

Olympic National Park

National Park Service
U.S. Department of the
Interior

Environmental Assessment

Rehabilitate Boulder Creek Trail and Campground

December 18, 2009



**U.S. Department of the Interior
National Park Service
Environmental Assessment
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Olympic National Park
Clallam County, Washington**

Summary

The National Park Service (NPS) proposes to rehabilitate a 2.2 mile stretch of the Boulder Creek Trail and the Boulder Creek Campground within Olympic National Park (ONP). These actions are identified in the park's 2008 General Management Plan (GMP) as goals for future management of the Elwha Area, and include:

- Retain road access to the Boulder Creek trailhead
- Improve the Boulder Creek trailhead and parking lot
- Rehabilitate the Boulder Creek Trail to provide access for hikers and pack stock users
- Maintain trail access that minimizes adverse effects on river processes and aquatic and riparian habitats to the extent possible
- Rehabilitate the historic Civilian Conservation Corps (CCC) campground [Boulder Creek Campground] at Olympic Hot Springs, with some sites removed and restored to natural conditions, and other sites retained to allow continued camping opportunities for backpackers

This environmental assessment describes and analyzes four alternatives for managing the Boulder Creek trail and campground: Alternative 1: no action; Alternative 2: minimum services, extensive restoration; Alternative 3: moderate services, active revegetation; and Alternative 4: enhanced services, active revegetation.

Notes to Reviewers and Respondents

This environmental assessment will be on public review for 20 days. Before including your address, phone number, email 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 request in your comment that your personal identifying information be withheld from public review, the National Park Service cannot guarantee that we would be able to do so. All submissions from organizations, businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses would be made available for public inspection in their entirety.

The public is invited to direct concerns or comments regarding this project to Superintendent online at <http://parkplanning.nps.gov/olym> or you may send comments to:

Superintendent – Boulder Creek EA
Olympic National Park
600 East Park Avenue
Port Angeles, WA 98362
Fax: 360-565-3015

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Chapter 1: Purpose of and Need for Action

Background and Introduction

The National Park Service (NPS) proposes to rehabilitate a 2.2 mile stretch of the Boulder Creek Trail and the Boulder Creek Campground within Olympic National Park (ONP). These actions are identified in the park's 2008 General Management Plan (GMP) as goals for future management of the Elwha Area, and include:

- Retain road access to the Boulder Creek trailhead
- Improve the Boulder Creek trailhead and parking lot
- Rehabilitate the Boulder Creek Trail to provide access for hikers and pack stock users
- Maintain trail access that minimizes adverse effects on river processes and aquatic and riparian habitats to the extent possible
- Rehabilitate the historic Civilian Conservation Corps (CCC) campground [Boulder Creek Campground] at Olympic Hot Springs, with some sites removed and restored to natural conditions, and other sites retained to allow continued camping opportunities for backpackers

The Boulder Creek trailhead currently provides parking for approximately 15 vehicles, with additional use of the roadside as parking when existing spaces have filled. The park proposes to expand the parking lot to accommodate more vehicles and to provide adequate turnaround space for vehicles towing stock trailers.

The Boulder Creek Trail is a popular destination for day hikers and overnight users year-round, although automobile access to the trailhead is only provided during the snow-free season. The existing trail consists of remnants of a paved asphalt road that was closed to vehicle traffic in 1982 due to slope failure and serious erosion at stream crossings. The trail currently provides pedestrian access to the Boulder Creek Campground, Olympic Hot Springs, and an extensive wilderness trail system. Although the trail is designated for stock use, it cannot be used in its current condition by stock beyond the Crystal Creek stream crossing due to extensive erosion that has destroyed the trail in this location, resulting in a trail that is too steep for safe stock use, and a large amount of rock and woody debris in the stream channel that make it unsuitable for stock animals to ford the stream.

At present, the 2.2 mile stretch of asphalt trail crosses several drainages where high stream levels washed away sections of asphalt, washed out or plugged culverts, and deposited areas of gravel. The NPS proposes to rehabilitate the Boulder Creek Trail for use as a foot and stock trail by removing the deteriorating asphalt from the road surface, removing culverts, providing appropriate stream crossings for trail users, delineating a trail, and restoring native vegetation adjacent to the trail in areas where asphalt is removed.

The Boulder Creek Campground is located at the end of the trail in an area designated as potential wilderness. Prior to 1982 the campground was accessible by automobile, with approximately thirty campsites arranged in three drive-through loops. The east loop of the campground was originally built by the Civilian Conservation Corps (CCC) for use as a picnic

area, but has been managed for several decades to provide overnight camping. The campground is currently managed for backcountry use and is accessible only by foot. Current use of the area as a campground has resulted in extensive bare ground, trampled vegetation, and a lack of woody material on the forest floor due to extensive collecting and burning of wood for campfires. Camping currently occurs throughout the area, resulting in an increase in bare soil and loss of vegetation. Additionally, high levels of garbage are frequently found in the area.

The park proposes to rehabilitate the Boulder Creek Campground by designating campsites, removing old concrete foundations and culverts from the campground area, and revegetating the areas around campsites in an effort to better protect park resources while improving the quality of the visitor experience in this backcountry setting.

Figure 1: Context.

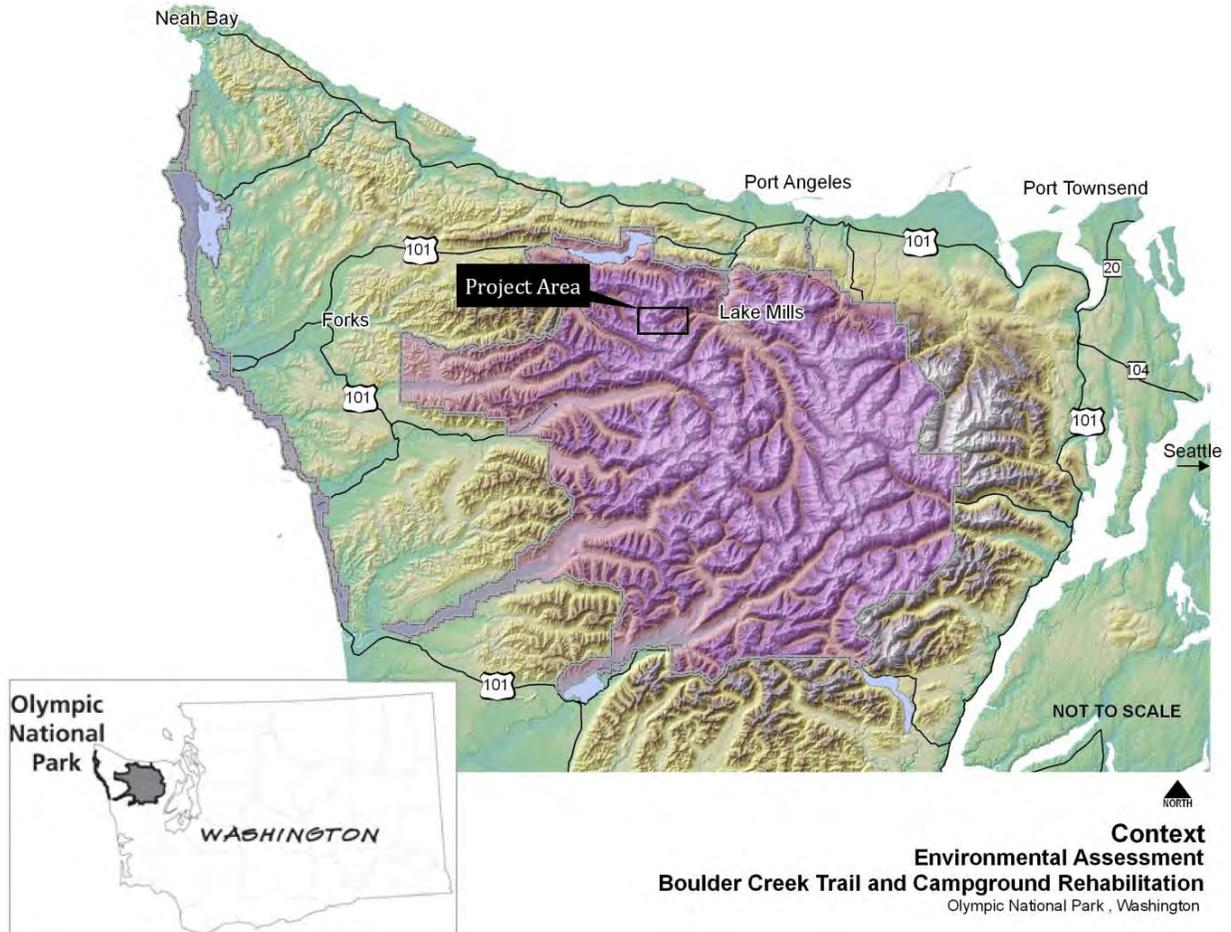
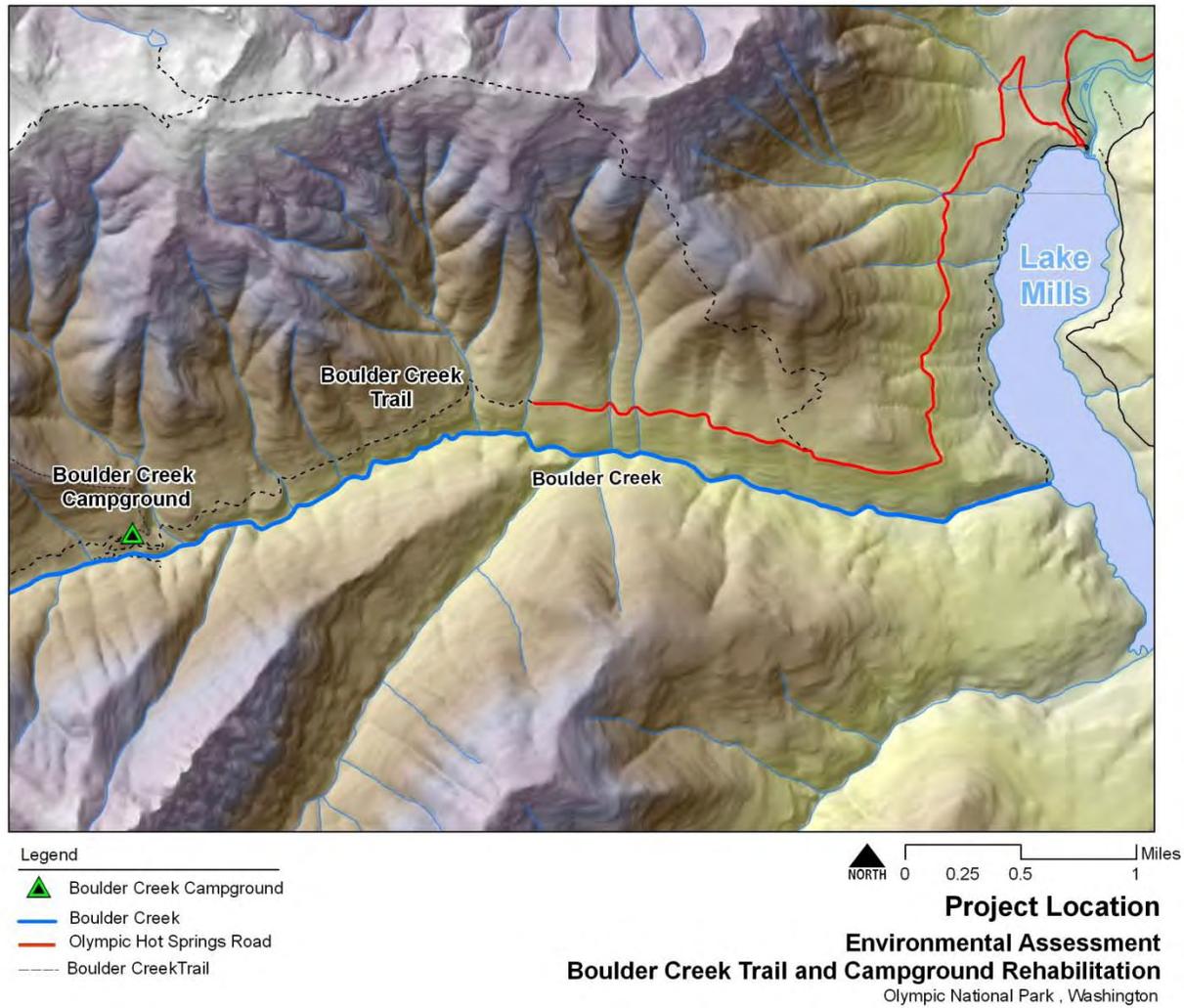


Figure 2: Project Location.



Purpose of and Need for Action

The purpose of the proposed action is to better protect park resources and provide for improved visitor access and enjoyment of the Boulder Creek Trail and campground in the Elwha Area of Olympic National Park as identified in the 2008 GMP.

This work is needed to address the following resource management and visitor experience concerns:

- The Boulder Creek trailhead does not provide adequate turnaround space for stock trailers or other large vehicles, nor does it provide adequate parking for visitors accessing the trail. This is resulting in impacts to the root systems of adjacent trees from visitors parking along the road shoulder after available parking spaces fill.
- The Boulder Creek Trail is designated as a hiking and stock use trail, but is currently not suitable for stock use due to the hardened asphalt trail surface and absence of an appropriate stock ford or crossing at Crystal Creek. Stock is unable to access the trail beyond Crystal Creek.
- The Boulder Creek Trail is located adjacent to designated wilderness (100 feet from centerline of the road). The current deteriorated asphalt trail surface is not consistent with the management of backcountry trails and detracts from visitor experience.
- The Boulder Creek Campground was identified through the Washington Park Wilderness Act of 1988 as a potential wilderness addition. This area is currently being impacted by trampling and the collection of firewood, resulting in the loss of vegetation and the expansion of bare ground and compacted soil. Additionally, obsolete infrastructure (concrete foundations, failed culverts) from the former automobile campground has altered the area's natural topography, water flow patterns, and vegetation. This is not consistent with the protection of wilderness character, and detracts from visitor experience.
- The formerly paved parking lot located adjacent to the Boulder Creek Campground at the end of the asphalt trail is no longer used by vehicles and is inconsistent with management of the area as backcountry. The presence of the leveled and compacted parking lot detracts from the visitor experience in this backcountry location, and prohibits the growth of native vegetation.
- The current trail and campground are not designed to meet visitor experience goals in a backcountry setting.

Management Goals and Objectives

The goals related to the rehabilitation of the Boulder Creek Trail and campground are based on federal legislation, National Park Service Management Policies, and park management plans. Each goal has a set of related management objectives. Goals describe what the park intends to accomplish by taking action. Management Objectives are specific statements of purpose that must be met to a large degree for proposed actions to be successful.

Goal 1: Protect Natural & Cultural Resources

Management Objectives:

- Avoid or minimize adverse effects to Threatened and Endangered Species.
- Provide appropriate drainage and sediment control along the trail to minimize erosion and protect water quality.
- Design stream crossings to accommodate high water flows and minimize adverse impacts to park resources.
- Promote the reestablishment of locally native vegetation in the project area consistent with the surrounding plant community.
- Minimize disturbance to wildlife during project implementation.
- Minimize the potential to introduce or spread non-native species.
- Minimize the potential for adverse effects to historic properties.
- Design the Boulder Creek trailhead, Boulder Creek Trail, Boulder Creek Campground and former automobile parking lot to minimize impacts to natural and cultural resources.

Goal 2: Protect and Restore Wilderness Character in Designated and Potential Wilderness

Management Objectives:

- Design and implement the project using methods that protect and minimize impacts to adjacent designated wilderness.
- Restore natural conditions within the Boulder Creek Campground Potential Wilderness Addition to meet Wilderness Act criteria for wilderness designation.
- Minimize impacts using wilderness minimum requirement guidelines during construction within potential wilderness (Boulder Creek Campground).
- Depending on the efficacy of restoration actions considered in the action alternatives, designation of the Boulder Creek Trail and Campground as Wilderness would be considered, following the removal of impediments and non-conforming elements.

Goal 3: Improve Visitor Experience

Management Objectives:

- Provide adequate parking and vehicle turnaround space at the trailhead for safe pedestrian use and vehicles towing stock trailers.
- Restore the Boulder Creek Trail (former road) to a safe hiking and stock-use trail.
- Provide safe and adequate stream crossings for pedestrians and stock users.
- Protect the trail from future damage by including sustainable trail design measures at stream crossings and slide areas.
- Rehabilitate the Boulder Creek Campground to provide a visitor experience consistent with visitor use in a wilderness area.

- Design the Boulder Creek area to facilitate effective and sustainable ongoing management, maintenance, and visitor use.

Legislative, Policy, and Planning Context

The NPS plans for one purpose—to ensure that the decisions it makes will carry out, as effectively and efficiently as possible, its mission:

“... to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.”

The NPS mission – along with applicable laws, policies, and plans, directs management within Olympic National Park.

Laws:

NPS Organic Act (1916) (16 USC 1 et seq.)

The 1916 NPS Organic Act established the NPS and provided the definitive statement of the purpose of the parks, which is, “... to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.”

National Parks Omnibus Management Act (1998) (Public Law 105-391)

The National Parks Omnibus Management Act requires the Secretary of Interior to continually improve NPS’ ability to provide state-of-the-art management, protection, and interpretation of, and research on NPS resources. Additionally, this act requires the Secretary to assure the full and proper utilization of the results of scientific study for park management decisions.

National Environmental Policy Act of 1969, as amended (NEPA) (42 USC 4321 et seq.)

NEPA is our basic national charter for protection of the environment. The stated purpose of this act is “to declare a national policy which will encourage productive and enjoyable harmony between [humans] and [their] environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of [humans]; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality (CEQ).”

NEPA covers all federal agencies and all federal actions. The act requires a systematic analysis of major federal actions that includes a consideration of all reasonable alternatives as well as an analysis of short-term and long-term, direct, indirect, and cumulative impacts. Within NEPA the environment includes natural, historical, cultural, and human dimensions. The NPS emphasis is on minimizing negative impacts and preventing “impairment” of park resources as described and interpreted in the NPS Organic Act. The result of analyses conducted under NEPA are presented to the public, federal agencies, and public officials in document format (e.g. Environmental

Assessments and Environmental Impact Statements) for consideration prior to taking official action or making official decisions.

Wilderness Act of 1964 (16 USC 1131 et seq.)

The Wilderness Act of 1964 (September 3, 1964, 16 USC 1131-1136) established a national wilderness preservation system to be composed of federally owned areas designated by Congress as wilderness. By law these wilderness areas, "...shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness." (16 USC 1131)

Each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area and shall so administer such areas for such other purposes for which it may have been established as also to preserve its wilderness character.

Except as otherwise provided in this Act, wilderness areas shall be devoted to the public purposes of recreational, scenic, scientific, educational, conservation and historical use.

Washington Park Wilderness Act of 1988 officially designated Wilderness in Olympic National Park on November 16, 1988 (PL 100-668). A total of 876,669 acres, about 95 % of the park, was designated as the Olympic Wilderness, and another 378 acres was designated as potential wilderness. Areas that currently do not qualify for designation as wilderness due to temporary nonconforming or incompatible conditions may be authorized by Congress as "potential wilderness" for future wilderness designation. The Boulder Creek Campground was identified through the Act as potential wilderness Potential wilderness becomes "designated wilderness" upon the Secretary of Interior's determination, published in the Federal Register, that they have met the qualifications for designation by the cessation or termination of the nonconforming use.

Endangered Species Act of 1973 (ESA), as amended (16 USC 1531 et.seq.)

The purposes of the ESA include providing a means whereby the ecosystems upon which endangered and threatened species depend may be conserved. According to the ESA all federal agencies shall seek to conserve endangered and threatened species and shall ensure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any endangered, threatened or proposed species or adversely modify designated or proposed critical habitat. The effects of any agency action that may affect endangered, threatened, or proposed species or their critical habitat must be evaluated in consultation or conference with either the United States Fish and Wildlife Service (USFWS) or National Marine Fisheries Service (NMFS), as appropriate.

Acts Related to Cultural Resources Management:

The National Historic Preservation Act of 1966 (1992, as amended) (NHPA), and other applicable laws and regulations including the NPS Organic Act (1916), the Antiquities Act of 1906, NEPA, the National Parks and Recreation Act of 1978, the Archeological Resources Protection Act of 1979, the Native American Graves Protection and Repatriation Act of 1990, and the Curation of Federally Owned and Administered Archeological Collections (1991), along

with applicable agency policies provide direction for the protection, preservation and management of cultural resources on public lands. Further, these laws and policies establish what must be considered in general management planning and how cultural resources must be managed in future undertakings resulting from the approved plan, regardless of the final alternative chosen.

Section 106 of the NHPA directs federal agencies to take into account the effect of any undertaking (a federally funded or assisted project) on historic properties. A historic property is any district, building, structure, site, or object that is eligible for listing in the National Register of Historic Places (NRHP). Properties that have national, state, or local significance in American history, architecture, archeology, engineering, or culture may be eligible for listing in the NRHP. Section 106 also provides the Advisory Council on Historic Preservation and the State Historic Preservation Officer (SHPO) an opportunity to comment on the anticipated effects of an undertaking.

Clean Water Act of 1972, as amended (33 USC 1251 et seq.)

The Clean Water Act, passed in 1972 as amendments to the Federal Water Pollution Control Act, and significantly amended in 1977 and 1987, was designed to restore and maintain the integrity of the nation's waters. It furthers the objectives of restoring and maintaining the chemical, physical and biological integrity of the nation's waters and of eliminating the discharge of pollutants into navigable waters by 1985. It establishes effluent limitation for new and existing industrial discharge into U.S. waters; authorizes states to substitute their own water quality management plans developed under S208 of the act for federal controls; provides an enforcement procedure for water pollution abatement; and agencies are required to obtain permits under S404 for actions that may result in discharge of dredged or fill material into a tributary, wetland, or associated water source connected to navigable waters.

Executive Orders

- Executive Order 13112 Invasive Species
- Executive Order 11988 Floodplain Management
- Executive Order 11990 Protection of Wetlands

Management Policies

The National Park Service Management Policies 2006 (NPS 2006) provide guidance for management of all national park units. Section 6.3.10.3 discusses campsites. This section states, "Although the development of facilities to serve visitors will generally be avoided, campsites may be designated when essential for resource protection and preservation or to meet other specific wilderness management objectives. In keeping with the terms of the park's wilderness management plan, campsite facilities may include a site marker, fire rings, tent sites, food storage devices, and toilets if these are determined by the superintendent to be the minimum facilities necessary for the health and safety of wilderness users or for the preservation of wilderness resources and values." Road systems are addressed in Section 9.2.1 and 9.2.1.2, which states "When plans for meeting the transportation needs of these parks are updated, a determination must be made as to whether the road system should be maintained as is, reduced, expanded, reoriented, eliminated, or supplemented by other means of travel." Also, "many parks contain roads that were not constructed by the Park Service and may not be under NPS

jurisdiction...where practicable, and after concurrence of the entity with road jurisdiction, non-NPS roads that are no longer needed will be closed or removed, and the area will be restored to a natural condition. Section 9.2.2.2 discusses hiking trails. This section states, "Trail design will vary to accommodate a wide range of users and be appropriate to user patterns and site conditions. Wetlands will generally be avoided, and where possible they will be spanned by a boardwalk or other means, using sustainable materials that will not disturb hydrologic or ecological processes. Backcountry trails will offer visitors a primitive outdoor experience, and these trails will be unsurfaced and modest in character except where a more durable surface is needed. The use of nonnative materials is generally not permitted on backcountry trails." Section 9.2.4 discusses the use and design of parking areas: "Parking areas and overlooks will be located to not unacceptably intrude, by sight, sound, or other impact, on park resources or values. When parking areas are deemed necessary, they will be limited to the smallest size appropriate, and they will be designed to harmoniously accommodate motor vehicles and other appropriate users."

NPS Director's Orders

Directors Orders serve as a vehicle to clarify or supplement NPS Management Policies to meet the needs of park managers. Directors Orders with relevance to this project include:

- DO-2.1 Resource Management Planning
- DO-12 Environmental Impact Assessment
- DO-41 Wilderness Preservation & Management
- DO-77 Natural Resource Protection

Park Planning Documents Related to Boulder Creek EA

Olympic National Park Final General Management Plan (GMP) and Environmental Impact Statement (2008)

The GMP provides park managers with long-term direction for achieving the resource protection and visitor experience goals of Olympic National Park and establishes the direction for managing the Boulder Creek Trail and Boulder Creek Campground in the Elwha area of the park. This EA guides implementation of the portions of the GMP that deal with the Boulder Creek Trail and campground. The GMP states, "Road access would be retained to the Boulder Creek trailhead. Trailhead and parking would be improved and may be relocated nearby. The Boulder Creek Trail would be rehabilitated to provide access for hikers and horseback riders. Trail access would be retained, using methods that minimize adverse effects on river processes and aquatic and riparian habitats, to the extent possible."

The Backcountry Management Plan (1980, updated in 1992)

The Backcountry Management Plan provides interim guidance for managing the backcountry and wilderness of Olympic National Park. A Comprehensive Wilderness Management Plan is anticipated to commence in the near future. The Wilderness Management Plan will provide specific guidance for managing backcountry areas and designated and potential wilderness in accordance with applicable laws, policies, and other regulatory guidance.

Elwha River Ecosystem Restoration Final Environmental Impact Statement (Elwha FEIS, 1995), and Supplemental Environmental Impact Statement (SEIS, 2005)

The Elwha FEIS determined that the removal of Elwha and Glines Canyon dams has the potential to fully restore the ecosystem and Elwha native anadromous fish and fulfill the purpose of the congressional mandate for full restoration. The SEIS, 2005 identified and analyzed the potential impacts of a new set of water quality and supply-related mitigation measures. Boulder Creek is a tributary of the Elwha River currently entering the Lake Mills Reservoir. The actions identified in these documents are included in the cumulative effects analysis of the Boulder Creek EA.

Elwha Wild and Scenic River Eligibility Report, Final Draft (2004)

The Elwha Wild and Scenic River Eligibility Report evaluated the eligibility and classification of the Elwha River watershed as a component of the National Wild and Scenic Rivers System. The report concluded that following the restoration of the Elwha River watershed by the removal of the Elwha and Glines Canyon dams, that river and watershed segments would be eligible for wild and scenic river designation, either under a “recreational” or “wild” classification. No actions considered in the Boulder Creek EA have the potential to alter the eligibility or classification of the Elwha River for future inclusion in the Wild and Scenic Rivers System.

Park Purpose, Significance, and Mission

An essential part of the planning process is to understand the purpose and significance of the park for which an environmental assessment is being prepared.

Park Purpose

Park purpose statements are based on national park legislation, legislative history and NPS policies. The statements reaffirm the reasons for which the national park was set aside, and provide the foundation for national park management and use.

Olympic National Park protects 922,651 acres of three distinctly different ecosystems — rugged glacier-capped mountains, more than 70 miles of wild Pacific coast, and magnificent stands of old-growth and temperate rain forest. Olympic National Park encompasses and protects one of the largest wilderness areas in the contiguous United States — 95% of the park (876,669 acres) is designated wilderness, offering visitors a chance to experience the park’s amazing diversity in its natural and pristine state.

Olympic National Park was established by the House Report No. 2247 of April 28, 1938. This report established:

The purpose of Olympic National Park is to preserve for the benefit, use and enjoyment of the people, the finest sample of primeval forests of Sitka spruce, western hemlock, Douglas fir and western red cedar in the entire United States; to provide suitable winter range and permanent protection for the herds of native Roosevelt elk and other wildlife indigenous to the area; to conserve and render available to the people, for recreational use, this outstanding mountainous country, containing numerous glaciers and perpetual

snow fields, and a portion of the surrounding verdant forests together with a narrow strip along the beautiful Washington coast.

Park Significance

Park significance statements capture the essence of the national park's importance to the natural and cultural heritage of the United States of America. Significance statements do not inventory park resources; rather, they describe the park's distinctiveness and help place the park within the regional, national, and international context. Defining park significance helps park managers make decisions that preserve the resources and values necessary to accomplish the purpose of the national park.

Olympic National Park is significant because it protects several distinct and relatively pristine ecosystems, including more than 70 miles of wild Pacific coast and islands, densely forested lowlands and the glacier-crowned Olympic Mountains. The ecosystems protected within Olympic National Park contain a unique array of habitats and life forms, resulting from thousands of years of geographic isolation, and extreme gradients of elevation, temperature and precipitation. At least 16 kinds of animals and 8 kinds of plants on the Olympic Peninsula exist nowhere else in the world.

Olympic National Park protects the primeval character of one of the largest wilderness areas in the contiguous United States.

Olympic National Park protects some of the finest remaining stands of old-growth temperate rain forest in the United States. These forests of ancient and immense trees provide habitat for dozens of smaller plants and animals, including important habitat for a number of threatened species.

Olympic National Park contains some of the last remaining undisturbed, contiguous aquatic habitat throughout the range of several west coast fish species. The park protects 12 major river basins, more than 3,500 miles of rivers and stream within 11 watersheds, more than 300 high mountain lakes, and two large lowland lakes. The park also supports more than 70 unique stocks of Pacific salmonids, 29 native freshwater fish species, and one endemic fish species.

Olympic National Park protects the largest population of Roosevelt elk in its natural environment in the world. Decades of protection from human harvest and habitat manipulation have sustained not only high densities of elk, but have also preserved the natural composition, social structure and dynamics of this unique coastal form of elk as found nowhere else.

Olympic National Park protects important cultural resources with regional and national significance, including more than 650 archeological sites, hundreds of ethnographic sites, 31 cultural landscapes, and 128 historic structures that are on the List of Classified Structures.

Park Mission

Park mission statements describe conditions that exist when the legislative intent for the park is being met. The mission of Olympic National Park is,

To preserve and protect, unimpaired, the Park's diverse natural and cultural resources and provide for the enjoyment, education, and inspiration of present and future generations.

To fulfill this mission, Park staff must understand and protect the natural processes, habitats, and life forms found within the Park – from the glacier-capped Olympic Mountains, to the ancient forests, to the beaches and headlands of the wilderness coast. In addition, Park staff must protect the Park's cultural resources, which document 10,000 years of human occupation and reveal the region's history of discovery, exploration, homesteading, and community development.

Decisions to be Made

The Boulder Creek Trail and Campground Rehabilitation Environmental Assessment (Boulder Creek EA) analyzes the preferred alternative and other alternatives and their impacts on the environment. This environmental assessment has been prepared in accordance with the National Environmental Policy Act of 1969, as amended (NEPA), and regulations of the Council on Environmental Quality (40 CFR 1508.9); National Park Service Director's Order-12: *Conservation Planning, Environmental Impact Analysis, and Decision-making (DO-12)*; Section 106 of the National Historic Preservation Act of 1966 (as amended); and implementing regulations 36 CFR Part 800.

The Boulder Creek EA will be used to help the National Park Service make the following decisions:

- What is the appropriate size, design and capacity of the Boulder Creek trailhead area and parking lot?
- How should the Boulder Creek Trail corridor and abandoned campground parking lot be rehabilitated and maintained?
- What level of infrastructure is appropriate at stream crossings, drainages, and washout areas along the Boulder Creek Trail?
- What is the appropriate design and capacity for the Boulder Creek Campground?
- How should the Boulder Creek Campground be rehabilitated and managed, recognizing its status as potential wilderness and an important historic site?

Scoping, Issues, and Impact Topics

Scoping

NPS staff began conducting internal scoping for the project in 2002. This included defining the draft purpose and need and project objectives, identifying potential actions to address the need, and determining what park resources would potentially be affected.

Public scoping for the Boulder Creek EA was initiated February 5, 2009. A press release and letter soliciting public comments and describing the proposed action was sent to approximately

150 individuals, interest groups, government agencies, and area tribes on the park's mailing list. A news release was published in the February 8, 2009 Peninsula Daily News. Respondents had the opportunity to provide written or faxed comments to the park, or electronically submit comments into the NPS Planning, Environment, and Public Comment (PEPC) website.

The public scoping period ended on March 9, 2009. The park received comments from eight individuals and three organizations. Several respondents provided useful information regarding how the work should be conducted while protecting park resources, including:

- The EA should discuss what NPS management actions would be taken to stabilize and prevent future erosion of the rehabilitated trail and stream crossings.
- Prepare a cumulative watershed effects analysis that discloses possible improvement and/or degradation of the Boulder Creek watershed, the level of disturbance contributed by the proposed action and proposed mitigation measures when project activities would cause degradation.
- Since Boulder Creek is a major tributary to the Elwha River, it is important that restoration and stabilization activities address ongoing and future erosion of fill into the creek prior to Elwha dam removal.
- The EA should look into the feasibility of air-lifting a small backhoe or other equipment capable of removing the old road surface. A helicopter can also be used to remove materials from this site.
- Full restoration, revegetation, and site delineation should take place at the campground.
- Consider minimum stream crossing structures such as simple footlogs and stock fords instead of bridges.
- Design trail reconstruction to minimize/reduce future maintenance needs and accommodate use.
- Include attractive environmental education/interpretive/leave no trace sign at trailhead.
- Reduce overall campground size and impacts, but develop some designated sites for use.
- Improve parking lot to provide additional parking, turnaround, and restroom facility.
- Provide parking and turnaround for stock trailers at the trailhead.
- Reopen the trail to stock use.
- Add educational signs acknowledging the history of the trail and the former Hot Springs Resort.

Issues and Impact Topics

Specific issues and impact topics were developed for discussion and to allow comparison of the environmental consequences of each alternative. The impact topics were identified based on internal and external scoping; federal laws, regulations, and executive orders; results of site visits; and park knowledge of potentially affected resources. A brief rationale for the selection of each impact topic and the relevant laws, regulations and policies is given in Table 1.

Scoping issues or impact topics that were considered, but not evaluated further, are discussed in "Impact Topics Eliminated from Further Consideration."

Table 1: Impact Topics Retained for Further Evaluation and Relevant Laws, Regulations, and Policies.

<i>Impact Topic</i>	<i>Reasons for Retaining Impact Topic</i>	<i>Relevant Laws, Regulations and Policies</i>
<i>Geologic Features and Soils</i>	Geologic resources would be affected under all Alternatives considered in this document; therefore, impacts to geologic resources are addressed in the environmental assessment.	<i>NPS Organic Act; NPS Management Policies 2006; NPS-77</i>
<i>Hydrology and Water Quality</i>	Water resources have the potential to be affected under all Alternatives considered in this document; therefore, impacts to hydrology and water quality are addressed in the environmental assessment.	<i>Clean Water Act; Executive Order 12088; NPS Management Policies 2006; NPS-77</i>
<i>Air Quality</i>	Air quality may be affected under all Action Alternatives considered in this document; therefore, impacts to air resources are addressed in the environmental assessment.	<i>NPS Management Policies 2006</i>
<i>Vegetation</i>	Vegetation would be affected under all Alternatives considered in this document; therefore, impacts to vegetation are addressed in the environmental assessment.	<i>NPS Organic Act; NPS Management Policies 2006; Resource Management Guidelines (NPS-77)</i>
<i>Wildlife and Wildlife Habitat</i>	Wildlife and wildlife habitat would be affected under all Action Alternatives considered in this document; therefore, impacts to wildlife are addressed in the environmental assessment.	<i>NPS Organic Act; NPS Management Policies 2006; NPS-77</i>
<i>Unique or Important Fish or Fish Habitat</i>	The Boulder Creek drainage is a major tributary to the Elwha River. The Elwha River is considered important habitat for threatened bull trout. Since Boulder Creek has the potential to be affected under all Alternatives considered in this document, impacts to unique or important fish and fish habitat are addressed in the environmental assessment.	<i>Endangered Species Act; NPS Management Policies 2006; 16 USC 1535 Section 7(a)(2)</i>
<i>Threatened and Endangered Species</i>	There is suitable habitat for marbled murrelet and northern spotted owl in the project area. The Boulder Creek drainage is a major tributary to the Elwha River, which is considered as important habitat for threatened bull trout; threatened and endangered (T & E) species may be affected under all Action Alternatives considered in this document. Therefore, impacts to T & E species are addressed in the environmental assessment.	<i>Endangered Species Act; NPS Management Policies 2006; 16 USC 1535 Section 7(a)(2)</i>

<i>Impact Topic</i>	<i>Reasons for Retaining Impact Topic</i>	<i>Relevant Laws, Regulations and Policies</i>
<i>Wetlands</i>	Natural hydrology would be restored through the removal of culverts in the Boulder Creek Campground; therefore, this topic is addressed in the environmental assessment.	<i>Executive Order (EO) II990, NPS Management Policies 2006 and DO-77-I</i>
<i>Cultural Resources</i>	Both prehistoric and historic cultural resources are known to exist in the project area; therefore, cultural resources will be further evaluated in the environmental assessment.	<i>National Historic Preservation Act (NHPA), NPS Management Policies 2006</i>
<i>Socioeconomics</i>	Implementation of any of the Action Alternatives is expected to have an effect on the local and regional economy; therefore, effects to the socioeconomic environment are addressed in the environmental assessment.	<i>NPS Management Policies 2006</i>
<i>Park Operations, Safety, and Sustainability</i>	Providing for visitor use requires operational support that ranges from the construction and maintenance of trails, campgrounds, bridges, and restrooms; to the provision of visitor safety and resource protection actions by park staff. The effects to park operations, safety, and sustainability vary across the alternatives, and are evaluated in the environmental assessment.	<i>NPS Management Policies 2006</i>
<i>Wilderness Values</i>	The Boulder Creek Trail (former road) is bordered by designated wilderness. The Boulder Creek Campground is a “Potential Wilderness Addition” area. Therefore, protection of wilderness values is addressed in the environmental assessment.	<i>Washington Park Wilderness Act of 1988, Wilderness Act of 1964, DO 41 “Wilderness Preservation and Management”</i>
<i>Visitor Use and Experience</i>	Visitor experience would be affected under all Alternatives; therefore, impacts to visitor experience are addressed in the environmental assessment.	<i>NPS Organic Act; NPS Management Policies 2006; NPS-77; The Redwood Act, 1978</i>
<i>Soundscapes</i>	Natural soundscapes would be affected under all Action Alternatives; therefore, impacts to natural soundscapes are addressed in the environmental assessment.	<i>NPS Management Policies 2006</i>

<i>Impact Topic</i>	Reasons for Retaining Impact Topic	Relevant Laws, Regulations and Policies
<i>Scenery and Visual Resources</i>	Scenery and visual resources would be affected under all Alternatives considered in this document; therefore, impacts to scenery and visual resources are addressed in the environmental assessment.	NPS <i>Management Policies 2006</i>

Impact Topics Dismissed from Further Analysis

The following topics were eliminated from detailed study because there would be no potential impacts or only negligible impacts expected.

Indian Trust Resources

Secretarial Order 3175 requires that any anticipated impacts to Indian Trust Resources from a proposed project or action by the Department of Interior agencies be explicitly addressed in environmental documents. The Federal Indian Trust responsibility is a legally enforceable fiduciary obligation on the part of the U.S. to protect tribal lands, assets, resources, and treaty rights; and it represents a duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes.

The NPS does not manage or administer Indian trust assets; including trust lands and trust resources, however, activities carried out on park lands may sometimes affect tribal trust resources. Trust resources are those natural resources reserved by or for Indian tribes through treaties, statutes, judicial decisions, and executive orders, which are protected by a fiduciary obligation on the part of the U.S. While the overriding mandate for the NPS is to manage the park units in the national park system consistent with park laws and regulations, the federal government, including the NPS, has a trust responsibility to protect Indian rights and advance their interests.

No lands comprising Olympic National Park are held in trust by the Secretary of Interior solely for the benefit of American Indians due to their status as American Indians. Therefore, this topic was dismissed from further analysis.

Designated Critical Habitat, Ecologically Critical Areas, Wild and Scenic Rivers, Other Unique Natural Areas

The project area is not in a designated ecologically critical area or designated critical habitat. Boulder Creek is a tributary of the Elwha River. The Elwha Wild and Scenic River Eligibility Report concluded that following the restoration of the Elwha River watershed by the removal of the Elwha and Glines Canyon dams, that river and watershed segments would be eligible for wild and scenic river designation, either under a “recreational” or “wild” classification. No actions considered in the Boulder Creek EA have the potential to alter the eligibility or classification of the Elwha River for future inclusion in the wild and scenic rivers system. Olympic National Park is an important natural area, but the project would not threaten the associated qualities and resources that make the park unique. Therefore, designated critical

habitat, ecologically critical areas, wild and scenic rivers, and other unique natural features have been dismissed as impact topics in this environmental assessment.

Environmental Justice

Executive Order 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 disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations or communities. No alternative under consideration would have disproportionate adverse effects on minorities or low-income populations. Therefore, environmental justice has been dismissed as an impact topic in this environmental assessment.

Prime Farmland

There are no prime or unique farmlands within the project area. Therefore, this topic is dismissed from further analysis.

Sacred Sites

There are no known Indian sacred sites in the project area.

Chapter 2: Alternatives

Introduction

This chapter describes four management strategies (alternatives) that the National Park Service is considering to achieve resource protection and visitor experience goals in the Boulder Creek area of Olympic National Park as identified in the 2008 GMP. These alternatives were developed through an interdisciplinary planning process that included discussions among subject matter experts, agency officials, partner agencies, American Indian tribes, and comments received from members of the public during initial project scoping.

Alternative 1 is the no action alternative that describes current management of the Boulder Creek trailhead, trail, and campground. The no action alternative provides a baseline against which other alternatives may be compared.

Alternatives 2, 3, and 4 (Action Alternatives) describe a range of reasonable approaches to meet the purpose and need for taking action, and to achieve management goals and objectives described in Chapter 1. The goals of this plan are:

- Goal 1: Protect Natural and Cultural Resources
- Goal 2: Protect and Restore Wilderness Character
- Goal 3: Improve Visitor Experience

The park's proposal to meet the objectives of Goals 1 and 2 are primarily described in this chapter as Activities Common to All Action Alternatives. The Action Alternatives described in this chapter vary primarily in how the park proposes to meet the management objectives defined for Goal 3, which are:

- Provide adequate parking and vehicle turnaround space at the trailhead for safe use by pedestrians and vehicles towing stock trailers.
- Restore the Boulder Creek Trail (former road) to a safe hiking and stock-use trail.
- Provide safe and adequate stream crossings for pedestrians and stock users.
- Protect the trail from future damage by including sustainable trail design measures at stream crossings and slide areas.
- Rehabilitate the Boulder Creek Campground to provide a visitor experience consistent with visitor use in a wilderness area.
- Design the Boulder Creek area to facilitate effective and sustainable management, maintenance, and visitor use.

This chapter is organized as follows:

- Alternative 1 (No Action, Continue Current Management Approach)
- Activities Common to All Action Alternatives
- Alternative 2 (Minimum Visitor Services Infrastructure)
- Alternative 3 (Provide Moderate Visitor Services)
- Alternative 4 (Provide Enhanced Visitor Services), Management Preferred

- Alternatives Considered but Dismissed
- Environmentally Preferred Alternative
- Summary Table of Alternatives
- Summary Table of Environmental Consequences

Alternative 1 - No Action (Continue Current Management, Routine Maintenance Only)

Under No Action, the National Park Service would not implement the actions identified for the Boulder Creek Trail and Campground in the 2008 General Management Plan. Only routine maintenance of existing structures would occur. No new infrastructure would be built. The current situation, as described below would continue. See Chapter 3 (Affected Environment) for a more detailed profile of the current environmental situation in the project area.

Boulder Creek Trailhead

The Boulder Creek trailhead is at the terminus of the Olympic Hot Springs Road, west of Lake Mills in the Elwha area of Olympic National Park. The trailhead is currently maintained to provide vehicle access during the snow-free seasons, generally between April and mid-November. An intermediate gate two miles east of the trailhead limits access during the winter months when snowpack at the higher elevations make access difficult and hazardous.

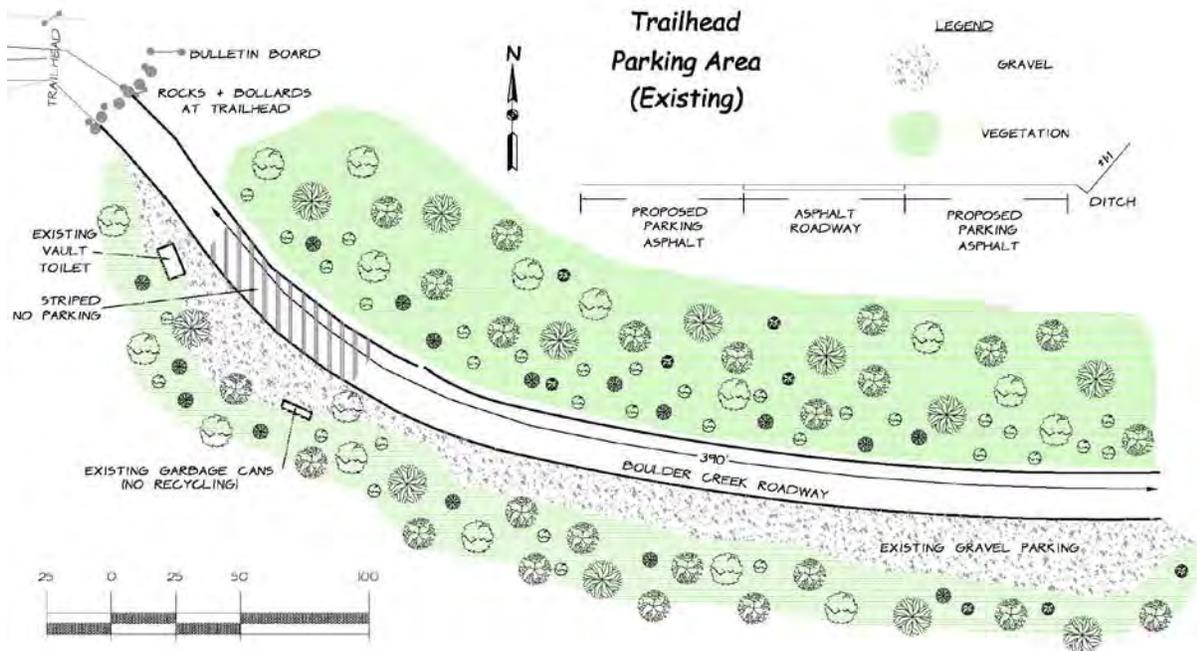
A stock user staging area is located approximately 1/8-mile east of the trailhead parking area. This stock area includes a raised earthen loading platform intended for use by high tailgate vehicles carrying stock. The stock staging area currently receives little use due to the inability of stock to cross Crystal Creek.

The trailhead currently provides parking for approximately 15 vehicles on a wide gravel shoulder on the south side of the road, although these parking spaces are not delineated and additional vehicles parallel park along the side of the road (Figure 3). On busy days as many as 55 vehicles have been observed by park staff. The trailhead currently contains approximately 7,020 square feet of paved asphalt road (approximately 18 feet wide by 390 feet long) and approximately 5,300 square feet of gravel surface along the road shoulder, which varies in width from the edge of the road.

The west end of the parking area is striped as “No Parking” to allow for west-bound vehicles to turn back toward the east. The existing turn-around design is limited in width and is inadequate to support turning movements by trucks towing long stock trailers and other longer vehicles.

The trailhead also contains trash receptacles, and one vault toilet. There are currently no interpretive signs in place, although there is a bulletin board at the trailhead where information is posted. There is currently one sign at the trailhead with mileage information for backcountry trails accessed from this point.

Figure 3: No Action Alternative, Existing Trailhead and Parking.



Boulder Creek Trail

The Boulder Creek Trail segment addressed in this document is a 2.2 mile long segment that begins at the trailhead parking lot on the western edge of the Olympic Hot Springs Road and ends at the Boulder Creek campground located near the Olympic Hot Springs. The trail was originally a paved asphalt road leading to the Hot Springs and campground.

The road to the Hot Springs was closed to vehicle traffic in 1982 and has been managed as a trail after the road surface failed in several locations. These failures include erosion at stream crossings where plugged and eroded culverts caused the road to wash out. Erosion of the hillsides above and below the trail continues.

