and areas of potential effect.

Thank you for your interest and continued involvement with Mount Rainier National Park. I look forward to continuing to work with the Tribe for many years to come. If you have questions or comments regarding the Stevens Canyon road rehabilitation projects or the EA process, please contact the park's Environmental Protection Specialist, Sue Jennings at 360-569-2211 extension 3376; or our Cultural Resource Specialist, Greg Burtchard, at extension 3362. Sue and Greg also can be reached via E-mail at sue_jennings@nps.gov or greg_burtchard@nps.gov.

Sincerely,

/s/ David V. Uberuaga

David V. Uberuaga
Superintendent

cc:
Mike Iyall, Cowlitz Indian Tribe

bcc: (via e-mail)
S. Jennings
G. Burtchard

Same letter to; Cynthia Iyall, Nisqually Indian Tribe, Ralph Sampson & Johnson Meninick, Confederated Tribes and Bands of the Yakama Nation

Cowlitz Indian Tribe

P.O. Box 2547 Longview, WA 98632
360.577.8140 577.7432 (f)

November 13, 2008

Sue Jennings
Environmental Protection Specialist
United States Department of the Interior
National Park Service, Mount Rainier National Park
55210 238th Avenue East
Ashford, WA 98304-9751

RE: Stevens Canyon Road Rehabilitation Project, Mount Rainier National Park.

Dear Ms. Jennings:

In reference to the project stated above, the Cultural Resources Department of the Cowlitz Indian Tribe would like to state its interest.

We appreciate being apprised of this and future projects. The Cowlitz Tribe recommends an Inadvertent Discovery Plan be attached to the permit; we have included language for your consideration.

Please contact us with any questions or concerns you may have. We look forward to working with you on this undertaking.

Thank you for your time and attention.

All My Relations,

dAVe burlingame
Director, Cultural Resources
360.577.6962
508.1677 [c]
577.6207 [f]

CC: Robert Whitlam, Department of Archaeology and Historic Preservation
Greg Burtchard, Mount Rainier National Park
Ed Arthur, Cowlitz Indian Tribe

COWLITZ INDIAN TRIBE

Cultural Resources Department
P.O. Box 2547 1055 9th Ave. Suite C Longview, WA 98632
360.577.6962 577.6207 (f) www.cowlitz.org

INADVERTENT DISCOVERY LANGUAGE
[revised 080722]

In the event any archaeological or historic materials are encountered during project activity, work in the immediate area (initially allowing for a 100' buffer; this number may vary by circumstance) must stop and the following actions taken:

1. Implement reasonable measures to protect the discovery site, including any appropriate stabilization or covering; and
2. Take reasonable steps to ensure the confidentiality of the discovery site; and,
3. Take reasonable steps to restrict access to the site of discovery.

The project proponent will notify the concerned Tribes and all appropriate county, state, and federal agencies, including the Department of Archaeology and Historic Preservation. The agencies and Tribe(s) will discuss possible measures to remove or avoid cultural material, and will reach an agreement with the project proponent regarding actions to be taken and disposition of material.

If human remains are uncovered, appropriate law enforcement agencies shall be notified first, and the above steps followed. If the remains are determined to be Native, consultation with the affected Tribes will take place in order to mitigate the final disposition of said remains.

See the Revised Code of Washington, Chapter 27.53, "Archaeological Sites and Resources," for applicable state laws and statutes. See also Washington State Executive Order 05-05, "Archaeological and Cultural Resources." Additional state and federal law(s) may also apply.

Contact information:

dAVe burlingame
Director, Cultural Resources
360.577.6962
508.1677 cell
577.6207 fax
culture@cowlitz.org

Ed Arthur
Assistant Director, Cultural Resources
360.575.3314
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earthur@cowlitz.org

United States Department of the Interior

NATIONAL PARK SERVICE
Mount Rainier National Park
55210 238th Avenue East
Ashford, Washington 98304-9751

IN REPLY REFER TO:

L76

October 10, 2008

Mr. Ken Berg
U. S. Fish and Wildlife Service
Attention: Marc Whistler
North Pacific Coast Ecoregion
Western Washington Office
510 Desmond Drive NE, Suite 102
Lacey, Washington 98503

Dear Mr. Berg:

Mount Rainier National Park is initiating the preparation of an *Environmental Assessment* (EA) for proposed road rehabilitation work along two segments of Stevens Canyon Road. In accordance with the National Environmental Policy Act (NEPA), the EA will analyze and disclose potential impacts and alternatives for the proposed work. The proposal is not expected to impact anadromous fish/fish habitat or other federally listed species/habitat, however, our data suggest there is the potential to affect northern spotted owls, a federally listed species which has been documented to nest in this area, most recently as 2006. Pursuant to the requirements of Section 7 of the Endangered Species Act, the park will prepare a Biological Assessment (BA) and submit to your office as part of the process to initiate formal consultation. We expect our BA to be completed in early 2009.

The first segment begins at the Nisqually-Paradise Road intersection (Canyon Wye) and continues for 5.0 miles along Steven's Canyon Road to Stevens Creek Bridge. The second segment includes a 5 mile segment from Backbone Ridge Viaduct to the roadways intersection with State Route 123 at the Stevens Canyon entrance. Road deficiencies include drainage problems, surface slumps, soft spots, pavement warping and cracking, narrow shoulders, deteriorating historic stone masonry retaining and guard walls. Additionally, there is a pedestrian and circulation conflict at the Reflection Lake causing dangerous conditions for visitors parking and walking to viewing areas. The current layout and grading are also contributing erosion and associated water quality impacts. If approved, construction would occur in 2011, and could include water withdrawal from park waters for dust control, culvert replacements, and removal and/or addition of parking turn-outs within the above segments.

The 19 mile Stevens Canyon Road serves as the sole east-west access across the park, linking the Nisqually –Paradise Road to State Route 123 and cross-park access to the popular Paradise area and Henry Jackson Memorial Visitor Center. The road also provides access to numerous day-use areas (Box Canyon, Reflection Lake, Backbone Ridge, Inspiration Point, etc.) as well as various trailheads leading to the historically significant Wonderland Trail. The road and stone masonry walls are contributing elements to the National Historic Landmark District. The current character of the road and the visitor driving experience are key considerations when evaluating possible alternatives for road rehabilitation. It is the intent of the national park to minimize impacts to visitor experiences and adjacent resources.

Mount Rainier National Park was established to protect and preserve the park's natural and cultural resources and to provide opportunities for visitors to safely experience and understand the park environment in a manner that does not impair park resources and values. The park's approved General

Management Plan (2002) allows for general road maintenance and minor modifications for resource protection and visitor safety.

This letter serves as a record that Mount Rainier National Park has initiated informal Section 7 consultation with your Agency, pursuant to the requirement of the Endangered Species Act and National Park Service Policies.

If you and your staff have any questions or comments, please contact Ms. Sue Jennings, Environmental Protection Specialist, at (360) 569-2211, extension 3376; or Mr. Roger Andrascik, Chief, Resource Management, at extension 33380.

Sincerely,

/s/ David V. Uberuaga

David V. Uberuaga
Superintendent

Bcc:
Andrascik (MORA)
Jennings (MORA)

Jeri DeYoung (NPS-DSC)

FILE COPY

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Washington Fish and Wildlife Office
510 Desmond Dr. SE, Suite 102
Lacey, Washington 98503

JAN 21 2010

In Reply Refer To:
13410-2010-I-0022

Randy King, Acting Superintendent
National Park Service
Mount Rainier National Park
55210 238th Avenue E.
Ashford, Washington 98304-9751

Dear Mr. King:

Subject: Stevens Canyon Road Rehabilitation Project Segments 1 and 4

This letter responds to your request for consultation under section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act) on the proposed Stevens Canyon Road rehabilitation project (road segments 1 and 4). Your Biological Assessment dated July 2009, was received in the U.S. Fish and Wildlife Service's (Service) Washington Fish and Wildlife Office on October 7, 2009. In your October 5, 2009, cover letter you requested Service concurrence with the determination that the proposed action "may affect, but is not likely to adversely affect" the northern spotted owl (*Strix occidentalis caurina*) (spotted owl). Subsequent correspondence between our staffs provided additional information which determined that the proposed project "may affect, but is not likely to adversely affect" marbled murrelet (*Brachyramphus marmoratus*) (murrelet), and bull trout (*Salvelinus confluentus*).

Summary of the Proposed Action

The National Park Service, in cooperation with the Federal Highway Administration is proposing to resurface, restore, and rehabilitate a total of 10.09 miles of Stevens Canyon Road in Mount Rainier National Park (Park). The Stevens Canyon Road is 18.99 miles long and traverses the south slope of Mount Rainier in Lewis County, Washington. For planning purposes, the Stevens Canyon Road has been divided into 4 segments. This project includes road segments 1 and 4.

Segment 1 includes a 4.83-mile road section at the west end of the road. This road segment crosses from the upper Nisqually River drainage into Stevens Creek Canyon. Elevations along Segment 1 range from 4,000 to 4,800 ft. Vegetation adjacent to the road corridor is characterized as montane and sub-alpine forest types, dominated by Pacific silver-fir (*Abies amabilis*) and mountain hemlock (*Tsuga mertensiana*) plant associations. Forests adjacent to Segment 1 are not considered to be suitable nesting habitat for spotted owls or murrelets due to a lack of large trees to provide potential nesting sites for these species.

Segment 4 includes a 5.26-mile road section at the east end of the road terminating at the road junction with State Route 123. This road segment is located entirely in the Ohanapecosh River basin. Elevations along this segment range from 1,900 to 3,300 ft. Vegetation is characterized as mid-elevation montane forest, dominated by Pacific silver-fir and western hemlock (*Tsuga heterophylla*) plant associations. Forests adjacent to this road segment include stands of old-growth forest and large trees that provides suitable nesting habitat for both spotted owls and murrelets.

The purpose and need for the project is to provide a safe road condition for park visitors and staff by correcting uneven driving surfaces and deteriorated road sections. The proposed road surface restoration work is scheduled for construction in the summer and fall months of 2011, and includes the following activities:

- Excavate old asphalt road surfaces. This material will be milled onsite and reused as a recycled asphalt road base. Treated road segments will be resurfaced with a 2-inch asphalt overlay.

- Install additional cross-drain culverts in areas of road settlement and other areas as needed.

- Stabilize the roadbed and rebuild roadside embankments in some locations.

- Repair historic stone walls and curbs.

- Clean and inspect existing culverts and associated inlets and headwalls. If damaged, effect repairs or replace as necessary. Install additional culverts where needed to correct drainage.

- Some roadside turnouts would be obliterated and revegetated, other existing road turnouts will be paved and may include fencing and installation of design features to walkways, parking, and sidewalks for accessibility.

- Guard rails on bridges over the Ohanapecosh River and Falls Creek will be repaired and repainted. The sidewalk at the Ohanapecosh River Bridge would be widened.

- Extend stone barriers adjacent to Reflection Lakes and construct a new public viewing platform to discourage access to the lake from the roadway.

- Replace existing or install new road closure gates as needed.

- Limited water withdrawals from the Ohanapecosh River and/or the Paradise River for project dust abatement as needed.

The majority of the construction work would occur within the prism of the roadway, which is defined as the road surface, road shoulders, turnouts, and adjacent side-cast slopes. The only place where construction would occur outside the road prism is at the proposed location for the viewing platform at Reflection Lakes. With the exception of this location, there would be no removal of roadside vegetation. The entire project is expected to occur within the previously developed road prism. The project is not expected to result in increased visitor use, vehicle speed limits, or result in additional development of recreational facilities in the Park.

In higher elevations, construction likely would not start until June or later, depending upon snow conditions. It is expected that construction will last into the fall months. Construction will require single lane closures, traffic stoppages, and in some areas, full road closures.

Minimization Measures to be Implemented with the Proposed Action

The following list of protective measures would be implemented throughout the duration of the project to minimize effects to spotted owls and murrelets:

- Construction personnel would be informed of the occurrence and status of special status species and would be advised of the potential impacts to the species and potential penalties for taking or harming a special status species.

- Noise-generating activities would be performed between two hours after sunrise and two hours before sunset to prevent impacts to sensitive wildlife. Night construction work would not be allowed.