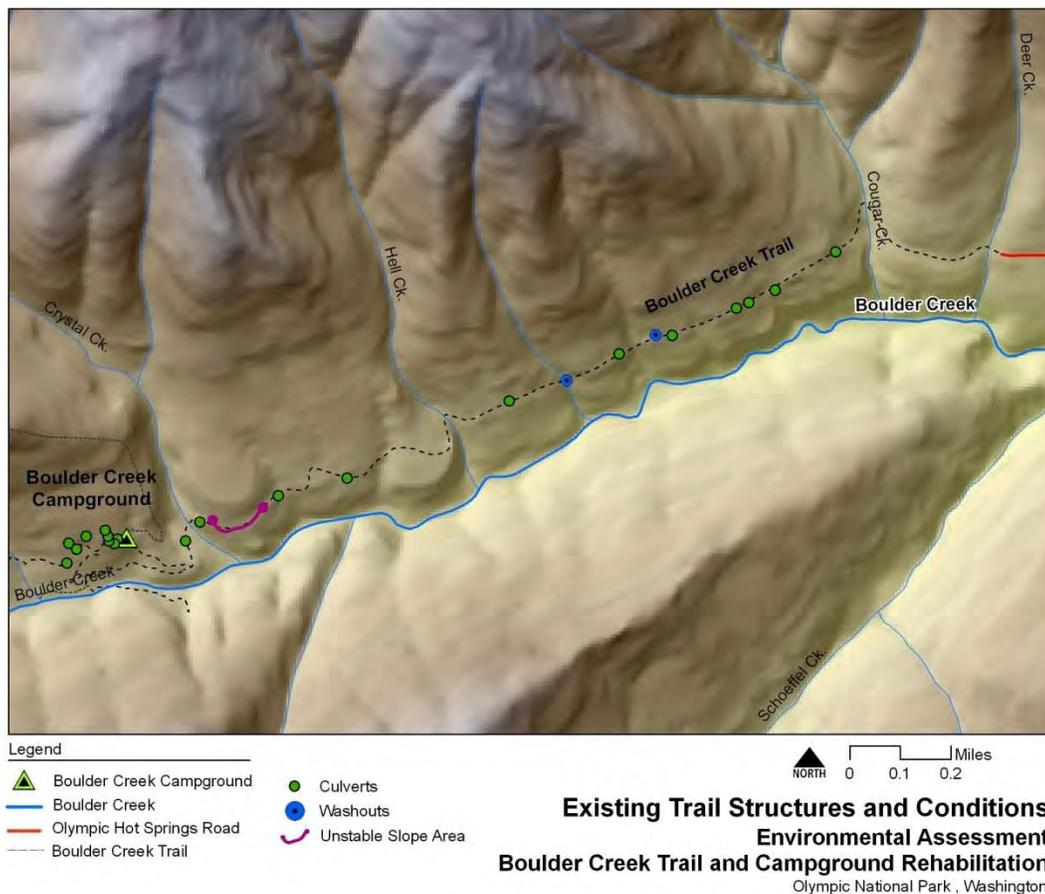
The road was cut from the existing hillside, resulting in uphill slopes of varying steepness and an abrupt edge on the downhill edge of the roadway. The resulting trail corridor ranges in width from approximately 12-20 feet, with an average width of 14 feet of asphalt paving in areas where the road surface is intact. The asphalt averages around 2 inches in thickness.

Current uses include hiking for pedestrians to access the Olympic Hot Springs, Boulder Creek Campground, and several backcountry hiking trails, including Boulder Lake, Appleton Pass, and the Sol Duc valley. Current maintenance is routine. Seasonal repairs consist of removing downed trees from the trail, cleaning drainage structures, and removing debris flows from across the trail.

The trail is immediately bordered by young trees and herbaceous plants that have established since the road was closed to vehicular access. The asphalt surface of the trail is deteriorated in many places, and is contributing both crumbled asphalt and gravel fill from the road bed into the Boulder Creek drainage. In several areas the uphill road cut has slumped onto the paved surface, burying the trail, reducing the width of exposed asphalt and providing a medium for the growth of both native and non-native vegetation.

There are approximately eleven culverts in place along the trail. These culverts were originally installed at low spots in the road that formed collection areas for storm water runoff. All of these culverts have failed due to blockage of the culvert or erosion of materials below the outlet of the culvert.

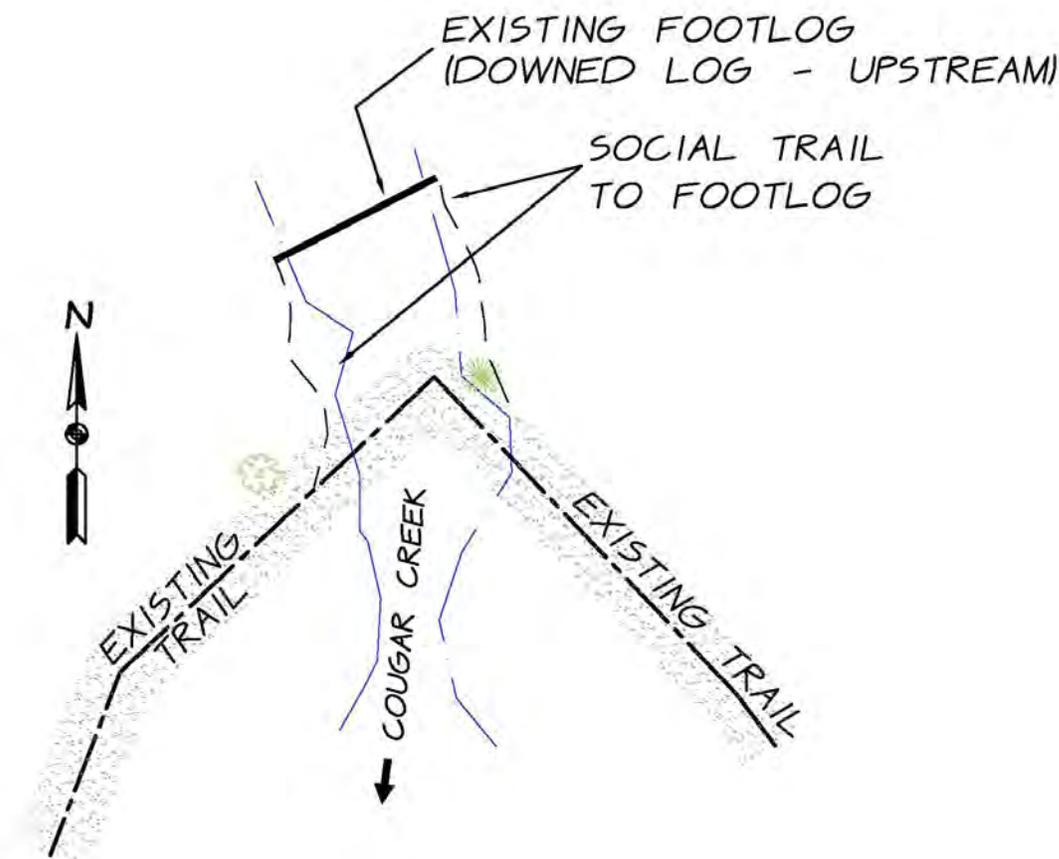
Figure 4: Existing Trail Structures and Conditions.



Stream Crossings

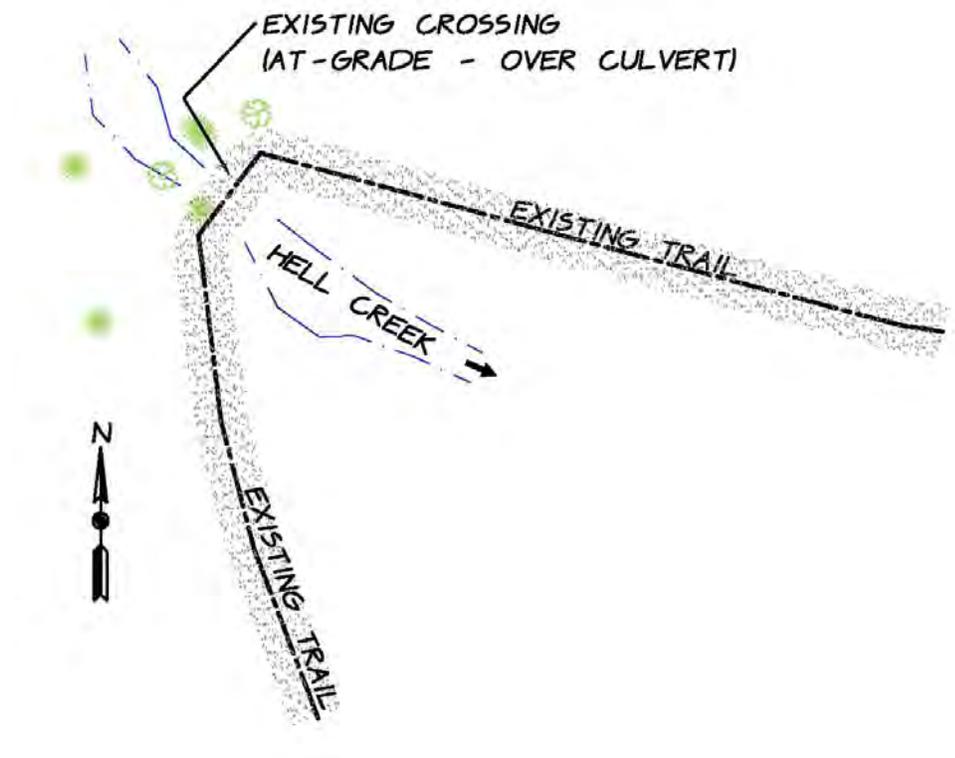
The trail crosses Cougar Creek, Hell Creek and Crystal Creek before reaching the Boulder Creek campground. The original Cougar Creek stream crossing was a corrugated metal pipe (CMP) culvert placed under the road. The culvert and road have failed at this location as a result of the culvert plugging and stream activity. A large log has fallen in Cougar Creek (Figure 5) approximately 50 feet upstream from the original stream crossing. The log is being used by some visitors to cross the creek, while others ford the creek during low flow at the original crossing location. A social trail has developed between the Boulder Creek Trail and the downed log. Pack stock may ford Cougar Creek in the original stream crossing location.

Figure 5: No Action Alternative, Cougar Creek Crossing.



The Hell Creek stream crossing contains a failed wooden box culvert. Although partially collapsed and currently buried, the culvert continues to carry water. The earthen cover over the culvert is intact and is being used by visitors to cross Hell Creek. Pack stock may cross Hell Creek in its current condition.

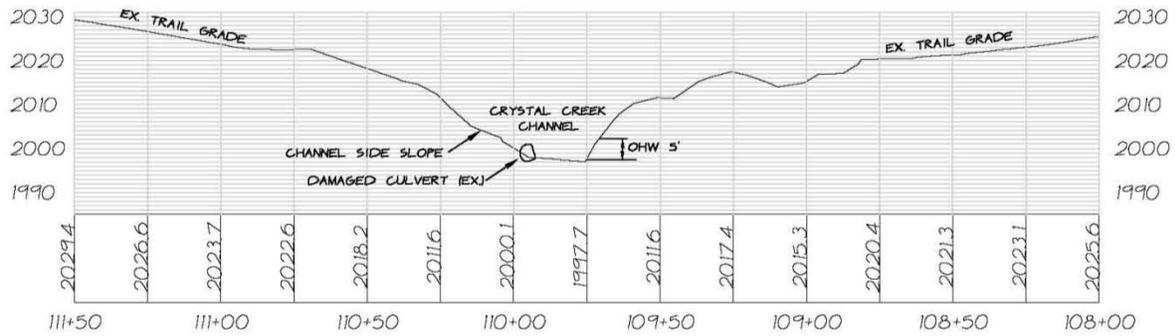
Figure 6: No Action Alternative, Hell Creek Crossing.



The trail crosses Crystal Creek in a highly eroded area with steep side slopes (Figure 7). A temporary footlog approximately 35 feet long is currently in place at the Crystal Creek crossing, at or below the ordinary high water (OHW) mark, to provide access for hikers (Figure 8). People must hike and climb down a steep set of switchbacks to reach the footlog. The Crystal Creek stream crossing is currently unsuitable for stock due to the steepness of the trail down to the streambed and the large amount of rock and debris in the stream channel.

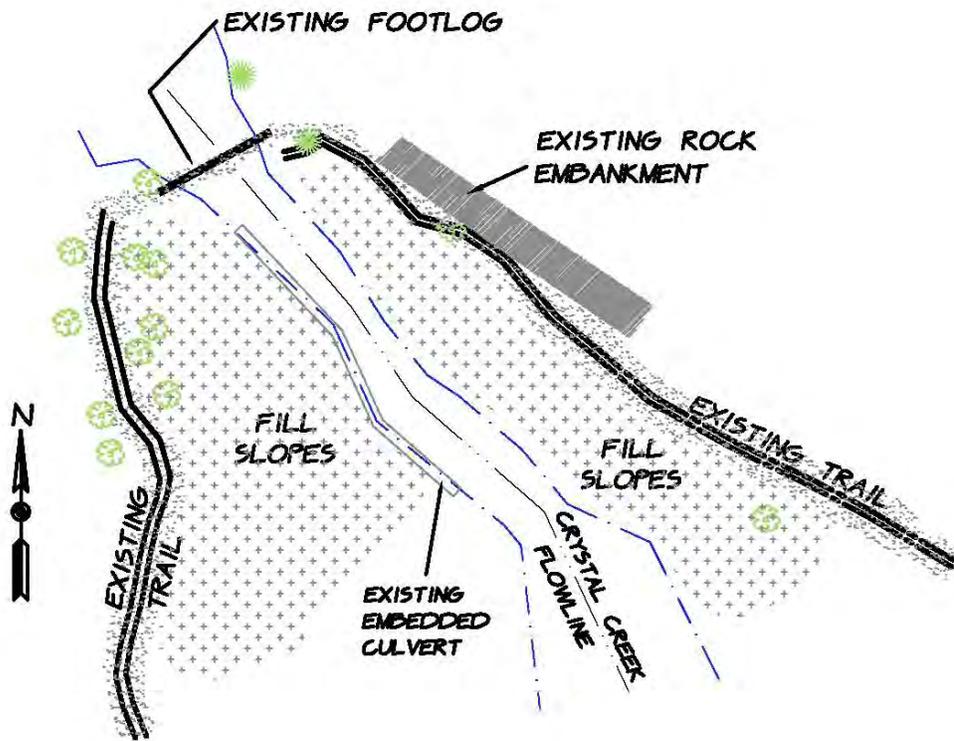
This stream crossing is located in an area that was originally constructed with a 60-inch diameter culvert set in a concrete headwall. Approximately 7,000 cubic yards of non-native fill was placed to cover the culvert and raise the level of the trail approximately 45 feet above the channel grade to match the adjoining trail approaches.

Figure 7: No Action Alternative, Crystal Creek Crossing Elevation.



The culvert was plugged with a large tree during a storm event, resulting in stormwater bypassing the culvert and eroding away the sides of the fill. The failed culvert remains partially exposed in the creek bed, buried beneath a large amount of debris. The concrete headwall remains intact. An estimated 5,000 cubic yards of fill material washed away. Approximately 2,000 cubic yards of fill material remain in place in the side slopes. This unstable fill is subject to further erosion into the creek.

Figure 8: No Action Alternative, Crystal Creek Crossing.



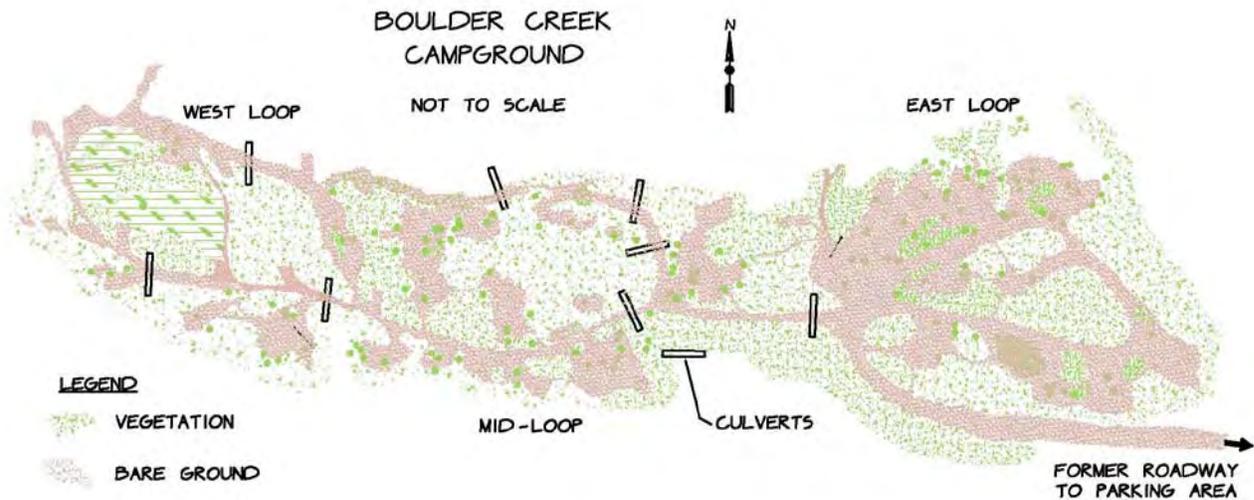
Abandoned Dump Site

An abandoned trash dump is located approximately 700 feet east of Crystal Creek, uphill from the Boulder Creek Trail. The dump site is approximately 30 by 50 square feet in size. The contents are partially buried, although there is visual evidence that people have continued to deposit trash at the site. Under the no action alternative the access to the abandoned trash dump would be allowed to recover naturally, leaving the trash dump in place.

Boulder Creek Campground Infrastructure

The Boulder Creek Campground (Figure 9) was once accessed by vehicles. Following closure of the Boulder Creek road, it is accessible to hikers but not stock users due to the failed stream crossing at Crystal Creek. The campground is comprised of numerous campsites, informal trail areas between campsites, a lower parking area separate from the campground and a short road segment between the former automobile parking area and the campsites. The former parking area is approximately 10,000 square feet and was once hardened, though it is currently eroded and deteriorated. The road segment to the campsites has experienced several small collapses of the uphill slope, resulting in a route of varying width now better defined as a trail. There are eleven CMP culverts along this trail between the former parking area and campground.

Figure 9: No Action Alternative, Campground Map.



Within the campground, previous development resulted in buried utility lines including sanitary sewer, water and storm drainage culverts. The buried utilities are not readily identifiable from the surface. There are two visible concrete foundations from restroom facilities which have been

removed. Two septic tank diversion boxes may also be present, although these have not been located. There are two pit toilets currently in use at the site, one in the campground and one in the former parking area. Approximately nine CMP culverts, ranging between 18 inches and 24 inches in diameter, are located within the campground. All have been partially or fully plugged and none function as intended. Trails throughout the campground have been built over the culverts and filled to raise the elevation of the trail between three and 15 feet. This results in altered topography and water flow patterns.

Under the No Action Alternative the campground would remain as-is, with the general circulation pattern of the former automobile campground. This would include the east, mid, and west loops, with the exception of the north end of the mid- and west-loops where wetlands have become established or expanded as a result of plugged culverts and altered water flow.

The remaining former campground road would remain at its current width except in areas where natural recovery occurs. Abandoned underground utilities would remain in place, as would the concrete foundations of the two former restrooms. Existing culverts would remain in place. The former campground parking lot would be left as-is, allowing natural recovery.

Campground Management

The campground contains approximately 30 campsites. The sites are not clearly delineated and camping occurs throughout the entire area of the campground. There are currently no designated group campsites or stock campsites. Some natural recovery of vegetation has occurred.

Campfires are currently permitted and one campfire ring is retained per campsite. In order to assist campers with proper food storage, bear wires are located within the campground to assist with the hanging of food out of the reach of park wildlife.

There are two pit toilets in the Boulder Creek campground; one in the campground area and one at the former campground parking lot. These would remain in place.

Both developed trails and social trails extend from the campground to the former parking lot, to Olympic Hot Springs, and to the Appleton Pass trail. These would remain in their current locations.

Approximately 1,640 overnight permits were issued for the Boulder Creek campground in 2008. In addition to overnight use, many visitors also picnic and hike through the campground on day trips and during longer backpacking trips through the area. In 2008 more than 70,000 visitors accessed the area via the Boulder Creek Trail (pers. Communication, M. Danisiewicz). Overnight wilderness permits are currently required for camping at the Boulder Creek

Campground. Permits may be obtained through the Wilderness Information Center (WIC) or at the Elwha Ranger Station. There is currently no limit on overnight or day use in the area.

Maintenance of the campground currently includes seasonal clearing of downed trees, cleaning and supply of the toilets and removal of garbage on an as-needed basis, generally once a week during the high visitor use season, as identified by rangers. Pit toilets must be reset and new holes dug approximately every seven years. The campground is patrolled by park rangers.

Resource management activities currently occurring in the campground include occasional treatment to eradicate non-native plants and ongoing monitoring of campsite conditions. Planting of denuded areas within the campground would not occur under the No Action Alternative.

Activities Common to All Action Alternatives

The following activities are included in all action alternatives (Alternatives 2, 3, 4). See Chapter III (Affected Environment) for a more detailed profile of the current environmental situation in the project area. To avoid adverse impacts to breeding northern spotted owls or marbled murrelets, any noise producing construction activities above ambient noise levels would not begin until after August 5, during or after the murrelet late breeding season (August 6 – September 15). During the project work period between August 6 and September 15, no work that generates above-ambient noise levels would take place at night or within two hours of sunrise and sunset, when murrelets are known to be most active. See Appendix A for a detailed list of mitigation measures common to all action alternatives.

Equipment and material storage and other staging activities would be located within the footprint of existing road, pullouts, and other areas that are currently disturbed unless otherwise indicated. Sections of the trail under construction would be closed to public access until asphalt removal and all activity involving the use of heavy equipment is complete. The conceptual design for trailhead improvements and trail and campground rehabilitation presented in this document may be modified during final design to best accommodate site-specific conditions and minimize resource impacts.

Boulder Creek Trailhead

Under all Action Alternatives the vehicle turnaround area would be expanded and paved to provide safe vehicular access, including vehicles towing stock trailers or other larger turning radius vehicles. This turnaround would be 80 feet in diameter and paved with approximately 2 to 3 inches of asphalt to provide a durable and lasting surface for the turning movements of

vehicles. The turnaround would be striped and signed “No Parking”. Construction of the turnaround would result in new clearing of approximately 4,750 square feet of vegetation and the placement of an estimated 5,100 square feet of asphalt pavement.

The turnaround would be constructed using heavy equipment, such as tracked excavators, wheeled loaders, backhoes, tractors, dump trucks and asphalt paving equipment (see Table 2). The work would take approximately 15 days and would be completed concurrently with removal of asphalt from the trail.

Additional animal-resistant trash receptacles and new recycling containers may be placed at the trailhead to accommodate increased visitor use. Additional restroom facilities may also be located at the trailhead if the existing toilet is found inadequate to meet visitor demand.

The Boulder Creek trailhead would be evaluated to determine if interpretive wayside exhibits are necessary to increase visitor understanding of the Olympic Hot Springs or other topics relevant to the park’s primary interpretive themes in the Olympic Hot Springs/Boulder Creek area.

Table 2: Equipment Required for Constructing New Vehicle Turnaround at Trailhead Parking Lot.

Equipment used	Duration (approx)	Noise Level (dBA)	Timing/Season
Tracked excavator	15 days	81-85	Aug. 6 - **
Wheeled front end loader	15 days	79-80	Aug. 6 - **
Dump truck	15 days	76-84	Aug. 6 - **
Paver	3 days	77-85	Aug. 6 - **
Compactor	5 days	80-83	Aug. 6 - **
Chainsaw	2 days	84-85	Aug. 6 - **
Dozer	5 days	82-85	Aug. 6 - **
Tractor	15 days	85	Aug. 6 - **
Pickup Truck	15 days	55-75	Aug. 6 - **
Hand tools	15 days	n/a	n/a

** - seasonal shutdown due to winter weather conditions

Boulder Creek Trail

Asphalt pavement would be removed from the Boulder Creek trail under all action alternatives. Removal of asphalt would affect an area of approximately 180,000 square feet, which includes the 155,000 square feet of asphalt paving to be removed. This disturbed area also includes disturbance of up to one foot along the outside edges of the asphalt and a limited amount of additional disturbance to route the trail outside of the established asphalt alignment, to provide adequate drainage.

Removal of all asphalt on the trail would require the use of heavy equipment, such as tracked excavators, backhoes, wheeled loaders, dump trucks, and hand equipment for approximately 55

days. Asphalt would be pulled up and stacked in piles using the excavators. The asphalt would then be loaded into dump trucks using the wheeled loaders. Where sensitive vegetation lines the edges of the trail, hand tools would be used to pull the remaining asphalt into the center of the trail where it would be loaded. The excavator and wheeled loader would be in continuous operation.

Table 3: Equipment Required for Removing Asphalt East of Crystal Creek Stream Crossing.

Equipment used	Duration (approx)	Noise Level (dBA)	Timing/Season
Tracked excavator	55 days	81-85	Aug. 6 - **
Wheeled front end loader	55 days	79-80	Aug. 6 - **
Backhoe / wheeled excavator	55 days	78-80	Aug. 6 - **
Dump trucks	55 days	76-84	Aug. 6 - **
Dozer	55 days	82-85	Aug. 6 - **
Tractor	55 days	85	Aug. 6 - **
Pickup Truck	55 days	55-75	Aug. 6 - **
Compressor	55 days	78-80	Aug. 6 - **
Hand tools	55 days	n/a	n/a

** - seasonal shutdown due to weather conditions

Asphalt located west of Crystal Creek, up to the campground parking lot, would be demolished and removed after September 15 or whenever heavy equipment could be delivered and operated without adversely affecting nesting marbled murrelets or northern spotted owls. This would require the delivery of an excavator and small wheeled backhoe/front loader to the campground parking lot by helicopter. Material would be demolished, collected into sling loads, and removed by helicopter to Sweets Field where it would be loaded into dump trucks for removal from the park. This would require an estimated 30 helicopter trips, each 30 minutes in length. Alternately, if the material can be moved to the east end of Crystal Creek without the use of a helicopter, it would be transported by dump trucks down the trail and out of the park.

Table 4: Equipment Required for Removing Asphalt West of Crystal Creek Stream Crossing.

Equipment used	Duration (approx)	Noise Level (dBA)	Timing/Season
Helicopter	30 trips - 30 min/ea	94	After September 15
Tracked excavator	10 days	81-85	After September 15
Backhoe / wheeled excavator	10 days	78-80	After September 15
Tracked or wheeled front end loader	10 days	79-80	After September 15
Flatbed Truck	10 days	79-80	After September 15
Hand tools	10 days	n/a	n/a

Temporary Large Vehicle Turnaround

Immediately east of Crystal Creek, a large slide area has covered the trail. In addition to clearing this slide from the trail to allow for removal of asphalt, additional material would be removed to allow for a vehicle turnaround for trucks hauling asphalt and soil out of the park. If necessary, this temporary turnaround would be maintained during construction using large native rocks or ecology blocks to prevent subsidence from the uphill slope. Construction of this turnaround would result in disturbance of approximately 2,200 square feet of the slide slope, which is a previously disturbed area.

Figure 10: Temporary Large Vehicle Turnaround.

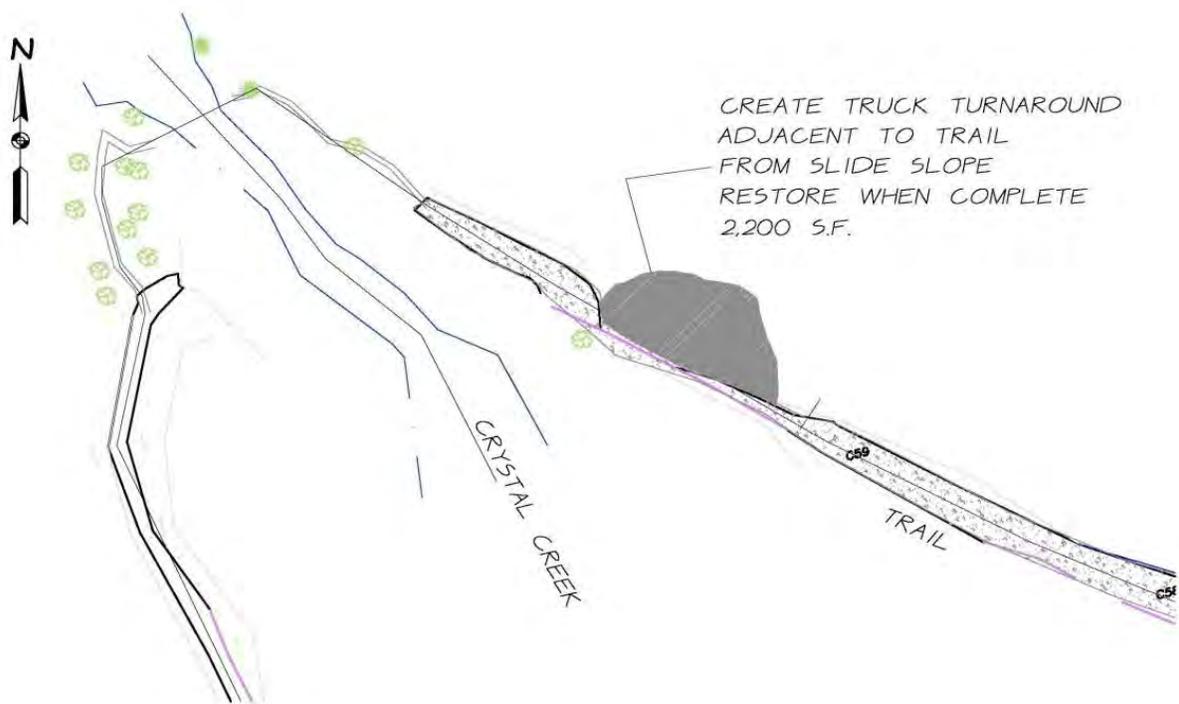


Table 5: Equipment Required for Constructing Temporary Large Vehicle Turnaround.

Equipment used	Duration (approx)	Noise Level (dBA)	Timing/Season
Tracked excavator	1 day	81-85	Aug. 6 - **
Dump Truck	1 day	76-84	Aug. 6 - **
Wheeled front end loader	1 day	79-80	Aug. 6 - **
Backhoe / wheeled excavator	1 day	78-80	Aug. 6 - **
Compactor	1 day	80-83	Aug. 6 - **
Hand tools	1 day	n/a	n/a

** - seasonal shutdown due to weather conditions

Boulder Creek Trail Culvert Removal

Under all Action Alternatives the existing culverts would be removed from the Boulder Creek trail. These culverts are between 3 feet and 8 feet deep and were placed to collect storm runoff from the road and hillside and divert it beyond the trail.

Removal of culverts would require the use of heavy equipment, such as tracked excavators, backhoes, wheeled loaders, dump trucks, and hand equipment for approximately six days. Culverts would be pulled up and stacked in piles using the excavators, then loaded into dump trucks for removal from the park. This work would not disturb any area outside of the trail corridor.

Table 6: Equipment Required for Removing Culverts from Trail.

Equipment used	Duration (approx)	Noise Level (dBA)	Timing/Season
Tracked excavator	6 days	81-85	Aug. 6 - **
Wheeled front end loader	6 days	79-80	Aug. 6 - **
Backhoe / wheeled excavator	6 days	78-80	Aug. 6 - **
Dump truck	6 days	76-84	Aug. 6 - **
Tractor	6 days	85	Aug. 6 - **
Pickup Truck	6 days	55-75	Aug. 6 - **
Hand tools	6 days	n/a	n/a

** - seasonal shutdown due to weather conditions

Improve Trail Grade at Former Culvert Locations

Following the removal of culverts, the trail grade would be improved using native soil to create a final grade matching the adjoining undisturbed trail. This work would be completed as part of the removal of asphalt along the trail. Re-establishment of the trail grade is necessary for the passage of equipment along the trail corridor. This work would require the use of a tracked excavator,

backhoe, wheeled loader, dump trucks and compactor. Construction of water bars or other appropriate trail building techniques would be used to manage water flow across the trail.

Table 7: Equipment Required for Improving Trail Grade at Former Culvert Locations.

Equipment used	Duration (approx)	Noise Level (dBA)	Timing/Season
Tracked excavator	5 days	81-85	Aug. 6 - **
Dump Truck	5 days	76-84	Aug. 6 - **
Wheeled front end loader	5 days	79-80	Aug. 6 - **
Backhoe / wheeled excavator	5 days	78-80	Aug. 6 - **
Compactor	5 days	80-83	Aug. 6 - **
Hand tools	5 days	n/a	n/a

** - seasonal shutdown due to weather conditions

Temporary Stream Crossings at Cougar and Hell Creeks

Temporary crossings would be placed over Cougar and Hell Creeks to allow the passage of trucks and equipment through the placement of equipment spanners. Spanners are self-contained bridging structures designed for the passage of heavy equipment and trucks. The spanners used would be approximately 50 feet in length and 12 feet wide, constructed of a steel framework and deck. Spanners would be painted a neutral color and would have a wood deck placed over the steel surfacing.

The equipment spanners would be transported to Cougar and Hell Creeks by truck. It would take approximately twenty minutes to deliver the spanner to Cougar Creek and approximately forty minutes to reach Hell Creek. They would be placed using tracked excavators, with installation taking an estimated thirty minutes for each temporary crossing. Once construction is complete, the spanner at Hell Creek would be removed to allow placement of a footlog. Removal of the spanner at Cougar Creek varies by alternative.

Figure 11: Temporary Spanner Bridge at Cougar Creek and Hell Creek.

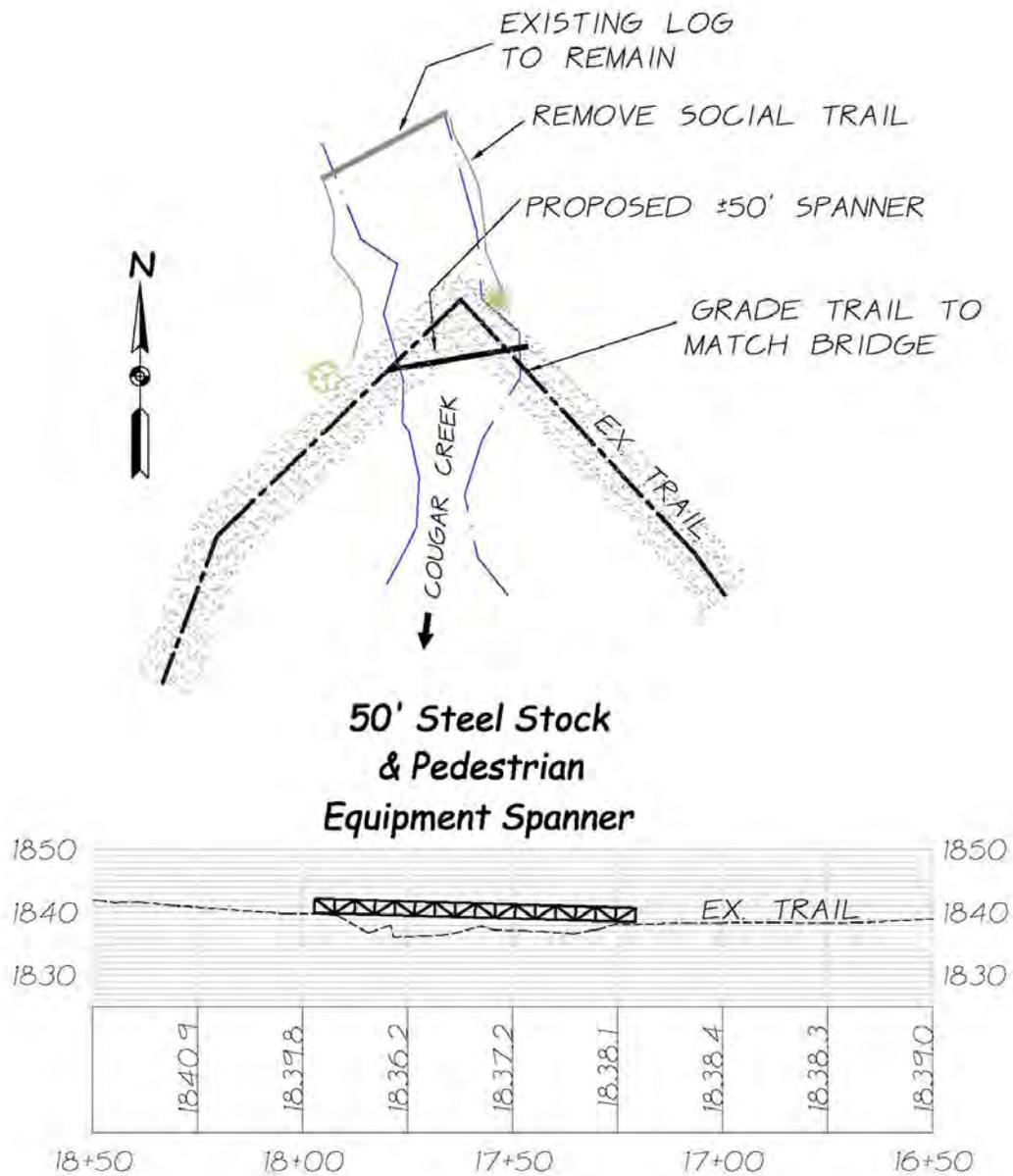
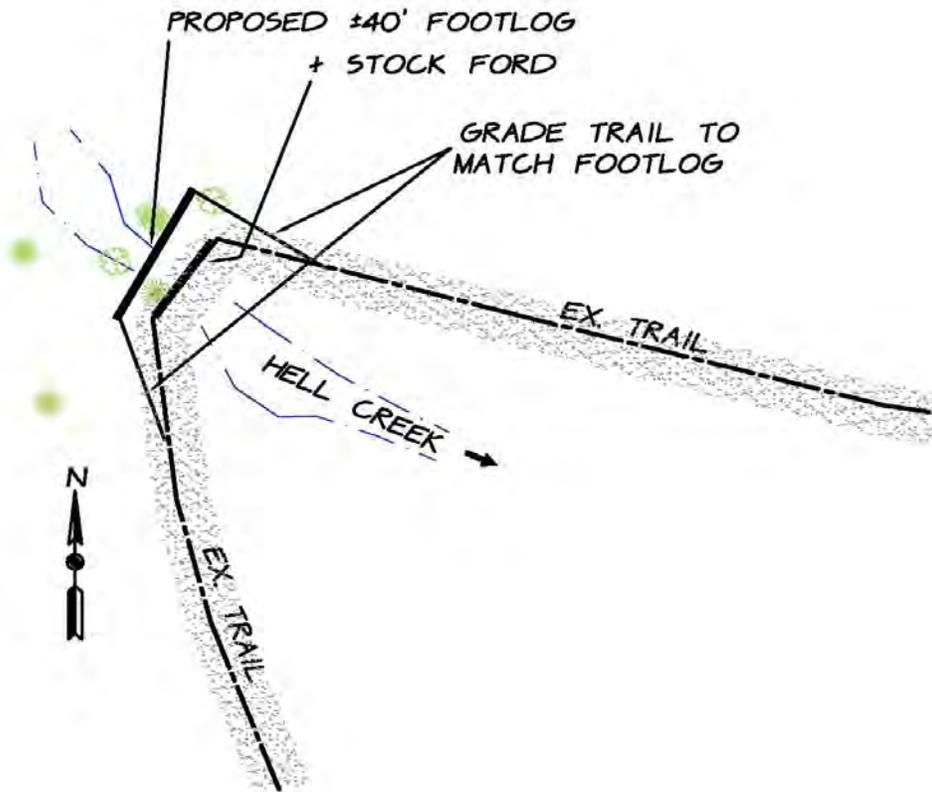


Figure 12: Footlog and Stock Ford at Hell Creek.



Hell Creek Stream Crossing

The partially collapsed wooden culvert at Hell Creek would be removed under all action alternatives. Following project completion, the Hell Creek crossing would be spanned by an approximately 40 foot long footlog for hikers and a ford for stock use along the existing trail alignment (Figure 12). The Hell Creek area would be surveyed to determine if a suitable fallen log is available nearby. If a suitable fallen log is not available, a fallen log would be located from another area of the park. If no suitable fallen log is available in the park, a log may be purchased from outside the park. The log would be transported to the stream crossing site either by motorized transport up the trail or by helicopter if trail access were infeasible.

If a log is transported to the stream crossing via the trail, work would utilize a truck and a loader. Temporary stream crossings would be placed across Cougar Creek to allow vehicles to drive up the trail. The work would last approximately 90 minutes. If transport over the trail is infeasible, the log would be flown to the project site using a helicopter. The log would be staged at Sweets Field (in the Elwha Valley) and transported using either a medium or heavy lift helicopter depending on the weight of the log. The duration of helicopter use needed to pick up the log, set

it in place, and leave the area would be approximately 30 minutes. This work would occur when the noise impact from the helicopter would not result in an adverse effect to nesting marbled murrelets. If a heavy lift helicopter were used, this would require a flight after September 15.

A stock ford would be created by constructing a spur trail from the main hiking trail down to the proposed ford. Any large rocks that may make the crossing unsafe for stock would be removed from the ford and placed nearby.

Table 8: Equipment Required for Removing Collapsed Culvert and Installing Footlog and Stock Ford at Hell Creek.

Equipment used	Duration (approx)	Noise Level (dBA)	Timing/Season
Wheeled front end loader	3 days	79-80	Aug. 6 - **
Flat bed truck	3 days	79-80	Aug. 6 - **
Backhoe / wheeled excavator	3 days	78-80	Aug. 6 - **
Helicopter (if needed – see text)	30 minutes	94	Aug. 6 - **
Chainsaw	1 day	84-85	Aug. 6 - **
Pickup Truck	3 days	55-75	Aug. 6 - **
Hand tools	3 days	n/a	n/a

** - seasonal shutdown due to weather conditions

Abandoned Trash Dump Site

The access route to an abandoned trash dump east of Crystal Creek would be blocked with large boulders or other natural materials where it intersects with the Boulder Creek Trail. This work would be done concurrently with asphalt removal from the trail using hand tools and a small excavator to loosen the soil and prepare it for rehabilitation. Treatment to restore the route would include placement of downed logs or rocks and planting of small to medium-sized native plants and trees. This placement of materials is expected to result in disturbance of approximately 60 square feet to match the placed material to the adjoining vegetation line.

The excavator and hand equipment would be driven to the site from the trailhead. This would require temporary vehicle crossings be placed over both Cougar and Hell Creeks. Treatment of the actual dump site will be determined after the site is evaluated by the National Park Service in accordance with federal law and policy. This includes an assessment of the site to determine if any contaminants are present that would require treatment. If removal of materials from the site is necessary, the area would be evaluated to determine if any historic materials requiring special treatment are present. If necessary, appropriate mitigation measures would be taken to address any adverse effects to historic properties.

Table 9: Equipment Required for Blocking and Rehabilitating Route to Abandoned Trash Dump.

Equipment used	Duration (approx)	Noise Level (dBA)	Timing/Season
Tracked excavator	1 day	81-85	Aug. 6 - **
Backhoe / wheeled excavator	1 day	78-80	Aug. 6 - **
Pickup Truck	1 day	55-75	Aug. 6 - **
Hand tools	1 day	n/a	n/a

** - seasonal shutdown due to weather conditions

Crystal Creek Culvert Removal

Within Crystal Creek, a failed 60 inch culvert that is partially buried in the stream channel would be excavated and removed. This would require the use of cutoff saws, cables, winches and tracked equipment staged on the trail above the culvert. The culvert would be chopped into pieces and removed from the park by transport down the trail. The concrete headwall located in the stream channel would also be removed. Removal of the culvert and headwall would allow for the natural movement of water within the channel and of slope material, both of which are not blocked by the culvert. This work would be concurrent with asphalt removal while temporary crossings are in place over Cougar and Hell Creeks to allow the movement of equipment along the trail.

Table 10: Equipment Required for Removing 60" Diameter Culvert and Concrete Headwall from Crystal Creek.

Equipment used	Duration (approx)	Noise Level (dBA)	Timing/Season
Tracked excavator	3 days	81-85	Aug. 6 - **
Dump Truck	3 days	76-84	Aug. 6 - **
Wheeled front end loader	3 days	79-80	Aug. 6 - **
Hand tools	3 days	n/a	Aug. 6 - **

Boulder Creek Campground Infrastructure

Under all Action Alternatives the culverts located in the campground would be removed. These culverts are between three to 15 feet deep and were placed to create a more level trail surface throughout the campground. After culverts are removed, any fill material present would be removed and graded to restore natural topography and drainage patterns in the area.

Concrete foundations from two former restrooms would also be removed and the area restored to natural grade. If located, concrete septic tanks would also be removed. Removal of the culverts and foundations as described above would result in disturbance of approximately 2,000 square feet.

Helicopter transport would be used to deliver and remove a small excavator with a front blade and tractor for the excavation and removal of culverts and foundations from the site. It is anticipated that this would require approximately two trips to deliver equipment, and eight trips to remove equipment, culverts, and restroom foundations from the campground. This work would be done in a manner that avoids adverse effects to northern spotted owls and marbled murrelets due to construction and noise impacts, and would be coincident with delivery of equipment for removal of asphalt from the trail on the west side of Crystal Creek.

The equipment would be driven to the east side of Crystal Creek and staged for helicopter lift to the campground parking lot. Each helicopter flight would be approximately 15 minutes long for delivery and removal of the equipment and materials using a heavy lift helicopter.

Table 11: Equipment Required for Removing Culverts and Restoring Natural Grades at Campground, Removing Concrete Foundations, and Preparing Site for Revegetation.

Equipment used	Duration (approx)	Noise Level (dBA)	Timing/Season
Helicopter	10 trips (15 min ea)	94	after September 15
Tracked excavator, small	10 days	81-85	after September 15
Backhoe / wheeled excavator	10 days	78-80	after September 15
Tractor	10 days	85	after September 15
Chainsaw	3 days	84-85	after September 15
Hand equipment	10 days	n/a	after September 15

Note that delivery of this equipment is coincident to delivery of equipment for asphalt removal west of Crystal Creek

Campfire Ban

Campfires and the collection of firewood would no longer be allowed at the Boulder Creek campground. Existing campfire rings would be broken down, and the rocks scattered to discourage this use.

Campground Revegetation and Maintenance

Campsites would be clearly delineated under all Action Alternatives, although the size and number of sites and varies by alternative. Trails from the campground to the former parking lot, hot springs, and Appleton Pass trail would remain in their current locations.

The road extending between the former parking lot and campground would be converted to a trail by narrowing any remaining wide sections. Areas outside of the trail would be scarified,

delineated with the placement of downed logs or boulders, and actively planted to enhance natural recovery. Downed logs would be obtained from the surrounding area, if available. If downed logs are obtained from outside the immediate area they may be brought to the site using a helicopter for transport. If helicopter support is necessary it would occur outside of the breeding season of listed species in the project area to avoid adverse effects associated with elevated noise levels from helicopter use that have the potential to harass sensitive species.

Maintenance of the campground would continue to include seasonal clearing of downed trees, cleaning and resupply of the toilets and removal of garbage on an as-needed basis, generally once a week during the high visitor use season. Relocating and excavating the pit for the pit toilets would be completed as required, generally every seven years, using hand tools. The type of toilet may be modified to allow for improved maintenance. The campground would continue to be patrolled by park rangers.

Active revegetation of denuded areas within the campground would occur outside of delineated campsites and visitor use areas under all Action Alternatives, although the extent of areas to be revegetated varies by alternative. Initial preparation of the ground for revegetation efforts would be completed using wheeled tractors with discs and tilling attachments. Work would also be done using hand tools. Any work performed with equipment would be staged to coincide with asphalt removal on the trail and potential helicopter flight time. The excavator and hand equipment would be driven to the east side of Crystal Creek and staged for a helicopter lift to the campground parking lot. The helicopter flight would be approximately 15 minutes each for delivery and removal of the equipment using a heavy lift helicopter. Additional restoration and revegetation work would continue to occur in the project area in a manner consistent with the park's wilderness restoration program.

Any downed logs used for trail or campsite delineation from outside of the immediate project area would be staged at either Sweets Field or another appropriate helicopter-accessible site. The helicopter flight would be approximately 30 minutes each for delivery using a heavy lift helicopter. The number of trips would be established based on the weight of logs and the number needed for trail and campsite delineation. Flights would be limited to after September 15.