- No project activities that generate noise levels 92 decibels (dB) or above would be allowed within known spotted owl territories (defined as within a 0.7-mile radius of spotted owl activity centers) or unsurveyed suitable owl habitat between March 15 and July 31 unless current surveys confirm that no spotted owls are nesting within the noise-affected area.

- Spotted owl surveys are ongoing, and the Park will provide mile-markers for each exclusion zone by June 1st. Exclusion zones will be based on the most recent information available and may change within a season as new information is gained.

The following measures would be taken to limit noise and disturbance from vehicles and construction equipment:

- Equipment would not be allowed to idle longer than 15 minutes when not in use.

- All motor vehicles and equipment would have mufflers conforming to original manufacturer specifications that are in good working order and are in constant operation to prevent excessive or unusual noise, fumes, or smoke.

- Mufflers and sound attenuation devices (such as rubber strips or sheeting) would be installed and maintained on all equipment. This would include truck tail gate dampeners (both opening and closing) for all dump trucks on the project.

- Use of un-muffled engine brakes or Jake Brakes is prohibited in the Park unless required for safety

- Use of air horns within the Park would be limited to emergencies only.

- No asphalt batch plants or rock crushing plants would be allowed within Park boundaries.

- No night construction work would be allowed.

- A litter control program would be implemented during construction to eliminate the accumulation of trash. All food items would be stored inside vehicles, trailers, or trash dumpsters except during actual use to prevent unnatural attractants to birds, bears, fox, and other wildlife.

- Any roadkill or wildlife collisions would be reported to the Park immediately.

The following measures would be taken to protect water quality and fish habitat:

- Sediment traps, erosion checks, and /or filters would be constructed above or below all culvert drains (if such drains would be required) and in all other ditches before the runoff leaves the project construction limits.

- Surface restoration and revegetation of disturbed soils would be implemented to minimize long term soil erosion.

- A tarp/pump system would be hung under the Ohanapecosh River bridge during bridge painting work to capture contaminants that would otherwise fall into the river below and damage water quality.

- Except as authorized by this contract, mechanized equipment would not be operated or material discharged or placed within the boundaries of any United States (U.S.) waters as identified by the ordinary high water mark or edge of a wetland. This includes wetlands, unless authorized by a permit issued by the U.S. Army Corps of Engineers according to 33 USC § 1344, and if required by the state agency having jurisdiction over the discharge of material into U.S. waters.

- Work areas would be separated, including material sources by the use of a suitable barrier that prevents sediment, petroleum products, chemicals, other liquids, or solid materials

from entering the waters of the U.S. Construct and remove barriers to avoid discharge of material into the waters of the U.S. Remove and properly dispose of sediment or other material collected by the barrier.

- Water extraction would only be allowed once minimum flow criteria have been established for the Ohanapecosh and Paradise rivers. No water extraction from the Ohanapecosh or Paradise rivers would be allowed below the minimum flow criteria which would be established and monitored by the Park biologist.

- Water extraction from the Paradise River at the Stevens Canyon Y would be allowed only when sufficient data has been collected to determine a minimum flow criterion and a 15 percent of flow daily allowable volume, which may be less than 30,000 gallons per day due to the river being much smaller in size than the Ohanapecosh River.

- The contractor may only extract water from the Park at approved sites on the Ohanapecosh and Paradise rivers. For example, on the lower Ohanapecosh River located at the pullout at approximately milepost 18.4. In order to reduce impacts to the riverbank, the Park would designate where pumping equipment would be located at the extraction sites 14 days before using this water source. The contractor must use muffled pumping equipment (i.e., pump and generator) to reduce sound to less than that of the average ambient noise level of roadway traffic on Stevens Canyon Road. Pumping equipment must be staged away from the rivers; except for the pump hose, which may extend down to the edge of the rivers. The contractor must provide a screen (filtration size 0.08 inches maximum) on the end of pump hose to filter-out aquatic organisms. This screen should be cleaned of debris periodically.

- The contractor must provide a spill containment enclosure around the pump and or generator to contain gas, oil or other fluids. The contractor must provide a waddle or other filter barrier around the outside edge of the staging area to prevent siltation into the river. The Contracting Officer must be notified 14 days prior to drawing water to determine the presence of threatened or endangered species. The streambed and streambank vegetation must not be disturbed when drawing water. All Federal, state, and local permits, if required, must be obtained before drawing water.

- The contractor must have the Park's approval to install culverts at any location that differs from the approved plan.

Effects to Northern Spotted Owls

Surveys for spotted owls have been conducted in the Park annually since 1997 as part of an ongoing spotted owl demography study (Herter et al. 2008). In 2009, there were two occupied spotted owl territories detected in close proximity (within a 0.7-mile radius) to Segment 4 of the Stevens Canyon Road in the Ohanapecosh River valley. Due to the proximity of the project to known spotted owl nesting habitat, the Park Service determined that the sound and activity associated with the proposed road work "may affect" spotted owls.

The proposed use of large trucks, excavators, and other heavy equipment will introduce increased levels of sound into the project area. We have previously completed analyses of the potential for noise disturbance to spotted owls (USFWS 2003, pp.265-285; USFWS 2006). In these analyses we concluded that spotted owl nesting behaviors may be disrupted by loud construction noises (≥ 92 dB) that occur in close proximity to an active nest during the early portion of the nesting season. We defined a significant disruption of nesting behavior as flushing from a nest or missed feeding during spotted owl incubation and nestling development (USFWS 2003, p. 273).

We expect that some of the equipment used for the Stevens Canyon Road project will produce sound levels that exceed 92 dB at the source. Sound attenuates with a loss of 6 dB for every doubling of distance from the source, and can be further reduced by dense vegetation (OSHA 1999). For example, a jackhammer could produce a sound level of 101 dB at the source (USFWS 2006, p. 18). This sound would attenuate to ~89 dB at a distance of approximately 100 ft (30.5 m) and will further dissipate to less than 80 dB at a distance of approximately 300 ft (91.4 m). However, a sound of 101 dB may be detectable (above ambient ~ 50 dB) at a distance of over 2 miles (3.2 km) from the source.