Table 12: Equipment Required for Campground Revegetation and Maintenance.

Equipment used	Duration (approx)	Noise Level (dBA)	Timing/Season
Helicopter	1 trip (15 min)	94	after September 15
Tractor	5 days	85	after September 15
Chainsaw	2 days	84-85	after September 15
Hand Tools	15 days	85	after September 15

Note that delivery of this equipment is coincident to delivery of equipment for asphalt removal west of Crystal Creek

Future Wilderness Designation

The Washington Park Wilderness Act (1988) designated the Boulder Creek campground as potential wilderness. The Boulder Creek Trail (former road) is currently outside the potential wilderness designation area, but would become suitable for wilderness designation if the road is removed.

The Boulder Creek Campground and Trail would both be considered for designation as wilderness, within the National Wilderness Preservation System under all action alternatives upon the successful removal of abandoned infrastructure and restoration of natural conditions within previously disturbed areas.

Mitigation Measures to Avoid or Reduce Impacts to Natural and Cultural Resources

The National Park Service has identified mitigation measures that would be implemented under all Action Alternatives in order to avoid or minimize adverse effects to natural and cultural resources and visitor experience. Detailed descriptions of these actions are included in Appendix A.

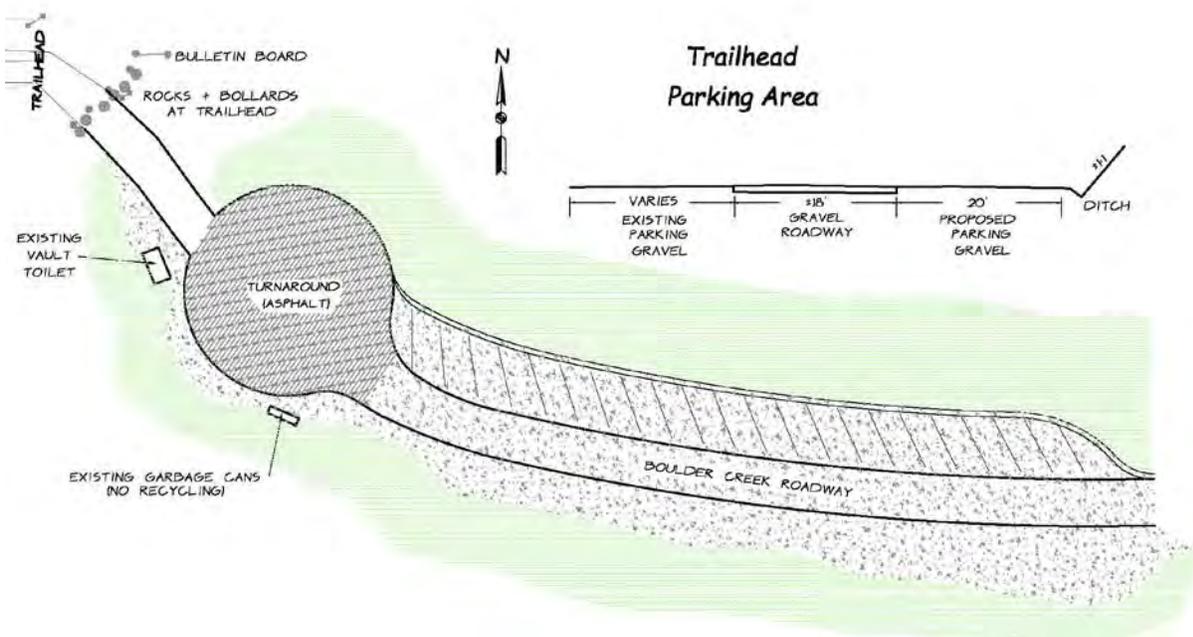
Alternative 2 – Minimum Visitor Services Infrastructure, Extensive Restoration

Under Alternative 2, the National Park Service would implement the actions identified for the Boulder Creek Trail and Campground in the 2008 General Management Plan so as to create and maintain the minimum amount of infrastructure necessary to achieve project objectives.

Boulder Creek Trailhead

Under Alternative 2 the Boulder Creek trailhead would be expanded to provide additional parking on the north side of the existing road for approximately 21 vehicles (Figure 13). This new parking area would be constructed using compacted gravel. New parking spaces would be approximately 12 feet wide and 24 feet long, and angled to maintain a road corridor that is approximately 20 feet wide. Vehicles would continue to park on the wide gravel shoulder on the south side of the road, providing space for approximately 15 additional vehicles. This would provide parking for a total of approximately 36 vehicles. Drainage would continue to be through sheet flow distributed across the south side of the roadway. As described in Activities Common to All Alternatives, the vehicle turnaround area would be expanded and paved in order to accommodate vehicles towing stock trailers.

Figure 13: Alternative 2, Expanded Trailhead Parking Area.



Expanding the parking area would require cutting approximately 2,100 cubic yards of soil from the northern slope of the existing road corridor. No fill would be required. After construction the trailhead parking area would include approximately 5,100 square feet of asphalt surface in the turnaround and approximately 22,000 square feet of gravel, including that already in place along the south edge of the roadway. Construction of the parking area (not including the vehicle turnaround area) would result in new clearing of an estimated 15,500 square feet of vegetation.

Construction of the expanded parking area would require the use of heavy equipment, including a wheeled loader, tracked excavator, backhoe, grader, dump trucks, tree felling equipment, and soil compactors. Work would require approximately 20 full days of construction to complete (in addition to the turnaround construction). Dump trucks hauling excavated soil to a disposal area outside the park would use the Olympic Hot Springs road and would pass adjacent to campgrounds and private residences immediately outside the park. Work would need to be completed after August 5 to minimize noise related impacts to marbled murrelets and northern spotted owls during the early nesting season.

Table 13: Equipment Required for Expanding Vehicle Parking at Trailhead on North Side (Compacted Gravel Surface).

Equipment used	Duration (approx)	Noise Level (dBA)	Timing/Season
Tracked excavator	20 days	81-85	Aug. 6 - **
Wheeled front end loader	20 days	79-80	Aug. 6 - **
Dump truck	20 days	76-84	Aug. 6 - **
Dozer	5 days	82-85	Aug. 6 - **
Tractor	20 days	85	Aug. 6 - **
Grader	5 days	85	Aug. 6 - **
Compactor	5 days	80-83	Aug. 6 - **
Chainsaw	1 day	84-85	Aug. 6 - **
Pickup Truck	20 days	55-75	Aug. 6 - **
Hand tools	20 days	n/a	n/a

** - seasonal shutdown due to weather conditions

Boulder Creek Trail

Under Alternative 2, approximately 155,000 square feet of asphalt, including pavement now covered by soil and vegetation, would be cleared and excavated using heavy equipment as described under Activities Common to All Alternatives. This would result in disturbance of up to 180,000 square feet of are on or surrounding the trail. The trail would be rehabilitated and managed as a hiking and stock use trail. The trail tread would be either natural tread or gravel, typically maintained on an annual basis. The trail corridor would be maintained to provide vegetation clearance to a width of 6 feet and vertical height of eight feet. The trail would be approximately 18 inches to 24 inches wide.

Areas outside of the trail width would be scarified using heavy equipment or hand tools to prepare the soil for revegetation and natural recovery.

Stream Crossings

Under Alternative 2, all stream crossing would be constructed using footlogs and stock fords to provide safe access for visitors and park staff. Removal of the temporary spanner bridges placed at Cougar and Hell Creeks during construction would occur prior to placement of the footlogs. Footlogs would be set on wood abutments at each end on flat and stable ground. Footlogs would be located at or below the level of ordinary high water. The footlog at Cougar Creek would be approximately 40-feet long with hand rails. The footlog at Hell Creek is described under activities common to all alternatives. The footlog at Crystal Creek would require placement of a log approximately 50-feet long with a handrail.

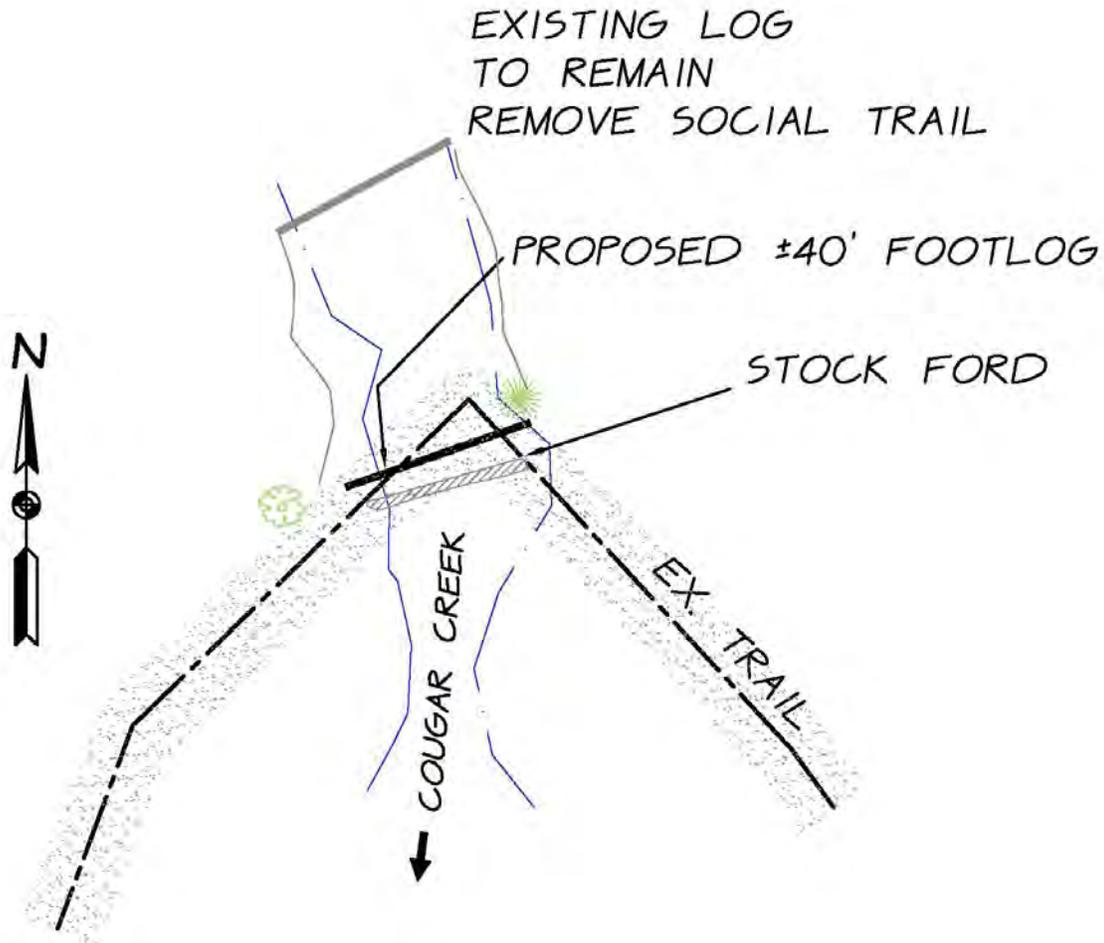
This would require locating and transporting suitable logs from outside of the immediate area of the stream crossings unless suitable downed logs are found immediately adjacent to the project area. The footlogs would be delivered by helicopter. The logs would be staged at Sweets Field (in the Elwha Valley) and transported using either a medium or heavy lift helicopter, depending on the weight of the log.

The duration of helicopter use would be an estimated thirty minutes. This would include picking up the log, delivering the log to the stream crossing, and setting it in place. This operation would take require three trips, one per stream crossing. Helicopter flights would be scheduled to avoid adverse effects to nesting marbled murrelets and northern spotted owls due to helicopter noise.

Table 14: Equipment Required for Delivering and Installing Footlog at Cougar Creek.

Equipment used	Duration (approx)	Noise Level (dBA)	Timing/Season
Helicopter	1 trip @ 30 min.	94	After September 15
Tracked excavator	5 days	81-85	After September 15
Backhoe / wheeled excavator	5 days	78-80	After September 15
Tracked or wheeled front end loader	5 days	79-80	After September 15
Dump truck	5 days	76-84	After September 15
Flatbed Truck	5 days	79-80	After September 15
Pickup Truck	5 days	55-75	After September 15
Hand tools	5 days	n/a	After September 15

Figure 14: Alternative 2, Cougar Creek Footlog Crossing.



At Cougar and Hell Creeks, the trail grade generally matches the proposed elevation of the footlogs. Only minimal grading would be required to match the trail grade to the footlog elevations. At Crystal Creek the footlog elevation is approximately 40 feet below the grade of the existing trail. The trail would be graded to match the elevation of the new Crystal Creek footlog and stock ford. This would require blasting and removal of approximately 1,400 cubic yards of rock from the eastern side of the trail. The trail would descend at a slope of approximately ten percent down to the footlog. An estimated 2,500 cubic yards of fill material would also need to be blasted and cut from the trail embankment to bring the trail to a stable slope at the elevation of the footlog.

Work at Crystal Creek would entail the use of a track-mounted rock drill, generator, air compressor and blasting materials. A wheeled loader, backhoe, tracked excavator, and dump trucks would be used to remove the material from the park. Drilling, blasting and removal of the material would extend over approximately fifteen days. Temporary fencing would be placed between the blast zone and the stream to reduce the quantity of material entering the stream. Best

management practices as described in Appendix A would be used to minimize the amount of material entering Crystal Creek during construction. However, it is anticipated that up to 250 cubic yards of rock and fill materials may enter the stream channel.

Figure 15: Alternative 2, Crystal Creek Footlog Crossing.

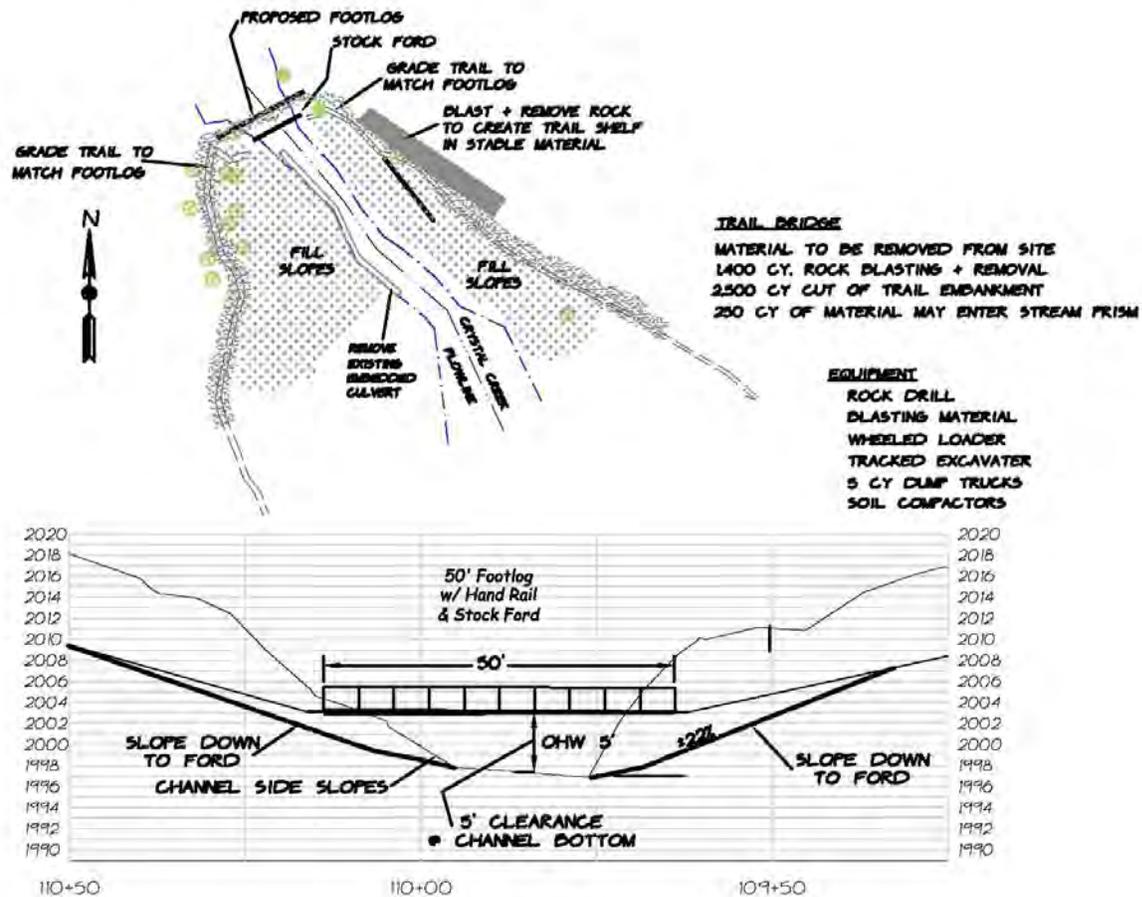


Table 15: Equipment Required for Delivering and Installing Footlog at Crystal Creek.

Equipment used	Duration (approx)	Noise Level (dBA)	Timing/Season
Helicopter	1 trip @ 30 min.	94	After September 15
Rock Drill w/ compressor	15 days	81-85	After September 15
Blasting	15 days	94-105	After September 15
Tracked excavator	15 days	81-85	After September 15
Backhoe / wheeled excavator	15 days	78-80	After September 15
Tracked or wheeled front end loader	15 days	79-80	After September 15
Dump truck	15 days	76-84	After September 15
Flatbed Truck	15 days	79-80	After September 15
Pickup Truck	15 days	55-75	After September 15
Hand tools	15 days	n/a	n/a

Construction of the stock ford would require splitting the stock trail from the pedestrian trail and constructing new trail down to the stream grade at the crossing and removing any large rocks or debris present in the stream channel in the location of the proposed ford. The stock trail would drop at a slope of approximately 20 percent. This work would be performed immediately following the completion of work to construct the trail to the footlog (above). It is anticipated that any blasting necessary would be completed as described above in constructing the trail segment. A wheeled loader, tracked excavator and dump trucks would be used to create the stock trail and remove excess material to outside the park. Work would extend over approximately eight days.

Table 16: Equipment Required for Creating Stock Fords at Cougar Creek and Crystal Creek.

Equipment used	Duration (approx)	Noise Level (dBA)	Timing/Season
Tracked excavator	8 days	81-85	After September 15
Dump Truck	8 days	76-84	After September 15
Wheeled front end loader	8 days	79-80	After September 15
Backhoe / wheeled excavator	8 days	78-80	After September 15
Hand tools	8 days	n/a	n/a

This work would be conducted in a manner that avoids adverse effects to northern spotted owls and marbled murrelets due to noise impacts during the early breeding season. Blasting and preparation of the trail bed would be the first element of the project and would occur after September 15th. Temporary crossings would be placed across Cougar and Hell Creek to allow the required equipment to reach the east side of Crystal Creek. This schedule would provide for construction activities outside of the breeding window for special status species, but would likely require that the contractor mobilize to complete the work, demobilize for the winter and remobilize the next spring to continue the work.

Boulder Creek Campground

Under Alternative 2 all of the obsolete infrastructure within the campground would be removed, including the abandoned underground sanitary sewer and water utilities, storm drain culverts, and the concrete foundations of two former restrooms. This would require extensive excavation and recontouring to allow for removal of buried materials and the restoration of natural topography. As much as 10,000 square feet of disturbance would occur during this removal, spread out throughout the campground and centered over the utility lines and foundations.

A trail would be delineated through the former campground parking lot toward the hot springs trail and the existing pit toilet. Equipment would be used to recontour the compacted soil of the parking lot. Active site restoration would include soil scarification and revegetation.

Under Alternative 2 seven campsites would be delineated within the east (CCC) loop using downed logs and other natural materials. Campsites would be located in traditionally used areas where removal of mature vegetation would not be required. Two of the campsites would be designed to accommodate large groups of 7 to 12 people.

The mid and west loops of the campground would be closed to camping and restored to natural conditions. Extensive rehabilitation would occur in the denuded areas outside of designated campsites and visitor use zones. Soil scarification, active revegetation and natural recovery would help restore previously disturbed sites to natural conditions.

No new infrastructure would be installed to support stock use under this alternative. No hitching posts would be built, and no campsite for stock users would be developed.

Alternative 3 – Provide Moderate Visitor Services, Active Revegetation

Under Alternative 3, the National Park Service would implement the actions identified for the Boulder Creek Trail and campground in the 2008 General Management Plan by taking actions necessary to achieve project objectives as identified in Alternative 2, while providing limited additional visitor services.

Boulder Creek Trailhead

Under Alternative 3 the Boulder Creek trailhead would be expanded to provide additional parking on the north side of the existing road for approximately 21 vehicles (Figure 16). This new parking area would be constructed using a permeable non-asphalt surfacing material. New parking spaces would be approximately 12 feet wide and 24 feet long, and angled to maintain a road corridor that is approximately 20 feet wide. Vehicles would also continue to park on the wide gravel shoulder on the south side of the road, providing space for approximately 15 additional vehicles. This would provide parking for a total of approximately 36 vehicles. Drainage would continue to be through sheet flow distributed evenly across the south side of the roadway, aided by the permeability of the surfacing material.

As described in Actions Common to All Alternatives, the vehicle turnaround area would be expanded and paved to accommodate vehicles towing stock trailers.

Expanding the parking lot and vehicle turnaround area would require cutting approximately 2,100 cubic yards of soil from the northern slope of the existing road corridor. No fill would be required. After construction, the surface of the trailhead would include approximately 5,100 square feet of asphalt in the turnaround, 16,700 square feet of permeable paved surfacing in the new parking area and replacing the existing asphalt roadway, with 5,300 square feet of gravel remaining along the south side of the road. Construction of the parking area (not including the turnaround) would result in new clearing of approximately 15,500 square feet of vegetation.

Construction of the expanded parking lot and vehicle turnaround would require the use of heavy equipment, including a backhoe, wheeled loader, tracked excavator, grader, dump trucks, tree felling equipment, soil compactors, and a paving machine. Work would occur during daylight hours. Work would require approximately 30 full days of construction to complete. Trucks hauling excavated soil to a disposal area outside the park would use the Olympic Hot Springs road and thus pass adjacent to campgrounds and private residences located immediately outside the park. Work would be scheduled to minimize noise related impacts to special status species and to provide for temperatures suitable for asphalt placement.

Figure 16: Alternative 3, Expanded Parking at Trailhead.

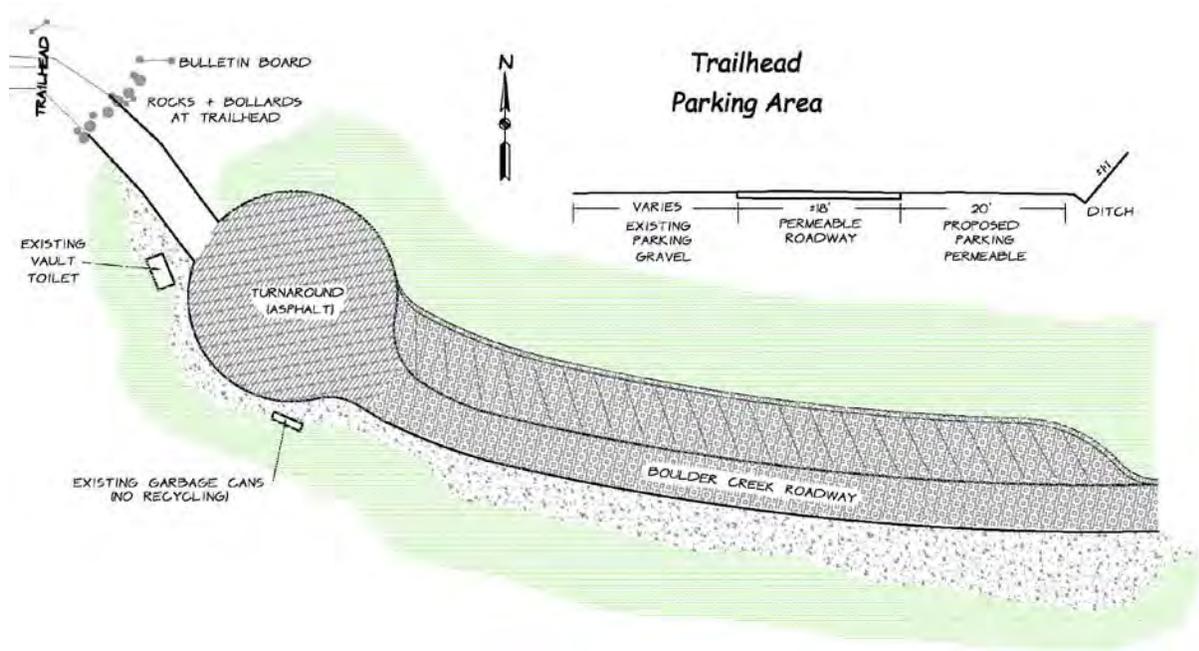


Table 17: Equipment Required for Expanding Vehicle Parking at Trailhead on North Side (Permeable Non-asphalt Surface).

Table 2.24, equipment to expand vehicle parking at trailhead on north side (permeable non-asphalt)

Equipment used	Duration (approx)	Noise Level (dBA)	Timing/Season
Tracked excavator	30 days	81-85	Aug. 6 - **
Wheeled front end loader	30 days	79-80	Aug. 6 - **
Dump truck	30 days	76-84	Aug. 6 - **
Grader	30 days	85	Aug. 6 - **
Compactor	30 days	80-83	Aug. 6 - **
Chainsaw	30 days	84-85	Aug. 6 - **
Paver		77-85	Aug. 6 - **

Boulder Creek Trail

Under Alternative 3, approximately 155,000 square feet of asphalt, including pavement now covered by soil and vegetation, would be cleared and excavated using heavy equipment as described under Activities Common to All Alternatives. This would result in disturbance of up to 180,000 square feet of area on or surrounding the trail. The trail would be rehabilitated and managed as a hiking and stock use trail. The trail tread would be either natural tread or gravel, typically maintained on an annual basis. The trail corridor would be maintained to provide

vegetation clearance to a width of 8 feet and vertical height of 10 feet. The trail would be approximately 24 inches to 30 inches wide.

Areas outside of the trail width would be scarified using heavy equipment or hand tools to prepare the soil for revegetation and natural recovery.

Stream Crossings

Under Alternative 3, the stream crossings at both Cougar and Hell Creeks would be accomplished by installing footlogs and stock fords as described in Alternative 2.

The stream crossing at Crystal Creek would be through the placement of a weathering steel bridge approximately 80 feet long and 6 feet wide. The bridge would have handrails for safety and would have a wood deck. The bridge would provide an estimated 12 feet of clearance from the bottom of the creek channel, and approximately 7 feet of clearance above the ordinary high water mark (OHW).

The bridge would be designed to accommodate both pedestrian and stock use, and sized to account for snow loads. This would require the professional design and construction of a bridge offsite and transport by truck for staging prior to helicopter delivery. Concrete abutments for the bridge would be constructed during the course of asphalt removal along the trail. Abutments would be set according to design drawings of the bridge. The size of the reinforced concrete abutments would be approximately 8 feet by 4 feet by 4 feet deep, although final size may change during design, and would be placed on each end of the bridge. Little or no new disturbance would occur, as the work would take place within the existing trail corridor.

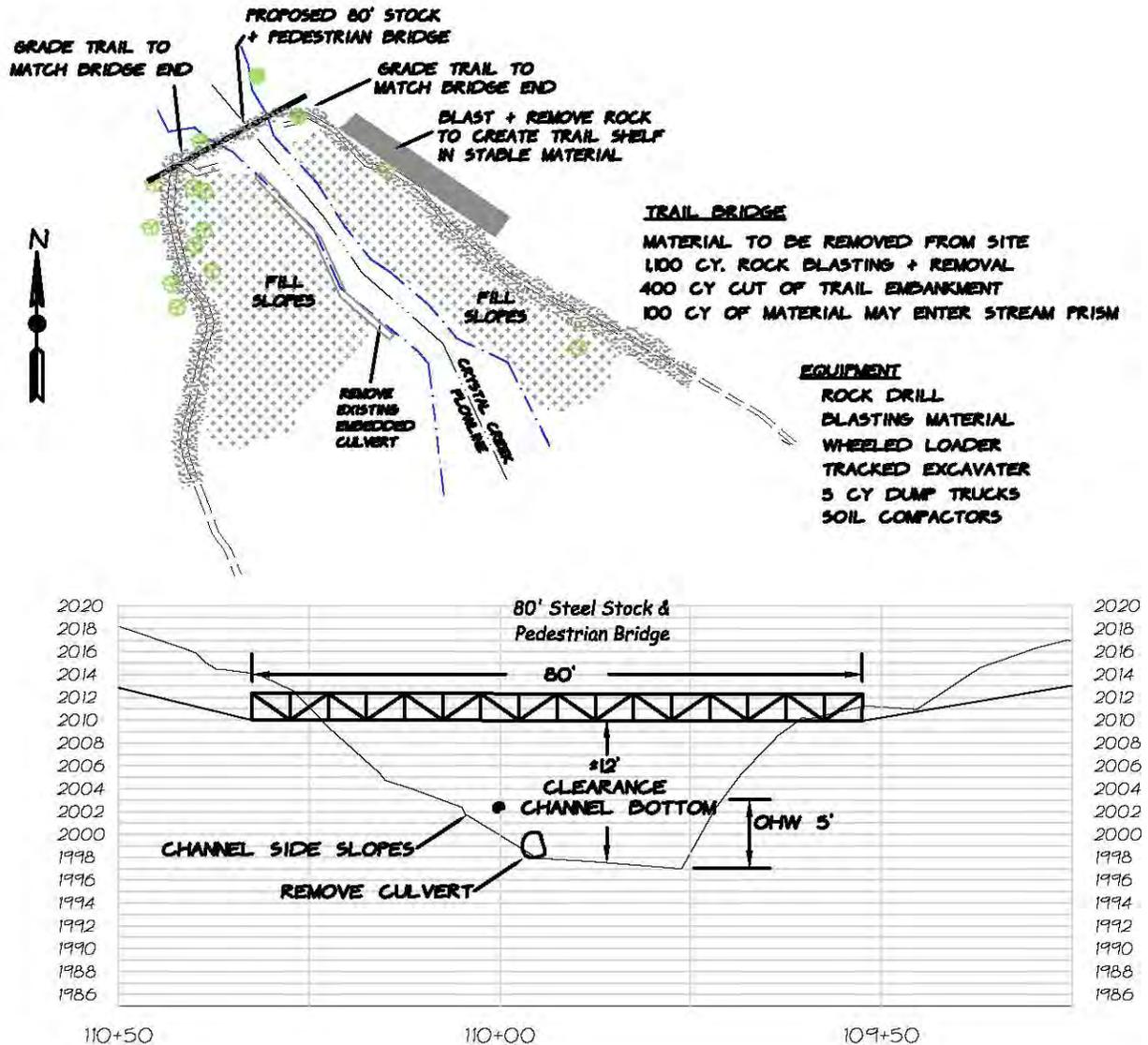
Concrete for the uphill abutment at Crystal Creek would be delivered by helicopter. Concrete for the downhill abutment would be delivered up the trail.

Transport of the bridge would be via helicopter. The bridge would be staged at Sweets Field and transported using a heavy lift helicopter. The trip from picking up the bridge to setting it in place on the prepared abutments would take approximately one hour. This work would be timed to occur outside of the nesting season for marbled murrelets and northern spotted owls to avoid adverse effects due to the noise of the helicopter.

The proposed bridge elevation at Crystal Creek is approximately 25 feet below the grade of the existing trail. The trail would be graded to match the elevation of the new Crystal Creek bridge, requiring blasting and removal of approximately 1,100 cubic yards of rock from the eastern side of the trail. The trail would descend at a slope of approximately 10 percent down to the bridge. An estimated 400 cubic yards of fill material would also need to be blasted and cut from the trail embankment to establish a stable slope at the elevation of the bridge.

Work at Crystal Creek would require the use of a track-mounted rock drill, generator, air compressor and blasting materials. A wheeled loader, tracked excavator and dump trucks would be used to remove the material to outside the park. The decibel level of the rock drill would be for sustained periods while the blasting would be for very short periods during the course of work.

Figure 17: Alternative 3, Crystal Creek 80' Span Bridge.



Drilling, blasting and removal of the material will extend over approximately fifteen days. Temporary fencing would be placed between the blast zone and the stream to reduce the quantity of material entering the stream. Best management practices as described in Appendix A would be used to minimize the amount of material entering Crystal Creek during construction.

However, it is anticipated that up to one hundred cubic yards of rock and fill materials may enter the stream channel.

Table 18: Equipment Required for Delivering and Installing 80' Bridge at Crystal Creek.

Equipment used	Duration (approx)	Noise Level (dBA)	Timing/Season
Helicopter	1 trip @ 60 min for bridge 12 trips @ 30 min for concrete	94	After September 15
Tracked excavator	15 days	81-85	After September 15
Backhoe / wheeled excavator	10 days	78-80	After September 15
Wheeled front end loader	15 days	79-80	After September 15
Rock Drill	8 days	81-85	After September 15
Blasting	8 days	94-105	After September 15
Dump Truck	15 days	76-84	After September 15
Tracked excavator	15 days	81-85	After September 15
Generator	15 days	81-82	After September 15
Hand Tools	15 days	n/a	After September 15

This work would be conducted in a manner that avoids adverse effects to northern spotted owls and marbled murrelets due to noise impacts during the early breeding season. Blasting and preparation of the trail bed would be the first element of the project and would occur after September 15th. Temporary crossings would be placed across Cougar and Hell Creek to allow the required equipment to reach the east side of Crystal Creek. This schedule would provide for construction activities outside of the breeding window for special status species, but would likely require that the contractor mobilize to complete the work, demobilize for the winter and remobilize the next spring to continue the work.

Boulder Creek Campground

Under Alternative 3 the culverts and visible concrete foundations of the former restrooms would be removed as described under Activities Common to All Alternatives.

A trail would be delineated through the former campground parking lot toward the hot springs trail and the existing pit toilet. Equipment would be used to recontour the compacted soil of the parking lot. Active site restoration would include soil scarification and revegetation.

Under Alternative 3, five campsites would be delineated within the east (CCC) loop and three sites would be delineated within the mid-loop using downed logs and other natural materials.

Campsites would be located in traditionally used areas where removal of mature vegetation would not be required. Three of the campsites would be designed to accommodate large groups of seven to twelve people.

The west loop of the campground would be closed to camping and restored to natural conditions. Extensive rehabilitation would occur in the denuded areas outside of designated campsites and visitor use zones. Soil scarification, active revegetation and natural recovery would help restore previously disturbed sites to natural conditions.

New infrastructure to support stock use under this alternative would be limited to the installation of a wood hitching post in the area of the former campground parking to support day-use of the area by people traveling with pack stock. No campsite for stock users would be developed.

Alternative 4 – Provide Enhanced Visitor Services, Active Revegetation (Management Preferred)

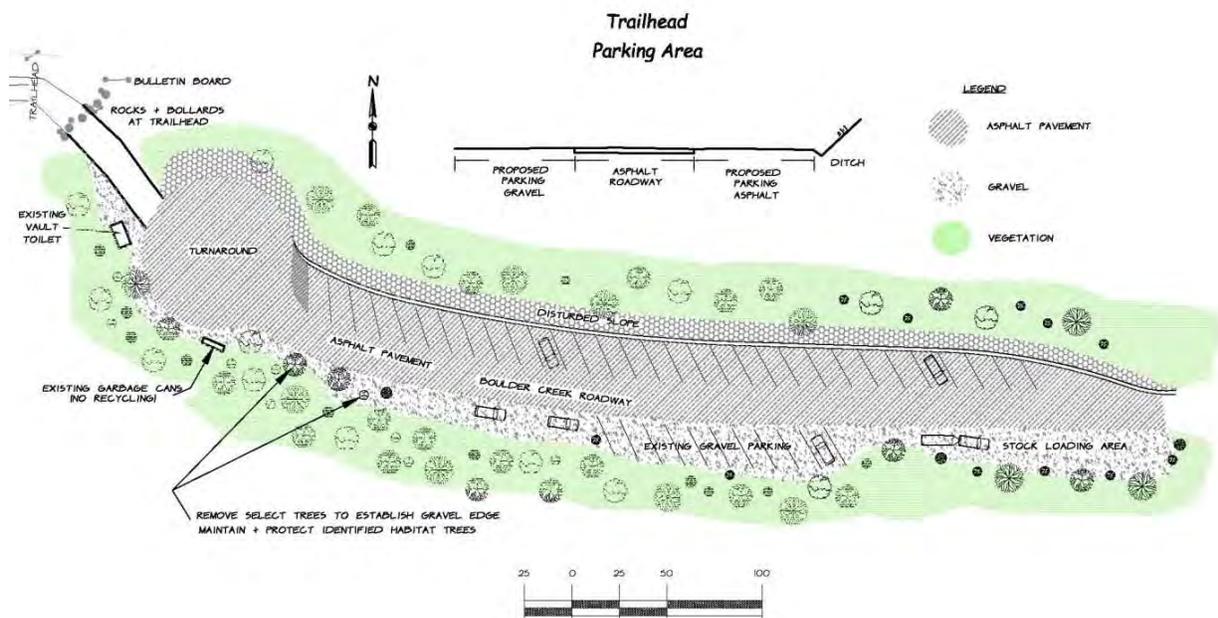
Under Alternative 4, the National Park Service would implement the actions identified for the Boulder Creek Trail and campground in the 2008 General Management Plan by taking actions necessary to achieve project objectives, while providing additional visitor services by further expanding the parking lot at the Boulder Creek trailhead, installing bridges at the Cougar Creek and Crystal Creek stream crossings to allow safe access at higher water levels, and by providing additional visitor services at the Boulder Creek campground for backpackers and pack stock users.

Boulder Creek Trailhead

Under Alternative 4, the Boulder Creek Trailhead would be expanded to provide asphalt paved parking on the north side of the existing road for approximately 31 vehicles. New parking spaces would be approximately 12 feet wide and 24 feet long, and angled to maintain a road corridor that is 23 feet wide. Additional parking would be available on existing gravel shoulder located on the south side of the road.

Surface drainage of the parking lot would be through sheet flow distributed evenly across the south side of the roadway. As described in Activities Common to All Alternatives, the vehicle turnaround area would be expanded and paved in order to accommodate vehicles towing stock trailers.

Figure 18: Alternative 4, Expanded Parking Lot.



A designated pack stock staging area for loading and unloading stock would be established at the eastern end of the parking lot outside of the road corridor. A hitching post 20 feet in length would be placed adjacent to the loading area.

Expanding the parking lot on both the north and south side of the road, and increasing the vehicle turnaround area would require cutting approximately 2,400 cubic yards of soil from the northern slope of the existing road corridor. After construction, the parking lot would contain approximately 23,000 square feet of paved asphalt surface, with approximately 5,300 square feet of gravel remaining along the south side of the roadway, including the stock use area. Construction of the parking area (not including the vehicle turnaround area) would result in new clearing of approximately 21,000 square feet of vegetation.

Construction of the expanded parking lot and vehicle turnaround would require the use of heavy equipment, including a wheeled loader, tracked excavator, backhoe, grader, dump trucks, tree felling equipment, soil compactors, and a paving machine. Work would require approximately 40 full days of construction to complete. Trucks hauling excavated soil to a disposal area outside the park would use the Olympic Hot Springs road and would pass adjacent to campgrounds and private residences immediately outside the park.

Work would be completed between August 6th and September 30th to minimize noise related impacts to special status species during the nesting season and to provide for temperatures suitable for asphalt placement.

Table 19: Equipment Required for Expanding Vehicle Parking at Trailhead on North and South Side.

Equipment used	Duration (approx)	Noise Level (dBA)	Timing/Season
Tracked excavator	40 days	81-85	Aug. 6 - **
Wheeled front end loader	40 days	79-80	Aug. 6 - **
Dump truck	40 days	76-84	Aug. 6 - **
Paver	3 days	77-85	Aug. 6 - **
Compactor	15 days	80-83	Aug. 6 - **
Chainsaw	2 days	84-85	Aug. 6 - **
Dozer	7 days	82-85	Aug. 6 - **
Tractor	40 days	85	Aug. 6 - **
Pickup Truck	40 days	55-75	Aug. 6 - **
Hand tools	40 days	n/a	Aug. 6 - **

** - seasonal shutdown due to weather conditions

Boulder Creek Trail

Under Alternative 4, all visible asphalt would be cleared and excavated using heavy equipment as described under Activities Common to All Alternatives. The trail would be rehabilitated and

managed as a hiking and stock use trail. The trail tread would be either natural tread or gravel, typically maintained on an annual basis. The trail corridor would be maintained to provide vegetation clearance to a width of 8 feet and vertical height of 10 feet. The trail would be approximately 24 inches to 30 inches wide.

Areas outside of the trail width would be scarified using heavy equipment or hand tools to prepare the soil for revegetation and natural recovery.

Approximately 148,000 square feet of visible asphalt would be cleared and excavated using heavy equipment. This would result in disturbance of up to 180,000 square feet of area on or surrounding the trail as described in Activities Common to All Alternatives. Areas where soils have slid over the asphalt and where vegetation has become established would remain in place to maintain the stability of uphill trail slopes.

Stream Crossings

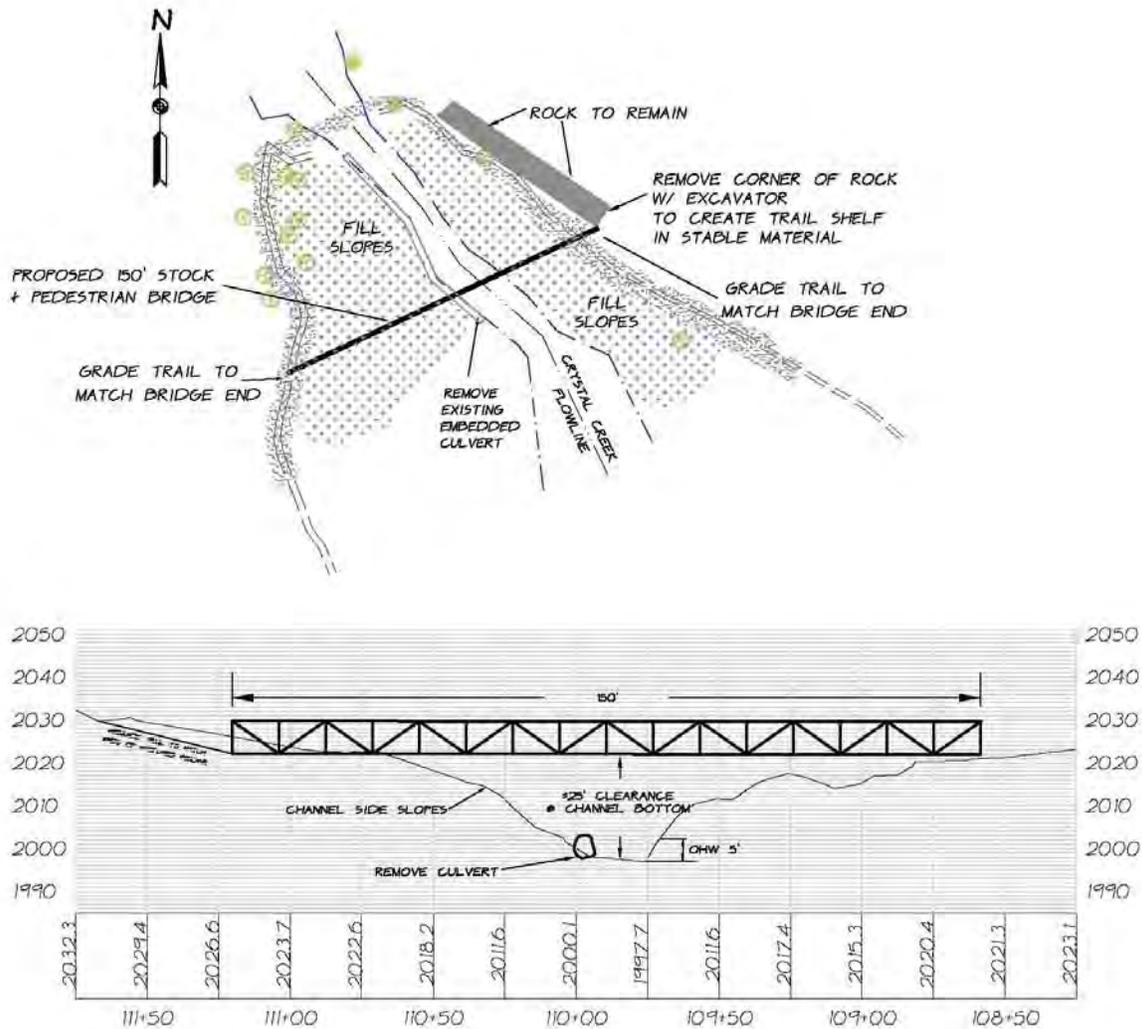
The Hell Creek stream crossing would be accomplished through the placement of a footlog and stock ford as described under Activities Common to All Alternatives. The spanner bridge installed during construction would remain in place at Cougar Creek, with the 12 foot width reduced to 6 feet wide. A handrail would be installed on the bridge, and wood decking would be in place to support both pedestrian and stock use.

The Crystal Creek bridge would be 150 feet long and up to 12 feet wide to provide stability for the longer structure, based on engineered design calculations. The Crystal Creek bridge would provide approximately 40 feet of clearance from the bottom of the stream channel, and approximately 25 feet of clearance above the ordinary high water mark (OHW). Both bridges would be designed to accommodate pedestrian and stock use, and sized to account for snow loads. This would require the professional design and construction of a bridge offsite and transport by truck for staging prior to helicopter delivery. Little or no new disturbance would occur in previously undisturbed areas, as this work would take place within the existing trail corridor.

Reinforced concrete abutments for the bridges may be constructed during the course of asphalt removal along the trail. Abutments would contain approximately 5 cubic yards of concrete each at Cougar Creek and 10 cubic yards each at Crystal Creek. Abutments would be set according to design drawings of the bridge. Abutments approximately 8 feet by 4 feet by 4 feet deep (may change during design) would be on each end of the bridge at Cougar Creek. Abutments approximately 12 feet by 6 feet by 5 feet deep (may change during design) would be on each end of the bridge at Crystal Creek. Concrete for the uphill abutment at Crystal Creek would be flown in by helicopter if another delivery method proves infeasible. Concrete for the downhill abutment would be delivered over the trail.

Transport of the bridges would be via helicopter. The bridges would be staged at Sweets Field and transported using a heavy lift helicopter. Each trip from picking up the bridge to setting it in place on the prepared abutments would take approximately one hour. This work would be timed to occur outside of the nesting season for marbled murrelets and northern spotted owls to avoid adverse effects due to the noise of the helicopter.

Figure 19: Alternative 4, Crystal Creek 150' Span Bridge.



The trail grade would generally match the proposed elevation of the bridges at Cougar and Crystal Creeks, requiring only minimal grading to match the trail grade to the bridge elevations. At Crystal Creek the rock face adjoining the trail abutment would require excavation to accommodate the placement of the abutment. This would require a tracked excavator with a rock hammer and removal of approximately 10 cubic yards of rock from the rock face on the eastern side of the trail.

Construction of stock fords at Cougar and Crystal Creeks would not be necessary as the bridges would support both pedestrian and stock use.

Table 20: Equipment for Delivering and Installing 50' Bridge at Cougar Creek and 150' Bridge at Crystal Creek.

Equipment used	Duration (approx)	Noise Level (dBA)	Timing/Season
Helicopter	4 trips @ 60 min. for bridges 30 trips @ 30 min for concrete	94	After September 15
Tracked excavator	15 days	81-85	After September 15
Tracked excavator w/ hammer	2 days	85	After September 15
Backhoe / wheeled excavator	15 days	78-80	After September 15
Wheeled front end loader	15 days	79-80	After September 15
Dump Truck	15 days	76-84	After September 15
Generator	15 days	81-82	After September 15
Hand Tools	15 days	n/a	After September 15

Boulder Creek Campground

Under Alternative 4, the culverts and visible concrete foundations of the former restrooms would be removed as described under Activities Common to All Alternatives.

A trail would be delineated through the former campground parking lot toward the hot springs trail and the existing pit toilet. Equipment would be used to recontour the compacted soil of the parking lot. Active site restoration would include soil scarification and revegetation.