Awbrey and Bowles (1990, p. 21) suggest that noise begins to disturb (i.e., cause an alert response, but not flight) most raptors at around 80-85 dB, and that the threshold for flight response is around 95 dB. Mexican spotted owls (*Strix occidentalis lucida*) exposed to helicopter noise elicited alert responses (i.e., head turning towards noise) when helicopters were an average of 0.25 mile (400 m) away, but owls did not flush from their roosts until the noise from helicopters exceeded 92 dB and occurred within a distance of less than 344 ft (105 m) (Delaney et al. 1999 pp. 66-68). Based on the above information, we expect that spotted owls may detect road construction noises from over a mile away. However, lower level sounds (< 80 dB) are not likely to cause an alert response or a significant change in spotted owl behavior. Only very loud sounds (> 92 dB) are likely to cause spotted owls to flush away from a noise, and we expect that only areas that are immediately adjacent to active road construction (generally less than 200 ft depending on dB levels) would be exposed to noise levels sufficient to cause a spotted owl to flush away from the area.

The Park Service has incorporated a conservation measure into the project that prohibits road restoration work to occur within a 0.7-mile radius (1.13 km) surrounding an active spotted owl nest site during the spotted owl early nesting season. At Mount Rainier, the spotted owl early nesting season is defined as March 15 to July 31. Early nesting season behavior includes nest site selection, egg laying, incubation, and brooding of nestlings to the point of fledging (Forsman et al. 1984, pp. 32-38). The Park Service also included a daylight operating restriction, which restricts road construction work to daylight hours only. Spotted owls are primarily nocturnal, and forage for prey almost exclusively at night, with peak activity levels occurring after sunset and prior to sunrise (Forsman et al. 1984, p. 51). During the nesting season, spotted owls forage and roost in a "core area" of suitable habitat closest to their nest sites (Bingham and Noon 1997, p. 127). In the Washington Cascades, spotted owl core areas are defined as a 0.7-mile radius circle surrounding the nest site (Hanson et al. 1993, p. 33). By incorporating these minimization

measures into the project design, the Park will avoid disrupting spotted owl nesting and foraging behaviors. Therefore, the effects of noise and construction activities to spotted owls are considered to be insignificant.

Effects to Marbled Murrelet

The Park Service has conducted surveys for murrelets in the Park annually since 1994. To date, murrelet presence has been documented within four watersheds: the Carbon, Mowich, Puyallup, and Nisqually Rivers (NPS 2009). Based on the presence of suitable murrelet nesting habitat and multiple presence detections, it is assumed that murrelets are nesting in these areas. Murrelets have not been detected in the vicinity of the Stevens Canyon Road project, but surveys for murrelets have been limited in this area. Audio-visual surveys for murrelets were conducted in the project area along the Ohanapecosh River near Chinook Creek in 1994; and at the Grove of the Patriarchs in 1998. No murrelets were detected during these surveys (NPS 2009).

With the establishment of the Northwest Forest Plan in 1994, the range of the murrelet for management and conservation purposes was established at 55 miles inland from marine waters in Washington (Raphael et al. 2006, p.101). Essentially the entire Park, with the exception of a small area in the southeast corner of the Park, is located within the potential range of the murrelet. Road Segment 4 – from Backbone Ridge to the Highway 123 junction (5.26 miles), passes through mid-elevation old-growth forest that contains suitable nesting habitat for murrelets. The murrelet potential nesting habitat maps produced by Raphael et al. (2006, p.119) depict murrelet nesting habitat in the project area extending up to an elevation of about 3,800 ft.

Although suitable murrelet nesting habitat is located in the project area, the likelihood that this habitat is used by murrelets is very low. With elevations ranging from 4,500 to 6,500 ft, the Tatoosh Range likely presents a major barrier to murrelets transiting between marine foraging areas in Puget Sound and inland nesting habitat east of the Tatoosh Range. In order to reach nesting habitat in the Ohanapecosh River valley, a murrelet would have to fly inland up the Nisqually River valley and cross over the Tatoosh Range via a subalpine pass at Reflection Lake (elevation 4,800 ft); or, by-pass the Tatoosh Range altogether by crossing into the Cowlitz River basin several miles down valley and then flying upriver to the project area (Figure 1, enclosure). Either route has a minimum one-way commuting distance of approximately 67 to 73 miles to the nearest marine waters, well beyond the range that most murrelets typically fly inland (Hamer 1995, p. 170). The furthest inland site with confirmed murrelet occupancy behaviors is located at approximately 52 miles inland in the North Cascades (Hamer 1995, p. 167).

Radar surveys along the Nisqually River at Kautz Creek and Tahoma Creek from 2000 to 2009 have consistently detected murrelets (mean 3-5 per day), suggesting that the upper Nisqually River valley contains a few nesting murrelets, with likely occupancy occurring in the Kautz Creek drainage (ABR, Inc. 2009). Considering the extensive area of potential nesting habitat in the upper Nisqually basin, and the low number of murrelets observed entering this area with radar, we conclude that the likelihood that these birds are passing out of the Nisqually River basin to access nesting habitat in the Upper Cowlitz River basin is very low.

As with spotted owls, the Service assumes that loud construction noises (≥ 92 dB) that occur in close proximity to an active nest during the early portion of the nesting season has the potential to disrupt murrelet nesting behavior (USFWS 2003, pp.265-285; USFWS 2006). We assume that some of the equipment used for the Stevens Canyon Road project will produce sound levels that exceed 92 dB at the source. We expect that only areas that are immediately adjacent to active road construction (generally less than 200 ft depending on dB levels) would be exposed to noise levels sufficient to cause a murrelet to flush away from the area. By restricting road construction activities to daylight hours only, the Park Service has precluded potential noise disturbance during the dusk and dawn hours when murrelets are most active at the nest site for incubation exchanges and feeding of chicks (Nelson 1997, pp.17-18). However, based on the above discussion, the Service considers potential noise disturbance effects to murrelets in the project area to be discountable due to the low likelihood for the species presence in the project area.