Under Alternative 4, seven campsites would be delineated within the east (CCC) loop and four sites would be delineated within the mid-loop using downed logs and other natural materials. Campsites would be located in traditionally used areas where removal of mature vegetation would not be required. Up to three of the campsites would be designed to accommodate large groups of seven to twelve people.

The west loop of the campground would be closed to camping and restored to natural conditions. Extensive rehabilitation would occur in the denuded areas outside of designated campsites and visitor use zones. Soil scarification, active revegetation and natural recovery would help restore previously disturbed sites to natural conditions.

New infrastructure to support stock use under this alternative would include the replacement of a hitching rail for day use in the area of the former campground parking lot or near the bridge to the Olympic Hot Springs area. One campsite for stock users would be developed in the former

campground parking lot apart from the newly delineated trail. In addition to campsite delineation consistent with the backpacker camping areas, this would require placement of an additional stock hitching rail for overnight use by campers traveling with pack stock. The area outside of the campsite would be revegetated in a manner consistent with the rest of the Boulder Creek campground site restoration.

Alternatives Considered but Dismissed

The following management actions were identified during internal and public scoping for this plan, but are not included in any of the Action Alternatives being considered for adoption by the park. Actions are dismissed from full consideration when they do not achieve the purpose and need for taking action, when they are infeasible, or when the actions proposed are outside of the scope of the plan. The reasons for not pursuing each action are identified below.

Manage the Boulder Creek Trail as a paved asphalt multi-use trail that allows bicycle use

The National Park Service received a comment suggesting that Olympic National Park consider repair of the damaged asphalt surface and management of the Boulder Creek Trail as a multi-use trail that would also accommodate bicycle use.

This alternative was considered, but is not retained for full analysis in the Boulder Creek EA because it would not achieve the purpose and need for taking action and would be inconsistent with the park's 2008 GMP which directs that the Boulder Creek Trail would be rehabilitated to provide access for hikers and stock users. A paved asphalt multi-use trail that allows hiking, bicycling and stock use is being constructed in the park as an extension of the Olympic Discovery Trail near Lake Crescent. This new six mile long trail is under construction and will be open to public use in 2010.

Remove the Trail and Rehabilitate the area to natural conditions

The National Park Service received a comment suggesting that Olympic National Park consider removing the existing trail and rehabilitating the area to natural conditions. This alternative was considered, but is not retained for full analysis in the Boulder Creek EA because it would not meet the purpose and need for taking action, and it would be inconsistent with the park's 2008 GMP which directs that the Boulder Creek Trail would be rehabilitated to provide access for hikers and horseback riders.

Establish Limits on Overnight Use, Ban Open Campfires, and Require Use of Food Canisters for Food Storage

The National Park Service considered changing the management approach of the Boulder Creek Campground to be more consistent with management of high visitor use areas in the park's

backcountry. It was determined that these decisions would be more appropriately made through the park's upcoming Wilderness Management Plan.

Fracture asphalt and till into the soil of the trail, rather than going to the expense of asphalt removal

The National Park Service considered tilling the asphalt into the soil of the trail, however it was determined that this would be inconsistent with the park's approach to managing backcountry trails, and would potentially contribute to the leaching of contaminants from the asphalt into the soil and adjacent streams. This was determined to be an unacceptable impact that would be inconsistent with the purpose and need for taking action.

Remove asphalt using hand tools only

The National Park Service considered removing the 2.2 miles of asphalt using hand tools only. Although feasible, it was determined that the risk of injury to park staff and volunteers would be unacceptably high due to the strenuous nature of this activity, the distance from the trail to the parking area where the asphalt would be loaded into trucks for removal, and the large volume of asphalt (approximately 150,000 square feet) that needs to be removed.

The Environmentally Preferred Alternative

In accordance with DO-12, the NPS is required to identify the "environmentally preferred alternative" in all environmental documents, including EAs. According to CEQ guidelines, the environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in Section 101 of NEPA, which considers:

1. Fulfilling the responsibilities of each generation as trustee of the environment for succeeding generations;
2. Assuring for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings;
3. Attaining the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;
4. Preserving important historic, cultural and natural aspects of our national heritage and maintaining, wherever possible, an environment that supports diversity and variety of individual choice;
5. Achieving a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities; and

6. Enhancing the quality of renewable resources and approaching the maximum attainable recycling of depletable resources (NEPA, section 101).

The following paragraphs compare how well each of the alternatives considered meet criteria 1 – 4 described above. The alternatives considered in this document do not measurably vary in how well they meet criteria 5 and 6.

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

- Alternative 1 is least successful in meeting this objective due to continued risk of contaminants leaching from the degraded asphalt trail into the adjacent environment, and the continued impacts associated with the kinds and amounts of visitor use occurring in the Boulder Creek Campground.
- Alternatives 2,3, and 4 all result in improvements over existing conditions by removing asphalt, minimizing the potential for impacts associated with the kinds and amounts of visitor use in the campground, and the extensive revegetation efforts proposed along the length of the trail and in the campground and former campground parking lot areas.

2) Assuring for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings;

- Alternative 1 is least successful in meeting this objective due to the lack of safe stream crossings at Cougar and Crystal Creeks, the unacceptable appearance of the degrading asphalt trail surface, and the areas of compacted soil and vegetation loss in the campground due to trampling and extensive collection of wood for campfires.
- Alternative 2 provides safe and healthful access for pedestrians and stock users during the low water season by providing footlogs and stock fords at stream crossings. The lack of visible infrastructure would likely be seen by some visitors as having the least scenic impacts. The retention of campsites in the east (CCC) loop of the campground would help preserve the historic use and layout of the area.
- Alternative 3 would provide safe and healthful access for pedestrians and stock users during a slightly longer season due to the presence of a bridge at Crystal Creek, which would provide safe crossing during higher stream levels than Alternatives 1 or 2. Although some visitors may not enjoy seeing a bridge along the trail, others would appreciate the ease of access and view from the bridge. Additionally, this alternative provides less dense camping due to the dispersal of campsites between the east and mid loops. However, the lower number of campsites retained in the east (CCC) loop may not preserve the historic use and layout to the extent of Alternatives 2 and 4.
- Alternative 4 provides safe and healthful access for pedestrians and stock users over the longest period of time due to the additional clearance over Cougar and Crystal Creeks due to the placement of bridges in these locations. Although some visitors

may not enjoy seeing bridges in these locations, others would appreciate the ease of access and view from the bridges. This alternative retains the highest number of campsites in the east and mid loops, and also provides a new campsite for visitors traveling with pack stock. The use of the east (CCC) loop would help preserve the historic use and layout of the east (CCC) loop of the campground.

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

- Alternative 1 is least successful in meeting this objective due to the lack of safe stream crossings at Cougar and Crystal Creeks, the lack of access for stock users beyond Crystal Creek, and the unacceptable appearance of the degrading asphalt trail surface, and the areas of compacted soil and vegetation loss in the campground due to trampling and extensive collection of wood for campfires.
- Alternative 2 provides safe and healthful access for pedestrians and stock users during the low water season by providing footlogs and stock fords at stream crossings. However, this alternative requires extensive modification of soils and native bedrock at Crystal Creek to bring the trail down to the level of the creek for stock users. This alternative would also require replacement of the footlogs periodically as they are destroyed by high water events or degrade in place over time. This would require the transport of new footlogs, most likely via helicopter, on a recurring basis. Additionally, the maintenance of stock fords at three stream crossing locations would require extensive annual maintenance to keep these corridors clear for safe stock use.
- Alternative 3 would provide safe and healthful access for pedestrians and stock users during a slightly longer season due to the presence of a bridge at Crystal Creek, which would provide safe crossing during higher stream levels than Alternatives 1 or 2. However, alternative 3 would also require blasting and recontouring of soils and bedrock at Crystal Creek to construct a trail down to the elevation of the 80' long bridge.
- Alternative 4 provides safe and healthful access for pedestrians and stock users over the longest period of time due to the additional clearance over Cougar and Crystal Creeks due to the placement of bridges in these locations. This alternative results in the least soil disturbance, as the stream crossings would be placed at the same level as the trail and would not require extensive disturbance to soils and bedrock. The noise impacts during construction would be least under this alternative and the amount of annual and ongoing maintenance would be least under this alternative.

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

- Alternative 1 is least successful in meeting this objective due to continuing impacts to natural and cultural resources in the campground due to the adverse effects of current visitor use patterns. This includes compacted soils and lack of vegetation in many areas. Additionally, the presence of the asphalt trail, failed culverts, and fill materials

throughout the project site is adversely affecting surface hydrology, resulting in increased erosion in many areas and resulting in unnatural vegetation patterns in others.

- Alternative 2 preserves historic features by retaining use patterns in the east (CCC) loop of the campground, and in actively removing abandoned infrastructure and revegetating the trail corridor, campground, and former campground parking lot. However, this alternative does require the most disturbance to soil and bedrock due to the need to blast and excavate materials from the Crystal Creek stream crossing to allow installation of a footlog and stock ford, and also to excavate buried utilities from the campground.
- Alternative 3 does not preserve historic features in the campground as well as alternatives 2 and 4, due to the altered layout of campsites and lower density development pattern in the east loop. This alternative, like Alternative 2, would result in improved natural conditions due to the removal of asphalt from the trail and the active revegetation of the trail corridor, campground and former campground parking lot. However, this alternative still requires soil disturbance and blasting at Crystal Creek to allow for construction of a trail that meets the elevation of the 80' long bridge.
- Alternative 4 preserves historic features by retaining use patterns in the east (CCC) loop of the campground. This alternative also avoids impacts to soils and bedrock due to the ability to connect the trail with a 150' long bridge over Crystal Creek without the need for blasting or extensive removal of soil and fill materials. This alternative results in the active revegetation of the trail corridor, campground, and former campground parking lot; and also provides enhanced day use and camping opportunities for visitors traveling with pack stock.

Although all Action Alternatives meet the criteria listed above to varying degrees, it was determined that Alternative 4 is the Environmentally Preferred Alternative. This alternative provides safe access to pedestrians and stock users during the longest period of time with the least amount of impact to natural and cultural resources during construction and through ongoing maintenance. Each of the action alternatives results in the removal of asphalt from the trail, restoration of natural drainage patterns in the campground, and active revegetation outside of designated visitor use areas. Alternative 4 reduces the number of campsites from current levels, but provides adequate facilities to support both backpackers and people camping with pack stock. This determination was upheld during an interdisciplinary workshop that found Alternative 4 was superior to the other alternatives in terms of providing for visitor safety, sustainability, natural and cultural resource protection, and visitor experience.

Table 21: Summary Table of Environmental Consequences.

Factor	Alt 1: No action	Alt 2: Minimize Built Environment	Alt 3: Provide Moderate Visitor Services	Alt 4: Provide Enhanced Visitor Services (Preferred)
Trailhead (construction Aug 6 - end season)				
Vehicle Turnaround	N/A	80' diameter paved asphalt; 5,100 ft ² asphalt/4,750 ft ² new disturbed area	same as alt 2	same as alt 2
Accommodates stock trailers	No	yes	same as alt 2	same as alt 2
Surface material and estimated extent of surface cover and vegetation clearance	7,020 ft ² asphalt/ 5,300 ft ² gravel	22,000 ft ² gravel/15,500 ft ² new disturbed area	16,700 ft ² permeable/5,300 ft ² gravel/ 15,500 ft ² new disturbed area	23,000 ft ² asphalt/5,300 ft ² gravel/ 21,000 ft ² new disturbed area
# parking spaces	No delineated parking, between 15-55 park on gravel road shoulders	approx 36 vehicles/ gravel	approx 36 vehicles/21 paved, 15 gravel	Up to 45 spaces (avoiding lg trees/arch site)
Stock Staging Area	located approx 1/8 east of parking lot	same as alt 1	same as alt 1	new staging area near trailhead
Trail (construction east of Crystal Creek Aug 6 - end season, west of Crystal Creek Sept 16 - end season)				
Surface	eroding asphalt	natural tread and/or gravel	same as alt 2	same as alt 2
Revegetation	natural recovery only	active revegetation	same as alt 2	same as alt 2
Trail width	varies, typical 14'	18 - 24"	24 - 30"	24" - 30"
Trail clearance	12-20 feet	6' wide X 8' high	8' wide X 10' high	8' wide X 10' high
Asphalt removal	no removal	remove all asphalt (155,000 ft ²) 180,000 ft ² footprint	same as alt 2	remove visible asphalt only (148,000 ft ²), not under slumps; 180,000 ft ² footprint
Culvert removal	no removal	remove all culverts	same as alt 2	same as alt 2
Temporary large vehicle turnaround	N/A	temporary during construction (2,200 ft ² disturbed area)	same as alt 2	same as alt 2
Trail stabilization method	N/A	grade areas where culverts removed	same as alt 2	same as alt 2
Temporary Stream Crossings (Hell & Cougar)	N/A	install spanner bridges at Hell and Cougar Creeks with wood decking to support project work during asphalt removal and revegetation	same as alt 2	same as alt 2
Long-term Cougar Creek Crossing	natural fallen log/stock ford	40' footlog/stock ford	same as alt 2	50' long steel bridge (6' max width)
Long-term Hell Creek Crossing	collapsed wooden culvert	40' footlog/stock ford	same as alt 2	same as alt 2
Long-term Crystal Creek Crossing	35' footlog/no stock ford	50' footlog/stock ford	80' long steel bridge (6' max width)	150' long steel bridge (12' max width)

Factor	Alt 1: No action	Alt 2: Minimize Built Environment	Alt 3: Provide Moderate Visitor Services	Alt 4: Provide Enhanced Visitor Services (Preferred)
Trail (construction east of Crystal Creek Aug 6 - end season, west of Crystal Creek Sept 16 - end season)				
Crystal Creek (culvert/headwall)	crushed partially exposed 60" cmp/concrete headwall remain	remove culvert & concrete headwall	same as alt 2	same as alt 2
Former road to abandoned trash dump	remain as is	block entry, revegetate (60 ft ² disturbed area)	same as alt 2	same as alt 2
Abandoned trash dump east of campground	remain in place	evaluate dump site per law & policy	same as alt 2	same as alt 2
Campground Infrastructure (construction from Sept 16 to end of season for heavy equipment/helicopter use)				
Revegetation	natural recovery only	active revegetation	same as alt 2	same as alt 2
Campfire Ban	Continue to allow campfires	Ban campfires and wood collection to allow for revegetation efforts to be successful	same as alt 2	same as alt 2
Former campground parking lot	remain as is (compacted soil)	Delineate trail to restroom and hot springs trail, major recontouring and revegetation	same as Alt 2 and minor recontouring and revegetation	same as alt 3
Abandoned underground utilities	leave in place	remove underground utilities (10,000 ft ² disturbed area)	leave buried utilities in place (2,000 ft ² disturbed area)	leave buried utilities in place (2,000 ft ² disturbed area)
Existing culverts between campground and former parking area	leave in place	remove all culverts	same as alt 2	same as alt 2
Former road through campground	natural recovery only	convert to trail in remaining visitor use areas	same as alt 2	same as alt 2
Existing culverts and concrete foundations from old restrooms in campground	leave in place	remove culverts and concrete/restore natural grade	same as alt 2	same as alt 2
Toilet facilities	one pit toilet in campground, one pit toilet in old parking lot area	same as alt 1	same as alt 1	Retain existing and construct additional toilet if necessary, replace/upgrade existing as needed
Campground Loops Retained	leave as is (remaining east, mid, west loops)	east loop only	east and mid loop	east and mid loop
# of campsites	~ 30 campsites	7 sites in east (CCC) loop	5 sites in east (CCC) loop, 3 sites in mid-loop	Up to 7 sites in east (CCC) loop, and up to 4 sites in mid-loop
Group Campsites	none designated	2 group sites	same as alt 2	Up to 3 group sites
Stock Campsites	none designated	same as alt 1	same as alt 1	one stock campsite designated in former campground parking area
Stock Hitching Post	none provided	none provided	day use hitching post in old parking lot area (wood)	hitching posts: day use in old parking lot area (metal or wood), & campsite (metal or wood)

Chapter 3: Affected Environment & Environmental Consequences

Introduction

The purpose of this chapter is to describe park resources within and adjacent to the Boulder Creek project area in their existing condition, and to evaluate the potential impacts to each resource that would be expected to occur under each of the alternatives described in Chapter 2.

The analysis presented here assumes that the alternatives would be implemented as described, including all mitigation measures identified in Appendix A of this EA. The following impact analyses and conclusions were informed by a review of existing literature and park studies, information provided by subject matter experts within the park and other agencies, consultation with the state historic preservation officer and interested local Tribes, professional expertise, knowledge of park staff, and public input. The end of Chapter 2 also contains a summary of environmental impacts. This chapter is organized as follows:

- **Methodology for Impact Assessment**
- **Impairment of Park Resources and Values**
- **Physical Environment**
 - Geologic Features and Soils
 - Hydrology and Water Quality
 - Air Quality
- **Biological Environment**
 - Vegetation
 - Wildlife and Wildlife Habitat
 - Unique or Important Fish or Fish Habitat
 - Threatened and Endangered Species
 - Wetlands
- **Wilderness Values**
- **Social and Cultural Environment**
 - Cultural Resources
 - Socioeconomics
 - Park Operations and Safety
- **Experiential Environment**
 - Visitor Use and Experience
 - Soundscapes
 - Scenery and Visual Resources
- **Unavoidable Adverse Impacts**
- **Relationship of Short-Term Uses and Long-Term Productivity**
- **Irreversible and Irrecoverable Commitments of Resources**

Methodology for Impact Assessment

The following terms are used to define the nature of impacts associated with project alternatives:

Type: Impacts can be beneficial or adverse.

Context: Context is the setting within which an impact would occur, such as site-specific, parkwide, or regional. The Council on Environmental Quality requires that impact analyses include discussions of context.

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

Impact Intensity: Impact intensity is defined individually for each impact topic. There may be no impact or impacts may be negligible, minor, moderate, or major. Because definitions of intensity vary by resource, intensity definitions are provided for each impact topic analyzed.

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

Cumulative impacts: 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. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR §1508.7).

Past, present, and reasonably foreseeable future actions, are listed in appendix B. Relevant plans and actions that could combine with those described for this plan are described below. These actions are then discussed cumulatively under each impact topic.

Olympic National Park

Park Plans and Actions

Olympic National Park Final General Management Plan (GMP) and Environmental Impact Statement (2008)

The GMP provides park managers with long-term direction for achieving the resource protection and visitor experience goals of Olympic National Park and establishes the direction for managing the Boulder Creek Trail and Boulder Creek Campground in the Elwha area of the park. This EA guides implementation of the portions of the GMP that deal with the Boulder Creek Trail and campground. The GMP states, “Road access would be retained to the Boulder Creek trailhead. Trailhead and parking would be improved and may be relocated nearby. The Boulder Creek Trail would be rehabilitated to provide access for

hikers and horseback riders. Trail access would be retained, using methods that minimize adverse effects on river processes and aquatic and riparian habitats, to the extent possible.”

Elwha River Ecosystem Restoration Final Environmental Impact Statement (Elwha FEIS, 1995), and Supplemental Environmental Impact Statement (SEIS, 2005)

The Elwha FEIS determined that the removal of Elwha and Glines Canyon dams has the potential to fully restore the ecosystem and Elwha native anadromous fish and fulfill the purpose of the congressional mandate for full restoration. The SEIS, 2005 identified and analyzed the potential impacts of a new set of water quality and supply-related mitigation measures. Boulder Creek is a tributary of the Elwha River currently entering the Lake Mills Reservoir. The actions identified in these documents are included in the cumulative effects analysis of the Boulder Creek EA.

Other Planned or Ongoing Park Projects

Olympic National Park Wilderness Management Plan

Olympic National Park will begin internal scoping for a Wilderness Management Plan in 2010. This plan will guide the preservation, maintenance, use, and restoration of wilderness in the park. The plan will establish specific goals and objectives, provide guidelines and standards, and designate zones for the Olympic National Park Wilderness.

Ozette Lake Management Plan

The 2008 General Management Plan identified the need to develop an Ozette Lake Management Plan to focus on visitor use, access, and resource protection at Ozette Lake.

Olympic Hot Springs Restoration Plan

The 2008 General Management Plan identified the need to develop a plan to evaluate restoration options for the Olympic Hot Springs area.

Olympic Discovery Trail, Phase 1

Approximately six miles of paved trail was constructed above the north shore of Lake Crescent as part of a planned trail that will eventually link the town of Port Townsend, on Puget Sound, with the community of LaPush on the Pacific Coast. The segment of trail constructed in 2009 will provide an accessible trail with access for hikers, bicyclists, stock users, wheelchairs, and strollers.

Olympic Discovery Trail, Phase 2

Approximately three miles of new trail along the north shore of Lake Crescent are proposed for construction by Clallam County within the park. This new segment would connect to the new trail constructed in 2009.

Replacement of Griff Creek Barrier Culvert

A large culvert on Griff Creek, a tributary to the Elwha River, will be replaced in 2010 to provide fish passage and to expand areas that may serve as refugia for bull trout during the implementation of the Elwha Dam Removal Project.

Rehabilitate Sand Point Trail at Lake Ozette

This project will rehabilitate or replace approximately 2,100 linear feet of failing elevated wood puncheon on the Sand Point Trail at Lake Ozette. This project is anticipated to occur within the next two years. The Cape Alava and Sandpoint trails depart from the Lake Ozette visitor area and extend to the Pacific coast. The ends of the trails are linked by 3 miles of beach, creating a nine-mile triangle. Over 100,000 visitors per year come to Ozette to backpack the trails through primeval forest and camp on the rugged Pacific coast.

Olympic National Forest

Olympic Discovery Trail

Olympic National Forest manages an extensive network of trails, including segments of the Olympic Discovery Trail, a planned trail that will eventually link the town of Port Townsend, on Puget Sound, with the community of LaPush on the Pacific Coast.

County / Community Plans and Activities

Olympic Discovery Trail

Clallam County manages several miles of multiple-use, non-motorized trails, including segments of the Olympic Discovery Trail, a planned trail that will eventually link the town of Port Townsend, on Puget Sound, with the community of LaPush on the Pacific Coast.

Impairment of Park Resources and Values

In addition to determining the environmental consequences of the preferred alternatives, NPS *Management Policies* 2006 and Director's Order #12, require analysis of potential effects to determine if actions would impair park resources and values. The fundamental purpose of the national park system established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. NPS managers must always seek ways to avoid, or minimize to the greatest degree practicable, adverse impacts to park resources and values. Congress has given NPS managers direction, however, to allow impacts to park resources and values when necessary and appropriate to fulfill the purpose of the park, so long as the impact does not constitute impairment of the affected resources and values.

The prohibited impairment is an impact that would, in the professional judgment of the responsible NPS manager, harm the integrity of park resources or values, including opportunities that would otherwise be present for the enjoyment of those resources or values. An impact would

more likely constitute impairment when it has a major or severe adverse effect upon a resource or value whose conservation is:

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

Impairment may result from NPS activities in managing the park, visitor activities, or activities undertaken by concessioners, contractors, and others operating in ONP. The Chapter 3 includes a determination on impairment in the conclusion statement of the appropriate impact topics for each alternative. Impairment statements are not required for recreational values/visitor experience, park operations, or health and safety topics. In addition, neither NPS policies nor managerial determinations regarding impairment apply to non-NPS land or resources.

Physical Environment

The following section describes the geology and soils, hydrology and water quality, and air quality of the project area. It also includes a description of the methodology used to describe impacts to these resources, followed by an analysis of the impacts anticipated to occur to these resources for each of the Alternatives described in Chapter 2.

Geologic Features and Soils

The National Park Service mapped landforms for this area in 2006. The majority of the project area occurs on three categories of landform:

- 1) *Valley wall*: steep forested slopes ranging from 20° to 60° and consisting of bedrock, till or colluviums
- 2) *Debris apron*: the transitional zone on the base of a valley wall where slope decreases and debris accumulates. Debris aprons are generally composed of deeper, less consolidated colluviums or talus.
- 3) *Debris cone*: usually mapped adjacent to small drainages, debris cones are composed of upslope debris that has been transported by small streams and deposited in multiple events over time to form a conical shaped debris fan. These cones are often reworked and redeposited during subsequent flood events.

Soil data for Olympic National Park is limited. The Natural Resources Conservation Service's (NRCS) Soil Survey of Washington, contains soils maps for the Olympic Peninsula but does not include the areas inside the ONP boundary. Specifically, the NRCS Soil Survey for the Clallam County Area of Washington manual describes the area closest to the Boulder Creek Trail and campground as "soils on mountains" in the Terbies-Louella soil series. However, individual soil

types have not been delineated within the Park boundaries. Soils in the Terbies-Louella series are generally deep and well drained and formed from basalt, sandstone, siltstone, and conglomerate materials. Bedrock in the project area is comprised of mica rich sandstone, shale, slate, and phyllite (Tabor, R.W., 1975, Guide to the Geology of Olympic National Park, University of Washington Press, Seattle).

Soils along the Boulder Creek Trail are highly erodible and unstable, with steep slopes present along the majority of the trail. Erosion is primarily due to surface runoff and stream flow, with increased erosion occurring during periods of heavy rainfall and associated high streamflow events. The Crystal Creek drainage has been highly eroded within the project area. The side slopes of Crystal Creek at the Boulder Creek Trail crossing are comprised of medium to fine gravel that was imported as fill material during construction of the former road. A 60 inch diameter metal culvert installed at Crystal Creek was blocked by a large tree and debris during storm events, resulting in failure of the culvert and the erosion of a large quantity of fill material above and around the culvert. High flow events and associated debris jams at the Crystal Creek culvert caused continuing erosion of this fill material.



Photo 1: Construction of the Olympic Hot Springs Road by the CCC, 1937.

The Boulder Creek Trail, a former road, was constructed by cutting into the slopes. Excavated materials removed from the uphill area were deposited along the length of the road and on downhill slopes in order to form a level road bed. This method of construction resulted in

relatively stable downslopes, but less stable upslopes in steeper areas. Several cut slopes are stable as a result of natural grade and reestablishment of vegetation. However, several steep unstable slopes prompted shallow surface slides less than one foot deep, and large “block” slides up to 5 feet deep. Such slides deposited materials across the trail in several locations, ranging in size from fine silt to 6 inch diameter rocks.



Photo 2: Construction of the Olympic Hot Springs Road by the CCC, 1937.

Slopes below the trail are generally stable with the exception of several areas eroded by surface water runoff patterns in the trail. In these cases, an impervious layer of asphalt channels water runoff to low spots on the trail or areas where constructed drainages failed. In several locations, areas of concentrated drainage undermine the pavement surface. Also, several culverts are undermined on the downslope side of the trail, resulting in a loss of materials immediately beneath the road surface and all around the culvert (see Photo 9).

Soil in some areas of the campground, such as the former road beds, tent pads, and food hanging areas are compacted such that vegetation will not regenerate. Soils in the campground area are generally comprised of gravely silt-loam (K. Kwarsick, pers comm. 2009). Social trails and game trails lead to the ridge top. Slopes of the developed campground area are between 2 and 15 percent. Hillsides above and below the campground are steeper, varying between 40 and 150 percent. Surface flows from the upslope areas quickly channel into limited drainages within the

campground, with little evidence of significant surface erosion channels. These channels are controlled and limited by the placement of culverts (see Hydrology, Figure 21). A wetland in the northwestern area of the campground is expected to contain hydric soils (soils formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part). A wetland survey would be conducted.

Impact Assessment Methodology

Type: Beneficial impacts improve or sustain geologic resources or processes. Adverse effects diminish or degrade geologic resources or processes.

Context: Site-specific impacts occur only in the immediate vicinity of an action. Local impacts occur only within the project area. Regional impacts occur both within and outside of the project area.

Duration: Short-term impacts occur only during project implementation. Long-term impacts occur over one to ten years. Permanent impacts occur for longer than ten years.

Intensity: The following table describes intensity benchmarks for geologic resources and processes.

Table 22: Geologic Features and Soils Impact and Intensity.

Impact and Intensity	Intensity Description
Negligible	The effects to geologic features or soils would be below or at a lower level of detection. Any effects on soil productivity or erosion potential would be slight.
Minor	Effects to geologic features or soils would be detectable. Soil profile would change in a relatively small area, but would not appreciably increase the potential for erosion of additional soil. Geologic processes would remain intact. 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 noticeable change in geologic features or soils, including the quantity or alteration of the topsoil, overall biological productivity, or the potential for erosion to remove small quantities of additional soil. Changes to localized ecological processes would be limited. Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.
Major	An action would result in a highly noticeable change to the park's geologic features, including 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.
Impairment	An action would result in the permanent, highly noticeable adverse change to the park's key geologic features, including the potential to create extensive erosion or irreversible impacts to the park's topsoil and overall biological productivity over a broad region in the park. Key ecological processes would be irreversibly altered and landscape scale changes would occur. Mitigation measures to offset adverse effect would be unlikely to succeed.

Environmental Consequences to Geologic Features and Soils

Alternative 1 – No Action

Direct and Indirect Impacts of the Alternative. The No Action Alternative would result in adverse, local, long-term, minor to moderate impacts to geologic resources and soils as a result of the continued presence of compacted soils and asphalt along the length and width of the trail (approximately 155,000 square feet of asphalt), and the presence of compacted soils in the campground and former campground parking lot. The presence of asphalt would also contribute to these impacts through increased erosion potential due to the combination of increased surface runoff combined with failed drainage structures.

Impacts Common to All Action Alternatives

Direct and Indirect Impacts of the Alternatives. Adverse, site-specific, long-term to permanent minor adverse impacts would occur due to construction of an 80' diameter vehicle turnaround area at the Boulder Creek Trailhead due to clearing, compaction, and paving with asphalt. This would result in approximately 4,750 square feet of newly disturbed area, and paving of approximately 5,100 square feet with asphalt.

Removal of asphalt and culverts from the trail corridor would result in site-specific, short-term negligible to minor adverse impacts during construction due to excavation using heavy equipment, and the associated ground disturbance in an covering approximately 180,000 square feet (including the 148,000-155,000 square feet of asphalt to be removed).

Construction of a temporary large vehicle turnaround area near Crystal Creek would result in adverse, site-specific, short-term minor to moderate impacts due to the excavation of unstable soils that may result in increased erosion and instability until construction is complete and the area is allowed to reach a new state of stability, or angle of repose. Construction of the temporary large vehicle turnaround would affect an area of approximately 2,200 square feet.

Removal of culverts, concrete restroom foundations, and recontouring of compacted soils within the former campground parking lot would result in short-term negligible to minor adverse impacts due to ground disturbance during project implementation. This work would affect an area of approximately 2,000 square feet.

Beneficial, site-specific and local, long-term to permanent minor to moderate impacts would result from the removal of approximately 148,000-155,000 square feet of asphalt from the trail and the decompaction of soils along the rehabilitated trail length, and also in the decompacted areas within the campground and former campground parking lot.

Alternative 2 – Minimum Built Environment, Extensive Restoration

Direct and Indirect Impacts of the Alternative. Alternative 2 would result in adverse, site-specific, long-term to permanent minor adverse impacts due to the expansion of gravel parking on the north side of the existing lot to create a gravel parking surface covering approximately 22,000 square feet. This would require clearing and disturbance to approximately 15,500 square feet. Additional soil compaction would occur within the 18-24 inch wide tread width of the new

trail, although this area is likely compacted due to the presence of the asphalt road surface. Destabilization of uphill slopes would result in adverse, site-specific, short-term and long-term minor to moderate impacts when soils that have slid onto the trail are excavated to allow for complete asphalt removal. These unstable soils would likely continue to slide until soils reach a renewed state of stability after project completion.

Alternative 2 would also result in adverse, site-specific, short-term minor to moderate impacts to soils during construction of the new trail and grading of the trail to match the footlogs placed at three stream crossings. This would include blasting and removal of approximately 1,400 cubic yards of rock at the Crystal Creek stream crossing and cut and removal of approximately 2,500 cubic yards of trail embankment to bring the trail grade to the proposed location of the new footlog and stock ford at this site.

Best management practices would be implemented to prevent material from entering the stream channel, but it is anticipated that approximately 250 cubic yards of material may enter the stream channel during blasting and trail construction. Soil compaction would continue to occur in the seven campsites that would be retained at the Boulder Creek Campground, and along the length of the trail segments retained in this area. This would result in adverse, site-specific, long-term to permanent minor impacts. Excavation of buried utility lines in the campground would also result in adverse, site-specific, minor to moderate adverse impacts due to the extensive ground disturbance (approximately 8,000 square feet) that would be required to locate, excavate and remove buried infrastructure throughout the area of the campground.

Alternative 3 – Moderate Visitor Services, Active Revegetation

Direct and Indirect Impacts of the Alternative. Alternative 3 would result in adverse, site-specific, long-term to permanent minor adverse impacts due to the expansion of parking on the north side of the existing lot to create a paved, non-asphalt parking surface covering approximately 16,700 square feet. Approximately 5,300 square feet of gravel parking would be retained. Expansion of the parking lot would require clearing and disturbance of approximately 15,500 square feet.

Additional soil compaction would occur within the 24-30 inch tread width of the new trail. Destabilization of uphill slopes would result in adverse, site-specific, short-term and long-term minor to moderate impacts when areas soils that have slid onto the trail are excavated to allow for complete asphalt removal. These unstable soils would likely continue to slide until soils reach a renewed state of stability after project completion.

Alternative 3 would also result in adverse, site-specific, short-term minor impacts to soils during construction of the new trail and grading of the trail to match the footlogs and bridge placed at three stream crossings. This would include blasting and removal of approximately 1,100 cubic yards of rock at the Crystal Creek stream crossing and cut and removal of approximately 400 cubic yards of trail embankment to bring the trail grade to the proposed location of the new 80 foot long steel bridge at this site.

Best management practices would be implemented to prevent material from entering the stream channel, but it is anticipated that approximately 100 cubic yards of material may enter the stream

channel during blasting and trail construction. Soil compaction would continue to occur in the eight campsites that would be retained at the Boulder Creek Campground, and along the length of the trail segments retained in this area.

This would result in adverse, site-specific, long-term to permanent minor impacts. Installation of a day-use stock hitching rail near the Boulder Creek campground former parking lot may result in adverse, site-specific, short to long-term minor impacts due to the concentrated use in this area for pack stock, and the associated soil compaction that would occur in the immediate area.

Alternative 4 – Enhanced Visitor Services, Active Revegetation

Direct and Indirect Impacts of the Alternative. Alternative 4 would result in adverse, site-specific, long-term to permanent minor to moderate adverse impacts due to the expansion of parking on the north side of the existing lot to create a paved asphalt parking surface covering approximately 23,000 square feet. Approximately 5,300 square feet of gravel parking would be retained. This would require clearing and disturbance of approximately 21,000 square feet. Additional soil compaction would occur within the 24-30 inch tread width of the new trail.

Alternative 4 would also result in adverse, site-specific, short-term negligible to minor impacts to soils during construction of the new trail and grading of the trail to match the footlog and bridges placed at three stream crossings. This would include removal of approximately 20 cubic yards of rock at the Crystal Creek stream crossing and cut and removal of approximately 20 cubic yards of trail embankment to bring the trail grade to the proposed location of the new 150 foot long steel bridge at this site.

Best management practices would be implemented to prevent material from entering the stream channel. Soil compaction would continue to occur in the eleven campsites that would be retained at the Boulder Creek Campground, and along the length of the trail segments retained in this area. This would result in adverse, site-specific, long-term to permanent minor impacts.

Installation of a day-use stock hitching rail near the Boulder Creek campground near the former parking lot, and a campsite with a hitching rail for overnight use for the associated campsite may result in adverse, site-specific, short to long-term minor to moderate impacts due to the concentrated use in this area for pack stock, and the associated soil compaction that would occur.

Cumulative Impacts. The original construction of the Boulder Creek Road resulted in minor to moderate adverse impacts to geologic resources from earthwork, excavation, and asphalt paving. Ongoing regular maintenance and repairs to the trail (former road) would have minor adverse effects to the Boulder Creek watershed, negligible adverse effects to the Elwha River, and minor adverse effects to geologic resources because surface disturbances occur primarily within existing areas of disturbance. The NPS plan to restore the Elwha River may benefit stream geomorphology of Boulder Creek by restoring natural fluvial processes at the mouth of the creek. After the restoration of the Elwha River, sediment and debris from the eroding slopes in the Boulder Creek drainage would flow directly into the Elwha River. Sediment would create an alluvial fan, altering the delta where the creek and the current reservoir meet. No action would contribute long-term beneficial effects as natural geologic processes are reestablished. Cumulative impacts on geologic resources would remain minor to moderate from past and

current activities in the basin even with the slight beneficial effects of the proposed dam removals, which would restore the natural geomorphologic processes of both the Elwha River and Boulder Creek watershed.

Impairment. Geological resources would not be impaired under any of the alternatives considered in this document.

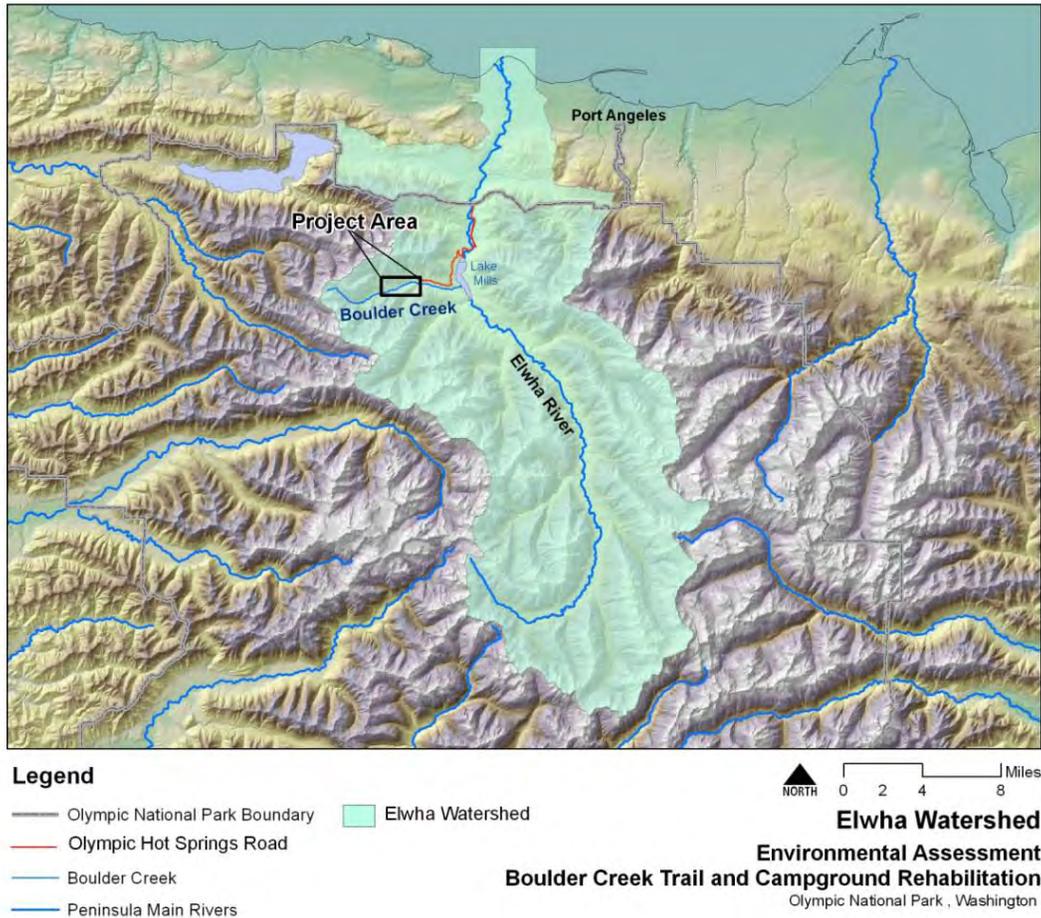
Hydrology and Water Quality

The Boulder Creek drainage is in the Elwha watershed, the largest watershed in Olympic National Park, containing approximately 321 square miles. Average annual precipitation measured at the Elwha Ranger Station is 55 inches, increasing to nearly 100 inches at the headwaters of Boulder Creek. Relatively high rainfall in the area, coupled with periodic rain-on-snow events lead to very high flows during storm events. The park's rivers, streams, creeks, and lakes are relatively pristine, with the exception of the Elwha River, which is impacted by two dams, the Elwha dam and the Glines Canyon dam. The Glines Canyon dam is in the park boundary and Elwha dam is outside the park. It is anticipated that the dams would be removed starting in 2011.

Boulder Creek originates from Boulder Lake, located in Olympic National Park wilderness at approximately 4,400 feet elevation, and drains into Lake Mills, which was formed by the Glines Canyon dam. Boulder Creek supports important habitat for several fish species including rainbow trout, sculpin, cutthroat trout and threatened bull trout. No threatened or endangered fish are present in the project area due to the presence of the downstream fish barrier.

Several tributaries flow into Boulder Creek. The four major tributaries that cross the Boulder Creek Trail are Deer Creek, located at the trailhead; Cougar Creek, Hell Creek, and Crystal Creek (See Figure 21). Of these tributaries, Crystal Creek is the largest drainage and has the highest volume of flows during heavy rainfall events. There is evidence of the stream carrying large downed trees and debris.

Figure 20: Elwha Watershed.



Impact Assessment Methodology

Type: Beneficial impacts improve or sustain hydrologic processes or water quality. Adverse effects diminish or degrade hydrologic processes or water quality.

Context: Site-specific impacts occur only in the immediate vicinity of an action. Local impacts occur only within the project area. Regional impacts occur both within and outside of the project area.

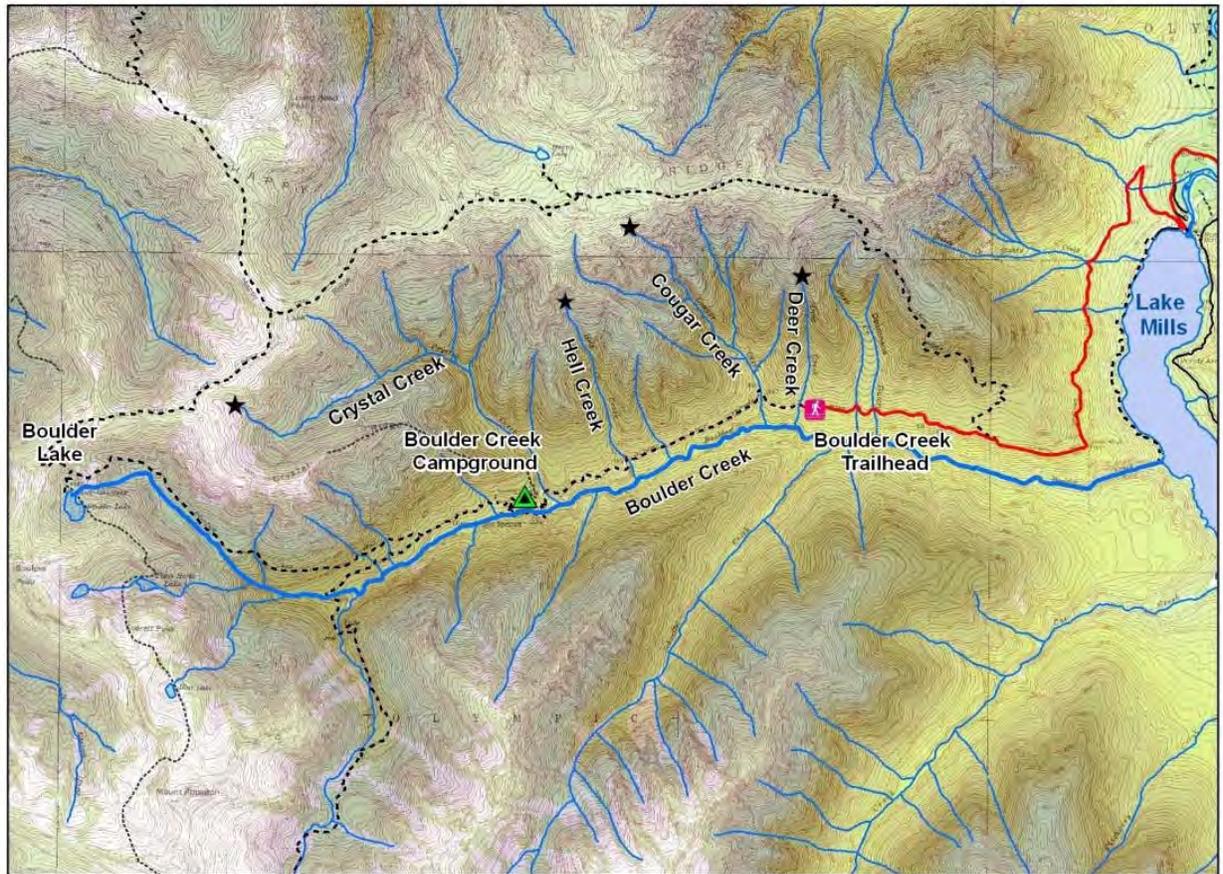
Duration: Short-term impacts occur only during project implementation. Long-term impacts occur over one to ten years. Permanent impacts occur for longer than ten years.

Intensity: The following table describes intensity benchmarks for hydrologic processes or water quality.

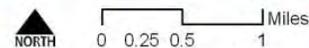
Table 23: Hydrology and Water Quality Impact and Intensity.

Impact Intensity	Intensity Description
Negligible	An action that would result in a change to a hydrologic resource or water quality, but the change would be so small that it would not be of any measurable or perceptible consequence.
Minor	An action that would result in a change to a singular hydrologic resource or water quality, but the change would be small, localized, and of little consequence.
Moderate	An action that would result in a change to a hydrologic resource or water quality; the change would be measurable and of consequence. Mitigation would likely be necessary and would be expected to be successful.
Major	An action that would result in a noticeable change to a hydrologic resource or water quality; the change would be measurable and result in a severely adverse or major beneficial impact with regional consequences. Mitigation would be necessary and success would not be certain.
Impairment	An action would result in a permanent, noticeable, adverse change to a hydrologic resource or water quality within the park to the extent that the ecological integrity of the park would be substantially compromised.

Figure 21: Hydrology.



- Legend**
- Boulder Creek Campground
 - Boulder Creek
 - Olympic Hot Springs Road
 - Boulder Creek Trail
 - Major tributaries crossing the Boulder Creek Trail



Hydrology
Environmental Assessment
Boulder Creek Trail and Campground Rehabilitation
 Olympic National Park, Washington

Environmental Consequences to Hydrologic Processes and Water Quality

Alternative 1 – No Action

Direct and Indirect Impacts of the Alternative. The No Action Alternative would result in adverse, local, long-term, minor to moderate impacts to hydrologic resources and water quality as a result of the continued presence of compacted soils and asphalt along the length and width of the trail (approximately 155,000 square feet of asphalt), the presence of compacted soils in the campground and former campground parking lot, and the presence of culverts and fill material that have altered the topography and flow of water in the campground. The presence of asphalt would also contribute to these impacts due to failed drainage structures. The continued presence of failed culverts in the stream channel at several locations would affect channel morphology and hydrology on Hell and Crystal Creeks.

Impacts Common to All Action Alternatives

Direct and Indirect Impacts of the Alternatives. Adverse, site-specific, long-term to permanent negligible to minor adverse impacts would occur due to construction of an 80 foot diameter vehicle turnaround area at the Boulder Creek Trailhead. Clearing, compaction, and paving with asphalt, which is not permeable, would alter surface water flow in an area approximately 5,100 square feet. Removal of asphalt and culverts from the trail corridor, and the construction of a temporary large-vehicle turnaround area would result in local, short-term, negligible to minor adverse impacts during construction due to excavation using heavy equipment, and the associated ground disturbance and potential for erosion in the event that a heavy rainfall event occurs that transports construction-generated sediments.

Removal of culverts, concrete restroom foundations, and recontouring of compacted soils within the former campground parking lot would result in short-term negligible to minor adverse impacts due to ground disturbance during project implementation and the associated erosion that may occur if a heavy rainfall event occurs during project implementation. Beneficial, site-specific and local, long-term to permanent minor to moderate impacts would result from improvement of surface water flow along the improved Boulder Creek Trail, and within the recontoured and revegetated areas in the Boulder Creek campground and former campground parking lot.