Effects to Bull Trout

Bull trout have been documented in several drainages within the Park, including the Carbon River, White River, Puyallup River and their associated tributaries. Bull trout presence has not been documented in Stevens Creek or the Ohanapecosh River, which are both tributaries to the Cowlitz River. Despite many fish surveys in the tributaries of the upper Cowlitz River basin (including extensive fish surveys in 1934-1942 [McIntosh et al. 1995]), no verified bull trout have been documented in the Cowlitz River watershed. Historically the Cowlitz River would have been accessible to migratory bull trout originating from the Lewis River basin, or other areas in the Lower Columbia River basin. Upstream passage for migratory fish to the Cowlitz River is currently blocked at the Barrier Dam at river mile 49.5, located below Mayfield Dam. Because the area was historically accessible to bull trout and some streams contain suitable bull trout habitat, the bull trout recovery planning team has identified the Cowlitz River basin as a research needs area (USFWS 2002, p. iv). Critical habitat for bull trout has not been proposed or designated within the Cowlitz River basin.

Both Stevens Creek and the Ohanapecosh River provide habitat that is potentially suitable for bull trout, and both streams support resident trout (*Oncoryhnchus* sp.), including remnant populations of introduced eastern brook trout (*Salvelinus fontinalis)*(USFS 1998, pp. 3-130 to 3-132). Ongoing work to repair the Stevens Canyon Road, including culvert cleaning, culvert replacements, and bridge-deck repair have the potential to cause short term increases in turbidity and suspended sediment in areas occurring directly downstream from culvert replacement sites. Suspended sediment concentrations generated by culvert replacement projects have the potential to cause adverse effects to salmonid fishes up to 0.5 mile downstream from a culvert removal site (Foltz et al. 2008, p.336). The National Park Service has incorporated several best management practices into the project design to minimize water quality effects from road work. However, based on the above discussion, the Service considers effects to bull trout in the Upper Cowlitz River basin to be discountable due to the low likelihood for the species presence in this area.

Concurrence

Considering the current status of the spotted owl, murrelet, and bull trout, and the potential effects of the proposed action, we concur that the Stevens Canyon Road rehabilitation project (road segments 1 and 4) is not likely to adversely affect these species or designated critical habitat. This concludes informal consultation in accordance with the Act (50 CFR 402.13). This action should be re-analyzed if new information reveals effects of the action that may affect listed species or designated critical habitat in a manner or to an extent not considered in this consultation; if the action is subsequently modified in a manner that causes an effect to a listed species or designated critical habitat that was not considered in this consultation; and/or, if a new species or critical habitat is designated that may be affected by this project.

The Service appreciates your efforts to protect listed species and the habitats on which they depend while meeting your land management needs. If you have any questions regarding this letter or your responsibilities under the Act, please contact Vince Harke at (360) 753-9529 or Marc Whisler at (360) 753-4410, of this office.

Sincerely,

for Ken S. Berg, Manager
Washington Fish and Wildlife Office

Enclosure(s):

cc:
Mount Rainier National Park, Ashford, WA (K. Thompson)

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APPENDIX B

Wetland Delineation Report - Reflection Lakes

Wetland Delineation of the Reflection Lake-Stevens Canyon Road proposed overlook.

Introduction

A wetland delineation for the potential road modification on Stevens Canyon Road near Reflection Lake at Mount Rainier National Park was completed on September 7, 2008 by Mignonne Bivin, Plant Ecologist, North Cascades National Park. The survey was conducted with Mount Rainier Staff (Lou Whiteaker, Barbara Samora, and GIS staff) and North Cascades Science Advisor, Regina Rochefort.

The road base is elevated from Reflection Lake shore by approximately 5 feet. The fill appears to be crushed gravel and some finer sandy soils.

Methods

The potential project would widen an area near the current parking area at Reflection Lake to provide for the development of an overlook. The area surveyed was from the parking area on the west to the Wonderland Trail trailhead to the east. The wetland/upland boundary line was delineated using a GPS unit (Appendix A).

The methods in 1987 Corps of Engineers Wetlands Delineation Manual were used to conduct the delineation. The site was evaluated for the presence of three criteria: wetland soil, hydrology and wetland vegetation. The results of the wetland/upland boundary are found in the attached wetland delineation field forms (Appendix B)

Results

The site consisted of a fill slope from the highway edge to the lake wetted edge of the lake shore and associated wet meadow. The wetland boundary was primarily the contact with the toe of the fill slope and the wet meadow.

The wetland area was dominated by obligate wetland (OBL) or facultative wetland (FACW) species. A list of the species is found in Appendix C.

The wetland delineation was preformed at the end of the growing season after approximately 2 months of drought and the soil of the wetland was saturated at the surface or just below the surface layer.

The soil is volcanic in nature. Volcanic soils produce a low chroma and this complicates the identification of hydric andisols (Tiner, 1999). As a result other indicators such as a dark layer of peat at the surface and soil saturation were used to conclude that wetland soil conditions existed at the site.

The upland was dominated by upland (UPL) or facultative upland (FACU) species. A list of the species is found in Appendix C.

The soil was comprised of a well drained gravel fill and had neither wetland soil properties nor wetland hydrology.

References:

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DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)
Wetland

Project/Site: Reflection Lake, Mt Rainier National Park Applicant/Owner: National Park Service Investigator: Mignonne Bixin	Date: 9/7/2008 County: Pierce State: Washington
Do Normal Circumstances exist on the site? Yes (No) Is the site significantly disturbed (Atypical Situation)? (Yes) No Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. Alnus Viridis ssp sinuata	Tree	FACW
2. Salix sitchensis	Shrub	FACW
3. Salix commutata	"	OBL
4. Carex lenticularis	herb	FACW+
5. C. spectabilis		FACW
6. C. nigricans		FACW*
7. Enaphorum brachyanthemum		OBL
8.		
9. Caltha leptosepala	herb	OBL
10. Dodecatheon pulchellum	herb	FACW+
11. Leptarrhena pyrifolia	herb	FACW
12. Pedicularis groenlandica	herb	OBL
13. Senecio triangularis	herb	FACW
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

X No Recorded Data Available

Field Observations:

Depth of Surface Water: _____ (in.)

Depth to Free Water in Pit: >0.25 (in.)