Alternative 2 – Minimum Built Environment, Extensive Restoration

Direct and Indirect Impacts of the Alternative. Alternative 2 would result in adverse, site-specific, long-term to permanent negligible adverse impacts due to the expansion of gravel parking on the north side of the existing lot to create a gravel parking surface covering approximately 22,000 square feet. Destabilization of uphill slopes would result in adverse, site-specific, short-term minor to moderate impacts when areas where soils have slid onto the trail are excavated to allow for complete asphalt removal. These unstable soils would likely be subject to erosion in the event of a heavy rainfall event prior to disturbed soils reaching a new state of stability after project completion.

Alternative 2 would also result in adverse, site-specific, short-term minor to moderate impacts to water quality during construction of the new trail and grading of the trail to match the footlogs placed at three stream crossings due to blasting and removal of approximately 1,400 cubic yards of rock at the Crystal Creek stream crossing and cut and removal of approximately 2,500 cubic yards of trail embankment to bring the trail grade to the proposed location of the new footlog and stock ford at this site. Best management practices would be implemented to prevent material from entering the stream channel, but it is anticipated that approximately 250 cubic yards of material may enter the stream channel during blasting and trail construction.

Excavation of buried utility lines in the campground would also result in adverse, site-specific, minor adverse impacts to water quality in the event of a heavy rainfall event during construction due to the extensive ground disturbance that would be required to locate, excavate and remove buried infrastructure throughout the area of the campground.

Alternative 3 – Moderate Visitor Services, Active Revegetation

Direct and Indirect Impacts of the Alternative. Alternative 3 would result in adverse, site-specific, long-term to permanent, negligible adverse impacts due to the expansion of parking on the north side of the existing lot to create a permeable, paved, non-asphalt parking surface covering approximately 16,700 square feet. Approximately 5,300 square feet of gravel parking would be retained. Destabilization of uphill slopes would result in adverse, site-specific, short-term minor to moderate impacts when areas where soils have slid onto the trail are excavated to allow for complete asphalt removal. These unstable soils would likely be subject to erosion in the event of a heavy rainfall event prior to disturbed soils reaching a new state of stability after project completion.

Alternative 3 would also result in adverse, site-specific, short-term minor impacts to water quality during construction of the new trail and grading of the trail to match the footlogs and bridge placed at three stream crossings. This would include blasting and removal of approximately 1,100 cubic yards of rock at the Crystal Creek stream crossing and cut and removal of approximately 400 cubic yards of trail embankment to bring the trail grade to the proposed location of the new 80 foot long steel bridge at this site. Best management practices would be implemented to prevent material from entering the stream channel, but it is anticipated that approximately 100 cubic yards of material may enter the stream channel during blasting and trail construction.

Installation of a day-use stock hitching rail near the Boulder Creek campground former parking lot may result in adverse, site-specific, short-term negligible impacts to water quality due to the concentrated use in this area for pack stock, and the associated soil erosion, and possible runoff from manure that may occur in the immediate area.

Alternative 4 – Enhanced Visitor Services, Active Revegetation

Direct and Indirect Impacts of the Alternative. Alternative 4 would result in adverse, site-specific, long-term to permanent minor to moderate adverse impacts due to the expansion of parking on the north side of the existing lot to create a paved asphalt parking surface that is not

permeable and would alter surface water flow in an area covering approximately 23,000 square feet. Approximately 5,300 square feet of gravel parking would be retained.

Alternative 4 would also result in adverse, site-specific, short-term negligible impacts to water quality during construction of the new trail and grading of the trail to match the footlog and bridges placed at three stream crossings. This would include removal of approximately 20 cubic yards of rock at the Crystal Creek stream crossing and cut and removal of approximately 20 cubic yards of trail embankment to bring the trail grade to the proposed location of the new 150 foot long steel bridge at this site. Best management practices would be implemented to prevent material from entering the stream channel.

Installation of a day-use stock hitching rail near the Boulder Creek campground near the former parking lot, and a campsite with a hitching rail for overnight use for the associated campsite may result in adverse, site-specific, short-term negligible to minor impacts to water quality due to the concentrated use for pack stock, and the associated potential for soil erosion, and runoff from manure that may occur in the immediate area.

Cumulative Impacts. The original construction of the Boulder Creek Road resulted in minor to moderate adverse impacts to hydrologic processes and water quality from earthwork, excavation, and asphalt paving. Ongoing regular maintenance and repairs to the trail (former road) would have minor adverse effects to the Boulder Creek watershed, negligible adverse effects to the Elwha River, and minor adverse effects to hydrologic resources because surface disturbances and erosion occur primarily within existing areas of disturbance. The NPS plan to restore the Elwha River may benefit stream geomorphology of Boulder Creek by restoring natural fluvial processes. After the restoration of the Elwha River, the sediment and debris from the eroding slopes in the Boulder Creek drainage would flow directly into the Elwha River. Sediment would create an alluvial fan, altering the delta where the creek and lake meet. No action would contribute long-term beneficial effects as natural hydrologic processes are reestablished.

Impairment. Hydrology and water quality would not be impaired under any of the alternatives considered in this document.

Air Quality

The 1963 Clean Air Act, as amended (42 USC 7401 et seq.) requires land managers to protect air quality. Section 118 of the Clean Air Act requires national parks to meet all federal, state, and local air pollution standards. Olympic National Park is designated as a Class I area as defined by the Clean Air Act, as amended. All areas immediately surrounding the park are considered Class II areas. Class I areas are afforded the highest degree of protection under the Clean Air Act. This designation allows very little additional deterioration of air quality. Protecting the overall park visibility and impacts on the views that are most important to park visitors is a management concern. Pristine air quality is important to the visitor experience because it allows the long-range scenic views of the Olympic Mountains. Air quality is also important for human health and the preservation of natural and cultural resources.

Campfires are permitted in the campground year-round with the exception of short dry periods during late summer and fall, when burn bans may occur for fire protection and safety reasons. Campfires, generators, and operation of motor vehicles and equipment all may cause local, temporary air quality impacts in the park.

NPS Management Policies address the need to analyze potential impacts to air quality during planning. In order to assess the magnitude of air quality impacts under the various alternatives, air quality standards governing the Park were examined and compared to expected changes due to construction activities. The thresholds of change that define the impact intensities are discussed below.

Impact Assessment Methodology

Type: Beneficial impacts improve air quality. Adverse effects diminish or degrade air quality.

Context: Site-specific impacts occur only in the immediate vicinity of an action. Local impacts occur only within the project area. Regional impacts occur both within and outside of the project area.

Duration: Short-term impacts occur only during project implementation. Long-term impacts occur over one to five years. Permanent impacts occur for longer than five years.

Intensity: The following table describes intensity benchmarks for air quality.

Table 24: Air Quality Impact and Intensity.

Impact Intensity	Intensity Description
Negligible	Impacts (chemical, physical, or biological) would not be detectable and would be well within air quality standards or criteria, and would be within historical or desired air quality conditions.
Minor	Impacts (chemical, physical, or biological effects) would be detectable, but would be within air quality standards or criteria and within historical or desired air quality conditions.
Moderate	Impacts (chemical, physical, or biological effects) would be readily detectable, but would be within air quality standards or criteria; however, historical baseline or air quality standards would be infrequently and not continuously, exceeded by a small amount.
Major	Impacts (chemical, physical, or biological effects) would be highly noticeable and would be frequently altered from the historical baseline or desired air quality conditions; and/or air quality standards or criteria would be frequently and/or continuously exceeded.
Impairment	Impacts (chemical, physical, or biological effects) would be highly noticeable and would be permanently altered from the historical baseline or desired air quality conditions; and/or air quality standards or criteria would be continuously exceeded to the extent that the purposes of the park could not be achieved.

Environmental Consequences to Air Quality

Alternative 1 – No Action

Direct and Indirect Impacts of the Alternative. The No Action Alternative would result in no new impacts to air quality. There would be adverse, local, short-term to long-term, negligible to

minor impacts from vehicular access to the trailhead by visitors and park staff accessing the project area in motorized vehicles.

Alternative 2 – Minimum Built Environment, Extensive Restoration

Direct and Indirect Impacts of the Alternative. Alternative 2 would result in adverse, local, short-term minor to moderate impacts to air quality from blasting, vehicle, and heavy equipment used to implement this alternative. It is anticipated this work would occur over a period of approximately ten weeks.

Alternative 3 – Moderate Visitor Services, Active Revegetation

Direct and Indirect Impacts of the Alternative. Alternative 3 would result in adverse, local, short-term minor to moderate impacts to air quality from blasting, vehicle, and heavy equipment used to implement this alternative. It is anticipated this work would occur over a period of approximately ten weeks.

Alternative 4 – Enhanced Visitor Services, Active Revegetation

Direct and Indirect Impacts of the Alternative. Alternative 4 would result in adverse, local, short-term minor impacts to air quality from vehicle and heavy equipment used to implement this alternative. It is anticipated this work would occur over a period of approximately nine weeks.

Cumulative Impacts. The ongoing use of the area would result in adverse, local, short-term to long-term, negligible to minor impacts from vehicular access to the trailhead by visitors and park staff accessing the project area in motorized vehicles. Implementation of this project concurrent with the removal of the Elwha and Glines Canyon dams would likely result in cumulative, adverse, short-term, negligible to minor impacts to air quality during construction due to the use of blasting, vehicles, and heavy equipment.

Impairment. Air quality would not be impaired under any of the alternatives considered in this document.

Biological Environment

Vegetation

Vegetation in the project area is dominated by forest from the North Pacific Maritime Douglas-Fir-Western Hemlock Forest Group. These forests are synonymous with the Western Hemlock Zone of Franklin and Dyrness (1988) and are dominated by Douglas fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*), and western red cedar (*Thuja plicata*). Western hemlock is the most shade tolerant of these species and thus is the characteristic dominant of mature forests. Douglas-fir is an early, long-lived seral species in this zone. However, due to the longevity of Douglas-fir, even old growth stands have a conspicuous amount of Douglas-fir present. Western red cedar is typically found on moist to wet sites (Crawford et al, 2009).

Representative forested plant associations from this Group which have been documented in the project area include; Douglas-fir-Western Hemlock/Vanilla-leaf, Douglas-fir/Salal-Red huckleberry, Douglas-fir/Salal-Oceanspray, Douglas-fir-Western Hemlock/Salal-Oregon grape, and Douglas-fir-Western Hemlock/Oregongrape/Swordfern. Plant associations not represented in current NPS plot data but also likely to occur in this area have understories dominated by species such as vine maple, oxalis, and Alaska huckleberry. Disturbed areas are likely to have associations from the North Pacific Red Alder-Bigleaf Maple-Douglas-fir Forest Group. (C. Thompson, pers comm. 2009).

There are no known threatened and endangered, rare species, or species of concern in the project area or in the Boulder Creek drainage. Based on the knowledge of the ecology and distribution of these species, it appears unlikely that any occur in the project area. A survey of the area would be conducted during the growing season prior to start of project work.

Exotic species are present in the project area and include herb Robert (*Geranium robertianum*) and everlasting peavine (*Lathyrus latifolius*). In addition oxeye daisy (*Leucanthemum vulgare*), foxglove (*Digitalis purpurea*), St. Johnswort (*Hypericum perforatum*), bull thistle (*Cirsium vulgare*), and Canada thistle (*Cirsium arvense*) are likely to be found. The park's Exotic Plant Management Team (EPMT) has treated herb Robert and everlasting peavine in the Boulder Creek drainage over the past five years. During the 2009 field season, the EPMT will use Garlon 3A to treat herb Robert in the project area and throughout the Elwha Valley. The current accepted herbicide active ingredients used by the park's EPMT are: glyphosate, aminopyradlid, triclopyr amine, triclopyr ester, imazapyr, and imazapic (D. Campbell, pers comm. 2009).



Photo 3: Typical vegetation along the Boulder Creek Trail.

Vegetation in the campground is sparse due to soil compaction from high use in the area. The dominant understory plant species is salal. Throughout the campground area, there is an unusual abundance of trees missing lower limbs; this is likely a result of higher than normal visitor use and the collection of firewood. Also, from late spring and into the fall season dead and downed material from winter storms is absent from the campground; this is likely due to abundant collection for campfire use.

Appropriate genetic stock (i.e. native propagules) would be collected in the Boulder Creek drainage and propagated at the Park's greenhouse facility to be transplanted in the project area under the action alternatives.

Impact Assessment Methodology

Type: Beneficial impacts protect or restore native vegetation or remove non-native vegetation. Adverse effects diminish or remove native vegetation or introduce or spread non-native vegetation.

Context: Site-specific impacts occur only in the immediate vicinity of an action. Local impacts occur only within the project area. Regional impacts occur both within and outside of the project area.

Duration: Short-term impacts occur only during project implementation. Long-term impacts occur over one to ten years. Permanent impacts occur for longer than ten years.

Intensity: The following table describes intensity benchmarks for vegetation.

Table 25: Vegetation Impact and Intensity.

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

Environmental Consequences to Vegetation

Alternative 1 – No Action

Direct and Indirect Impacts of the Alternative. The No Action Alternative would result in adverse, site-specific and local, long-term minor to moderate impacts due to the presence of the wide asphalt trail and the compacted soils associated with visitor use patterns that are prohibiting the establishment and maintenance of native plant communities in the denuded sections of the Boulder Creek Campground and the former campground parking lot.

Impacts Common to All Action Alternatives

Direct and Indirect Impacts of the Alternatives. The activities common to all Action Alternatives would result in adverse, site-specific, long-term to permanent impacts due to the removal of vegetation in the trailhead parking lot area due to the expansion of the vehicle turnaround area and additional vegetation clearance to expand parking on the north side of the road. Approximately 4,750 square feet of vegetation would be removed due to the expansion of the vehicle turnaround area at the trailhead parking lot. This is not an area with old-growth characteristics, and it appears that the area has been previously cleared in decades past.

Approximately 85% of conifers are between 6” – 16” in diameter, with very few trees 21” in diameter or greater.

Additional adverse, site-specific and local, short-term negligible to minor impacts would also occur during asphalt removal, but no old-growth or rare species would be affected. Beneficial, site-specific and local, long-term, minor to moderate impacts due to the rehabilitation of the trail corridor, campground, and former campground parking lot would occur due to the ban on campfires and wood collection and active revegetation throughout the project area. This would include revegetation of the former road leading to an abandoned trash dump east of the campground near Crystal Creek. Best management practices, such as the mitigation measures identified in Appendix A would be implemented to avoid and minimize the potential for the introduction or spread on non-native plant species due to construction and rehabilitation efforts.

Alternative 2 – Minimum Built Environment, Extensive Restoration

Direct and Indirect Impacts of the Alternative. Alternative 2 would result in beneficial, site-specific and local, long-term, minor to moderate impacts due to the rehabilitation of denuded areas associated with approximately 23 former campsites. Adverse, site-specific, long-term to permanent, minor to moderate impacts would occur due to the loss of vegetation covering approximately 15,500 square feet due to the expansion of the trailhead parking lot. Vegetation is primarily coniferous with size classes as described above.

Alternative 3 – Moderate Visitor Services, Active Revegetation

Direct and Indirect Impacts of the Alternative. Alternative 3 would result in adverse, site-specific, negligible to minor impacts due to concentrated stock use within the area immediately adjacent to the day-use hitching rail proposed near the former campground parking lot. Beneficial, site-specific and local, long-term, minor to moderate impacts would occur due to the rehabilitation of denuded areas associated with approximately 22 former campsites. Adverse, site-specific, long-term to permanent, minor to moderate impacts would occur due to the loss of vegetation covering approximately 15,500 square feet due to the expansion of the trailhead parking lot. Vegetation is primarily coniferous with size classes as described above.

Alternative 4 – Enhanced Visitor Services, Active Revegetation

Direct and Indirect Impacts of the Alternative. Alternative 4 would result in would result in adverse, site-specific, negligible to minor impacts due to concentrated stock use within the area immediately adjacent to the new stock campsite with hitching rail, and the day-use hitching rail proposed near the former campground parking lot. Beneficial, site-specific and local, long-term, minor to moderate impacts would occur due to the rehabilitation of denuded areas associated with approximately 19 former campsites. Adverse, site-specific, long-term to permanent, minor to moderate impacts would occur due to the loss of vegetation covering approximately 21,000 square feet due to the expansion of the trailhead parking lot. Vegetation is primarily coniferous with size classes as described above.

Cumulative Impacts. Non-native plants have been intentionally and accidentally introduced to the region, and the project area. Efforts to limit the spread of non-native plants are taking place both

within and outside of the park. Active treatment to reduce the extent of non-native plants is occurring in the project area, the park, and outside park boundaries. However, it is likely that non-native plants will continue to be unintentionally spread both within and outside the park boundaries. Actions will continue to be taken to limit spread and reduce the extent of non-native plants in order to protect native plant communities and the functioning of the ecosystems of which they are a key component. Best management practices would be implemented to avoid the unintentional introduction or spread of non-native plant species as a result of project activities.

Impairment. Vegetation would not be impaired under any of the alternatives considered in this document.

Wildlife and Wildlife Habitat

An abundant array of wildlife species can be found in Olympic National Park. Fifteen types of animals are endemic to the Olympic Peninsula, meaning that they are not found anywhere else on earth. Lands managed by the National Park Service provide havens for wildlife because they are more protected and generally less developed than privately owned lands.

The Columbia black-tailed deer (*Odocoileus hemionus columbianus*) are likely the most common mammal occurring in the project area. Other mammals likely to frequent this area would include Roosevelt elk (*Cervus elaphus roosevelti*), black bear (*Ursus americanus*), cougar (*Felis concolor*), bobcat (*Lynx rufus*), coyote (*Canis latrans*), Douglas squirrel (*Tamiasciurus douglasii*) spotted skunk (*Spilogale putorius*), weasel (*Mustela* sp.), deer mouse (*Peromyscus maniculatus*), and Olympic chipmunk (*Tamias amoenus caurinus*).

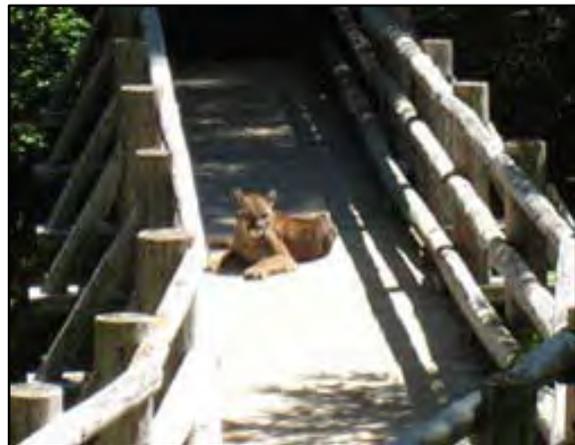


Photo 4: Cougar on the Boulder Creek Hot Springs Bridge – Al Reginato (ONP webpage)

A diversity of resident and migratory bird species can also be found in and around the project location. Bird species common to the area include gray jay (*Perisoreus canadensis*), northern flicker (*Colaptes auratus*), winter wren (*Troglodytes troglodytes*), dark-eyed junco (*Junco hyemalis*), red-breasted sapsucker (*Sphyrapicus ruber*), varied thrush (*Zoothera naevia*), pine siskin (*Carduelis pinus*), northern pygmy owl (*Glaucidium californicum*), and barred owl (*Strix varia*)

Amphibians of Olympic National Park include northwestern salamander, (*Ambystoma gracile*), long-toed salamander (*Ambystoma macrodactylum*), the endemic Olympic torrent salamander (*Rhyacotriton olympicus*), Cope's giant salamander (*Dicamptodon copei*), rough-skinned newt (*Taricha granulose*), Oregon ensatina (*Ensatina eschscholtzi*), western red backed salamander

(*Plethodon vehiculum*), Van Dyke's salamander (*Phethdon vandykei*), western toad (*Bufo boreas*), tailed frog (*Ascaphus truei*), red legged frog (*Rana aurora*), pacific tree frog (*Pseudacris regilla*), and the Cascades frog (*Rana cascadae*).

Due to the cool, maritime climate only a few reptile species are found in Olympic National Park. These species include the northern alligator lizard (*Elgaria coerulea*), rubber boa (*Charina bottae*), common garter snake (*Thamnophis sirtalis*), and the northwestern garter snake (*Thamnophis ordinoides*).

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

Wildlife is not significantly affected by the presence of the trail corridor. However, the former road does bisect wildlife habitat and creates edges where non-native or exotic plant species germinate and thrive.

Impact Assessment Methodology

Type: Beneficial impacts protect or restore native wildlife presence, distribution, or abundance. Adverse effects diminish native wildlife presence, distribution, or abundance.

Context: Site-specific impacts occur only in the immediate vicinity of an action. Local impacts occur only within the project area. Regional impacts occur both within and outside of the project area.

Duration: Short-term impacts occur only during project implementation. Long-term impacts occur over one to ten years. Permanent impacts occur for longer than ten years.

Intensity: The following table describes intensity benchmarks for wildlife.

Table 26: Wildlife and Wildlife Habitat Impact and Intensity.

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

Environmental Consequences to Wildlife

Alternative 1 – No Action

Direct and Indirect Impacts of the Alternative. The No Action Alternative would result in adverse, site-specific, local, and regional short-term to long-term minor to moderate impacts due to disturbance to wildlife associated with recreational use and ongoing maintenance of the Boulder Creek campground, and the disturbance to habitat resulting from the presence of the trailhead parking area, trail, and campground facilities. Adverse, site-specific, short-term negligible to moderate impacts occur when the presence of people in the project area alters the behavior of individual animals. Adverse, site-specific and local, short-term to long-term, minor to moderate impacts occur when individuals or populations of animals avoid the project area due to the kinds and amounts of visitor and administrative use. Adverse, local and regional, short-term minor to moderate adverse effects occur when periodic maintenance requires the use of helicopters to deliver or remove heavy objects to provide continued infrastructure (privies) for backcountry use, resulting in noise-related harassment to native species.

Impacts Common to All Action Alternatives

Direct and Indirect Impacts of the Alternatives. The activities common to all Action Alternatives would result in adverse, site-specific, local, and regional impacts due to the visual and noise-related disturbances from the use of helicopters, heavy equipment, and powered hand-tools during the expansion of the trailhead parking area, removal of asphalt and culverts from 2.2 miles of trail, and the removal of culverts and concrete foundations from the former campground restrooms. It is expected that these actions will alter use of the immediate and surrounding area by individual animals during the period of construction, resulting in animals using other similar habitat within the park until the project work is complete. No direct mortality is anticipated due to construction and rehabilitation activities, although the kinds and amounts of construction

related activities may unintentionally harass native wildlife that are unaccustomed to the proposed actions.

Beneficial, site-specific and local, long-term minor to moderate impacts are anticipated under all action alternatives due to the removal of asphalt and narrowing of the travel corridor. This would minimize the presence of this potential barrier to wildlife movement across the landscape. Additionally, the active revegetation of the trail corridor and areas in the Boulder Creek campground and former campground parking lot will provide increased habitat and improved habitat quality for wildlife when the project is complete.

Alternative 2 – Minimum Built Environment, Extensive Restoration

Direct and Indirect Impacts of the Alternative. In addition to impacts described above, Alternative 2 would result in adverse, site-specific and local, short-term moderate impacts due to noise related impacts from the use of blasting to construct the proposed foot log and stock ford stream crossing at Crystal Creek, and the large number of vehicle trips required to remove approximately 1,400 cubic yards of rock and 2,500 cubic yards of soil and fill materials from the trail embankment at Crystal Creek. Beneficial, site-specific and local, long-term minor to moderate impacts would result from habitat expansion and improvement due to the revegetation of denuded areas associated with approximately 23 former campsites.

Alternative 3 – Moderate Visitor Services, Active Revegetation

Direct and Indirect Impacts of the Alternative. In addition to impacts common to all described above, Alternative 3 would result in adverse, site-specific and local, short-term minor to moderate impacts due to noise related impacts from the use of blasting to construct the proposed 80 foot long bridge at Crystal Creek, and the number of vehicle trips required to remove approximately 1,100 cubic yards of rock and 400 cubic yards of soil and fill materials from the trail embankment at Crystal Creek. Beneficial, site-specific and local, long-term minor to moderate impacts would result from habitat expansion and improvement due to the revegetation of denuded areas associated with approximately 22 former campsites.

Alternative 4 – Enhanced Visitor Services, Active Revegetation

Direct and Indirect Impacts of the Alternative. In addition to impacts common to all described above, Alternative 4 would result in adverse, site-specific and local, short-term minor impacts due to noise related to install a 50 foot long bridge at Cougar Creek and a 150 foot long bridge at Crystal Creek, and the number of vehicle trips required to remove approximately 20 cubic yards of rock and 20 cubic yards of soil and fill materials from the trail embankment at Crystal Creek. Beneficial, site-specific and local, long-term minor to moderate impacts would result from habitat expansion and improvement due to the revegetation of denuded areas associated with approximately 19 former campsites.

Cumulative Impacts. Human use and development both within and outside of the park has reduced the quantity and quality of wildlife habitat due to changes in species composition, habitat structure, and ecosystem function. Large protected areas like Olympic National Park also provide extensive intact habitat that provide alternate feeding, sheltering, and breeding locations

for many animals in the park and surrounding area when site specific impacts occur that change wildlife use patterns. Active restoration efforts for individual species of wildlife also occur, including the reintroduction of fisher within Olympic National Park. Efforts to restore and improve both terrestrial and aquatic habitat is also occurring both within and outside of park boundaries, including within the Boulder Creek project area.

Impairment. Wildlife would not be impaired under any of the alternatives considered in this document.

Unique or Important Fish or Fish Habitat

There are thirty-seven species of native fish inhabiting the rivers, streams, and lakes throughout Olympic National Park. NPS staff surveyed Boulder Creek and the tributaries in the project area for fish on May 29, 2009. No fish were observed in any the tributaries or the mainstem of Boulder Creek. These findings are consistent with a previous assessment that identified a barrier cascade waterfall upstream from Lake Mills (Hosey and Associates, 1988). The 1,400 foot section of Boulder Creek between Lake Mills and the falls supports spawning habitat for rainbow trout and is also periodically inhabited by bull trout, a species identified as threatened under the Endangered Species Act. This section of the creek also provides habitat for sculpin and cutthroat trout.

Rainbow trout have been observed to spawn in Boulder Creek from April through June. Bull trout spawning has not been documented in Boulder Creek, but bull trout are known to spawn on the delta near the head of Lake Mills from late September through October.

Impact Assessment Methodology

Type: Beneficial impacts protect or restore important fish or fish habitat. This includes presence, distribution, or abundance of native fish species and quality of fish habitat. Adverse effects diminish native fish presence, distribution, or abundance or degrade the quality of fish habitat.

Context: Site-specific impacts occur only in the immediate vicinity of an action. Local impacts occur only within the project area. Regional impacts occur both within and outside of the project area.

Duration: Short-term impacts occur only during project implementation. Long-term impacts occur over one to ten years. Permanent impacts occur for longer than ten years.

Intensity: The following table describes intensity benchmarks for important fish and fish habitat.

Table 27: Unique or Important Fish or Fish Habitat Impact and Intensity.

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

Environmental Consequences to Fish and Essential Fish Habitat

Alternative 1 – No Action

Direct and Indirect Impacts of the Alternative. The No Action Alternative would result in no new impacts to fish or essential fish habitat. No fish are located within the project area, although fish do inhabit the downstream portion of Boulder Creek below a cascade that acts as a fish barrier. Adverse, regional, long-term, negligible to minor impacts would continue to occur due to the continuing erosion of asphalt and fill materials from the Boulder Creek trail, particularly at failed culvert locations.

Impacts Common to All Action Alternatives

Direct and Indirect Impacts of the Alternatives. Removal of asphalt and failed culverts from 2.2 miles of trail has the potential to contribute sediment into Boulder Creek if a large rainfall event occurs during construction activities near tributary streams. It is anticipated that the implementation of best management practices would prevent adverse impacts, but the potential for adverse, short-term, regional, negligible impacts due to increased sediment exists. However, it is unlikely that the amount of sediment that might enter stream waters in the project area would be detectable above background water quality levels below the fish barrier cascade where increased sediment would otherwise have the potential to adversely impact resident fish.

Alternative 2 – Minimum Built Environment, Extensive Restoration

Direct and Indirect Impacts of the Alternative. Alternative 2 would result in adverse, regional, short-term, negligible impacts to fish and fish habitat due to the potential introduction of approximately 250 cubic yards of material into Crystal Creek due to blasting and excavation required to install the proposed footlog and stock ford at this location. However, it is unlikely

that the amount of sediment that might enter stream waters in the project area would be detectable above background water quality levels below the fish barrier cascade, located over five miles downstream from the Crystal Creek trail crossing, where increased sediment would otherwise have the potential to adversely impact resident fish.

Alternative 3 – Moderate Visitor Services, Active Revegetation

Direct and Indirect Impacts of the Alternative. Alternative 3 would result in adverse, regional, short-term, negligible impacts to fish and fish habitat due to the potential introduction of approximately 100 cubic yards of material into Crystal Creek due to blasting and excavation required to install the proposed 80 foot long bridge at this location. However, it is unlikely that the amount of sediment that might enter stream waters in the project area would be detectable above background water quality levels below the fish barrier cascade, located over five miles downstream from the Crystal Creek trail crossing, where increased sediment would otherwise have the potential to adversely impact resident fish.

Alternative 4 – Enhanced Visitor Services, Active Revegetation

Direct and Indirect Impacts of the Alternative. Alternative 4 would result in adverse, regional, short-term, negligible impacts to fish and fish habitat due to the potential introduction of sediment into Crystal Creek due to installation of the proposed 150 foot long bridge at this location. However, it is unlikely that the amount of sediment that might enter stream waters in the project area would be detectable above background water quality levels below the fish barrier cascade, located over five miles downstream from the Crystal Creek trail crossing, where increased sediment would otherwise have the potential to adversely impact resident fish.

Cumulative Impacts. Construction of the Elwha and Glines Canyon dams blocked passage to the upper Elwha watershed for resident and anadromous populations of fish. Changes in human use patterns, including consumption of fish and alteration of fish habitat has reduced the distribution and abundance of native fish species. Removal of the Elwha and Glines Canyon dams will have temporary adverse effects on fish and fish habitat, but will have significant long-term beneficial impacts on anadromous fish and river habitat. Removal of the Griff Creek barrier culvert will also extend suitable fish habitat on the Elwha watershed and will provide refuge for fish during the dam removal project. Due to the distance from fish habitat in the Elwha watershed, it is unlikely that the actions considered for this project would result in a detectable cumulative impact. The potential for negligible impacts associated with project implementation is described for each alternative above.

Impairment. Fish and essential fish habitat would not be impaired under any of the alternatives considered in this document.

Threatened and Endangered Species

Under the Endangered Species Act (ESA) of 1973, as amended, an endangered species is defined as any species in danger of extinction throughout all or a significant portion of its range. No critical habitat has been formally designated within ONP for marbled murrelet and northern

spotted owl, although much of the park contains high quality habitat that is considered important for the recovery of the species. Critical habitat was not designated because habitat in the park is not thought to require special management consideration or protection by virtue of its national park status.

Northern Spotted Owl

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

Northern spotted owls generally require large areas of land containing semi-continuous expanses of old growth forest to meet their biological needs for nesting, roosting, foraging, and dispersal. Nesting and roosting habitat typically includes a multiple layer, multiple species, moderate to high closure canopy with large trees. Preferred nesting and roosting habitat also contains open space below the canopy for protected flight, large trees with deformities to provide nesting locations and numerous fallen trees and other ground debris (Thomas, et al.). Foraging habitat used by northern spotted owls is often fragmented and includes open forest. In much of the species' northern range, large dense forests are also chosen as foraging habitat. Foraging habitat in the Elwha River watershed mid-elevation includes the edges of dense forests and open forest. Dispersal habitat is important for owl movement between nesting habitat, both locally and over the range of the northern spotted owl, and provides critical links between owl populations. Northern spotted owls require forest stands with adequate tree size and moderate canopy closure to provide refuge from predators and for occasional foraging. OLYM represents the largest contiguous block of suitable nesting habitat remaining within the listed range of the northern spotted owls.

Habitat in the project area is physically suitable for northern spotted owl nesting and roosting, consisting primarily of mature Douglas-fir, western hemlock, western red cedar and some red alder at approximately 1800- 2200 feet in elevation. While spotted owls are known to have occurred in the project area in the past, with the spread of the Barred Owl (*Strix varia*) into the area in the late 1990's most spotted owl activity has shifted to higher elevations in the Boulder Creek drainage. Spotted owl surveys have been conducted along the Hot Springs trail and campground since the early 1990's as part of the park's long-term spotted owl demography study. Three spotted owl pairs are known to use this section of Boulder Creek. However, no nesting or roosting has been observed within 500 meters of the road or campground in the last 5 years. The most recently occupied activity centers at all three sites have been over 1500 meters from the project area. (S. Gremel, pers comm. 2009)

Marbled Murrelet

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

Marbled murrelets inhabit the Pacific coast of North America from the Bering Sea to central California, just south of San Francisco Bay. In contrast to other seabirds, murrelets do not form dense colonies, but instead nest singly on large limbs of coniferous trees. They may fly as far as 43 miles or more inland to nest, generally in older coniferous forests with a high canopy closure. This habitat requires trees with large branches and deformities found in old-growth forests for nesting platforms. Marbled murrelets have a 30 day incubation period during which adults trade off incubation duties while the other member of the pair forages at sea. Shortly after the chick hatches both adults leave the chick alone while they forage at sea. They return to feed the chick 1-8 times per day, primarily during dawn and dusk. Chicks remain on the nest for 27-40 days until they fledge. The nesting season for marbled murrelets is highly asynchronous, begins on April 1, and lasts up to 182 days, with the peak occurring in June and July (Kim et al 2006). When not nesting, the birds live at sea, spending their days feeding close to shore and then moving several kilometers offshore at night (USFWS 1997).

Portions of this project would take place in suitable habitat for marbled murrelets. The Boulder Creek drainage is one that has not been previously surveyed for murrelets by ONP wildlife staff (P. Happe, pers comm. 2009).

For the purposes of Section 7 consultation, marbled murrelet breeding season is broken into two periods: April 1 through August 5 is the early season, and August 6 through September 15 is the late season, with some chicks hatched and approximately 50 percent fledged as early as August 6.

Bull Trout

All populations of bull trout are designated as threatened in the conterminous United States under the ESA (64 Fed. Reg. 58910 (November 1, 1999)). The decline of bull trout is primarily due to habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, past fishery management practices, and the introduction of nonnative species. Boulder Creek flows into Lake Mills, which is fed by the Elwha River and created by the Glines Canyon dam.



Photo 5: Bull Trout (ONP webpage)

The Boulder Creek drainage (from the mouth at Lake Mills to the barrier falls, approximately 1,400 feet upstream) supports spawning habitat for rainbow trout and is periodically inhabited by threatened bull trout. The Elwha River supports habitat for subpopulations of bull trout (“native char”). The lower and upper Elwha River subpopulations are isolated by the dams (Fed. Reg. Vol. 63, No. 111, 31696). The project would occur approximately 2.5 to 5.5 miles upstream from the barrier falls in the Boulder Creek drainage.

Bull trout appear to have more specific habitat requirements than other salmonids and generally need cold water, complex cover, stable substrate with a low percentage of fine sediments, high channel stability, and stream/population connectivity (Rieman and McIntyre 1993). Adults inhabit cold rivers and large tributary streams with moderate to fast currents. Spawning occurs in small cold streams. These habitat components, as well as valley form, spawning and rearing substrates, and migratory corridors, influence bull trout distribution and abundance (Pratt 1992; USFWS 2004).

Section 7 of the Endangered Species Act (ESA) mandates all federal agencies to determine how to use their existing authorities to further the purposes of the ESA to aid in recovering listed species, and to address existing and potential conservation issues. Section 7(a)(2) states that each federal agency shall, in consultation with the Secretary of the Interior, ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat.

Impact Assessment Methodology

Type: Beneficial impacts protect or restore threatened or endangered species or critical habitat. Adverse effects diminish threatened or endangered species or critical habitat.

Context: Site-specific impacts occur only in the immediate vicinity of an action. Local impacts occur only within the project area. Regional impacts occur both within and outside of the project area.

Duration: Short-term impacts occur only during project implementation. Long-term impacts occur over one to ten years. Permanent impacts occur for longer than ten years.

Intensity: The following table describes intensity benchmarks for threatened and endangered species.

Table 28: Threatened and Endangered Species Impact and Intensity.

Impact Intensity	Intensity Description
Negligible	The action could result in a change to a population or individuals of a species, but the change would not be of any measurable or perceptible consequence and would be well within natural variability. In the case of federally listed species, this impact intensity equates to a USFWS determination of "may affect, not likely to adversely affect."
Minor	The action could result in a change to a population or individuals of a species. The change would be measurable, but small and localized, and not outside the range of natural variability. Mitigation measures, if needed, would be simple and successful. In the case of federally listed species, this impact intensity typically equates to a USFWS determination of "may affect, not likely to adversely affect."
Moderate	Impacts on special status species, their habitats, or the natural processes sustaining them would be detectable and occur over a large area. Breeding animals of concern are present, animals are present during particularly vulnerable life stages; mortality or interference with activities necessary for survival could be expected on an occasional basis, but is not expected to threaten the continued existence of the species in the park unit or conservation zone. Mitigation measures would be extensive and likely successful. In the case of federally listed species, this impact intensity typically equates to a USFWS determination of "may affect, likely to adversely affect."
Major	The action would result in noticeable effects to the viability of the population or individuals of a species. Impacts on special status species or the natural processes sustaining them would be detectable, both inside and outside of the park. Loss of habitat might affect the viability of at least some special status species. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed. In the case of federally listed species, the impact intensity equates to a USFWS determination of "may affect, likely to jeopardize the continued existence of a species."
Impairment	Actions would result in the extirpation of a listed species from within the park.

Environmental Consequences to Threatened and Endangered Species

Alternative 1 – No Action

Direct and Indirect Impacts of the Alternative. The No Action Alternative would result in adverse, site-specific, local, and regional short-term to long-term negligible to moderate impacts due to disturbance to marbled murrelets and northern spotted owls from recreational use and ongoing maintenance of the Boulder Creek campground, and the disturbance to habitat resulting from the presence of the trailhead parking area, trail, and campground facilities.

Adverse, site-specific, short-term negligible to moderate impacts occur when the presence of people in the project area alters the behavior of individual animals. Adverse, site-specific and local, short-term to long-term, minor to moderate impacts occur when individuals or populations of animals avoid the project area due to the kinds and amounts of visitor and administrative use.

Adverse, local and regional, short-term minor to moderate adverse effects occur when periodic maintenance requires the use of helicopters to deliver or remove heavy objects to provide continued infrastructure (privies) for backcountry use, resulting in noise-related harassment to marbled murrelets and northern spotted owls. Helicopter flights are regularly planned to occur after the breeding season for endangered species to avoid adverse effects resulting from noise-related impacts. Occasionally fire management or other emergency actions require use of equipment during the early breeding season, with the potential to adversely affect nesting marbled murrelets and spotted owls.

The No Action Alternative would result in no new impacts to bull trout or bull trout habitat. Adverse, regional, long-term, negligible to minor impacts would continue to occur due to the continuing erosion of asphalt and fill materials from the Boulder Creek trail, particularly at failed culvert locations.

Impacts Common to All Action Alternatives

Direct and Indirect Impacts of the Alternatives.

Expansion of the vehicle turnaround at the trailhead parking lot would result in adverse, site-specific, long-term, minor to moderate impacts due to the removal of coniferous forest vegetation from approximately 4,750 square feet of previously disturbed forest. Approximately 85% of trees are between 6" – 16" in diameter, with very few trees 21" in diameter or greater. No trees with structural components, such as large branches with suitable nesting platforms for marbled murrelets would be removed. The surrounding forest would remain intact and would continue to provide suitable nesting, roosting and dispersal habitat for northern spotted owls, although displacement due to the presence of barred owls would likely continue. Construction would occur after the early breeding season to avoid and minimize noise-related impacts to marbled murrelets and northern spotted owls. No effects to bull trout are anticipated from expansion of the vehicle turnaround area.

Removal of asphalt from 2.2 miles of trail, removal of culverts from the trail and campground, and removal of abandoned infrastructure in the campground would not result in the loss of any mature trees. Disturbance would be limited to the removal of young plants that have become established immediately adjacent to the asphalt trail, or on top of fill material that has slumped onto the trail since the road was closed to automobile use in the early 1980s. Visual and noise-related disturbances from the use of helicopters, heavy equipment, and powered hand-tools during the expansion of the trailhead parking area, removal of asphalt and culverts from 2.2 miles of trail, and the removal of culverts and concrete foundations from the former campground restrooms would result in adverse, site-specific to regional, minor impacts. It is expected that these actions may alter use of the immediate and surrounding area by individual marbled murrelets or northern spotted owls during the period of construction, resulting in animals using other similar habitat within the park until the project work is complete. No direct mortality is anticipated due to construction and rehabilitation activities, although the kinds and amounts of construction related activities may unintentionally affect individual birds. All use of heavy equipment and helicopters would occur outside of the early breeding season for marbled

murrelets and northern spotted owls. This is intended to avoid or minimize the potential to adversely affect these species.

Revegetation work would be done by hand, and is not anticipated to result in additional disturbance to marbled murrelets or northern spotted owls above existing levels due to visitor use in the project area. If materials for campsite delineation required helicopter transport of logs or other materials, this work would occur outside of the nesting period for northern spotted owls and marbled murrelets. Beneficial, site-specific, long-term minor impacts are expected due to the restoration of a native vegetation understory due to the planned restoration activities along the trail and in the campground and former campground parking lot.

Removal of asphalt and failed culverts from 2.2 miles of trail has the potential to contribute sediment into Boulder Creek if a large rainfall event occurs during construction activities near tributary streams. It is anticipated that the implementation of best management practices would prevent adverse impacts, but the potential for adverse, short-term, regional, negligible impacts due to increased sediment exists. However, it is unlikely that the amount of sediment that might enter stream waters in the project area would be detectable above background water quality levels below the fish barrier cascade where increased sediment would otherwise have the potential to adversely affect resident bull trout.

Alternative 2 – Minimum Built Environment, Extensive Restoration

Direct and Indirect Impacts of the Alternative. Expansion of the trailhead parking lot would result in adverse, site-specific, long-term, minor to moderate impacts due to the removal of coniferous forest vegetation from approximately 15,500 square feet of previously disturbed forest. Approximately 85% of trees are between 6” – 16” in diameter, with very few trees 21” in diameter or greater. No trees with structural components, such as large branches with suitable nesting platforms for marbled murrelets would be removed. The surrounding forest would remain intact and would continue to provide suitable nesting, roosting and dispersal habitat for northern spotted owls, although displacement due to the presence of barred owls would likely continue. Construction would occur after the early breeding season to avoid and minimize noise-related impacts to marbled murrelets and northern spotted owls. No effects to bull trout are anticipated from expansion of the trailhead parking area.

In addition to impacts described above, Alternative 2 would result in adverse, site-specific and local, short-term minor impacts due to noise related impacts from the use of blasting to construct the proposed foot log and stock ford stream crossing at Crystal Creek, and the large number of vehicle trips required to remove approximately 1,400 cubic yards of rock and 2,500 cubic yards of soil and fill materials from the trail embankment at Crystal Creek. This work would occur after the breeding season for northern spotted owls and marbled murrelets to minimize the potential for adverse effects. Beneficial, site-specific and local, long-term minor to moderate impacts would result from habitat expansion and improvement due to the revegetation of denuded areas associated with approximately 23 former campsites.

Alternative 2 would result in adverse, regional, short-term, negligible impacts to bull trout and bull trout habitat due to the potential introduction of approximately 250 cubic yards of material into Crystal Creek due to blasting and excavation required to install the proposed footlog and

stock ford at this location. However, it is unlikely that the amount of sediment that might enter stream waters in the project area would be detectable above background water quality levels below the fish barrier cascade, located over five miles downstream from the Crystal Creek trail crossing, where increased sediment would otherwise have the potential to adversely affect resident bull trout.

Alternative 3 – Moderate Visitor Services, Active Revegetation

Direct and Indirect Impacts of the Alternative. Expansion of the trailhead parking lot would result in adverse, site-specific, long-term, minor to moderate impacts due to the removal of coniferous forest vegetation from approximately 15,500 square feet of previously disturbed forest. Approximately 85% of trees are between 6” – 16” in diameter, with very few trees 21” in diameter or greater. No trees with structural components, such as large branches with suitable nesting platforms for marbled murrelets would be removed. The surrounding forest would remain intact and would continue to provide suitable nesting, roosting and dispersal habitat for northern spotted owls, although displacement due to the presence of barred owls would likely continue. Construction would occur after the early breeding season to avoid and minimize noise-related impacts to marbled murrelets and northern spotted owls. No effects to bull trout are anticipated from expansion of the trailhead parking area.

In addition to impacts common to all described above, Alternative 3 would result in adverse, site-specific and local, short-term minor impacts due to noise related to blasting to construct the proposed 80 foot long bridge at Crystal Creek, and the number of vehicle trips required to remove approximately 1,100 cubic yards of rock and 400 cubic yards of soil and fill materials from the trail embankment at Crystal Creek. This work would occur after the early breeding season for northern spotted owls and marbled murrelets to minimize the potential for adverse effects. Beneficial, site-specific and local, long-term minor to moderate impacts would result from habitat expansion and improvement due to the revegetation of denuded areas associated with approximately 22 former campsites.

Alternative 3 would result in adverse, regional, short-term, negligible impacts to bull trout and bull trout habitat due to the potential introduction of approximately 100 cubic yards of material into Crystal Creek due to blasting and excavation required to install the proposed 80 foot long bridge at this location. However, it is unlikely that the amount of sediment that might enter stream waters in the project area would be detectable above background water quality levels below the fish barrier cascade, located over five miles downstream from the Crystal Creek trail crossing, where increased sediment would otherwise have the potential to adversely affect resident bull trout.

Alternative 4 – Enhanced Visitor Services, Active Revegetation

Direct and Indirect Impacts of the Alternative. Expansion of the trailhead parking lot would result in adverse, site-specific, long-term, minor to moderate impacts due to the removal of coniferous forest vegetation from approximately 21,000 square feet of previously disturbed forest. Approximately 85% of trees are between 6” – 16” in diameter, with very few trees 21” in diameter or greater. No trees with structural components, such as large branches with suitable nesting platforms for marbled murrelets would be removed. The surrounding forest would

remain intact and would continue to provide suitable nesting, roosting and dispersal habitat for northern spotted owls, although displacement due to the presence of barred owls would likely continue. Construction would occur after the early breeding season to avoid and minimize noise-related impacts to marbled murrelets and northern spotted owls. No effects to bull trout are anticipated from expansion of the trailhead parking area.

In addition to impacts common to all described above, Alternative 4 would result in adverse, site-specific and local, short-term minor impacts due to noise related to install a 50 foot long bridge at Cougar Creek and a 150 foot long bridge at Crystal Creek, and the number of vehicle trips required to remove approximately 20 cubic yards of rock and 20 cubic yards of soil and fill materials from the trail embankment at Crystal Creek. This work would occur after the early breeding season for northern spotted owls and marbled murrelets to minimize the potential for adverse effects. Beneficial, site-specific and local, long-term minor to moderate impacts would result from habitat expansion and improvement due to the revegetation of denuded areas associated with approximately 19 former campsites.

Alternative 4 would result in adverse, regional, short-term, negligible impacts to bull trout and bull trout habitat due to the potential introduction of sediment into Crystal Creek due to installation of the proposed 150 foot long bridge at this location. However, it is unlikely that the amount of sediment that might enter stream waters in the project area would be detectable above background water quality levels below the fish barrier cascade, located over five miles downstream from the Crystal Creek trail crossing, where increased sediment would otherwise have the potential to adversely affect resident bull trout.

Cumulative Impacts. Development for human use both within and outside of the park has reduced the extent of suitable habitat for threatened and endangered species, such as the northern spotted owl, marbled murrelet, and bull trout. These changes have affected the composition, structure, and function of species populations and habitat. A programmatic biological opinion was prepared during the preparation of the Olympic National Park General Management Plan. All actions taken in the park must take into account the potential to adversely affect listed species or habitat. Many ongoing activities, including road and trail construction and maintenance have the potential to adversely affect listed species and habitat. Best management practices are implemented to avoid or minimize the potential for adverse impacts associated with park activities.