Depth to Saturated Soil: at surface (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- X Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- X Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- X Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations

Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
X Other (Explain in Remarks)

Remarks: No soil sample was take because the are volcanic in nature Volcanic soils produce low chroma and this complicates the hydric ardisols

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

(Circle)
Is this Sampling Point Within a Wetland? (Yes) No

Remarks: The upland vegetation is established on crushed gravel fill Very little soil formation exists

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

upland

Project/Site: Reflection Lake, Mount Rainier NP Applicant/Owner: National Park Service Investigator: Mignonne Bivin	Date: 9/7/2008 County: Pierce State: Washington
Do Normal Circumstances exist on the site? Yes (No) Is the site significantly disturbed (Atypical Situation)? (Yes) No Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. Abies lasiocarpa	Tree	FACU
2. Cascara mediabsiana	Shrub	FACU+
3. Phyllodoce empetriformis	Shrub	UPL
4. Rhododendron albiflorum	Shrub	FACU
5. Spirea splendens	Shrub	UPL
6. Valeriana sitchensis	herb	FAC
7. Chamerion angustifolium	herb	FACU
8. Sorbus sitchensis	Shrub	FACU

Dominant Plant Species	Stratum	Indicator
9. Athyrium felix-femina	herb	FACU
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 11%

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
X No Recorded Data Available

Field Observations:

Depth of Surface Water: _____ (in.)
Depth to Free Water in Pit: >12 (in.)
Depth to Saturated Soil: >12 (in.)

Wetland Hydrology Indicators:
Primary Indicators:
___ Inundated
___ Saturated in Upper 12 Inches
___ Water Marks
___ Drift Lines
___ Sediment Deposits
___ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 Inches
___ Water-Stained Leaves
___ Local Soil Survey Data
___ FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks: Upland soil is gravel fill

SOILS

Map Unit Name
(Series and Phase): _____

Taxonomy (Subgroup): _____

Drainage Class: _____
Field Observations
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
_X_ Other (Explain in Remarks)

Remarks: The upland soil is comprised of gravel fill, has no soils characters.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes (No) (Circle)
Wetland Hydrology Present? Yes (No)
Hydric Soils Present? Yes (No)

(Circle)
Is this Sampling Point Within a Wetland? Yes (No)

Remarks:

Approved by HQUSACE 3/92

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APPENDIX C

Native Plant Lists

Genus/Species	Common name	82800 - 84500	84700 - 89500	89500 - 90632	90632 - 91750	91750 - 93000	93000 - 94300	94500 - 96000		96000 - 97600		97600 - 99216		99216 - 100375	
								East	West	East	West	East	West	East	West
Circaea alpina	Enchanter's Nightshade		2	2		2									
Clematis sp.??			1												
Collomia heterophylla	Varied-leaf Collomia		3				2	2		2	2	2	2		
Cornus canadensis	Bunchberry Dogwood	2	2	3	3	3		3	3				3		
Dipphasiastrum sitchense	Alaska clubmoss		1												
Disporum hookeri	Hooker Fairy-bell		1	1		1									
Elymus glaucus	Blue Wildrye	3	2	3	3	3		2		2	2				
Epilobium angustifolium	Fireweed	2	3	2	2	2	2	2	2	2	2	2	2	2	
Epilobium sp (glaberimmum?)		2	2				2	1		2	2	2	2	2	
Equisetum arvense	Field Horsetail	2	1						1	2			2	1	
Festuca rubra	Red Fescue	3	3	3	3	3	3	3	3	4	4	4	4	4	
Fragaria vesca	Woods Strawberry	3	4	3	4	3	4	3	3	3	3	3	3	2	
Fragaria virginiana	Broadpetal Strawberry	4	5	3	5	3	4	3	3	5	5	5	5	5	
Galium oreganum	Oregon Bedstraw	2		3		3									
Galium triflorum	Sweet-scented Bedstraw		3				2		2	2	2	2	2		
Gaultheria ovatifolia	Slender Wintergreen	3	4	3	5	3	5	4	4	4	4	4	4	4	4
Gaultheria shallon	Salal		3		2		3	3	4	2	2	2	2	2	5
Geum macrophyllum	Oregon Avens		2	2		2									
Goodyera oblongifolia	Western Rattlesnake-plantain				1		2		1	2	2	2	2		
Grass sp?							2								
Grass sp1?		3								4	4	4	4	4	
Gymnocarpium dryopteris	Pacific oak fern		3	2		2									
Heuchera glabra	Smooth Alumroot	3								2					
Hieracium albiflorum	White-flowered Hawkweed	2	3	3	2	3	3	3	3	2	2	2	2	3	
Holodiscus discolor	Ocean Spray	2	1				1			2					2
Juncus xiphioides	Dagger-leaf rush		2												
Juniperus communis	Mountain Juniper		1												
Lilium columbiana	Tiger Lily	1													
Linnaea borealis	Twinflower	3	5	3	4	3	3	2	5	3	3	3	3	3	5
Luina hypoleuca	Silverback Luina													1	
Lupinus latifolius	Broadleaf Lupine	2		2		2									
Lycopodium clavatum	Running ground-pine		1												
Madia exigua	Little Tarweed									2	2	2	2		
Maianthemum dilatatum	Maianthemum			2		2			1						
Mitella sp?							2		1						
Montia parvifolia	Littleleaf Montia	3	3				2			2	2	2	2		
Nothochelone nemorosa	Woodland Beard-tongue	2	3	2	2	2	2		1	3					
Oplopanax horridum	Devil's Club		1	2		2									
Osmorhiza chilensis	Mountain Sweet-cicely		2	2		2		2	1	2			1		2
Pachistima myrsinites	Mountain boxwood	2	2				2		2	2	2	2	2	2	
Pedicularis racemosa	Lousewort							2							
Petasites frigidus	Coltsfoot		2					3			2		2		