Removal of the Elwha and Glines Canyon dams has the potential to adversely affect listed species and habitat over the short term, but will significantly improve habitat for threatened and endangered fish species over the long term. Implementation of the fish-barrier culvert removal project on Griff Creek will also result in long-term beneficial effects to bull trout by extending suitable habitat and providing refuge during dam removal activities. Other actions taken both within and outside of the park have the potential to adversely affect, or improve the quality of suitable habitat for threatened and endangered species.

All alternatives considered in this plan were developed to avoid or minimize the potential for adverse effects to threatened and endangered species and habitat. Work with the potential to cause noise related impacts would occur outside of the early nesting season to reduce the

potential for adverse effects to nesting marbled murrelets and spotted owls. No actions are likely to harm individual animals or result in mortality. Distance from project activities with the potential to affect aquatic habitat for bull trout make adverse impacts to this species unlikely due to the presence of a fish barrier cascade over two miles downstream from the nearest project activity.

Impairment. Threatened and Endangered Species would not be impaired under any of the alternatives considered in this document.

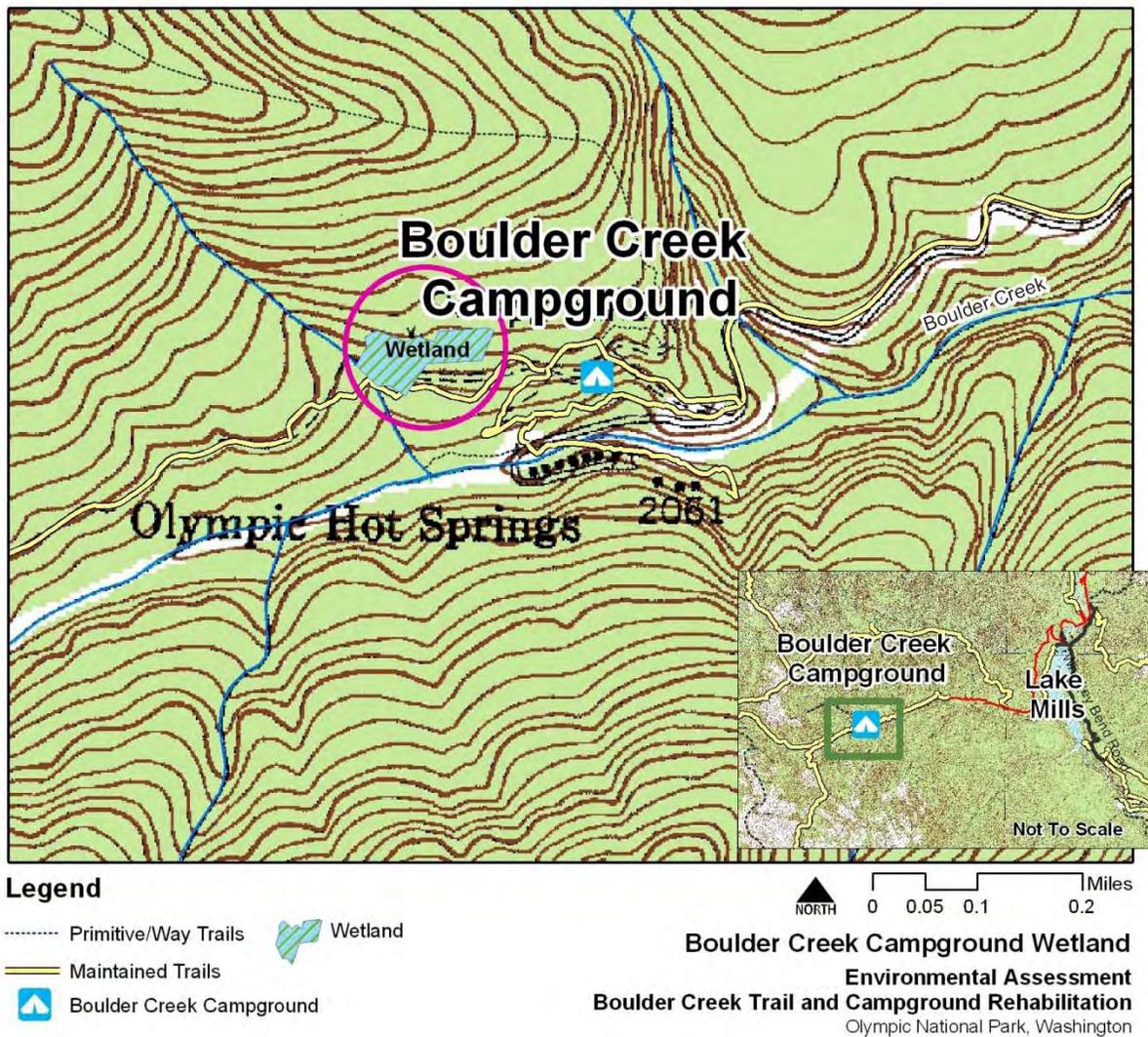
Wetlands

Wetlands include the lands between terrestrial and deep-water habitats, and isolated areas, where the water is at or near the surface. The presence of certain types of soils, plant species, and the presence of water define wetlands. Wetlands provide many essential functions including filtering pollutants which also improves water quality, recharging ground water, controlling erosion, controlling floods, and providing habitat for plants and animals. The functions that an individual wetland performs depend on its location, surrounding topography, subsurface geology, amount and duration of water, and the types of plants present.

Although not shown on the park's geographic information system (GIS) database or on the National Wetland Inventory (NWI) website, a forested wetland is in the northwest area of the Boulder Creek campground. The wetland was likely overlooked because the Park receives information from NWI and NWI's mapping did not include many of the forested wetland areas of the park. Olympic National Park staff conducted several site visits during the summer and a wetland assessment was conducted on November 10, 2009. The assessment was conducted at the end of the growing season, the water table was high, and the ground was covered with snow. Therefore, a future assessment (i.e. wetland determination, classification, and delineation) would be required during the growing season and prior to project work.

Nine data points were collected around the perimeter using GPS. Data indicates that the wetland is approximately 3 acres in size; however, due to snow in the tree canopy, data may need to be collected again to determine accuracy of this measurement.

Figure 22: Wetland at Boulder Creek Campground.



Surface water was present at all nine data point locations. Water runoff from the hillslope west of the campground appears to flow to the lowest point in the wetland. A more detailed assessment would be required to determine if manipulations (i.e. roads, fill material, and culverts) during the construction of the Boulder Creek campground also contributed to the formation of the wetland.

Due to snow cover, soil test pits were not dug during the assessment. However, park staff recorded soils that were mucky and contained sulfidic smells. These are two indicators of wetland (hydric) soils.

Vegetation observed by park staff during the growing season was dominated by skunk cabbage (*Lysichiton americanum*), which is an obligate wetland species. Under natural conditions obligate wetland species occur almost always (> 99% probability) in wetlands. Vegetation recorded during the assessment includes the following:

- Dominate trees: red alder (*Alnus rubra*) and western redcedar (*Thuja plicata*); these are facultative plants that are equally likely to occur in wetlands or nonwetlands (estimated probability 34%-66%).
- Dominate shrub: devils club (*Oplopanax horridus*), a facultative species.
- Dominate forbs: coltsfoot (*Petasites palmatus*), lady fern (*Athyrium filix-femina*) and slough sedge (*Carex obnupta*).

The NPS manages wetlands in accordance with Executive Order 11990 (Protection of Wetlands), the Clean Water Act, the Rivers and Harbors Appropriation Act of 1899, and the procedures described in Director’s Order 77-1 (Wetland Protection). (*Management Policies 2006*).

To protect wetlands and surrounding habitat the park implements a “no net loss of wetlands” policy by providing leadership and taking action to prevent the destruction, loss, or degradation of wetlands and preserve and enhance their natural and beneficial values. A detailed wetland inventory will be conducted during the next growing season.

Impact Assessment Methodology

Type: Beneficial impacts protect or restore wetlands. Adverse effects diminish wetlands.

Context: Site-specific impacts occur only in the immediate vicinity of an action. Local impacts occur only within the project area. Regional impacts occur both within and outside of the project area.

Duration: Short-term impacts occur only during project implementation. Long-term impacts occur over one to ten years. Permanent impacts occur for longer than ten years.

Intensity: The following table describes intensity benchmarks for wetlands.

Table 29: Wetlands Impact and Intensity.

Impact Intensity	Intensity Description
Negligible	No effects would occur or the effects to wetland conditions would be below the level of detection.
Minor	The effect to wetland conditions would be detectable. Any effects would be small and if mitigation were needed to offset potential adverse effects, it would be simple and successful.
Moderate	Effects to wetland conditions would be detectable, localized and would be small and of little consequence to the surrounding habitat. Mitigation measures, if needed to offset adverse effects, would be successful.
Major	Effects to wetlands would be obvious, with substantial consequences to wetland and surrounding habitat. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed.
Impairment	Effects to critical wetlands in the park would be adverse and permanent, and would result in impacts to the park’s biological integrity such that the purposes of the park could not be achieved.

Environmental Consequences to Wetlands

Alternative 1 – No Action

Direct and Indirect Impacts of the Alternative. The No Action Alternative would result in no changes in the extent size, species composition, or function of the small wetland located in the Boulder Creek campground.

Impacts Common to All Action Alternatives

Direct and Indirect Impacts of the Alternatives. Removal of culverts and fill materials in the Boulder Creek Campground is intended to restore natural topography and associated hydrologic conditions within the project area. If the wetland present in the campground is partially dependent of the presence of fill material and failed culverts to maintain hydric soils and support wetland dependent plant species, the removal of this obsolete infrastructure may improve site drainage and reduce the extent of the wetland. It is not anticipated that this work would alter species composition, or wetland function. However, site rehabilitation does have the potential to result in adverse, site-specific, and short – to long-term, negligible to moderate impacts if site conditions after removal of infrastructure no longer support the wetland in its current condition.

Short term impacts to individual plants within the wetland may occur during project implementation, but natural recovery and active revegetation would mitigate this impact. Restoration of natural topography and vegetation is anticipated to result in beneficial, long-term, site-specific, negligible to moderate impacts to native vegetation, including the plant community within the wetland.

Alternative 2 – Minimum Built Environment, Extensive Restoration

Direct and Indirect Impacts of the Alternative. Alternative 2 would result in additional adverse, site-specific, short-term, minor impacts due to extensive excavation in the Boulder Creek campground to locate and remove the buried utility lines from the former automobile campground development that used to provide water and sewer services. Approximately 10,000 square feet would be disturbed, some of which is located in or adjacent to the wetland.

Alternatives 3 & 4

Direct and Indirect Impacts of the Alternative. Impacts are described above for actions common to all alternatives.

Cumulative Impacts. Construction of the Boulder Creek campground and associated road resulted in the placement of fill materials that altered water flow in the project area. It is possible that this has resulted in the expansion of wetland vegetation and soils in the campground. Development both within and outside of the park has resulted in the reduction in the extent and quality of wetland habitat in the region and across the country. No reasonably foreseeable future projects in the Elwha watershed are designed to fill wetlands. Although the Boulder Creek Trail and Campground Rehabilitation Project does not include filling wetlands, it is intended to restore natural topography and surface water flow. This may result in the diminishment of wetland

vegetation and soils when abandoned infrastructure that may be contributing to the presence and extent of the wetland is removed, and site drainage is improved.

Impairment. Wetlands would not be impaired under any of the alternatives considered in this document.

Wilderness Values

For more than 100 years, the Olympic Mountains have been described as wilderness. Since the early accounts of exploration into the interior Olympics in the late 19th century, wilderness has been the underlying concept in what is now the park. In the early 1900s, development of the Olympic wilderness began with U.S Forest Service construction of trails, shelters, and ranger stations. Private developers made a few roads into the interior Olympics with the construction of hunting chalets, cabins, and access to the Olympic Hot Springs Resort into the 1930s.

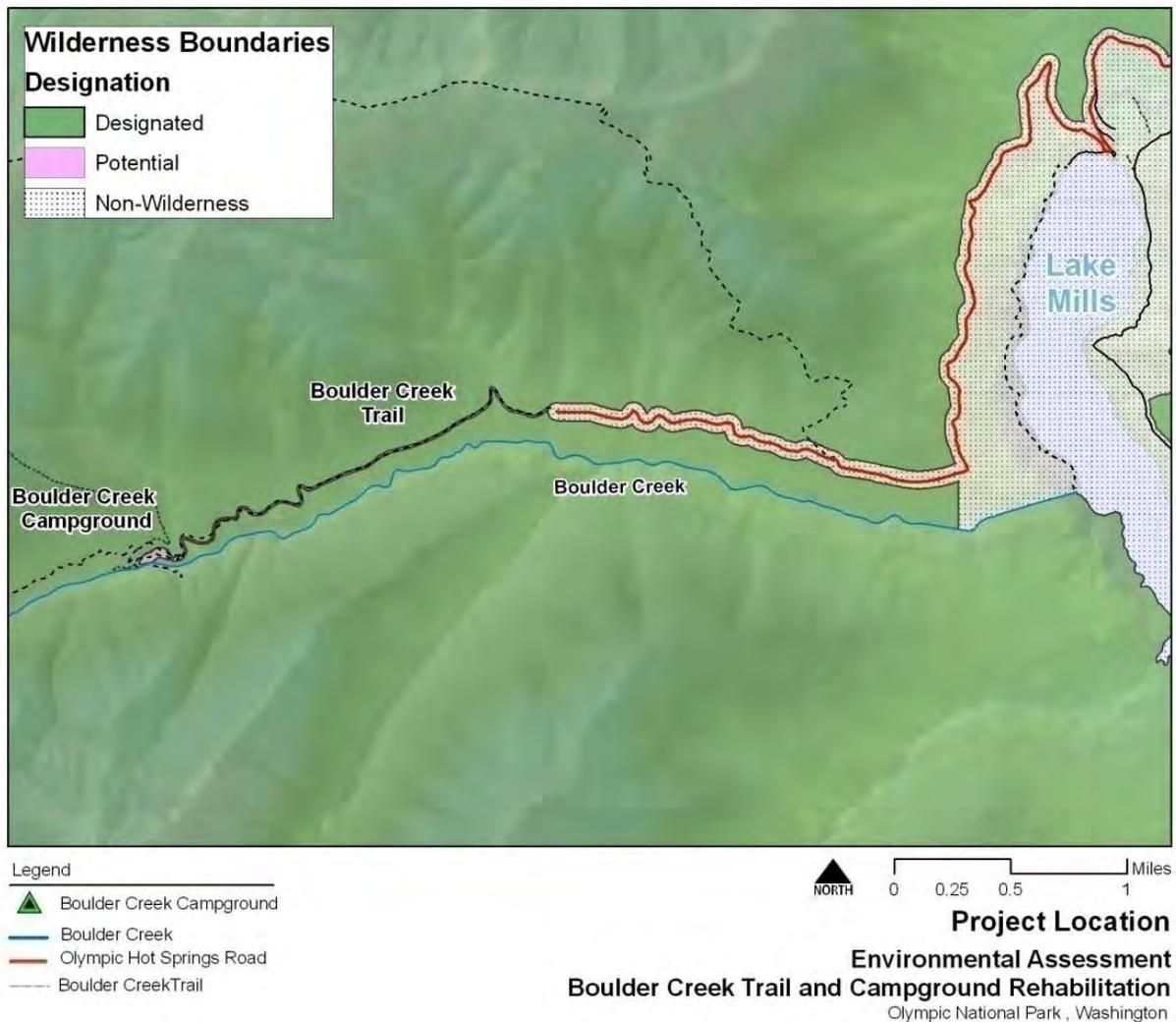
Olympic National Park was created in 1938. In a speech given that year, Secretary of the Interior Harold Ickes stated that the preservation of wilderness conditions within the park would be the primary management objective. The National Park Service inherited from the U. S. Forest Service a system of trails similar to what exists today. Also within these lands were trail shelters, several private cabins on leased lands, ranger stations, and a telephone system.

In 1974, 96% of the park was proposed as a wilderness area. The recommendation was sent to Congress, and a Senate bill was introduced. Although the bill was never acted upon, the proposed lands were managed as de facto wilderness until the wilderness was officially designated by Congress on November 16, 1988 (PL 100-668). Today, Olympic National Park is one of the largest wilderness areas in the contiguous United States, encompassing 876,669 acres (about 95% of the park) of designated wilderness, and 378 acres of potential wilderness additions. The Olympic wilderness is exceptionally diverse, providing experiential benefits such as solitude and quiet, as well as, “ecologic services” such as clean water and air.

Generally, the wilderness includes most of the park’s undeveloped lands. The park’s trails and wilderness camp areas are the most conspicuous human imprint on the wilderness. Several other structures are maintained in wilderness including ranger stations, historic structures, privies, other administrative and emergency facilities (e.g. radio repeaters), and research equipment. More than 1,300 campsites are scattered throughout the wilderness. Major road corridors with 200 foot buffers extending from the centerline, minor road corridors with 100 foot buffers, and other developed areas are not within designated wilderness.

Stock use currently accounts for 1.5% of visitor nights in the wilderness. Stock teams are also used extensively for the administration of the wilderness and support activities such as trail and facility maintenance. Due to the condition of the Boulder Creek Trail (former road) it is currently inaccessible to stock users beyond Crystal Creek.

Figure 23: Wilderness Boundary.



The Boulder Creek Trail, although not currently within the Olympic Wilderness, is immediately adjacent to designated wilderness, as shown in Figure 23. The Boulder Creek Campground was identified through the Washington Park Wilderness Act of 1988 as potential wilderness. Areas that currently do not qualify for designation as wilderness due to temporary nonconforming or incompatible conditions may be authorized by Congress as “potential wilderness” for future wilderness designation. Potential wilderness becomes “designated wilderness” upon the Secretary of Interior’s determination, published in the Federal Register, that they have met the qualifications for designation by the cessation or termination of the nonconforming use.

Impact Assessment Methodology

Wilderness character is evaluated in terms of four elements: untrammled quality, natural quality, undeveloped quality, and solitude or primitive and unconfined recreation quality. These characteristics are used by the National Park Service and other wilderness managing agencies to assess and monitor wilderness conditions. Impacts to Boulder Creek Campground are considered in terms of the potential for impact to these defining elements of wilderness character.

Type: Beneficial impacts protect or enhance wilderness character. Adverse impacts degrade wilderness character.

Context: Site-specific impacts occur only in the immediate vicinity of an action. Local impacts occur only within the project area. Regional impacts occur both within and outside of the project area.

Duration: Short-term impacts occur only during project implementation. Long-term impacts occur over one to ten years. Permanent impacts occur for longer than ten years.

Intensity: The following table describes intensity benchmarks for wilderness character.

Table 30: Wilderness Values Impact and Intensity.

Impact Intensity	Intensity Description
Negligible	There is little or no change in wilderness character or wilderness experience.
Minor	One or more attributes of wilderness character and wilderness experience change temporarily or in small ways in one or more locations.
Moderate	One or more attributes of wilderness character and wilderness experience changes in substantial ways in a single distinct region, or it affects multiple regions but is not permanent.
Major	One or more attributes of wilderness character and wilderness experience changes substantially across more than one distinct region of the park on either a permanent or frequent but temporary basis.
Impairment	An area of the park designated as wilderness or an area determined suitable for wilderness designation no longer meets the criteria for designation.

Environmental Consequences to Wilderness Character

Alternative 1 – No Action

Direct and Indirect Impacts of the Alternative. The No Action Alternative would result in continuing adverse, local, long-term, moderate impacts to wilderness character (including untrammled quality, natural quality, undeveloped quality, and solitude or primitive and unconfined recreation quality) due to the presence of abandoned infrastructure in the Boulder Creek Campground. Continuing use of campfires and the associated collection of woody materials for campfires would result in trampling of vegetation, soil compaction, and denuded areas within the campground.

Impacts Common to All Action Alternatives

Direct and Indirect Impacts of the Alternatives. The action alternatives would result in beneficial, long-term, site-specific and local, minor to moderate impacts to wilderness character due to the removal of the asphalt trail surface, removal of infrastructure from the Boulder Creek campground, and active restoration and revegetation along the trail corridor, in the campground, and the former campground parking lot. Implementation of a ban on campfires and wood collection would help restore the natural quality of denuded areas. Construction activities would result in adverse, short-term, local and regional, moderate to major impacts to wilderness character due to noise generated by heavy equipment and helicopter use within potential wilderness and adjacent to designated wilderness areas.

Alternative 2 – Minimum Built Environment, Extensive Restoration

Direct and Indirect Impacts of the Alternative. In addition to impacts described above, Alternative 2 would result in adverse; site-specific, local, and regional; short term and long term; minor to major impacts due to the need to use heavy lift helicopter for the initial delivery of footlogs for the stream crossings at Cougar, Hell, and Crystal Creeks; and also for the subsequent replacement of those footlogs when they deteriorate or are damaged during high water events. Adverse, site-specific and local, short-term minor to moderate impacts would also occur due to noise generated by blasting to remove 1,400 cubic yards of rock and 2,500 cubic yards of trail embankment to construct the footlog and stock ford at Crystal Creek. These noise impacts would affect wilderness character in adjacent wilderness areas.

Alternative 3 – Moderate Visitor Services, Active Revegetation

Direct and Indirect Impacts of the Alternative. In addition to impacts described above, Alternative 3 would result in adverse; site-specific, local, and regional; short term and long term; minor to major impacts due to the need to use heavy lift helicopter for the initial delivery of footlogs for the stream crossings at Cougar and Hell Creeks, and the delivery of an 80 foot long bridge to Crystal Creek; and also for the subsequent replacement of those footlogs when they deteriorate or are damaged during high water events. Adverse, site-specific and local, short-term minor to moderate impacts would also occur due to noise generated by blasting to remove 1,100 cubic yards of rock and 400 cubic yards of trail embankment to construct the footlog and stock ford at Crystal Creek. These noise impacts would affect wilderness character in adjacent wilderness areas.

Alternative 4 – Enhanced Visitor Services, Active Revegetation

Direct and Indirect Impacts of the Alternative. In addition to impacts described above, Alternative 4 would result in adverse; site-specific, local, and regional; short term and long term; minor to major impacts due to the need to use heavy lift helicopter for the initial delivery of a footlog for the stream crossing Hell Creek, and the delivery of a 50 foot long bridge to Cougar Creek and a 150 foot long bridge to Crystal Creek; and also for the subsequent replacement of the footlog when it deteriorates or is damaged during high water events.

Cumulative Impacts.

Olympic National Park is 95% designated Wilderness. Olympic National Forest also contains extensive lands within the Wilderness Preservation System. Application of the Minimum

Requirements/Minimum Tool decision process has resulted in the installation and retention of various types of infrastructure and uses in Olympic National Park wilderness areas. A Wilderness Management Plan is proposed for Olympic National Park, with work anticipated to start in 2010. There is also legislation pending that may designate the Boulder Creek Trail and surrounding area as wilderness, where it is not already included in the Wilderness Preservation System.

Impairment. Wilderness values would not be impaired under any of the alternatives considered in this document.

Social and Cultural Environment

Cultural Resources

For the purpose of this analysis, the term “cultural resources” refers to all properties potentially eligible for the National Register of Historic Places, as well as resources that are culturally important to tribes and other communities.

The term “historic properties” is a classification used in the National Historic Preservation Act (NHPA). This term is most commonly used in reference to the National Register of Historic Places. Historic Properties categories include: buildings, structures, objects, sites, and districts.

NPS manages its historic properties in five different groups based on disciplines. The five groups are:

- **Archeological resources** are the remains of past human activity and records documenting the scientific analysis of these remains. Archeological resources can be found above and below ground. They are commonly associated with prehistoric peoples, but may be products of a more contemporary society.
- **Pre-historic and historic structures** include constructions that shelter any form of human activity or habitation. The NPS definition of structure includes both a structure and a building.
- **Cultural landscapes** are settings that humans have created in the natural world. They reveal fundamental ties between people and the land, a pattern of things both natural and constructed.
- **Ethnographic resources** are traditional park sites, structures, objects, landscapes and natural resources that traditionally associated people define as significant to their present way of life.
- **Museum objects** are objects, specimens, and archival and manuscript collections that are valuable for the information they provide about processes, events, and interactions among people and the environment. Museum objects can be cultural and natural.

The Boulder Creek Trail and Campground Rehabilitation Project has the potential to primarily affect archeological resources and cultural landscapes. Within the project area, no cultural resources that are not also considered historic properties have been identified.

The Olympic Hot Springs were known by the local Klallam tribes well before the springs were first claimed in 1907. The Klallam used the hot springs and have spiritual beliefs associated with them. The Olympic Hot Springs are outside of the project area, and would not be affected by actions considered in this document.

Historic maps show the location of trash pits and privies in the vicinity of the campground. Surface inspections have confirmed the location of these features along with rock-work associated with campground construction by the Civilian Conservation Corp (CCC), and a large dump that was probably tied to operation of the campground or resort.

Limited subsurface archeological testing in the campground has revealed that an abundance of historic period artifacts are present within several of the campsites, some of these artifacts may be associated with early campground development and use. Because these historic period features are plotted on NPS maps and are visible on the ground surface there has been no formal effort to conduct archeological investigations targeted specifically at quantifying or evaluating them. If such studies were conducted it is very likely that a significant historical archeological component(s) would be identified. Given the campgrounds' association with the Civilian Conservation Corp and early park development it is also likely that these resources would be eligible for the National Register of Historic Places.

Within the last five years, archaeological surveys targeting large, forested terraces along the Elwha River Valley have resulted in the discovery of several new archaeological sites. Five recently recorded archaeological sites exist on high river terraces within five miles of the project area. Prior to this, few archaeological sites were recorded in the forested river valleys, likely due to the difficulty in locating sites within the dense understory and thick organic deposits. Boulder Creek campground is situated on one of these large, south facing terraces adjacent to a unique resource, the hot springs, which are documented to have been used by the Klallam tribes. Taking into consideration the above points, subsurface survey of the campground area was initiated in order to confirm the absence or presence of a concealed archaeological site along this high probability landform.

In total, 51 shovel test pits and one 1 x 1 meter test excavation unit were dug as a means of surveying the underground deposits. These shovel test pits were placed subjectively in areas of bare ground throughout the campground. Two shovel test pits were positive for prehistoric cultural resources with a total of 5 pieces of lithic debitage collected from the screen. These two shovel test pits were adjacent to each other and resulted in the recording of a new archaeological site, ONP-09-01, the Boulder Creek Campground site. One 1 x1 meter test excavation unit was dug within the site boundary and returned no additional artifacts. Additionally the subsurface

survey did confirm a high degree of historic disturbance in the area. Pedestrian and subsurface survey of the project area substantiates the presence of a small lithic scatter within the project area. Terraces along the Elwha valley are known to contain a high density of artifacts and while only a few artifacts have thus far been found, it is likely that more artifacts will be encountered. Depending on the alternative chosen, additional archaeological testing as well as monitoring of ground disturbance may be required during the project.

Information used in this assessment was obtained from relevant literature and documentation, maps, consultation with park archeologist and site visits. The National Historic Preservation Act requires agencies to take into account the effects of their actions on properties listed or eligible for listing in the National Register of Historic Places (NRHP). The process begins with identification and evaluation of cultural resources for NRHP eligibility, followed by an assessment of effects on eligible resources. This process includes consultation with the state historic preservation officer (SHPO). If an action could change in any way the characteristics that qualify the resource for inclusion in the national register, it is considered to have an effect. No adverse effect means there could be an effect, but the effect would not be harmful to the characteristics that qualify the resource for inclusion in the national register. Adverse effect means that action could diminish the integrity of the characteristics that qualify the resource for the national register. For the purposes of this analysis, the intensity of impacts on cultural resources was defined as follows:

Impact Assessment Methodology

Type: Beneficial impacts protect cultural resources. Adverse impacts damage the integrity of cultural resources.

Context: Site-specific impacts occur only in the immediate vicinity of an action. Local impacts occur only within the project area. Regional impacts occur both within and outside of the project area.

Duration: Short-term impacts occur only during project implementation. Long-term impacts occur over one to ten years. Permanent impacts occur for longer than ten years.

Intensity: The following table describes intensity benchmarks for cultural resources.

Table 31: Cultural Resources Impact and Intensity.

Impact Intensity	Intensity Description
Negligible	The effects on cultural resources would be at the lowest levels of detection, barely measurable without any perceptible consequences, either beneficial or adverse to cultural landscape resources, historic structures, archeological resources, or traditional cultural properties. For the purpose of Section 106 of the National Historic Preservation Act, the determination of effect would be <i>no adverse effect</i> .
Minor	The effects on cultural resources would be perceptible or measurable, but would be slight and localized within a relatively small area. The action would not affect the character or diminish the features of a National Register (NRHP) eligible or listed cultural landscape, historic structures, archeological sites, or traditional cultural properties, and it would not have a permanent effect on the integrity of any such resources. For the purposes of Section 106, the cultural resources' NRHP eligibility would be threatened; the determination of effect would be <i>no adverse effect</i> .
Moderate	The effects would be perceptible and measurable. The action would change one or more character-defining features of a cultural resource, but would not diminish the integrity of the resource to the extent that its National Register eligibility would be entirely lost. For the purposes of Section 106 of the National Historic Preservation Act, the cultural resources' NRHP eligibility would be threatened; the determination of effect would be <i>adverse effect</i> .
Major	The effects on cultural resources would be substantial, discernible, measurable, and permanent. For National Register eligible or listed cultural landscapes, historic structures or archeological sites, the action would change one or more character-defining features, diminish the integrity of the resource to the extent that it would no longer be eligible for listing in the National Register. For purposes of Section 106, NRHP eligibility would be lost; the determination of effect would be <i>adverse effect</i> .
Impairment	Permanent adverse impacts to cultural resources that are identified in the park's enabling legislation or general management plan would occur to the extent that the park would no longer be able to fulfill the purposes of a national park.

Environmental Consequences to Cultural Resources

Alternative 1 – No Action

Direct and Indirect Impacts of the Alternative. The No Action Alternative would result in negligible to minor impacts to archeological resources. Continuing adverse, site-specific and local, long-term, negligible to moderate impacts may also be occurring to the cultural landscape associated with the former CCC campground that now constitutes the east-loop of the Boulder Creek Campground.

Impacts Common to All Action Alternatives

Direct and Indirect Impacts of the Alternatives. Ground disturbing activities related to the expansion of parking and vehicle turnaround space at the trailhead, removal of asphalt and culverts from the trail, and removal of asphalt, exposed concrete foundations, and soil scarification to prepare the area for revegetation all have the potential to uncover or disturb surface and buried archeological resources. This could result in the physical destruction, damage, or removal of these objects.

Alternative 2 – Minimum Built Environment, Extensive Restoration

Direct and Indirect Impacts of the Alternative. In addition to the impacts described above, additional potential for impact to archeological resources would exist as a result of extensive excavation in the campground area that would occur to locate and remove buried utility lines associated with the former automobile campground infrastructure. There is also the potential to better protect the remaining elements of the former CCC campground loop. Alternative 2 would

re-establish and delineate up to seven campsites within the CCC loop, with the potential to adaptively re-use this area in a manner that restores and protects this cultural landscape.

Alternative 3 – Moderate Visitor Services, Active Revegetation

Direct and Indirect Impacts of the Alternative. Alternative 3 would re-establish and delineate up to five campsites within the CCC loop, in addition to three sites in the non-historic mid-loop of the campground, with the potential to adaptively re-use this area in a manner that restores and protects this cultural landscape.

Alternative 4 – Enhanced Visitor Services, Active Revegetation

Direct and Indirect Impacts of the Alternative. Alternative 4 would re-establish and delineate up to seven campsites within the CCC loop, in addition to four sites in the non-historic mid-loop, with the potential to adaptively re-use this area in a manner that restores and protects this cultural landscape.

Cumulative Impacts. Many projects occurring throughout the park and the Elwha area are occurring that have the potential to affect cultural resources. Actions are evaluated individually pursuant to the National Historic Preservation Act, and are considered cumulatively to ensure that the park does not take actions with the potential to impair cultural resources within Olympic National Park.

Impairment. Cultural Resources would not be impaired under any of the alternatives considered in this document.

Socioeconomics

Olympic National Park hosted 3 million recreation visits in 2007. Park visitors spent \$100.5 million in the local area, generating \$38.4 million in direct personal income (wages and salaries) for local residents and supporting about 2,080 jobs in area tourism businesses (Stynes 2006). In 2000, tourism accounted for approximately 10% of area employment, park visitors accounted for approximately 28% of all tourist spending in the region, and 62% of tourism spending in Clallam and Jefferson counties (Stynes et al. 2001). Access to the Elwha River Valley including the Olympic Hot Springs is popular among dayhikers and backpackers.

Information used in this assessment was obtained through the scoping process. The economic contribution of ONP to the local economies in the gateway communities are enhanced by visitors using the Boulder Creek Trail to access the Olympic Hot Springs, Boulder Lake, or other backcountry areas in the park accessed by this trailhead.

Impact Assessment Methodology

Type: Beneficial impacts sustain or enhance the socioeconomic concerns. Adverse impacts damage the integrity of socioeconomic concerns.

Context: Site-specific impacts occur only in the immediate vicinity of an action. Local impacts occur only within the project area. Regional impacts occur both within and outside of the project area.

Duration: Short-term impacts occur only during project implementation. Long-term impacts occur over one to ten years. Permanent impacts occur for longer than ten years.

Intensity: The following table describes intensity benchmarks for Socioeconomic concerns.

Table 32: Socioeconomics Impact and Intensity.

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

Environmental Consequences to Socioeconomic Concerns

Alternative 1 – No Action

Direct and Indirect Impacts of the Alternative. The No Action Alternative would result in no changes to socioeconomic conditions.

Impacts Common to All Action Alternatives

Direct and Indirect Impacts of the Alternatives. Implementation of the Boulder Creek Trail and Campground Rehabilitation project would result in beneficial, short-term, local and regional, negligible to minor impacts due to the increased spending associated with trailhead expansion, asphalt removal, trail development, and trail and campground revegetation. This is due to increased economic activity associated with workers hired to implement the project contributing to the local economy by making use of area lodging, restaurants, grocery stores, and other businesses if the workers are from outside of the area, and also by supporting employment of local residents if work is conducted by people from the adjacent region.

Cumulative Impacts. Implementation of portions of this project as part of the American Recovery and Reinvestment Act (ARRA) would cumulatively generate additional socioeconomic activity in areas where ARRA-funded projects are funded and implemented.

Experiential Environment

Visitor Use and Experience

The Boulder Creek Trail is a year round popular day and overnight use trail. From the Boulder Creek Trail visitors can access Boulder Lake, Happy Lake Ridge Trail, Appleton Pass and the Sol Duc Valley. Few accurate figures are kept on wilderness day use, though is quite significant, probably exceeding overnight use several times over. In 2008, 1640 overnight visitors were recorded at the Boulder Creek Campground. Day use for the area is considerably higher with estimates as high as 72,000 due to the popularity of the Olympic Hot Springs and accessibility to other backcountry destinations from this trailhead. (B. Bell & M. Danisiewicz, pers comm. 2009) Backpacking, day hiking, camping, soaking in the hot springs, and fishing are the primary recreational activities for visitor use in this area of the park. Backcountry camping requires a permit and campers are asked to stay in sites that are previously impacted. Boulder Creek campground is not currently included in the park's overnight limited use program.

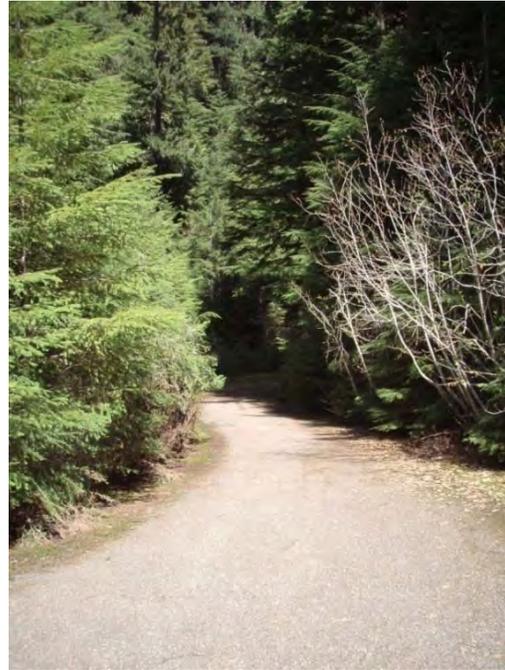


Photo 6: Asphalt along the Boulder Creek trail averages 14 feet wide.

Prior to designation as potential wilderness by the Washington Park Wilderness Act (1988), the Boulder Creek campground was a former CCC campground. Several remnants from this era still exist including the flat compacted area of the former parking lot, several metal corrugated culverts, two concrete comfort station bases, flagstone bases for picnic tables, old community campfire pits, and metal piping.



Photo 7: Part of the Olympic Hot Springs Forest Camp, July 4, 1937.

There are approximately 30 campsites remaining from the era of the old drive-in campground. Campsites are not signed; visitors usually select a site adjacent to an existing campfire ring. Most of the 30 campsites receive some use during the year. A few of the most popular campsites which are located next to trail junctions receive high use. During typical summer weekends, 8-12 campsites may be occupied. Soil in the campground is compacted due to the amount of visitor use; as a result vegetation is sparse. Forested areas adjacent to campsites are also heavily impacted due to visitors exploring and searching for firewood. In the immediate campground area most of the lower limbs on trees are stripped away and smaller living trees and snags cut down; this is likely a result of firewood collection. Visitors often construct campfire rings that exceed the standards for backcountry use and require dismantling by park staff.



Photo 8: Olympic Hot Springs Forest Camp, July 4, 1937.

Managed as an “all purpose trail” that allows for hikers and stock use, the Boulder Creek Trail is annually maintained to a standard width for stock travel. The project area currently includes 2.2 miles of asphalt trail with an average width of 14 feet. Some sections of the former road are overgrown with vegetation and have a dense canopy cover, while other areas are completely eroded due to slope instability and clogged culverts, vegetation in these locations is sparse. Remnants of old rusty culverts, which are exposed through erosion, occur in several locations along the former road bed. There are three creek crossings which require fording or have existing footbridges that need annual maintenance. The trail traverses the side of Crystal Ridge and parallels Boulder Creek. It is a slight grade with the exception of a few sections that cross creek drainages.

Currently visitors accessing the Boulder Creek trailhead park along the roadside. There are approximately 15 spaces for vehicles. A stock hitching post and unloading area is approximately 1/8 mile from the trailhead. Parking in the busy summer months usually exceeds the spaces available and the space for stock trailer turnaround is not adequate. A bulletin board at the trailhead provides visitor information.

A fundamental purpose of all parks is to provide for enjoyment of park resources and values by the people of the United States, and the NPS is committed to providing appropriate high quality opportunities for visitors to enjoy the parks (*NPS Management Policies 2006*). Part of the purpose of ONP is to offer opportunities for recreation, education, inspiration, and enjoyment. Consequently, one of the park’s management goals is to ensure that visitors safely enjoy and are

satisfied with the availability, accessibility, diversity, and quality of park facilities, services, and appropriate recreational opportunities.



Photo 9: Culvert along the Boulder Creek trail.

Public scoping input and observation of visitation patterns, combined with assessment of what is available to visitors under current park management, supported evaluation of effects of the alternatives. The potential for change in visitor experience inherent in the alternatives was evaluated by assessing projected change (increases or decreases) in access and other visitor uses, and determining whether or how these projected changes would affect the desired visitor experience, to what degree, and for how long.



Photo 10: Deteriorating asphalt along the Boulder Creek trail.

Impact Assessment Methodology

Type: Beneficial impacts improve visitor use and experience. Adverse impacts degrade visitor use and experience.

Context: Site-specific impacts occur only in the immediate vicinity of an action. Local impacts occur only within the project area. Regional impacts occur both within and outside of the project area.

Duration: Short-term impacts occur only during project implementation. Long-term impacts occur over one to ten years. Permanent impacts occur for longer than ten years.

Intensity: The following table describes intensity benchmarks for visitor use and experience.

Table 33: Visitor Use and Experience Impact and Intensity.

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

Environmental Consequences to Visitor Use and Experience

Alternative 1 – No Action

Direct and Indirect Impacts of the Alternative. The No Action Alternative would result in continued insufficient parking at the Boulder Creek trailhead, and inadequate vehicle turnaround space for vehicle towing trailers. Difficult footlog access would continue at Cougar and Crystal Creeks, and visitors traveling with pack stock would not be able to access the area beyond Crystal Creek due to the lack of a safe stock crossing at this site. The Boulder Creek Trail would retain the deteriorated asphalt surface, and the campground would continue to be subject to trampling, soil compaction, and loss of vegetation due to the presence of approximately thirty undesignated campsites and extensive collection of woody material from the area for burning in campfires. This would result in continuing adverse, site-specific and local, long-term, negligible to major impacts to visitor use and experience.

Impacts Common to All Action Alternatives

Direct and Indirect Impacts of the Alternatives. Construction of additional parking and expanded vehicle turnaround space at the trailhead would result in beneficial, site-specific, long-term, minor to moderate effects. Removal of the asphalt and failed culverts from the trail, removal of abandoned infrastructure in the campground, and revegetation along the trail corridor, in the campground, and the former campground parking lot would result in beneficial, site-specific and local, long-term, minor to major impacts. Restoration of stock access to the Olympic Hot Springs area and Boulder Creek Campground would result in beneficial effects to visitors who use pack stock or enjoy sharing the trail with pack stock users. Visitors who consider use of pack stock to be an incompatible use of the trail would consider restoration of stock access as an adverse effect. Implementation of a campfire ban and ban on the collection of firewood would result in adverse, local, short-term, minor to major impacts due to the change in policy and resistance by some visitors to adhere to this requirement. The ban would result in beneficial, local, long-term, minor to major impacts due to the successful restoration of impacted areas within the campground, and the development of a visitor experience more consistent with management of the area as a wilderness area.

Adverse, site-specific and local, short-term, minor to moderate impacts to visitor use and experience would occur during project implementation due to temporary closures and noise impacts in areas adjacent to construction from heavy equipment use and helicopters. It is anticipated that the majority of necessary trail closures related to the Boulder Creek Trail and Campground Rehabilitation Project would occur during the implementation of the Elwha Dam Removal Project. This would eliminate or reduce the amount of time that visitors would be unable to access the Boulder Creek area.

Alternative 2 – Minimum Built Environment, Extensive Restoration

Direct and Indirect Impacts of the Alternative. In addition to the impacts described above, additional beneficial, site-specific, long-term, minor to moderate impacts would occur due to the restoration of 23 out of 30 campsites in the Boulder Creek Campground. Retention of up to seven campsites in the east (CCC) campground loop would allow for continued backpacking use of the area, and would include up to two designated group campsites.

Alternative 3 – Moderate Visitor Services, Active Revegetation

Direct and Indirect Impacts of the Alternative. In addition to the impacts described above, additional beneficial, site-specific, long-term, minor to moderate impacts would occur due to the restoration of an estimated 22 out of 30 campsites in the Boulder Creek Campground. Construction of a day-use stock hitching rail near the former campground parking lot would also expand visitor opportunities. Retention of up to five campsites in the east (CCC) campground loop and up to three campsites in the mid-loop would allow for continued backpacking use of the area, and would include up to two designated group campsites.

Alternative 4 – Enhanced Visitor Services, Active Revegetation

Direct and Indirect Impacts of the Alternative. In addition to the impacts described above, additional beneficial, site-specific, long-term, minor to moderate impacts would occur due to the restoration of approximately 19 out of 30 campsites in the Boulder Creek Campground. Construction of a day-use stock hitching rail and overnight stock campsite with hitching rail near the former campground parking lot would further expand visitor opportunities. Retention of up to seven campsites in the east (CCC) campground loop and up to four campsites in the mid-loop would allow for continued backpacking use of the area, and would include up to three designated group campsites.

Cumulative Impacts. The Olympic Hot Springs Resort and automobile campground provided relatively easy access for visitors to the area and residents. Establishment of Olympic National Park created visitor expectations that may differ from what people might seek in National Forest recreation areas, or from recreational opportunities on non-federal public lands. Closure of the Olympic Hot Springs Resort and loss of automobile access to the campground altered previous visitor use patterns in the area. Construction of extensive trail networks, such as the Olympic Discovery Trail, provides hikers, bicyclists, and equestrians with varying experiences on the northern Olympic Peninsula. Continued construction of the Olympic Discovery Trail, both within and outside of park boundaries would expand non-motorized, multiple use trail options. Removal of the Elwha and Glines Canyon dams may have some adverse effects on visitor use for some, but would provide a unique visitor experience that others will seek out. Implementation of the Boulder Creek project would improve opportunities for day hikers, equestrians, and backpackers by restoring safe access along the 2.2 mile stretch of the Boulder Creek Trail.

Soundscapes

NPS *Management Policies 2006* require the National Park Service to preserve the natural soundscapes of the park. Natural soundscapes exist in the absence of human caused sound. Olympic National Park is one of the best examples of a natural soundscape found anywhere in the national park system and includes natural sounds that are part of the biological or physical resources of the park. (Olympic National Park Final General Management Plan. Volume 1, page 174. National Park Service. August 2008).

Natural sounds and natural quiet are important parts of the experience that visitors seek in Olympic National Park. Natural sounds generally predominate throughout the wilderness, and therefore through most of the park. Human-caused noise does occur in the wilderness, such as sounds related to visitor use, project activities, and sounds from aircraft overflights. Most human-caused sounds are usually confined to developed areas and along major roads. Noise levels in developed areas vary by location and time of year relative to the number of visitors and seasonal park operations. In certain areas, such as on the beach or beside a major river, natural sound levels exceed and, except for proximity to the source, mask some human sounds.

Some threats to natural soundscapes come from areas adjacent to the park boundaries such as noise from logging operations or construction activities, or aircraft including military, commercial, and private sector aircraft, in addition to NPS project related aircraft.

NPS *Management Policies 2006*, states that “the National Park Service will preserve, to the greatest extent possible, the natural soundscapes of parks.” The policy requires restoration of degraded soundscapes to the natural condition whenever possible, and protection of natural soundscapes from degradation due to unnatural sounds (noise) (NPS *Management Policies 2006*, sec. 4.9). The NPS is specifically directed to “take action to prevent or minimize all noise that, through frequency, magnitude or duration, adversely affects the natural soundscape or other park resources or values, or that exceeds levels that have been identified as being acceptable to, or appropriate for, visitor uses at the sites being monitored” (Management Policies 2006, sec. 4.9). The foundation for this policy is the fundamental purpose of the national park system, established in law (e.g., 16 USC 1 et seq.), which is to conserve park resources and values (NPS *Management Policies 2006*, sec. 1.4.3). NPS managers must always seek ways to avoid or minimize to the greatest degree practicable, adverse impacts on park resources and values (NPS *Management Policies 2006*, sec 1.4.3).

Noise can adversely affect park resources by modifying or intruding upon the natural soundscape, and can also interfere with sound important for animal communication, navigation, mating, nurturing, predation, and foraging. Noise can also adversely affect park visitor experiences by intruding upon or disrupting experiences of solitude, serenity, tranquility, contemplation, or a completely natural or historical environment.

The methodology used to assess noise impacts in this document is consistent with NPS *Management Policies 2006 and Director’s Order #47: Soundscape Preservation and Noise Management*.

Context, time, and intensity together determine the level of impact for an activity. Taken together, these three factors determine the level of noise impact. In some cases an analysis of one or more factors may indicate one impact level, while analysis of another factor may indicate a different impact level, according to the criteria below. In such instances, best professional judgment based on documented rationale is used to determine which impact level best applies to the situation being evaluated.

National literature was used to estimate the average decibel levels of activities proposed by the project alternatives. Personal observations by park staff and monthly use reports identified areas of use by visitors relative to the location of the proposed activities.

Impact Assessment Methodology

Type: Beneficial impacts protect or restore natural soundscapes. Adverse impacts degrade natural soundscapes.

Context: Site-specific impacts occur only in the immediate vicinity of an action. Local impacts occur only within the project area. Regional impacts occur both within and outside of the project area.

Duration: Short-term impacts occur only during project implementation. Long-term impacts occur over one to ten years. Permanent impacts occur for longer than ten years.

Intensity: The following table describes intensity benchmarks for soundscapes.

Table 34: Soundscapes Impact and Intensity.