Genus/Species	Common name	82800 - 84500	84700 - 89500	89500 - 90632	90632 - 91750	91750 - 93000	93000 - 94300	94500 - 96000		96000 - 97600		97600 - 99216		99216 - 100375	
								East	West	East	West	East	West	East	West
Phyllodoce empetriformis	Red Mountain Heather									1	1	1	1		
Pinus monticola	Western White Pine						1			1	1	1	1		1
Polystichum munitum	Swordfern	3	3	3	3	3	2	2	2	2	2	2	2	2	
Populus balsamifera	Cottonwood	2								2				2	
Potentilla glandulosa	Sticky Cinquefoil													1	
Prunella vulgaris	Self-heal	2	3	2	2	2	3	2	2	2	2	2	2	2	
Pseudotsuga menziesii	Douglas Fir	4	5	4	4	5	4	4	4	5	5	5	5	5	
Pteridium aquilinum	Bracken Fern	3	3	4	4	4	2	3	3	3	3	3	3	2	
Pterospora andromedea	Woodland Pinedrops													1	
Pyrola asarifolia	Alpine Pyrola								1				1		
Ranunculus uncinatus	Little Buttercup						2								
Ribes bracteosum	Stink Current									1	1	1	1		
Ribes lacustre	Swamp Gooseberry		1						1						1
Ribes sanguineum	Red Currant	3	1	2	2	2	2	1		2			1		
Ribes sp.				2		2									
Rosa gymnocarpa	Baldhip Rose		2	2	2	2	1	1	1	2			2	2	
Rubus laciniatus	Evergreen Blackberry		1												
Rubus lasiococcus	Dwarf Bramble						2			2					
Rubus leucodermis	Black Raspberry		3	3	3	3	3	3	3	3	3	3	3	3	
Rubus parviflorus	Thimbleberry	4	4	3		3	2	2	3	3	3	3	3	2	
Rubus pedatus	Fiveleaved Bramble			2		2									
Rubus spectabilis	Salmonberry		2	3		3								2	
Rubus ursinus	Pacific Blackberry	3	4	3	5	3				4	4	4	4	3	
Sagina sp. (apetala?)			2												
Salix sp?	Willow	1	2	2	2	2	2	1	2	2	2	2	2	3	
Sambucus racemosa	Red Elderberry		2	2		2	1								
Satureja douglasii	Yerba Buena												2		
Sedum oreganum	Oregon Stonecrop	3	3												
Sorbus sitchensis	Sitka Mountain Ash						1								
Spiraea densiflora	Subalpine Spirea	2	2												
Spiraea douglasii	Douglas's Spirea									2	2	2	2	2	
Spiranthes romanzoffiana	Ladies'-tresses									2	2	2	2	3	
Stachys colleyae	Cooley's Hedge-nettle	2	3	3		3									
Streptopus amplexifolius	Clasping-leaved Twisted-stalk								1						
Taxus brevifolia	Western Yew														1
Thuja plicata	Western Red Cedar	4	3	3	4	2	2	2	3	3	3	3	3	3	
Tiarella trifoliata	Coolwort Foamflower		3	3		3	2	3	2						
Trientalis latifolia	Western Starflower	3	2	2		2				2				2	
Trillium ovatum	White Trillium												1		
Tsuga heterophylla	Western Hemlock	5	5	5	5	5	5	5	5	5	5	5	5	5	
Unknown sp? (VERGER)		2													
Vaccinium alaskaense	Alaskan Blueberry								3					2	

Genus/Species	Common name	82800 - 84500	84700 - 89500	89500 - 90632	90632 - 91750	91750 - 93000	93000 - 94300	94500 - 96000		96000 - 97600		97600 - 99216		99216 - 100375	
								East	West	East	West	East	West	East	West
Vaccinium membranaceum	Big Huckleberry	2								1	1	1	1	3	
Vaccinium ovalifolium	Early Blueberry												2		
Vaccinium ovatum	Evergreen Blueberry				2					2	2	2	2		
Vaccinium parvifolium	Red Blueberry	3	3	3	3	3	2	2	3	4	4	4	4	3	3
Vicia americana	American Vetch		1												
Viola glabella	Wood Violet	2	2	2		2									
Viola orbiculata	Round-leaved Violet		2												
Viola sempervirens	Evergreen violet		3	3		3	2	5	2	2	2	2	2		
Xerophyllum tenax	Beargrass				1										3

Source: Mount Rainer National Park 2008.

Dominance Rating

1-Rare (one individual plant in area)
2-Uncommon
3-Common
4-Subdominant
5-Dominant

Note 1: One Dominant species is always recorded for each vegetative layer (i.e., herb, shrub, tree).

Note 2: In this area Stevens Canyon Road runs close to a North-South alignment. Thus, East and West refer to those sides of the road. Segments with values for both East and West sides were thought to have different plant community types on each side of the road. Segments with only one dominance value were thought to have the same plant community type on both sides of the road.

APPENDIX D

Exotic and Noxious Weed Lists

EXOTIC PLANT LIST- 10/23/08
STEVEN'S CANYON ROAD REPAIR PROJECT, PHASE 4 (Last 5.0 miles)
MOUNT RAINIER NATIONAL PARK

Scientific Name	Common Name	Noxious Weed Class	Growth Form
Agrostis stolonifera	Colonial bentgrass		Graminoid
Capsella bursa-pastoris	Sheppard's purse		Forb
Centaurea maculosa	Spotted knapweed	Class B	Forb
Cerastium viscosum	Nodding chickweed		Forb
Chenopodium alba	Lamb's quarter		
Chrysanthemum leucanthemum	Oxeye daisy	Class B	Forb
Cirsium arvense	Canada thistle	Class C	Forb
Clematis vitalba	Old man's beard	Class C	
Crepis capillaris	Smooth hawksbeard		Forb
Cytisus scoparius	Scot's broom	Class B	Shrub-high
Dactylis glomerata	Orchardgrass		Graminoid
Digitalis purpurea	Foxglove	Controlled by Park	Forb
Euphrasia officinalis	Hairy eyebright		Forb
Festuca pratensis	Kentucky bluegrass		Graminoid
Geranium robertianum	Herb robert	Class B	Forb
Hieracium floribundum	Yellow-devil hawkweed	Class A	Forb
Hypericum perforatum	Klamath weed	Class C	Forb
Hypochaeris radicata	Hairy cat's-ear	Class B	Forb
Lactuca muralis	Wall lettuce		Forb
Linaria vulgaris	Yellow toadflax	Class C	Forb
Lotus purshiana	Spanish clover		Forb
Matricaria matricarioides	Pineapple weed		Forb
Melilotus alba	Sweet clover		Forb
Phalaris arundinacea	Reed canary grass	Class C	Graminoid
Plantago lanceolata	English plantain		Forb
Plantago major	Common plantain		Forb
Poa annua	Annual bluegrass		Graminoid
Poa pratensis	Kentucky bluegrass		Graminoid
Polygonum aviculare	Doorweed		Forb
Polygonum convolvulus	Black bindweed		Forb
Polygonum douglasii	Douglas' knotweed		Forb
Polygonum lapathifolium	Willow-weed		Forb
Ranunculus repens	Creeping buttercup		Forb
Rubus discolor	Evergreen blackberry	Class B	Forb
Rumex acetosella	Sheep sorrel		Forb
Rumex crispus	Curly dock		Forb
Senecio jacobea	Tansy ragwort	Class B	Forb
Senecio vulgaris	Common groundsel		Forb
Solanum americanum	Black nightshade		Forb
Sonchus asper	Sow thistle		Forb
Tanacetum vulgare	Common tansy	Class C	Forb
Taraxacum officinale	Common Dandelion		Forb
Trifolium agrarium (Synonym: T. aureum)	Yellow clover		Forb
Trifolium pratense	Red clover		Forb
Trifolium repens	White clover		Forb
Verbascum thapsus	Common mullein	State Monitor List	Forb
Veronica chamaedrys	Speedwell		Forb
Veronica officinalis	Speedwell		Forb