Impact Intensity	Intensity Description
Negligible	Natural sound would prevail. Effects to natural sound environment would be at or below the level of human detection and such changes would be so slight that they would not be of measurable or perceptible consequence to the visitor experience. Best available information indicates that effects would not affect biological resources.
Minor	Natural sounds would prevail. Effects to natural sound would be localized, short-term and would be small and of little consequence to the visitor experience or to biological resources. Mitigation measures, if needed to offset adverse effects, would be simple and successful.
Moderate	Natural sounds would prevail, but activity noise could occasionally be present at low to moderate levels. Effects to the natural sound environment would be readily detectable, localized, short- or long-term, with consequences at the regional or population level. Natural sounds would be occasionally heard during the day. Mitigation measures, if needed to offset adverse effects, would be extensive and likely successful.
Major	Natural sound would be impacted by activity noise frequently for extended periods of time. Effects to the natural sound environment would be obvious, long-term, and have substantial consequences to the visitor experience or to biological resources in the region. Extensive mitigation measures would be needed to offset any adverse effects and success would not be guaranteed.
Impairment	Natural sound would be impacted on a permanent basis, to a level and extent that would preclude the park achieving its natural resource and visitor experience goals, and in a manner that would result in the park not fulfilling its duties as identified through enabling legislation and the general management plan.

Environmental Consequences to Soundscapes

Alternative 1 – No Action

Direct and Indirect Impacts of the Alternative. The No Action Alternative would result in continued adverse, site-specific, short-term, negligible to moderate impacts due to kinds and amounts of visitor use and administrative management actions occurring in the project area that generate noise.

Impacts Common to All Action Alternatives

Direct and Indirect Impacts of the Alternatives. Construction activities would result in adverse, short-term, local and regional, minor to major impacts to soundscapes due to noise generated by heavy equipment and helicopter use adjacent to designated wilderness areas.

Alternative 2 – Minimum Built Environment, Extensive Restoration

Direct and Indirect Impacts of the Alternative. In addition to impacts described above, Alternative 2 would result in adverse; site-specific, local, and regional; short term and long term; minor to major impacts due to the need to use heavy lift helicopter for the initial delivery of footlogs for the stream crossings at Cougar, Hell, and Crystal Creeks; and also for the subsequent replacement of those footlogs when they deteriorate or are damaged during high water events. Adverse, site-specific and local, short-term minor to moderate impacts would also occur due to noise generated by blasting to remove 1,400 cubic yards of rock and 2,500 cubic yards of trail embankment to construct the footlog and stock ford at Crystal Creek. Additional noise would occur due to the use of heavy equipment and dump trucks to remove the excavated materials from the park.

Alternative 3 – Moderate Visitor Services, Active Revegetation

Direct and Indirect Impacts of the Alternative. In addition to impacts described above, Alternative 3 would result in adverse; site-specific, local, and regional; short term and long term; minor to major impacts due to the need to use heavy lift helicopter for the initial delivery of footlogs for the stream crossings at Cougar and Hell Creeks, and the delivery of an 80 foot long bridge to Crystal Creek; and also for the subsequent replacement of those footlogs when they deteriorate or are damaged during high water events. Adverse, site-specific and local, short-term minor to moderate impacts would also occur due to noise generated by blasting to remove 1,100 cubic yards of rock and 400 cubic yards of trail embankment to construct the footlog and stock ford at Crystal Creek. Additional noise would occur due to the use of heavy equipment and dump trucks to remove the excavated materials from the park.

Alternative 4 – Enhanced Visitor Services, Active Revegetation

Direct and Indirect Impacts of the Alternative. In addition to impacts described above, Alternative 4 would result in adverse; site-specific, local, and regional; short term and long term; minor to major impacts due to the need to use heavy lift helicopter for the initial delivery of a footlog for the stream crossing Hell Creek, and the delivery of a 50 foot long bridge to Cougar Creek and a 150 foot long bridge to Crystal Creek; and also for the subsequent replacement of the footlog when it deteriorates or is damaged during high water events.

Cumulative Impacts.

Natural soundscapes have been altered by the expansion of human use and development both within and outside of the park. The construction of roads and trails, visitor centers, resorts, residential and business areas have all added sounds to the acoustic environment that did not previously exist. Noise related to the removal of the Elwha and Glines Canyon dams will be noticeable during project implementation. Noise from visitor use would be reduced during this time due to less access due to closures during construction. Noise from aircraft outside the park would continue. Noise generated from park activities would also continue. Reduction in the

number of campsites in the Boulder Creek campground may result in a slight improvement to the acoustic environment by reducing the number of people using this site at one time.

Impairment: Soundscapes would not be impaired under any alternative discussed in this document.

Scenery and Visual Resources

The Boulder Creek Trail and campground is located at low-elevation in the Elwha watershed. The trail traverses along the side slope of Crystal Ridge above Boulder Creek in a mostly forested landscape with a few openings to the scenic views of the surrounding peaks and valleys of the Olympic Mountains.

The former road was paved with asphalt for approximately 2.2 miles. Much of the paving still exists today although in some areas the paving has been weathered into pieces and washed away. Remnants of old rusted culverts from the road construction and former automobile campground development have been exposed through erosion. In several areas along the trail culverts were clogged with debris which caused the pavement and road (trail) surface to washout leaving behind small and large holes. Metal piping and concrete foundations for the former comfort stations still exists in the campground. There is a spur trail that contains an old garbage dump from the former Olympic Hot Springs Resort that still remains.

Olympic National Park is renowned for its natural qualities. Visual resources are measured as the potential impact to park scenery a proposed action might have. For the purposes of this document we assume that a visitor in the Boulder Creek drainage expects to have views of pristine landscape minimally influenced by human presence.

Impact Assessment Methodology

Type: Beneficial impacts protect or enhance scenery and visual resources. Adverse impacts degrade scenery and visual resources.

Context: Site-specific impacts occur only in the immediate vicinity of an action. Local impacts occur only within the project area. Regional impacts occur both within and outside of the project area.

Duration: Short-term impacts occur only during project implementation. Long-term impacts occur over one to ten years. Permanent impacts occur for longer than ten years.

Intensity: The following table describes intensity benchmarks for scenery and visual resources.

Table 35: Scenery and Visual Resources Impact and Intensity.

Impact Intensity	Intensity Description
Negligible	Effects to the visual quality of the landscape would be at or below the level of detection for nearly all visitors; changes would be so slight that they would not be of any measurable or perceptible consequence to the average visitor experience.
Minor	Effects to the visual quality of the landscape would be detectable, localized as would be small and of little consequence to the average visitor experience. Mitigation measures, if needed to offset adverse effects, would be simple and successful.
Moderate	Effects to the visual quality of the landscape would be readily detectable, localized, with consequences at the regional level. Mitigation measures, if needed to offset adverse effect, would be extensive and likely successful.
Major	Effect to the visual quality of the landscape would be obvious, with substantial consequences to the visitor experience in the region. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed.
Impairment	Adverse impacts to scenic and visual resources would occur over a broad area on a permanent basis to the extent that the park could not fulfill its purpose as identified in the park enabling legislation or general management plan.

Environmental Consequences to Scenery and Visual Resources

Alternative 1 – No Action

Direct and Indirect Impacts of the Alternative. The No Action Alternative would result in continued adverse, site-specific and local, long-term, minor to major impacts due to the continued presence of the eroding asphalt trail and culverts, the presence of abandoned infrastructure, failed culverts, trampled or denuded vegetation, and high use levels in the Boulder Creek campground.

Impacts Common to All Action Alternatives

Direct and Indirect Impacts of the Alternatives. Removal of abandoned infrastructure and asphalt and active revegetation and restoration of natural contours and native plants along the trail corridor, in the campground, and the former campground parking lot would result in beneficial, site-specific and local, long-term, minor to moderate impacts.

Alternative 2 – Minimum Built Environment, Extensive Restoration

Direct and Indirect Impacts of the Alternative. In addition to impacts described above, Alternative 2 would result in the least infrastructure at the completion of the project. For some visitors the use of footlogs and stock fords would result in a more scenic trail experience.

Alternative 3 – Moderate Visitor Services, Active Revegetation

Direct and Indirect Impacts of the Alternative. In addition to impacts described above, Alternative 3 would result in the least dense campsite development at the completion of the project. For some visitors the use of footlogs and stock fords would result in a more scenic trail experience at Cougar and Hell Creeks. For other visitors, the presence of the 80 foot long bridge at Crystal Creek would provide an opportunity to gain a different view of the trail from the bridge deck, for others the steel bridge may be seen as a visual intrusion.

Alternative 4 – Enhanced Visitor Services, Active Revegetation

Direct and Indirect Impacts of the Alternative. In addition to impacts described above, Alternative 4 would result in the most campsite development at the completion of the project. For some visitors the use of a footlog and stock fords would result in a more scenic trail experience at Hell Creek. For other visitors, the presence of the 50 foot long bridge at Cougar Creek and the 150 foot long bridge at Crystal Creek would provide an opportunity to gain a different view of the trail from the bridge decks, while for others the steel bridges may be seen as a visual intrusion.

Cumulative Impacts. Scenery and visual resources were impacted by the partial removal of infrastructure associated with the Olympic Hot Springs Resort and automobile campground. Damage to the Boulder Creek Trail due to the loss of the road surface at stream crossings has resulted in a deteriorated asphalt surface that is inconsistent with visitor expectations in a national park backcountry setting. Temporary impacts to scenery and visual resources may be expected during the removal of the Elwha and Glines Canyon dams, and the construction of other projects within the Boulder Creek and surrounding areas. Some visitors enjoy seeing construction activities, while others are distressed by the presence of heavy equipment in what is perceived by some as a pristine natural setting. Following the completion of the dam removal project, many visitors would enjoy seeing the recovery of the Elwha River watershed, particularly the transformation of the former reservoirs into vegetated riparian and upland habitat. Improvements to the Boulder Creek Trail and Campground would contribute to the overall improvement of scenery and visual resources in the area.

Impairment. Scenery and visual resources would not be impaired under any alternative considered in this document.

Unavoidable Adverse Impacts

Implementation of any of the action alternatives considered in this plan would result in temporary impacts related to closures to visitor use during project implementation, and noise impacts related to the use of heavy equipment and helicopters to remove asphalt and abandoned infrastructure, to improve the trailhead parking lot, and to deliver footlogs or bridges at stream crossings. Noise impacts would have short-term adverse effects on wildlife residing in the project area, and on any visitors recreating in park areas adjacent to the project area.

Relationship of Short-Term Uses and Long-Term Productivity

Short term impacts identified above and throughout this document are considered appropriate in order to provide for the long-term improvement of park resources and visitor experience along the Boulder Creek Trail and within the Boulder Creek Campground. Improvements would include the removal of abandoned asphalt road surfacing and obsolete infrastructure, and the long-term restoration of native vegetation and improved visitor experience following construction activities. Implementation of any of the action alternatives would result in improved long-term productivity, although short-term impacts would occur.

Irreversible and Irretrievable Commitments of Resources

No adverse permanent changes are proposed within the project area. Should the National Park Service determine that changes in the design of the Boulder Creek Trail or Campground are

warranted, nothing considered in this plan would preclude future actions from taking place. If new actions are proposed with the potential to adversely affect park resources or values, the decision would require additional planning and public review in accordance with federal law and policy.

Park Operations and Safety

The National Park Service is committed to providing a healthy and safe environment for visitors and employees, and to protect human life and provide for injury-free visits and appropriate responses when accidents and injuries occur. The goals of Olympic National Park include ensuring that basic visitor needs are met in keeping with the Park's purposes, and that visitor and employee safety and health are protected. To the extent feasible, facilities, programs, and services in the Park are accessible to and usable by all people, including those with disabilities (1.9.3 NPS *Management Policies*, 2006). Park operations, for the purposes of this EA, refers to the quality and effectiveness of the infrastructure, and the ability of park staff to maintain the infrastructure used in the operation of the park in order to adequately protect and preserve vital resources and provide for a high quality visitor experience. Facilities analyzed include the Boulder Creek Trail (former road), the trailhead and parking lot, bulletin board, and Boulder Creek campground.

Park operations in the project area include annual maintenance to clear trail debris (i.e. tree wind fall and boulders in unstable sections of the trail), garbage and trash pickup on the trail in the campground, and privy maintenance in the campground. Park staff also responds to lost and injured visitors, and provide a regular law enforcement presence to ensure visitor safety and resource protection needs are carried out.

Each year the Wilderness Resources Office coordinates efforts to monitor, maintain, and restore backcountry campgrounds, including the Boulder Creek Campground. Volunteers evaluate visitor use impacts and conduct minor maintenance projects in the field. Volunteers have provided substantial support to the ongoing management of the Boulder Creek Campground area.

Health and safety concerns associated with the rehabilitation of the trail include blasting into bedrock to construct an appropriate trail grade, removal of rock, soil, and debris, helicopter use, and the use of heavy equipment on sections of the trail that are narrow or highly unstable.

The current Boulder Creek trailhead parking area is located in an area not originally intended for this use. This parking location was established after storms forced the closure of the 2.2 mile section of road that is now managed as a trail. The current parking lot is a widened area of road with little space available for parking, no designated stalls, and the lack of an adequate turnaround area. There is no space designated for accessible parking. Large vehicles and vehicles pulling trailers have difficulty navigating through the trailhead parking area. There are approximately 15 spaces for vehicles to pull off on to the gravel shoulder for parking. During peak visitor season as many as 55 cars can be parked along the roadside. The parking area in its

current state creates potential hazards for pedestrians walking to the Boulder Creek trailhead and vehicles navigating and turning around in the narrow road corridor.

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

Members of the park’s planning team who are knowledgeable of the park’s operational issues evaluated the impacts of each alternative. Impact analysis is based on the current description of park operations presented in the “Affected Environment” section of this EA.

Impact Assessment Methodology

Type: Beneficial impacts improve park operations and safety. Adverse impacts hinder park operations and safety.

Context: Site-specific impacts occur only in the immediate vicinity of an action. Local impacts occur only within the project area. Regional impacts occur both within and outside of the project area.

Duration: Short-term impacts occur only during project implementation. Long-term impacts occur over one to ten years. Permanent impacts occur for longer than ten years.

Intensity: The following table describes intensity benchmarks for park operations and safety.

Table 36: Park Operations and Safety Impact and Intensity.

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

Environmental Consequences to Park Operations and Safety

Alternative 1 – No Action

Direct and Indirect Impacts of the Alternative. The No Action Alternative would result in continued safety concerns due to inadequate vehicle turnaround space at the trailhead and concerns due to inadequate stream crossings at Cougar and Crystal Creeks. Operationally, ongoing maintenance needs would continue to place a high burden on volunteers who do extensive maintenance within the Boulder Creek campground. Ongoing maintenance by park staff is also required due to continuing erosion along the trail, and the loss of footlogs at stream crossings during periods of high stream flow. Loss of vehicle access to the Boulder Creek campground and former Olympic Hot Springs Resort area resulted in an adverse, local, long-term, minor to major adverse impact on park operations and safety.

Impacts Common to All Action Alternatives

Direct and Indirect Impacts of the Alternatives. Adequate vehicle turnaround space at the trailhead would result in beneficial, site-specific, long-term minor to moderate impacts due to improved access for vehicles with a larger turning radius, and reduced potential for vehicular accidents. Improved safety for recreational and administrative use would result from construction of safe pedestrian and pack stock accessible stream crossings at Cougar, Hell, and Crystal Creeks. Implementation of a campfire ban and a ban on the collection of firewood would require a commitment of park law enforcement resources to ensure compliance with this new requirement. This would require either the hiring of additional law enforcement rangers, or reallocation of ranger patrol time to the Boulder Creek area.

Alternative 2 – Minimum Built Environment, Extensive Restoration

Direct and Indirect Impacts of the Alternative. In addition to impacts described above, Alternative 2 would result in increased annual and cyclical maintenance needs in order to maintain stock fords at Cougar, Hell, and Crystal Creeks. When footlogs deteriorated or were destroyed by high water events it would require location of replacement logs, and transportation of the log to the stream crossing site. This often includes the use of heavy-lift helicopters and the associated risk to staff. Pedestrian crossings at footlogs would only be safe during relatively low-water periods, as placement of the logs would not be expected to provide clearance above the ordinary high water levels. Reduced maintenance would be required in the Boulder Creek campground, where only seven out of an estimated thirty campsite areas would be retained. Extensive work to propagate plants for use in revegetation would be required. Substantial work would also be necessary to scarify compacted soils along the trail and throughout the campground and former campground parking lot in preparation of revegetation.

Alternative 3 – Moderate Visitor Services, Active Revegetation

Direct and Indirect Impacts of the Alternative. In addition to impacts described above, Alternative 3 would result in increased annual and cyclical maintenance needs in order to maintain stock fords at Cougar and Hell Creeks. When footlogs deteriorated or were destroyed by high water events, it would require location of a replacement log, and transportation of the log

to the stream crossing site. This may include the use of heavy-lift helicopters and the associated risk to staff. Pedestrian crossings at footlogs would only be safe during relatively low-water periods, as placement of the logs would not be expected to provide clearance above the ordinary high water levels. Reduced maintenance would be required in the Boulder Creek campground, where only eight out of an estimated thirty campsite areas would be retained. Extensive work to propagate plants for use in revegetation would be required. Substantial work would also be necessary to scarify compacted soils along the trail and throughout the campground and former campground parking lot in preparation of revegetation. Increased visitor safety and operational efficiency would be gained by the installation of an 80 foot long bridge at Crystal Creek. The bridge would provide additional clearance during high water events and would require less maintenance.

Alternative 4 – Enhanced Visitor Services, Active Revegetation

Direct and Indirect Impacts of the Alternative. In addition to impacts described above, Alternative 4 would result in increased annual and cyclical maintenance needs in order to maintain a stock ford at Hell Creek. When the footlog has deteriorated or is destroyed by high water events, it would require location of a replacement log, and transportation of the log to the stream crossing site. This may include the use of heavy-lift helicopters and the associated risk to staff. Pedestrian crossings at the footlog would only be safe during relatively low-water periods, as placement of the logs would not be expected to provide clearance above the ordinary high water levels. Reduced maintenance would be required in the Boulder Creek campground, where only eleven out of an estimated thirty campsite areas would be retained. Extensive work to propagate plants for use in revegetation would be required. Substantial work would also be necessary to scarify compacted soils along the trail and throughout the campground and former campground parking lot in preparation of revegetation. . Increased visitor safety and operational efficiency would be gained by the installation of a 150 foot long bridge at Crystal Creek. The bridge would provide additional clearance during high water events and would require less maintenance.

Cumulative Impacts.

Olympic National Park manages an extensive program of natural and cultural resource management while providing for visitor enjoyment. Many projects have occurred over the decades of the park's existence to improve park operations and safety. The Olympic Hot Springs Resort was closed due to operational needs. The current Boulder Creek Trail was constructed as a road to provide automobile access, but was closed when stream crossings washed out to protect visitor safety. Implementation of the proposed activities would improve visitor safety and park operations, primarily through the construction of safe stream crossings.

Chapter 4: Consultation and Coordination

Olympic National Park conducted public scoping for the Boulder Creek trail and campground rehabilitation project from February 5, 2009 to March 9, 2009. Project information was posted on the park website and on the NPS Planning, Environment and Public Comment (PEPC) website. A news release and letter soliciting public comments and describing the proposed action was sent to approximately 150 individuals, interest groups, government agencies, and area tribes on the park's mailing list.

An article providing project information and requesting public input was published in the February 8, 2009 Peninsula Daily News, National Parks Traveler website on February 6, 2009, and in the Tacoma News Tribune on February 12, 2009. A news announcement was aired on the local radio station, KNOP, on February 6, 2009. Respondents had the opportunity to provide written comments, fax comments, or input comments into the NPS compliance web system (PEPC). Eight individuals and three different organizations responded. Overall comments were supportive of the project. One respondent did not agree with the project. Respondents provided comments and useful information regarding how the project work should be conducted while protecting park resources. All comments were considered in the development of this environmental assessment.

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

Federal Agencies

Department of Agriculture

U.S. Forest Service

Olympic National Forest

Forest Supervisor

Recreation Manager

Department of Interior

U.S. Fish and Wildlife Service

Western Washington Office

Dungeness National Wildlife Refuge

National Park Service

Seattle Office

Office of Public Affairs

Department Of Commerce

National Oceanic and Atmospheric Administration

Olympic Coast National Marine Sanctuary

Department of Transportation

Federal Highways Administration, Western Federal Lands Highway Division

U.S. Army Corps of Engineers

U.S. Coast Guard

U.S. Environmental Protection Agency

State Agencies

State of Washington Representatives
Department of Archeology and Historic Preservation
Department of Ecology
Department of Fish and Wildlife Service
Department of Natural Resources
Department of Parks and Recreation

Local Agencies

City of Port Angeles
City of Forks
Clallam Bay and Sekiu Chamber of Commerce
Clallam County Commissioners
Clallam County Economic Development Council
Jefferson County Commissioners
Kitsap County Commissioners
Olympic Region Clean Air Agency
Port Angeles Chamber of Commerce

American Indian Tribes

Jamestown S'Klallam Tribe
Lower Elwha Klallam Tribe
Olympic Peninsula Intertribal Advisory Committee

Organizations and Businesses

Backcountry Horseman of Washington, Peninsula Chapter
Bicycle Alliance of Washington
Cascade Bicycle Club
Conservation Northwest
Friends of Lake Crescent, Friends of Olympic National Park
Green Crow Timber LLC
Jodesha Broadcasting
KNOP Radio
KXRO / KDUX Radio
National Audubon Society
National Parks Conservation Association
Olympic Forest Coalition
Olympic Park Associates & North Cascades Conservation Council
Olympic Peninsula Audubon Society
Outdoor Recreation Info Center (REI)
Peninsula News Network
Port Angeles, Victoria Visitor Bureau

Protect the Peninsula's Future
Rainier Evergreen, Inc.
Seattle Post Intelligencer
Sequim Gazette
Sierra Club, Cascade Chapter
Sunnydell Shooting Grounds
The Evergreen State College
The Wilderness Society
University of Washington, Olympic Natural Resource Center
Washington Environmental Council
Washington's National Parks Fund
Wilderness Watch

Area Libraries

Aberdeen Public Library
Amanda Park Public Library
Bremerton Public Library
Clallam Bay Public Library
Everett Public Library
Forks Public Library
Hoquiam Public Library
King County Library System - Documents Department
Kingston Public Library
Port Angeles Public Library
Port Townsend Public Library
Renton Public Library
Seattle Public Library
Sequim Public Library
Tacoma Public Library
University of Washington Libraries
Washington State University Holland Library

LIST OF PREPARERS

Olympic National Park

Karen Gustin, Superintendent
Sue McGill, Deputy Superintendent
Teri Tucker, Environmental Protection Specialist
Jennifer Chenoweth, Environmental Protection Assistant
Nancy Hendricks, Environmental Protection Specialist
Barb Maynes, Public Information Officer
Katie Gibbons, SCA, Environmental Protection Intern
Paul Gleeson, Chief of Cultural Resources
Cat Hawkins Hoffman, Chief of Natural Resources
Reed Robinson, Chief of Maintenance
Ruth Scott, Wilderness Specialist
Les Young, Roads Foreman
Larry Lack, Trails Foreman
Carl Elleard, Civil Engineer
Mike Danisiewicz, Park Ranger, Elwha
Pat Crain, Fisheries Biologist
Sam Brenkman, Fisheries Biologist
Dave Conca, Archeologist
Kim Kwarsick, Archeologist
Patti Happe, Wildlife Biologist
Scott Gremel, Wildlife Biologist
Steve Acker, Botanist
Joshua Chenoweth, Botanist
Dan Campbell, Exotic Plant Manager
Catharine Thompson, Vegetation Mapping Coordinator
Bryan Bell, Wilderness Information Center Manager
Colin Smith, Chief Ranger
Bill Rohde, Northwest District Ranger
Rod Roberson, Contract Officer
Greg Adams, Budget Analyst
Roger Hoffman, Geographic Information System Specialist
Katherine Beirne, Geographic Information System Specialist
Jeff Smith, Wilderness Resource Staff
John Teichert, Architect, Pacific West Region Program Manager
Ben Hertel, Trails Forman
Jacilee Wray, Anthropologist

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APPENDICES

Mitigation Measures Common to All Action Alternatives
Draft Wilderness Minimum Requirements Worksheet
Cumulative Impacts Summary

Appendix A: Mitigation Measures Common to All Action Alternatives

Resource Area	Mitigation
General Considerations	<p>Before the beginning of construction, construction limits would be surveyed and staked and may be marked with construction fencing, tape, flagging, snow fencing, or some similar material, as necessary. The construction limits identify and limit the area of construction activity. The contractor is responsible for ensuring that all work stays inside the construction limits. All protection measures would be clearly stated in the construction specifications and workers would be instructed to avoid conducting activities beyond the construction zone.</p> <p>Area staff would be notified when the project start date is known.</p> <p>Best management practices for drainage and sediment control would be implemented to prevent or reduce nonpoint pollution and minimize soil loss and sedimentation in drainage areas.</p> <p>Construction vehicle engines would not be allowed to idle for extended periods of time.</p> <p>All construction debris, including visible asphalt and metal culvert pieces, would be hauled from the Park to an appropriate disposal location. All tools, equipment, surplus materials, and rubbish would be removed from the project site upon project completion.</p>
Vegetation	<p>A revegetation plan would be developed to restore disturbed areas along the trail, former campground parking lot, and campground that include planting of native flora.</p> <p>Native species would be used in all revegetation.</p> <p>To maximize vegetation restoration efforts, the following measures would be implemented:</p> <ul style="list-style-type: none"> • Salvage topsoil and incidental native vegetation (as feasible) from construction areas for reuse during restoration. • Monitor revegetation success and exotic plants for up to 3 years following construction, implementing remedial and control measures as needed. <p>Temporary barriers would be provided to protect existing trees, plants, and root zones. Trees or other plants would not be removed, injured, or destroyed without prior approval from the park botanist.</p> <p>In effort to avoid introduction of non-native / noxious plant species, no imported hay/straw bales would be used during revegetation. On a case-by case basis, the following materials may be used for erosion control: pole peelings, wood straw, or other certified weed-free mulch products preapproved by Olympic National Park’s chief botanist.</p> <p>Pressure wash hauling vehicles before entering the park for the first time; subsequent</p>

	<p>entries will not require pressure washing unless the vehicle shows signs of mud, plant material, or other substances that could harbor seeds or other parts of exotic plants.</p> <p>Ensure that tools and clothing are free of seeds or other parts of exotic plants before being used at the construction site.</p> <p>Cover all haul trucks bringing fill materials from outside the Park to prevent seed transport. (This may or may not be necessary depending on the timing of construction.)</p> <p>All fill, rock, and additional topsoil would be obtained from the project area, if possible. If not possible or if weeds are known to exist in the project area, then weed-free fill, rock, or additional topsoil would be obtained from sources outside the park. NPS personnel would certify that the source is weed-free. Areas which are disturbed by project activities will be revegetated using site-adapted native seed and/or plants, or sterile exotic plants</p>
<p>Water Quality and Soils</p>	<p>Use best management erosion-control practices for drainage and sediment control to prevent or reduce nonpoint source pollution and minimize soil loss and sedimentation in drainage areas. These practices may include but are not limited to, silt fencing, filter fabric, temporary sediment ponds, check dams of pea gravel-filled burlap bags or other material, and/or immediate mulching of exposed areas to minimize sedimentation and turbidity impacts as a result of construction activities. Silt fencing fabric would be inspected daily during project work and weekly after project completion, until removed. Accumulated sediments would be removed when the fabric is estimated to be approximately 75% full. Silt removal would be accomplished in such a way as to avoid introduction into any flowing water bodies.</p> <p>If weather conditions during project operations generate and transport sediment to the stream channels, operations would cease until weather conditions improve. The operation of ground-disturbing equipment during large precipitation events would increase the production of sediment that may be transported to flowing waters. This measure is designed to reduce the production of fine and coarse sediments, which may affect spawning gravels, substrate embeddedness, pool frequency/quality and the development of large pools if they reach the stream channel.</p> <p>In areas where drainages may cross multiple segments of the same trail, a drainage system will be established which supports the natural drainage pattern and the efficient removal of flowing water from the trail alignment.</p> <p>Stream banks would be properly sloped to an angle of stability (natural repose) when removing culverts. This measure can reduce sediment production from bank erosion, undercutting, and slumping as the stream channel reestablishes following culvert removal.</p> <p>A storm water site plan (SWSP) would be developed and approved by the park prior to commencing any near-water activities.</p> <p>Regular site inspections would be conducted to endure that erosion-control measures are properly installed and functioning effectively.</p> <p>Prior to starting work each day, all machinery would be inspected for leaks (e.g.,</p>

	<p>fuel, oil, and hydraulic fluid) and all necessary repairs would be made before the commencement of work. This measure is designed to avoid/minimize the introduction of chemical contaminants associated with machinery used in project implementation.</p> <p>Delineate wetlands and apply protection measures during projects. Perform project activities in a cautious manner to prevent damage caused by equipment, erosion, siltation, etc.</p> <p>Any machinery maintenance involving potential contaminants (e.g., fuel, oil and hydraulic fluid) would occur outside the riparian area, defined as the entire channel migration zone or a distance greater than 150 feet from the stream edge. This measure is designed to avoid/minimize the introduction of chemical contaminants associated with machinery used in project implementation.</p> <p>Hazardous spill clean –up materials would be on-site at all times. This measure is designed to avoid/minimize the introduction of chemical contaminants associated with machinery used in project implementation.</p> <p>Chemicals may have a toxic effect on aquatic organisms, including salmonids.</p>
Special Status Species	<p>Since the project must be conducted during the breeding season for northern spotted owls and marbled murrelets, it shall occur as late in the breeding season as possible. Operating between August 6 and February 28 is preferable, to minimize disturbance effects to spotted and marbled murrelets.</p> <p>Conduct work between two hours after sunrise and two hours before sunset when such work includes the use of equipment which produces noise above 92 decibels (such as chainsaws, heavy equipment, and helicopters) and would occur between April 1 and September 15.</p> <p>No trees large enough to contain suitable habitat for spotted owls or murrelets would be cut.</p> <p>To avoid adverse impacts to breeding murrelets, any noise-producing construction activities above ambient noise levels within 35 yards of murrelet habitat would not begin until after August 6, during murrelet late breeding season (August 6 to September 15), and would be initiated as late as possible. This would ensure that heavy equipment operation would occur outside of the prime breeding season, yet provide a window for construction to be completed before winter weather.</p> <p>During the project work period between August 6 and September 15 within 35 yards of marbled murrelet habitat, no work that generates above ambient noise levels would take place at night or within 2 hours of sunrise and sunset, when murrelets are known to be most active.</p> <p>The park would maintain strict garbage control to prevent scavengers (e.g. corvids), which are predators on murrelet nests, from being attracted to the project area. No food scraps would be discarded or fed to wildlife.</p>
Visitor Experience and Recreational Resources	<p>Visitors would be informed in advance of construction activities.</p> <p>The trail would be closed to all visitors during construction activities. If a visitor inadvertently comes upon construction, they would be escorted through the</p>

	<p>construction zone and/or routed away from construction activities.</p> <p>The Wilderness Information Center would be notified when the project start date is known so that they may inform wilderness users.</p> <p>The ONP Public Information Officer would be provided with the project schedule (as soon as it is known) and periodic update of project work to inform visitors of project status and access.</p>
<p>Cultural Resources</p>	<p>Should any archeological resources be uncovered during construction, work would be halted in the area and the park archeologist, Office of Archeology and Historic Preservation (OAHP), and appropriate Native American Tribes would be contacted for further consultation.</p> <p>Park cultural resources staff would be available during construction to advise or take appropriate actions should any archeological resources be uncovered during construction. In the unlikely event that human remains are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (1990) would be followed.</p> <p>The NPS would ensure that all contacts and subcontractors are informed of the penalties for illegally collecting artifacts or intentionally damaging archeological sites or historic properties. Contractors and subcontractors also would be instructed on procedures to follow in case previously unknown archeological resources are uncovered during construction.</p> <p>Equipment and material staging area would avoid known archeological resources.</p>

Appendix B: Draft Minimum Requirement Worksheet

Olympic National Park Wilderness

April 5, 2006 Version



Complete Part 1 of ONP Project Proposal Form before proceeding

Issue or problem to be solved (provide attachments if necessary):

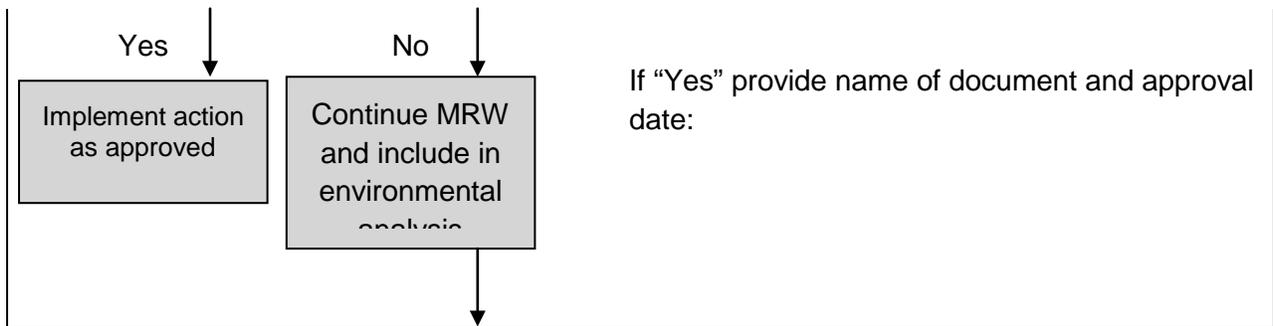
The Boulder Creek Campground was identified through the Washington Park Wilderness Act of 1988 as a potential wilderness addition. This area is currently being impacted by trampling and the collection of firewood, resulting in the loss of vegetation and the expansion of bare ground and compacted soil. Additionally, obsolete infrastructure (concrete foundations, failed culverts) from the former automobile campground has altered the area's natural topography, water flow patterns, and vegetation. This is not consistent with the protection of wilderness character, and detracts from visitor experience.

Project Initiator(s): Olympic National Park _____

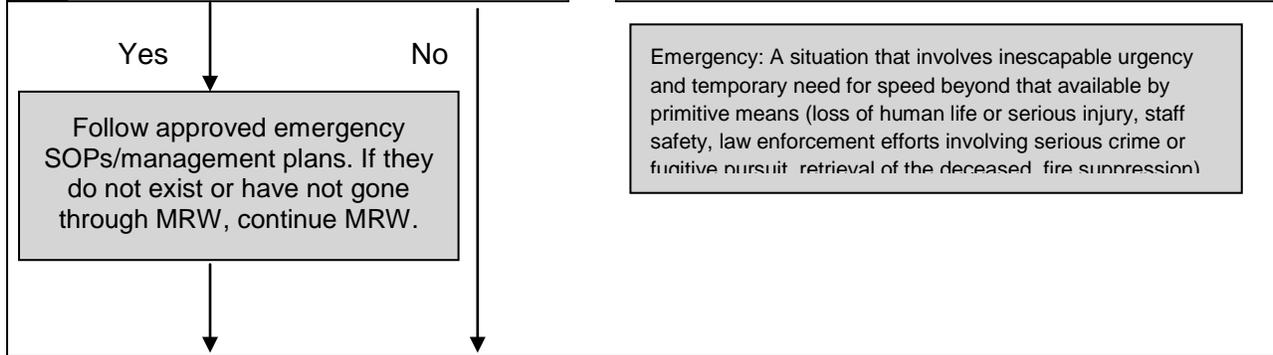
MRW Preparer(s): Teri Tucker, Ruth Scott _____ **Date:** 12/16/09

STEP ONE: Determine if action is necessary

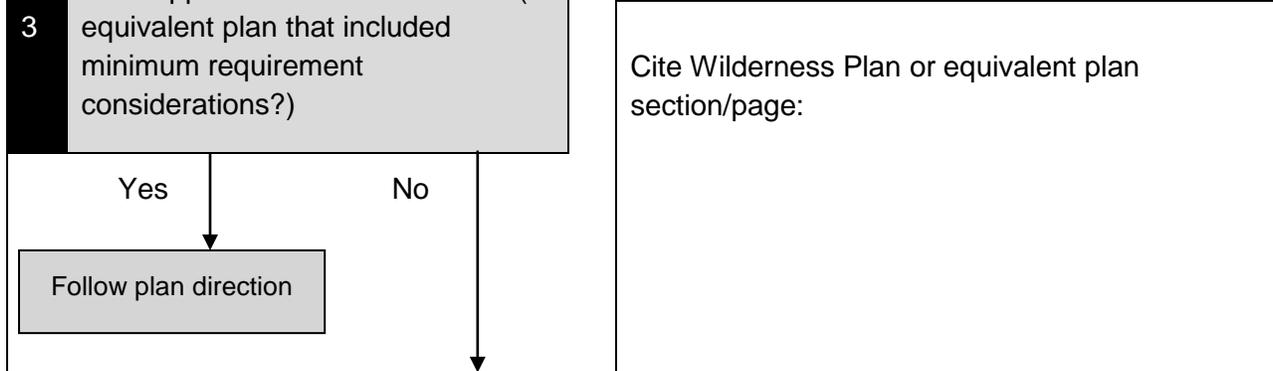
<p>1 Is the resolution of this issue covered by a Categorical Exclusion, Environmental Assessment/Finding of No Significant Impact, or an Environmental Impact Statement/Record of Decision that includes minimum requirement considerations?</p>	<p>Answer: Yes____ No__ X __</p>
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2	Is this an emergency?	Answer: Yes___ No__ X __
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3	Is resolution of this issue addressed in an approved Wilderness Plan? (or equivalent plan that included minimum requirement considerations?)	Answer: Yes___ No__ X __
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4	List guidance provided in law and policy for resolution of the issue	See Management Policies Chapter 6, Director's Order #41 and other applicable laws, policies and directives
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LAWS:

NPS Organic Act (1916) (16 USC 1 et seq.)

The 1916 NPS Organic Act established the NPS and provided the definitive statement of the purpose of the parks, which is, "... to conserve the scenery and the natural and historic objects and the wild life

therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.”

National Parks Omnibus Management Act (1998) (Public Law 105-391)

The National Parks Omnibus Management Act requires the Secretary of Interior to continually improve NPS’ ability to provide state-of-the-art management, protection, and interpretation of, and research on NPS resources. Additionally, this act requires the Secretary to assure the full and proper utilization of the results of scientific study for park management decisions.

National Environmental Policy Act of 1969, as amended (NEPA) (42 USC 4321 et seq.)

NEPA is our basic national charter for protection of the environment. The stated purpose of this act is “to declare a national policy which will encourage productive and enjoyable harmony between [humans] and [their] environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of [humans]; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality (CEQ).”

NEPA covers all federal agencies and all federal actions. The act requires a systematic analysis of major federal actions that includes a consideration of all reasonable alternatives as well as an analysis of short-term and long-term, direct, indirect, and cumulative impacts. Within NEPA the environment includes natural, historical, cultural, and human dimensions. The NPS emphasis is on minimizing negative impacts and preventing “impairment” of park resources as described and interpreted in the NPS Organic Act. The result of analyses conducted under NEPA are presented to the public, federal agencies, and public officials in document format (e.g. Environmental Assessments and Environmental Impact Statements) for consideration prior to taking official action or making official decisions.

Wilderness Act of 1964 (16 USC 1131 et seq.)

The Wilderness Act of 1964 (September 3, 1964, 16 USC 1131-1136) established a national wilderness preservation system to be composed of federally owned areas designated by Congress as wilderness. By law these wilderness areas, “...shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness.” (16 USC 1131)

See below for specific references.

Washington Park Wilderness Act of 1988 officially designated Wilderness in Olympic National Park by Congress on November 16, 1988 (PL 100-668). A total of 876,669 acres, about 95 % of the park, was designated as the Olympic Wilderness, and another 378 acres was designated as potential wilderness. The Boulder Creek Campground was identified through the Act as a Potential Wilderness Addition.

Endangered Species Act of 1973 (ESA), as amended (16 USC 1531 et.seq.)

The purposes of the ESA include providing a means whereby the ecosystems upon which endangered and threatened species depend may be conserved. According to the ESA all federal agencies shall seek to conserve endangered and threatened species and shall ensure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any endangered, threatened or proposed species or adversely modify designated or proposed critical habitat. The effects of any agency action that may affect endangered, threatened, or proposed species or their critical habitat must be evaluated in consultation or conference with either the United States Fish and Wildlife Service (USFWS) or National Marine Fisheries Service (NMFS), as appropriate.

Acts Related to Cultural Resources Management:

The National Historic Preservation Act of 1966 (1992, as amended) (NHPA), and other applicable laws and regulations including the NPS Organic Act (1916), the Antiquities Act of 1906, NEPA, the National Parks and Recreation Act of 1978, the Archeological Resources Protection Act of 1979, the Native American Graves Protection and Repatriation Act of 1990, and the Curation of Federally Owned and Administered Archeological Collections (1991), along with applicable agency policies provide direction for the protection, preservation and management of cultural resources on public lands. Further, these laws and policies establish what must be considered in general management planning and how cultural resources must be managed in future undertakings resulting from the approved plan, regardless of the final alternative chosen.

Section 106 of the NHPA directs federal agencies to take into account the effect of any undertaking (a federally funded or assisted project) on historic properties. A historic property is any district, building, structure, site, or object that is eligible for listing in the National Register of Historic Places (NRHP). Properties that have national, state, or local significance in American history, architecture, archeology, engineering, or culture may be eligible for listing in the NRHP.

Section 106 also provides the Advisory Council on Historic Preservation and the State Historic Preservation Officer (SHPO) an opportunity to comment on the anticipated effects of an undertaking.

Clean Water Act of 1972, as amended (33 USC 1251 et seq.)

The Clean Water Act, passed in 1972 as amendments to the Federal Water Pollution Control Act, and significantly amended in 1977 and 1987, was designed to restore and maintain the integrity of the nation's water. It furthers the objectives of restoring and maintaining the chemical, physical and biological integrity of the nation's waters and of eliminating the discharge of pollutants into navigable waters by 1985. It establishes effluent limitation for new and existing industrial discharge into U.S. waters; authorizes states to substitute their own water quality management plans developed under S208 of the act for federal controls; provides an enforcement procedure for water pollution abatement; and requires conformance to permit required under S404 for actions that may result in discharge of dredged or fill material into a tributary to, wetland, or associated water source for a navigable river.

1964 WILDERNESS ACT

Section 2.(A)

For this purpose there is hereby established a National Wilderness Preservation System to be composed of federally owned areas designated by the Congress as "wilderness areas," and these shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness; and no Federal lands shall be designated as "wilderness areas" except as provided for in this Act or by a subsequent Act.

Definition Of Wilderness Section 2.(C)

A wilderness, in contrast with those areas where man and his works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.

Use Of Wilderness Areas Section 4.(A)(3)(B)

Except as otherwise provided in this Act, each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area and shall so administer such area for such other purposes for which it may have been established as also to preserve its wilderness character. Except as otherwise provided in this Act, wilderness areas shall be devoted to the public purposes of recreational, scenic, scientific, educational, conservation, and historical use.

Prohibition Of Certain Uses Section 4.(A)(3)(C)

Except as specifically provided for in this Act, and subject to existing private rights, there shall be no commercial enterprise and no permanent road within any wilderness area designated by this Act and except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act (including measures required in emergencies involving the health and safety of persons within the area), there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area.

NPS MANAGEMENT POLICIES 2006

Chapter 4, Natural Resources Management

4.1.5 Restoration of Natural Systems

The Service will reestablish natural functions and processes in parks unless otherwise directed by Congress. Landscapes disturbed by natural phenomena, such as landslides, earthquakes, floods, hurricanes, tornadoes, and fires, will be allowed to recover naturally unless manipulation is necessary to protect other park resources, developments, or employee and public safety. Impacts on natural systems resulting from human disturbances include the introduction of exotic species; the contamination of air, water, and soil; changes to hydrologic patterns and sediment transport; the acceleration of erosion and sedimentation; and the disruption of natural processes. The Service will seek to return such disturbed areas to the natural conditions and processes characteristic of the ecological zone in which the damaged resources are situated. The Service will use the best available technology, within available resources, to restore the biological and physical components of these systems, accelerating both their recovery and the recovery of landscape and biological community structure and function. Efforts may include, for example

- . removal of exotic species
- . removal of contaminants and nonhistoric structures or facilities
- . restoration of abandoned mineral lands, abandoned or unauthorized roads, areas overgrazed by domestic animals, or disrupted natural waterways and/or shoreline processes
- . restoration of areas disturbed by NPS administrative, management, or development activities (such as hazard tree removal, construction, or sand and gravel extraction) or by public use
- . restoration of natural soundscapes
- . restoration of native plants and animals
- . restoration of natural visibility

When park development/facilities are damaged or destroyed and replacement is necessary, the development will be replaced or relocated to promote the restoration of natural resources and processes.

4.4.2.4 Management of Natural Landscapes

Natural landscapes disturbed by natural phenomena, such as landslides, earthquakes, floods, hurricanes, tornadoes, and fires, will be allowed to recover naturally unless manipulation is necessary to (1) mitigate for excessive disturbance caused by past human effects, (2) preserve cultural and historic resources as appropriate based on park planning documents, or (3) protect park developments or the safety of people. Landscape and vegetation conditions altered by human activity may be manipulated where the park management plan provides for restoring the lands to a natural condition. Management activities to restore human-altered landscapes may include, but are not restricted to removing constructed features, restoring natural topographic gradients, and revegetating with native park species on acquired inholdings and on sites from which previous development is being removed; restoring natural processes and conditions to areas disturbed by human activities such as fire suppression; rehabilitating areas disturbed by visitor use or by the removal of hazard trees; and maintaining open areas and meadows in situations in which they were formerly maintained by natural processes that now are altered by human activities. Landscape revegetation efforts will use seeds, cuttings, or transplants representing species and gene pools native to the ecological portion of the park in which the restoration project is occurring. Where a natural area has become so degraded that restoration with gene pools native to the park has proven unsuccessful, improved varieties or closely related native species may be used.

Landscape restoration efforts will use geological materials and soils obtained in accordance with geological and soil resource Management Policies. Landscape restoration efforts may use, on a temporary basis, appropriate soil fertilizers or other soil amendments so long as that use does not unacceptably alter the physical, chemical, or biological characteristics of the soil and biological community and does not degrade surface or groundwater.

Chapter 6, Wilderness Preservation and Management

6.3.5 Minimum Requirement

All management decisions affecting wilderness must be consistent with the minimum requirement concept. This concept is a documented process used to determine if administrative actions, projects, or programs undertaken by the Service or its agents and affecting wilderness character, resources, or the visitor experience are necessary, and if

so how to minimize impacts. The minimum requirement concept will be applied as a two-step process that determines whether the proposed management action is appropriate or necessary for administration of the area as wilderness and does not cause a significant impact to wilderness resources and character, in accordance with the Wilderness Act; and the techniques and types of equipment needed to ensure that impacts on wilderness resources and character are minimized.

In accordance with this policy, superintendents will apply the minimum requirement concept in the context of wilderness stewardship planning, as well as to all other administrative practices, proposed special uses, scientific activities, and equipment use in wilderness. The only exception to the minimum requirement policy is for eligible areas that the Service has not proposed for wilderness designation. However, those lands will still be managed to preserve their eligibility.

When determining minimum requirements, the potential disruption of wilderness character and resources will be considered before, and given significantly more weight than, economic efficiency and convenience. If a compromise of wilderness resources or character is unavoidable, only those actions that preserve wilderness character and/or have localized, short-term adverse impacts will be acceptable.

Although park managers have flexibility in identifying the method used to determine minimum requirement, the method used must clearly weigh the benefits and impacts of the proposal, document the decision-making process, and be supported by an appropriate environmental compliance document. Parks must develop a process to determine minimum requirement until the plan is finally approved. Parks will complete a minimum requirement analysis on those administrative practices and equipment uses that have the potential to impact wilderness resources or values. The minimum requirement concept cannot be used to rationalize permanent roads or inappropriate or unlawful uses in wilderness.