APPENDIX E

SHPO Correspondence

H4217

October 27, 2008

Dr. Allyson Brooks, State Historic Preservation Officer
Community Preservation Development Division
Department of Community Development
P.O. Box 48343
Olympia, Washington 98504-8343

Subject: Early project scoping for Stevens Canyon Road Rehabilitation: two, five-mile segments.

Dear Dr. Brooks:

Mount Rainier National Park is initiating the preparation of an *Environmental Assessment* for proposed road rehabilitation work along two segments of Stevens Canyon Road. In accordance with the National Environmental Policy Act (NEPA), the National Park Service will prepare an Environmental Assessment (EA) that will analyze and disclose potential impacts and alternatives for the proposed work.

The first segment begins at the Nisqually-Paradise Road intersection (Canyon Wye) and continues for 5.0 miles along Steven's Canyon Road to Stevens Creek Bridge. The second segment is the 5.0-mile segment from Backbone Ridge Viaduct to the roadway's intersection with State Route 123 at the Stevens Canyon Entrance. Road deficiencies include drainage problems, surface slumps, soft spots, pavement warping and cracking, narrow shoulders, and deteriorating historic stone masonry retaining and guard walls. Additionally, a pedestrian and vehicular circulation conflict at Reflection Lakes is causing dangerous conditions for hikers on the Wonderland Trail. The current layout and grading are also causing embankment erosion and water quality impacts. If approved, construction would occur in 2011, and could include water withdrawal from park waters for dust control, culvert replacements, and removal and/or addition of parking turnouts within the above segments.

The 19-mile Stevens Canyon Road is the only east-west road across the park, linking the Nisqually – Paradise Road to State Route 123 and providing cross-park access to the popular Paradise area and Henry Jackson Memorial Visitor Center. The road also provides access to numerous day-use areas (Box Canyon, Reflection Lake, Backbone Ridge, Inspiration Point, etc.) as well as various trailheads leading to the historically significant Wonderland Trail. The road and stone masonry walls are contributing structures to the National Historic Landmark District. Preservation of the historic character of the road and the visitor driving experience are key considerations when evaluating possible alternatives for road rehabilitation. It is the intent of the park to minimize impacts to the visitor experience and to natural and cultural resources.

Mount Rainier National Park was established to protect and preserve the park's natural and cultural resources and to provide opportunities for visitors to safely experience and understand the park environment in a manner that does not impair park resources and values. The park's approved General Management Plan (2002) allows for general road maintenance and minor modifications for resource protection and visitor safety.

As part of early project scoping, the park is inviting comments from the Washington Department of Archaeology and Historic Preservation to help identify issues to be addressed in the EA, as well as potential alternatives for reducing impacts to park resources, visitor access and safety. Additional opportunities for review and comment on the EA will be announced in the winter of 2009. Further Section 106 consultation with more details about the rehabilitation project will be conducted at that time.

Thank you for your assistance in this matter. Please direct your questions and comments regarding this undertaking to the park's Historical Landscape Architect, Susan Dolan at (206) 220 4132, or the park's Environmental Protection Specialist, Sue Jennings at (360) 569 2211 x 3376.

Sincerely,

David V. Uberuaga
Superintendent

cc:
Chief, Cultural Resources, PWR-CCSO-CR
Chief of Natural and Cultural Resources, MORA
Cultural Resource Specialist, MORA
Chief of Maintenance, MORA
Environmental Protection Specialist, MORA

STATE OF WASHINGTON

DEPARTMENT OF ARCHAEOLOGY & HISTORIC PRESERVATION

1063 S. Capitol Way, Suite 106 • Olympia, Washington 98501
Mailing address: PO Box 48343 • Olympia, Washington 98504-8343
(360) 586-3065 • Fax Number (360) 586-3067 • Website: www.dahp.wa.gov

Compliance
(Record file)

November 20, 2008

Mr. David V. Uberuaga
Superintendent
Mount Rainier National Park
55210 238th Avenue E
Ashford, Washington 98304-9751

In future correspondence please refer to:
Log: 112008-12-NPS
Property: Stevens Canyon Road Rehabilitation, Mount Rainier National Park
Re: Intent to Prepare EA

Dear Mr. Uberuaga:

Thank you for contacting the Washington State Department of Archaeology and Historic Preservation (DAHP) with your notice of intent to complete an environmental assessment for the Stevens Canyon Road Rehabilitation project. I have reviewed the documentation on behalf of the State Historic Preservation Officer under provisions of Section 106 of the National Historic Preservation Act of 1966 (as amended) and 36 CFR Part 800.

I have no preliminary comments to offer at this time but look forward to continuing consultation on this project.

Thank you for the opportunity to review and comment.

Sincerely,

Matthew Sterner, M.A., RPA
Transportation Archaeologist
(360) 586-3082
matthew.sterner@dahp.wa.gov

OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL

To: Jeri Dyar	# of pages ▶ 1
Dept./Agency	From: Sue Jennings
Fax # 303-969-2930	Phone # 360-569-2211 x 3376
NSN 7540-01-317-7368 5099-101	GENERAL SERVICES ADMINISTRATION

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 historic 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.

NPS 105/100124 March 2010

United States Department of the Interior ✧ National Park Service