Administrative use of motorized equipment or mechanical transport will be authorized only

- if determined by the superintendent to be the minimum requirement needed by management to achieve the purposes of the area, including the preservation of wilderness character and values, in accordance with the Wilderness Act; or
- in emergency situations (for example, search and rescue, homeland security, law enforcement) involving the health or safety of persons actually within the area.

Such management activities will also be conducted in accordance with all applicable regulations, policies, and guidelines and, where practicable, will be scheduled to avoid creating adverse resource impacts or conflicts with visitor use.

6.3.8 Cultural Resources

The Wilderness Act specifies that the designation of any area of the park system as wilderness “shall in no manner lower the standards evolved for the use and preservation of” such unit of the park system under the various laws applicable to that unit (16 USC 1133(a)(3)). Thus, the laws pertaining to historic preservation also remain applicable within wilderness but must generally be administered to preserve the area’s wilderness character. The responsible decision-maker will include appropriate consideration of the application of these provisions of the Wilderness Act in analyses and decision-making concerning cultural resources.

Cultural resources that have been included within wilderness will be protected and maintained according to the pertinent laws and policies governing cultural resources using management methods that are consistent with the preservation of wilderness character and values. These laws include the Antiquities Act and the Historic Sites, Buildings and Antiquities Act, as well as subsequent historic preservation legislation, including the National Historic Preservation Act, the Archaeological Resources Protection Act, and the Native American Graves Protection and Repatriation Act. The Secretary of the Interior’s Standards and Guidelines for Archeology and Historic Preservation projects provide direction for protection and maintenance. Cemeteries or commemorative features, such as plaques or memorials, that have been included in wilderness may be retained (including approved access to these sites), but no new cemeteries or additions to existing cemeteries may be made unless specifically authorized by federal statute, existing reservations, or retained rights.

6.3.10 Management Facilities

Part of the definition of wilderness as provided by the Wilderness Act is “undeveloped federal land retaining its primeval character and influence, without permanent improvements.” Accordingly, authorizations of NPS administrative facilities in wilderness will be limited to the types and minimum number essential to meet the minimum requirements for the administration of the wilderness area. A decision to construct, maintain, or remove an administrative facility will be based primarily on whether or not the facility is required to preserve wilderness character or values, not on considerations of administrative convenience, economic effect, or convenience to the public or park staff. Maintenance or the removal of historic structures will also comply with cultural resource protection and preservation policies and directives, and with the concept of minimum requirement management techniques for wilderness.

6.3.10.1 Administrative Facilities

Administrative facilities (for example, ranger stations and/or patrol cabins, fire lookouts, radio and/or cellular telephone antennas, radio repeater sites, associated storage or support structures, drift fences, and facilities supporting trail stock operations) may be allowed in wilderness only if they are determined to be the minimum requirement necessary to carry out wilderness management objectives and are specifically addressed within the park’s wilderness management plan or other appropriate planning documents.

Permanent storage caches are prohibited in wilderness unless necessary for health and safety purposes or when such caches are determined necessary, justified, documented, and approved through a minimum requirements analysis.

6.3.10.2 Trails in Wilderness

Trails will be permitted within wilderness when they are determined to be necessary for resource protection and/or for providing for visitor use for the purposes of wilderness.

The identification and inventory of the wilderness trail system will be included as an integral part of the wilderness management plan or other appropriate planning document.

Trails will be maintained at levels and conditions identified within the approved wilderness management plan or other planning document. Trail maintenance structures (such as water bars, gabions) may be provided, under minimum requirement protocols, where they are essential for resource preservation or where significant safety hazards exist during normal use periods. Historic and/or prehistoric trails will be administered in keeping with approved cultural resource and wilderness management plan requirements.

6.3.10.3 Shelters and Campsites

Although the development of facilities to serve visitors will generally be avoided, campsites may be designated when essential for resource protection and preservation or to meet other specific wilderness management objectives. In keeping with the terms of the park’s wilderness management plan, campsite facilities may include a site marker, fire rings, tent sites, food storage devices, and toilets if these are determined by the superintendent to be the minimum facilities necessary for the health and safety of wilderness users or for the preservation of wilderness resources and values. Toilets will be placed only in locations where their presence and use will resolve health and sanitation problems or prevent serious resource impacts, especially where reducing or dispersing visitor use is impractical or has failed to alleviate the problems.

Chapter 9, Park Facilities

9.1.3.2 Revegetation and Landscaping

The selection of plant materials and cultivation practices will be guided by the policies for management of plant materials in section 4.4 and the need for fire-resistant vegetation for defensible space. To the maximum extent possible, plantings will consist of species that are native to the park or that are historically appropriate for the period or event commemorated. The use of exotic plant species is restricted to situations that conform to the exotic species policy in section 4.4.4. Irrigation to maintain exotic plantings will be avoided, except when it is part of an approved management program essential to achieve park objectives and when adequate and dependable supplies of water are available. Low water use practices that measure soil moisture content and other technologies (such as drip irrigation and appropriate timing of water applications) should be employed.

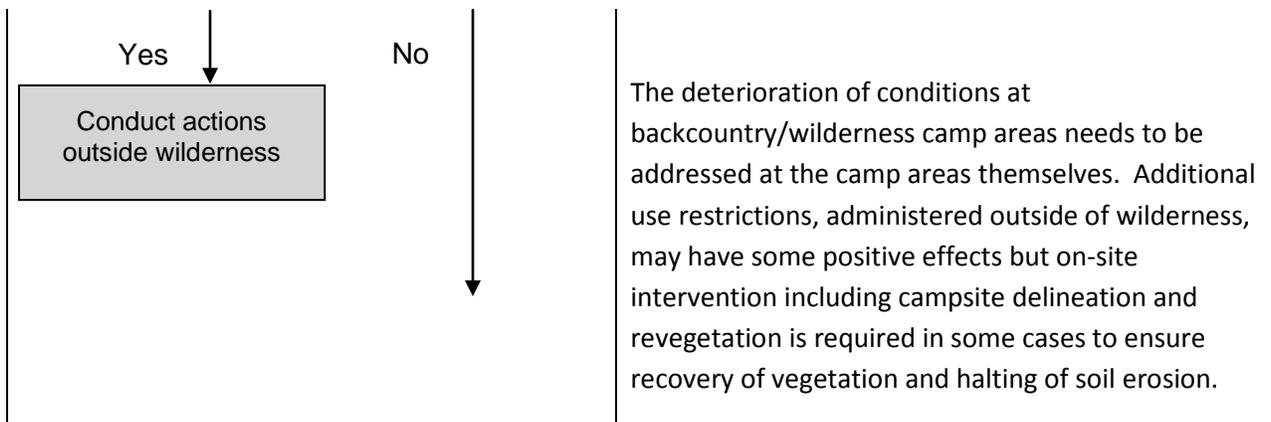
Prior to using soil fertilizers or other soil amendments in park natural or altered landscapes, parks must develop a prescription to ensure that the amendments will not unacceptably alter the physical, chemical, or biological characteristics of the soil, biological community, or surface or groundwater.

Wherever practicable, soils and plants affected by construction will be salvaged for use in site restoration. Any surplus soils and plants may be used, as appropriate, for the restoration of other degraded areas in the park. Surplus soils not used in this way should be stockpiled for future use. If additional soil and plants are needed to restore disturbed sites, they may be obtained from other sites in the park if it is determined that the use of an in-park source will not significantly affect cultural or natural resources or ecological processes. In any case, imported soils must (1) be compatible with existing soils, (2) be free of undesired seeds and organisms, and (3) fulfill the horticultural requirements of plants used for restoration.

9.3.2.2 Backcountry Campsites

Backcountry and wilderness campsites may be permitted, but only within the acceptable limits of use determined by the park’s wilderness management plan, resource management plan, or other pertinent planning document.

5	Is resolution of this issue necessary or appropriate to meet wilderness management objectives or the requirements of other laws, policies and directives?	Answer: Yes__ X __ No____
	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Yes</p> <p>↓</p> </div> <div style="text-align: center;"> <p>No</p> <div style="border: 1px solid black; background-color: #ccc; padding: 5px; margin: 5px 0;">Do not proceed with</div> </div> </div>	<p>Explain:</p> <p>The Washington Park Wilderness Act of 1988 officially designated Wilderness in Olympic National Park on November 16, 1988 (PL 100-668). A total of 876,669 acres, about 95 % of the park, was designated as the Olympic Wilderness, and another 378 acres was designated as potential wilderness. Areas that currently do not qualify for designation as wilderness due to temporary nonconforming or incompatible conditions may be authorized by Congress as “potential wilderness” for future wilderness designation. The Boulder Creek Campground was identified through the Act as potential wilderness. Potential wilderness becomes “designated wilderness” upon the Secretary of Interior’s determination, published in the Federal Register, that they have met the qualifications for designation by the cessation or termination of the nonconforming use. The Act’s identification of Boulder Creek Campground as potential wilderness indicates Congressional intent for rehabilitation of the area to a wilderness standard.</p>



At this point, if you have determined the action is necessary, contact the Planning and Compliance Office to schedule a presentation of your issue at a park Interdisciplinary Planning Team meeting

STEP TWO: Determine the minimum tools, techniques and actions that will effectively resolve the issue

8	Describe in detail alternative ways to resolve the issue (include use of primitive tools and skills)	<p>Questions to answer for each alternative:</p> <ul style="list-style-type: none"> - What is proposed? - Would the project involve ground disturbance? - Where would the action take place? - When would the action take place? - What design and standards would apply? - What methods, tools and techniques would be used? - How long would it take to complete the action? - Why is it being proposed in this manner? - What mitigation would be taken to minimize action impacts on wilderness resources and character?
	<div style="border: 1px solid black; padding: 5px;"> <p>Note: Alternatives described in other compliance documents that address this issue may be referenced. If minimum</p> </div>	

Alternative 1 – No Action (Continue Current Management, Routine Maintenance Only)

Under No Action, the National Park Service would not implement the actions identified for the Boulder Creek Trail and Campground in the 2008 General Management Plan. Only routine maintenance of existing structures would occur. No new infrastructure would be built. The current situation, as described in the “Rehabilitate Boulder Creek Trail and Campground Environmental Assessment”, Chapter 2: Alternatives, Alternative 1 would continue. See Chapter 3 (Affected Environment) for a more detailed profile of the current environmental situation in the project area.

Alternative 2 – Minimum Visitor Services Infrastructure, Extensive Restoration

Under Alternative 2, the National Park Service would implement the actions identified for the Boulder Creek Trail and Campground in the 2008 General Management Plan so as to create and maintain the minimum amount of infrastructure necessary to achieve project objectives.

See Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 2: Alternatives, Alternative 2 for details.

Alternative 3 – Provide Moderate Visitor Services, Active Revegetation

Under Alternative 3, the National Park Service would implement the actions identified for the Boulder Creek Trail and campground in the 2008 General Management Plan by taking actions necessary to achieve project objectives as identified in Alternative 2, while providing limited additional visitor services.

See Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 2: Alternatives, Alternative 3 for details.

Alternative 4 – Provide Enhanced Visitor Services, Active Revegetation (Management Preferred)

Under Alternative 4, the National Park Service would implement the actions identified for the Boulder Creek Trail and campground in the 2008 General Management Plan by taking actions necessary to achieve project objectives, while providing additional visitor services by further expanding the parking lot at the Boulder Creek trailhead, installing bridges at the Cougar Creek and Crystal Creek stream crossings to allow safe access at higher water levels, and by providing additional visitor services at the Boulder Creek campground for backpackers and pack stock users.

See Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 2: Alternatives, Alternative 4 for details.

9	Evaluate the impacts of each alternative	Potential impacts to evaluate under <u>each</u> alternative: <ul style="list-style-type: none"> - Wilderness character effects - Effects on natural resources - Cultural resources considerations - Social/recreational/experiential effects - Societal/political effects - Health/safety concerns - Economic/timing/sustainability considerations
<p>Alternative 1 - No Action (Continue Current Management, Routine Maintenance Only)</p> <p>Wilderness character effects</p> <p>This topic is analyzed in the Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 3: Affected Environment & Environmental Consequences, Wilderness Values section.</p> <p>Effects on natural resources</p> <p>This topic is analyzed in the Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 3: Affected Environment & Environmental Consequences, Physical Environment section and Biological Environment section.</p> <p>Cultural resources considerations</p> <p>This topic is analyzed in the Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 3: Affected Environment & Environmental Consequences, Social and Cultural Environment section.</p> <p>Social/recreational/experiential effects</p> <p>This topic is analyzed in the Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 3: Affected Environment & Environmental Consequences, Experiential Environment section.</p> <p>Societal/political effects</p> <p>This topic is analyzed in the Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 3: Affected Environment & Environmental Consequences, Social and Cultural Environment section.</p> <p>Health/safety concerns</p> <p>This topic is analyzed in the Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 3: Affected Environment & Environmental Consequences, Social and Cultural</p>		

Environment section.

Economic/timing/sustainability considerations

This topic is analyzed in the Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 3: Affected Environment & Environmental Consequences, **Social and Cultural Environment section.**

Alternative 2 – Minimum Visitor Services Infrastructure, Extensive Restoration

Wilderness character effects

This topic is analyzed in the Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 3: Affected Environment & Environmental Consequences, **Wilderness Values section.**

Effects on natural resources

This topic is analyzed in the Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 3: Affected Environment & Environmental Consequences, **Physical Environment section and Biological Environment section.**

Cultural resources considerations

This topic is analyzed in the Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 3: Affected Environment & Environmental Consequences, **Social and Cultural Environment section.**

Social/recreational/experiential effects

This topic is analyzed in the Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 3: Affected Environment & Environmental Consequences, **Experiential Environment section.**

Societal/political effects

This topic is analyzed in the Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 3: Affected Environment & Environmental Consequences, **Social and Cultural Environment section.**

Health/safety concerns

This topic is analyzed in the Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 3: Affected Environment & Environmental Consequences, **Social and Cultural**

Environment section.

Economic/timing/sustainability considerations

This topic is analyzed in the Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 3: Affected Environment & Environmental Consequences, **Social and Cultural Environment section.**

Alternative 3 – Provide Moderate Visitor Services, Active Revegetation

Wilderness character effects

This topic is analyzed in the Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 3: Affected Environment & Environmental Consequences, **Wilderness Values section.**

Effects on natural resources

This topic is analyzed in the Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 3: Affected Environment & Environmental Consequences, **Physical Environment section and Biological Environment section.**

Cultural resources considerations

This topic is analyzed in the Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 3: Affected Environment & Environmental Consequences, **Social and Cultural Environment section.**

Social/recreational/experiential effects

This topic is analyzed in the Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 3: Affected Environment & Environmental Consequences, **Experiential Environment section.**

Societal/political effects

This topic is analyzed in the Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 3: Affected Environment & Environmental Consequences, **Social and Cultural Environment section.**

Health/safety concerns

This topic is analyzed in the Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 3: Affected Environment & Environmental Consequences, **Social and Cultural**

Environment section.

Economic/timing/sustainability considerations

This topic is analyzed in the Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 3: Affected Environment & Environmental Consequences, **Social and Cultural Environment section.**

Alternative 4 – Provide Enhanced Visitor Services, Active Revegetation (Management Preferred)

Wilderness character effects

This topic is analyzed in the Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 3: Affected Environment & Environmental Consequences, **Wilderness Values section.**

Effects on natural resources

This topic is analyzed in the Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 3: Affected Environment & Environmental Consequences, **Physical Environment section and Biological Environment section.**

Cultural resources considerations

This topic is analyzed in the Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 3: Affected Environment & Environmental Consequences, **Social and Cultural Environment section.**

Social/recreational/experiential effects

This topic is analyzed in the Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 3: Affected Environment & Environmental Consequences, **Experiential Environment section.**

Societal/political effects

This topic is analyzed in the Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 3: Affected Environment & Environmental Consequences, **Social and Cultural Environment section.**

Health/safety concerns

This topic is analyzed in the Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 3: Affected Environment & Environmental Consequences, **Social and Cultural**

Environment section.

Economic/timing/sustainability considerations

This topic is analyzed in the Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 3: Affected Environment & Environmental Consequences, **Social and Cultural**

Environment section.

1 0	Select the alternative that will most effectively resolve the issue while having the <u>least</u> overall adverse impact on wilderness resources, character and the visitor experience	<i>Note:</i> When selecting the preferred alternative the potential disruption of wilderness character and resources will be considered before, and given significantly more weight than, economic efficiency and convenience. If a compromise of wilderness resources or character is unavoidable, only those actions that preserve wilderness character and/or have localized, short-term adverse impacts will be acceptable.
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Preferred alternative: #_____4_____

Describe rationale for selecting this alternative including how it meets minimum requirement guidelines and how impacts to wilderness will be minimized, and mitigated (if needed):

Although all Action Alternatives meet the criteria listed above to varying degrees, it was determined that Alternative 4 is the Environmentally Preferred Alternative. This alternative provides safe access to pedestrians and stock users during the longest period of time with the least amount of impact to natural and cultural resources during construction and through ongoing maintenance. Each of the action alternatives results in the removal of asphalt from the trail, restoration of natural drainage patterns in the campground, and active revegetation outside of designated visitor use areas. Alternative 4 reduces the number of campsites from current levels, but provides adequate facilities to support both backpackers and people camping with pack stock. This determination was upheld during an interdisciplinary workshop that found Alternative 4 was superior to the other alternatives in terms of providing for visitor safety, sustainability, natural and cultural resource protection, and visitor experience. See Rehabilitate Boulder Creek Trail and Campground Environmental Assessment, Chapter 2: Alternatives, "The Environmentally Preferred Alternative" for details.

1 1	After review by Division Chief, provide an electronic copy of MRW to the Planning and Compliance Office and the Wilderness Specialist to initiate park internal review and comment. Schedule a time to present findings at a park Interdisciplinary Planning Team meeting (held twice a month).
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<p>Comments:</p> <p>Comments by: _____</p> <p>Date _____</p>

Recommended by:

Division Chief

Date

Reviewed by:

Wilderness Specialist

Date

Approved by:

Superintendent

Date



Appendix C: Cumulative Impact Summary

	Past Actions	Current Actions (Alt 1)	Reasonably Foreseeable Future Actions	Alt 2: Limited Services, Extensive Restoration	Alt 3: Moderate Services, Active Revegetation	Alt 4: Enhanced Services, Active Revegetation
PHYSICAL ENVIRONMENT						
Geologic Features and Soils	Construction of the paved asphalt road to the Olympic Hot Springs Resort.	Degraded asphalt road to the Olympic Hot Springs in place	Continued soil compaction and erosion from asphalt road	Reduced soil compaction and erosion due to removal of asphalt road and soil decompaction along trail corridor and in the Boulder Creek Campground	Reduced soil compaction and erosion due to removal of asphalt road and soil decompaction along trail corridor and in the Boulder Creek Campground	Reduced soil compaction and erosion due to removal of asphalt road and soil decompaction along trail corridor and in the Boulder Creek Campground
	Construction of the trail system within Olympic National Park	Active maintenance of the trail system within Olympic National Park	Ongoing maintenance of the trail system within Olympic National Park	Ongoing maintenance of the trail system within Olympic National Park	Ongoing maintenance of the trail system within Olympic National Park	Ongoing maintenance of the trail system within Olympic National Park
	Construction of roads and trails on public and private lands outside the park	Active maintenance of roads and trails on public and private lands outside the park	Ongoing maintenance and expansion of roads and trails on public and private lands outside the park	Ongoing maintenance and expansion of roads and trails on public and private lands outside the park	Ongoing maintenance and expansion of roads and trails on public and private lands outside the park	Ongoing maintenance and expansion of roads and trails on public and private lands outside the park
	Removal of asphalt from Boulder Creek Campground	-	-	-	-	-
	Restoration of compacted soils through Olympic National Park Restoration Program	-	Continuing restoration of compacted soils through Olympic National Park Restoration Program as funding allows	Continuing restoration of compacted soils through Olympic National Park Restoration Program as funding allows, including within project area	Continuing restoration of compacted soils through Olympic National Park Restoration Program as funding allows, including within project area	Continuing restoration of compacted soils through Olympic National Park Restoration Program as funding allows, including within project area
	-	-	-	Impacts to soils in campground during excavation of buried utilities and culverts and blasting and excavation of bedrock, soils, and fill materials to install footlog at Crystal Creek.	Impacts to soils in campground during excavation of culverts and blasting and excavation of bedrock, soils, and fill materials to install 80' bridge at Crystal Creek.	Impacts to soils in campground during excavation of culverts and minor excavation to install 150' bridge at Crystal Creek
Hydrology and Water Quality	Construction of the Elwha and Glines Canyon dams altered hydrology of the Elwha Watershed. Boulder Creek is a tributary of the Elwha River.	The presence of the Elwha and Glines Canyon dams alters hydrology of the Elwha Watershed. Boulder Creek is a tributary of the Elwha River.	Removal of the Elwha and Glines Canyon dams will alter hydrology of the Elwha Watershed, with short term adverse effects and long term significant beneficial effects. Boulder Creek is a tributary of the Elwha River.	Removal of the Elwha and Glines Canyon dams will alter hydrology of the Elwha Watershed, with short term adverse effects and long term significant beneficial effects. Boulder Creek is a tributary of the Elwha River. Restoration of this project will result in additional beneficial impacts to hydrologic function and water quality.	Removal of the Elwha and Glines Canyon dams will alter hydrology of the Elwha Watershed, with short term adverse effects and long term significant beneficial effects. Boulder Creek is a tributary of the Elwha River. Restoration of this project will result in additional beneficial impacts to hydrologic function and water quality.	Removal of the Elwha and Glines Canyon dams will alter hydrology of the Elwha Watershed, with short term adverse effects and long term significant beneficial effects. Boulder Creek is a tributary of the Elwha River. Restoration of this project will result in additional beneficial impacts to hydrologic function and water quality.
	construction of roads and the associated placement of fill materials altered the flow of water through the project area.	existing roads and fill materials alter the flow of water through the project area.	-	Removal of remaining asphalt from 2.2 mile road segment, and regrading of trail to reduce erosion and fill materials will help restore the natural flow of water through the project area.	Removal of remaining asphalt from 2.2 mile road segment, and regrading of trail to reduce erosion and fill materials will help restore the natural flow of water through the project area.	Removal of remaining asphalt from 2.2 mile road segment, and regrading of trail to reduce erosion and fill materials will help restore the natural flow of water through the project area.
	High stream flow events have caused the failure of road and trail crossings in the project area, depositing large volumes of native and fill materials into Boulder Creek.	Slumping of the road cut and failure of culverts is resulting in accelerated erosion and the deposition of soil and fill materials into Boulder Creek.	High stream flow events will continue to erode materials at trail crossings in the project area, depositing native and fill materials into Boulder Creek.	High stream flow events will continue to erode materials at trail crossings in the project area, depositing native and fill materials into Boulder Creek.	High stream flow events will continue to erode materials at trail crossings in the project area, depositing native and fill materials into Boulder Creek.	High stream flow events will continue to erode materials at trail crossings in the project area, depositing native and fill materials into Boulder Creek.
	Visitor and Administrative use has resulted in increased sediment, nutrient, and contaminant loads in areas of development adjacent to surface waters.	Visitor and Administrative may result in increased sediment, nutrient, and contaminant loads in areas of development adjacent to surface waters.	Visitor and Administrative may continue to result in increased sediment, nutrient, and contaminant loads in areas of development adjacent to surface waters.	Sediment may be introduced to Crystal Creek and Boulder Creek during blasting and excavation to install a footlog and stock ford at Crystal Creek, and as a result of implementation of the asphalt removal and trail and campground rehabilitation project.	Sediment may be introduced to Crystal Creek and Boulder Creek during blasting and excavation to install an 80' bridge at Crystal Creek, and as a result of implementation of the asphalt removal and trail and campground rehabilitation project.	Sediment may be introduced to Crystal Creek and Boulder Creek during installation of a 150' bridge at Crystal Creek, and as a result of implementation of the asphalt removal and trail and campground rehabilitation project.
Air Quality	Vehicle emissions from visitor, administrative, residential, and industrial uses have affected regional air quality.	Vehicle emissions from visitor, administrative, residential, and industrial uses continue to influence regional air quality.	Vehicle emissions from visitor, administrative, residential, and industrial uses may continue to influence regional air quality.	Vehicle emissions from visitor, administrative, residential, and industrial uses may continue to influence regional air quality.	Vehicle emissions from visitor, administrative, residential, and industrial uses may continue to influence regional air quality.	Vehicle emissions from visitor, administrative, residential, and industrial uses may continue to influence regional air quality.
	-	-	Short-term impacts to air quality may result from the Elwha and Glines Canyon dam removal project	Short-term impacts to air quality may result from the Elwha and Glines Canyon dam removal project. Additional short term, site-specific impacts to air quality is anticipated due to the use of heavy equipment and vehicles during the implementation of this project.	Short-term impacts to air quality may result from the Elwha and Glines Canyon dam removal project. Additional short term, site-specific impacts to air quality is anticipated due to the use of heavy equipment and vehicles during the implementation of this project.	Short-term impacts to air quality may result from the Elwha and Glines Canyon dam removal project. Additional short term, site-specific impacts to air quality is anticipated due to the use of heavy equipment and vehicles during the implementation of this project.

BIOLOGICAL ENVIRONMENT						
Vegetation	Extensive logging and vegetation removal has reduced the amount of old growth forests on the Olympic Peninsula. Construction and maintenance of roads and trails within and outside of the park required the removal of mature trees and other vegetation.	Clearing of vegetation to maintain existing roads and trails is occurring throughout the project area, the park, and region.	Logging and vegetation removal will continue on the Olympic Peninsula. Clearing of vegetation to maintain existing roads and trails will continue throughout the project area, the park, and region.	Vegetation would be removed to expand the trailhead parking lot and turnaround area. Young trees and herbaceous plants would be removed during asphalt removal. Active revegetation would occur after asphalt removal to restore native species and plant communities along the trail corridor, in the campground, and in the former campground parking lot.	Vegetation would be removed to expand the trailhead parking lot and turnaround area. Young trees and herbaceous plants would be removed during asphalt removal. Active revegetation would occur after asphalt removal to restore native species and plant communities along the trail corridor, in the campground, and in the former campground parking lot.	Additional Vegetation would be removed to further expand the trailhead parking lot and turnaround area. Young trees and herbaceous plants would be removed during asphalt removal. Active revegetation would occur after asphalt removal to restore native species and plant communities along the trail corridor, in the campground, and in the former campground parking lot.
	Non-native plants have been intentionally and accidentally introduced to the region, and the project site.	Efforts to limit the spread of Non-native plants are taking place. Active treatment to reduce the extent of non-native plants is occurring in the project area, the park, and outside park boundaries.	Non-native plants will continue to be unintentionally spread both within and outside of park boundaries. Actions will continue to be taken to limit spread and reduce the extent of non-native plants in order to protect native plant communities and the functioning of the ecosystems of which they are a key component.	Best Management Practices would be implemented to avoid the unintentional introduction or spread of non-native plant materials as a result of project activities.	Best Management Practices would be implemented to avoid the unintentional introduction or spread of non-native plant materials as a result of project activities.	Best Management Practices would be implemented to avoid the unintentional introduction or spread of non-native plant materials as a result of project activities.
Wildlife and Wildlife Habitat	Human use and development both within and outside of the park has reduced the quantity and quality of wildlife habitat due to changes in species composition, habitat structure and ecosystem functions.	Human use and development both within and outside of the park continues to reduce the quantity and quality of wildlife habitat due to changes in species composition, habitat structure and ecosystem function in some areas. Active restoration of individual species of wildlife, such as the fisher at Olympic National park is also occurring. Efforts to restore both terrestrial and aquatic habitat is also occurring within the park and outside park boundaries.	Actions taken within and outside of the park will continue to impact wildlife and wildlife habitat. Short-term noise impacts due to the implementation of the Elwha dam removal project, and other projects in the region will likely harass animals located near construction activities. However, successful completion of projects like the Elwha dam removal project will result in long-term beneficial effects to wildlife through restoration of both terrestrial and aquatic habitat.	Implementation of the project would result in additional short-term impacts to wildlife due to noise from construction. Project would also result in improved habitat through the revegetation of the trail corridor and campground over the long-term.	Implementation of the project would result in additional short-term impacts to wildlife due to noise from construction. Project would also result in improved habitat through the revegetation of the trail corridor and campground over the long-term.	Implementation of the project would result in additional short-term impacts to wildlife due to noise from construction. Project would also result in improved habitat through the revegetation of the trail corridor and campground over the long-term.
Unique or Important Fish or Fish Habitat	Construction of the Elwha and Glines Canyon dams blocked passage to the upper Elwha watershed to anadromous fish species. Changes in human use patterns, including consumption of fish and alteration of fish habitat has reduced the distribution and abundance of native fish species.	Anadromous fish species below the dams are currently not able to reach the lower segments of Boulder Creek due to the presence of the Elwha and Glines Canyon dams. These dams also prevent resident fish from moving into the lower reaches of the Elwha River and out to sea. A natural fish barrier is located in Boulder Creek, preventing fish from entering the current project area.	Removal of the Elwha and Glines Canyon dams will have temporary adverse effects on fish and fish habitat, but will have significant long-term beneficial impacts on anadromous fish and river habitat. Removal of the Griff Creek fish barrier culvert will extend suitable habitat for bull trout and other resident fish of the Elwha River, providing refugia during dam removal.	Blasting and excavation to install a footlog and stock ford at Crystal Creek may introduce sediment into Crystal Creek, a tributary of Boulder Creek, which is a tributary of the Elwha River. Due to the presence of a fish barrier below the project area, it is unlikely that the amount of sediment generated at Crystal Creek would be detectable below the fish barrier 5.5 miles downstream.	Blasting and excavation to install an 80' bridge at Crystal Creek may introduce sediment into Crystal Creek, a tributary of Boulder Creek, which is a tributary of the Elwha River. Due to the presence of a fish barrier below the project area, it is unlikely that the amount of sediment generated at Crystal Creek would be detectable below the fish barrier 5.5 miles downstream.	Installation of a 150' bridge at Crystal Creek may introduce sediment into Crystal Creek, a tributary of Boulder Creek, which is a tributary of the Elwha River. Due to the presence of a fish barrier below the project area, it is unlikely that the amount of sediment generated at Crystal Creek would be detectable below the fish barrier 5.5 miles downstream.
Threatened and Endangered Species	Development for human use both within and outside of the park has reduced the extent of suitable habitat for threatened and endangered species, such as the northern spotted owl, marbled murrelet, and bull trout. These changes affected the composition, structure, and function of species populations and habitat. A programmatic Biological Opinion was prepared during the preparation of the Olympic National Park General Management Plan.	All actions taken in the park must take into account the potential to adversely affect listed species or habitat. Many ongoing activities, including road and trail construction and maintenance have the potential to adversely affect listed species and habitat. Best Management Practices are implemented to avoid or minimize the potential for adverse actions associated with park activities.	Removal of the Elwha and Glines Canyon dams has the potential to adversely affect listed species and habitat over the short-term, but will significantly improve habitat for threatened and endangered fish species over the long-term. Implementation of the fish-barrier culvert replacement project will also result in long-term beneficial effects to bull trout by expanding suitable habitat. Other activities taken both within and outside of the park will have the potential to adversely affect, or improve the quality of suitable habitat for threatened and endangered species.	All action alternatives considered in this plan were developed to avoid or minimize the potential for adverse effects to threatened and endangered species and habitat. Work with the potential to cause noise impacts would occur outside of the early nesting season to reduce the potential for adverse effects to nesting marbled murrelets and spotted owls. No actions are likely to harm individuals of any listed species. Bull trout are not present in the project area, and actions with the potential to affect water quality would occur miles from suitable habitat, making adverse effect to aquatic species unlikely.	All action alternatives considered in this plan were developed to avoid or minimize the potential for adverse effects to threatened and endangered species and habitat. Work with the potential to cause noise impacts would occur outside of the early nesting season to reduce the potential for adverse effects to nesting marbled murrelets and spotted owls. No actions are likely to harm individuals of any listed species. Bull trout are not present in the project area, and actions with the potential to affect water quality would occur miles from suitable habitat, making adverse effect to aquatic species unlikely.	All action alternatives considered in this plan were developed to avoid or minimize the potential for adverse effects to threatened and endangered species and habitat. Work with the potential to cause noise impacts would occur outside of the early nesting season to reduce the potential for adverse effects to nesting marbled murrelets and spotted owls. No actions are likely to harm individuals of any listed species. Bull trout are not present in the project area, and actions with the potential to affect water quality would occur miles from suitable habitat, making adverse effect to aquatic species unlikely.
Wetlands	Construction of the Boulder Creek campground and associated road resulted in the placement of fill materials that altered water flow, resulting in the development or expansion of wetland vegetation in an upland area. Development both within and outside of the park has resulted in the reduction of the extent and quality of wetland habitat in the region and across the country.	A small area within the Boulder Creek campground has become established with wetland vegetation and hydric soils. This small wetland area appears to be associated with altered surface flow due to the place of fill material during campground development.	No projects in the immediate project area have filling of wetlands as an objective. Projects outside of the park that have the potential to effect wetlands are subject to federal, state, and local regulations intended to avoid or minimize adverse effects to sensitive wetland areas.	Although the project does not involve filling any wetlands, the removal of fill materials from the Boulder Creek campground to restore natural topography and stream flow may result in the loss or diminishment of wetland vegetation and soils when abandoned infrastructure that is contributing to the presence of the wetlands is removed.	Although the project does not involve filling any wetlands, the removal of fill materials from the Boulder Creek campground to restore natural topography and stream flow may result in the loss or diminishment of wetland vegetation and soils when abandoned infrastructure that is contributing to the presence of the wetlands is removed.	Although the project does not involve filling any wetlands, the removal of fill materials from the Boulder Creek campground to restore natural topography and stream flow may result in the loss or diminishment of wetland vegetation and soils when abandoned infrastructure that is contributing to the presence of the wetlands is removed.

SOCIAL AND CULTURAL ENVIRONMENT

<p>Cultural Resources</p>	<p>Cultural resources, including: archeological resources, pre-historic and historic structures, cultural landscapes, and ethnographic resources have been adversely affected by past actions taken to restore natural conditions, to upgrade or replace old materials with new, and through unintentional impacts related to neglect or unplanned disturbance. Removal of historic structures associated with the Olympic Hot Springs Resort occurred over the last several decades. Deterioration of material remains of the CCC-era east loop of the Boulder Creek campground have occurred over time, through active removal and passive deterioration.</p>	<p>Archeological resources have been identified throughout the park, including the project area. NPS management actions are designed to avoid adverse effects to known archeological resources to the extent possible. No intact pre-historic or historic structures remain in the project area. Historic structures are maintained and adaptively re-used throughout other areas of the park and region. Cultural landscapes have been identified throughout the park and are managed to varying degrees to retain their defining elements. Ethnographic resources have been identified in many areas, and are managed to varying degrees.</p>	<p>Ongoing management for natural and cultural resource preservation and visitor use will have both beneficial and adverse effects on cultural resources within the park. Preservation maintenance and adaptive re-use will help protect many historic properties, although the potential for adverse effects will likely continue.</p>	<p>All action alternatives would remove remaining visible infrastructure associated with the former Olympic Hot Springs road and automobile campground. All ground disturbing activities would have the potential to impact previously unrecorded archeological resources. The delineation of seven campsites in the east (CCC) loop of the Boulder Creek Campground would help retain the historic use and site design of this cultural landscape. Evaluation of an abandoned dump site near Crystal Creek may result in the identification of cultural resources that have the potential to be adversely affected should the dump site need to be removed for environmental reasons.</p>	<p>All action alternatives would remove remaining visible infrastructure associated with the former Olympic Hot Springs road and automobile campground. All ground disturbing activities would have the potential to impact previously unrecorded archeological resources. The delineation of seven campsites in the east (CCC) loop of the Boulder Creek Campground would help retain the historic use and site design of this cultural landscape. Evaluation of an abandoned dump site near Crystal Creek may result in the identification of cultural resources that have the potential to be adversely affected should the dump site need to be removed for environmental reasons.</p>	<p>All action alternatives would remove remaining visible infrastructure associated with the former Olympic Hot Springs road and automobile campground. All ground disturbing activities would have the potential to impact previously unrecorded archeological resources. The delineation of seven campsites in the east (CCC) loop of the Boulder Creek Campground would help retain the historic use and site design of this cultural landscape. Evaluation of an abandoned dump site near Crystal Creek may result in the identification of cultural resources that have the potential to be adversely affected should the dump site need to be removed for environmental reasons.</p>
<p>Park Operations and Safety</p>	<p>Olympic National Park manages an extensive program of natural and cultural resource management while providing for visitor enjoyment. Many projects have occurred over the decades of the park's existence to improve park operations and safety. The Olympic Hot Spring Resort was closed due to operational needs. The current Boulder Creek Trail was constructed as a road to provide automobile access, but was closed when stream crossing washed out to protect visitor safety.</p>	<p>Boulder Creek Trail currently does not provide safe access during high water flows. The current trail is not safe for pack stock use beyond Crystal Creek. The Boulder Creek campground is currently sized too large for its current use as a hike-in backcountry campsite. The Boulder Creek trailhead provides insufficient parking to meet the current demand.</p>	<p>The operation of the Boulder Creek Trail and Campground is currently impeded by the presence of abandoned infrastructure and the lack of safe vehicular and stock access. This is unlikely to change without management action.</p>	<p>Actions proposed under Alternative 2 would improve park operations and visitor safety by removing the degraded asphalt surface from the trail, providing safe pedestrian and stock stream crossings during the dry season, and the reduced maintenance needs in the campground due to the limited number of retained campsites.</p>	<p>Actions proposed under Alternative 3 would improve park operations and visitor safety by removing the degraded asphalt surface from the trail, providing safe pedestrian and stock stream crossings during the a longer season, and the reduced maintenance needs in the campground due to the limited number of retained campsites. Placement of a bridge at Crystal Creek would reduce maintenance needs at this stream crossing since a stock ford would not need to be maintained and the bridge would be expected to last longer than a footlog.</p>	<p>Actions proposed under Alternative 4 would improve park operations and visitor safety by removing the degraded asphalt surface from the trail, providing safe pedestrian and stock stream crossings during a long season due to the installation of bridges at Cougar and Crystal Creeks, and the reduced maintenance needs in the campground due to fewer retained campsites. Placement of a bridge at Crystal and Cougar Creeks would reduce maintenance needs at these stream crossings since a stock ford would not need to be maintained and the bridges would be expected to last longer than footlogs.</p>

EXPERIENTIAL ENVIRONMENT

<p>Wilderness Values</p>	<p>Olympic National Park is 95% designated Wilderness. Olympic National Forest also contains extensive lands within the Wilderness Preservation System. Application of the Minimum Requirements/Minimum Tool decision process has resulted in the installation and retention of various types of infrastructure and uses in the Olympic Park wilderness area.</p>	<p>The Boulder Creek Campground is located within a potential wilderness addition. The area adjacent to the Boulder Creek Trail is designated wilderness (~100 feet from centerline of the former road). Olympic Wilderness includes over 870,000 acres of superlative wilderness, attracting thousands of visitors from across the globe each year. Hundreds of miles of constructed trails, footlogs, bridges, designated campsites, ranger stations, and historic structures are also located within the wilderness. Helicopters are frequently used to manage areas within wilderness when other tools are not feasible.</p>	<p>A Wilderness Management Plan is proposed for Olympic National Park. It is anticipated that work on the plan will begin in 2010. There is also legislation pending that would designate The Boulder Creek Trail and surrounding area as wilderness, where it is not currently included in the Wilderness Preservation System.</p>	<p>Under Alternative 2 the wilderness areas adjacent to the Boulder Creek Trail and Campground would be impacted by noise from project implementation, including noise from blasting, heavy equipment, and helicopter use. However, this alternative would result in the greatest extent of restoration. All visible and buried infrastructures along the trail and in the campground would be removed. All areas outside of the newly constructed hiking and stock use trail, and newly delineated campsites within the east (CCC) loop of the campground would be restored through recontouring of the landscape and active revegetation. Although the trail area is not currently within wilderness, some visitors may view the installation of footlogs as inappropriate installations in a backcountry setting adjacent to wilderness. If the area is designated as wilderness in the future, the presence of footlogs, and the helicopter flights to install and replace them may be seen as non-conforming.</p>	<p>Under Alternative 3 the wilderness areas adjacent to the Boulder Creek Trail and Campground would be impacted by noise from project implementation, including noise from blasting, heavy equipment, and helicopter use. However, this alternative would result in considerable restoration. All visible infrastructure along the trail and in the campground would be removed. All areas outside of the newly constructed hiking and stock use trail, and newly delineated campsites within the east (CCC) loop and mid loop of the campground would be restored through recontouring of the landscape and active revegetation. There would be the potential for adverse impacts to wilderness character due to the installation of a bridge at Crystal Creek. Although this area is not currently within wilderness, some visitors may view the bridge at Crystal Creek and the footlogs and Hell and Cougar Creeks as inappropriate installations in a backcountry setting adjacent to wilderness. If the area is designated as wilderness in the future, the presence of the footlogs and metal bridge may be seen as non-conforming.</p>	<p>Under Alternative 4 the wilderness areas adjacent to the Boulder Creek Trail and Campground would be impacted by noise from project implementation, including noise from heavy equipment and helicopter use. However, this alternative would result in considerable restoration. All visible infrastructure along the trail and in the campground would be removed. All areas outside of the newly constructed hiking and stock use trail, and newly delineated campsites within the east (CCC) loop and mid loop of the campground would be restored through recontouring of the landscape and active revegetation. There would be the potential for adverse impacts to wilderness character due to the installation of bridges at Cougar and Crystal Creek. Although this area is not currently within wilderness, some visitors may view the bridges at Cougar and Crystal Creek and the footlog at Hell Creek as inappropriate installations in a backcountry setting adjacent to wilderness. If the area is designated as wilderness in the future, the presence of metal bridges and the footlog may be seen as non-conforming.</p>
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EXPERIENTIAL ENVIRONMENT

<p>Visitor Use and Experience</p>	<p>The Olympic Hot Springs Resort and automobile campground provided relatively easy access for area visitors and residents. Establishment of Olympic National Park created visitor expectations that may differ from what people might seek in National Forest areas, or from recreation opportunities on non-federal public lands. Closure of the Olympic Hot Springs Resort and loss of automobile access to the campground altered previous visitor use patterns in the area. Construction of extensive trail networks, such as the Olympic Discovery Trail, provided hikers, bicyclists, and equestrians with varying experiences on the northern Olympic Peninsula.</p>	<p>Public lands within Olympic National Park, Olympic National Forest, and other adjacent areas provide outstanding opportunities for outdoor recreation and visitor enjoyment. The Elwha area within Olympic National Park contains automobile and backpacker camping areas. Extensive trail networks provide opportunities for day trips and extended overnight journeys in backcountry wilderness areas. Front country areas provide accessible day use sites, picnic areas, and full-service resorts.</p>	<p>Continued construction of the Olympic Discovery Trail, both within and outside of park boundaries would expand non-motorized, multiple use trail options for hikers, bicyclists, and equestrians on the north Olympic Peninsula. Removal of the Elwha and Glines Canyon dams may have some adverse effect on visitor use for some, but will provide a unique visitor experience that others will seek out.</p>	<p>Alternative 2 would improve visitor experience for many due to the improvements to the Boulder Creek Trail that would remove deteriorated asphalt and restore safe pedestrian and pack stock access, particularly at stream crossings. Extensive revegetation along the trail corridor and in the campground would also improve visitor experience for many. Some visitor would be disappointed by the reduced number of campsites available, while other would enjoy a less expansive campground development in the backcountry. Some visitors will appreciate the expanded access for pack stock use, while others will not enjoy the mixed use of the trail and campground area. The work proposed under all Alternatives would likely coincide with the removal of Elwha and Glines Canyon dams. Curing this time the area would be closed to most visitor use. By implementing the project concurrent with the Elwha dam removal project, impacts to visitor use are reduced by getting the most work done during the shortest possible period of area closure.</p>	<p>Alternative 3 would improve visitor experience for many due to the improvements to the Boulder Creek Trail that would remove deteriorated asphalt and restore safe pedestrian and pack stock access, particularly at stream crossings. The installation of a bridge at Crystal Creek would be seen as a benefit by some, particularly due to the ease of the crossing for both pedestrians and stock users, and also due to the use of the crossing during slightly higher stream flows. Extensive revegetation along the trail corridor and in the campground would also improve visitor experience for many. Some visitors would be disappointed by the reduced number of campsites available, while other would enjoy a less expansive campground development in the backcountry. Some visitors will appreciate the expanded access for pack stock use, while others will not enjoy the mixed use of the trail and campground area. This alternative would result in the least density in the campground. The work proposed under all Alternatives would likely coincide with the removal of Elwha and Glines Canyon dams. Curing this time the area would be closed to most visitor use. By implementing the project concurrent with the Elwha dam removal project, impacts to visitor use are reduced by getting the most work done during the shortest possible period of area closure.</p>	<p>Alternative 4 would improve visitor experience for many due to the improvements to the Boulder Creek Trail that would remove deteriorated asphalt and restore safe pedestrian and pack stock access, particularly at stream crossings. The installation of bridges at Cougar and Crystal Creeks would be seen as a benefit by some, particularly due to the ease of the crossing for both pedestrians and stock users, and also due to the use of the crossing during higher stream flows. Extensive revegetation along the trail corridor and in the campground would also improve visitor experience for many. Some visitors would be disappointed by the reduced number of campsites available, while other would enjoy a less expansive campground development in the backcountry. Some visitors will appreciate the expanded access for pack stock use, while others will not enjoy the mixed use of the trail and campground area. This alternative would retain the highest number of campsites in the campground. The work proposed under all Alternatives would likely coincide with the removal of Elwha and Glines Canyon dams. Curing this time the area would be closed to most visitor use. By implementing the project concurrent with the Elwha dam removal project, impacts to visitor use are reduced by getting the most work done during the shortest possible period of area closure.</p>
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EXPERIENTIAL ENVIRONMENT

<p>Soundscapes</p>	<p>Natural soundscapes have been altered by the expansion of human use and development both within and outside of the park. The construction of roads and trails, visitor centers, resorts, residential and business areas have all added sounds to the acoustic environment that did not previously exist.</p>	<p>Noise from Highway 101, Olympic Hot Springs Road, adjacent campgrounds, day use areas, trails, vehicles, and ongoing maintenance and construction affect soundscapes near Boulder Creek and the surrounding area. Aircraft overflights are audible at many times throughout the area.</p>	<p>Noise related to the removal of the Elwha and Glines Canyon dams will be noticeable during project implementation. Noise from visitor use will be reduced during this time due to less access due to construction. Noise from aircraft outside the park will continue. Noise generated from park activities would also continue.</p>	<p>Construction-related noise impacts would occur outside the early nesting season for marbled murrelets and northern spotted owls to avoid adverse effects to these species. Noise related impacts to park visitors would be minimized due to the concurrent timing of this project with the Elwha dam removal project, when background noise levels will be elevated due to removal of the dams and closure of many adjacent areas to protect visitor safety.</p>	<p>Construction-related noise impacts would occur outside the early nesting season for marbled murrelets and northern spotted owls to avoid adverse effects to these species. Noise related impacts to park visitors would be minimized due to the concurrent timing of this project with the Elwha dam removal project, when background noise levels will be elevated due to removal of the dams and closure of many adjacent areas to protect visitor safety.</p>	<p>Construction-related noise impacts would occur outside the early nesting season for marbled murrelets and northern spotted owls to avoid adverse effects to these species. Noise related impacts to park visitors would be minimized due to the concurrent timing of this project with the Elwha dam removal project, when background noise levels will be elevated due to removal of the dams and closure of many adjacent areas to protect visitor safety.</p>
<p>Scenery and Visual Resources</p>	<p>Scenery and visual resources were impacted by the partial removal of infrastructure associated with the Olympic Hot Springs Resort and automobile campground. Damage to the Boulder Creek Trail due to the loss of the road surface at stream crossings has resulted in a deteriorated asphalt surface that is inconsistent with visitor expectations in a national park backcountry setting.</p>	<p>The Elwha watershed within Olympic National Park contains outstanding scenery and visual resources due to the magnificent views of mountainous terrain, mature forests, the river, tributary streams and native wildlife. Deteriorated asphalt trail at Boulder Creek is perceived by many as an eyesore. Denuded areas in the Boulder Creek campground from trampling and extensive gathering of woody material for campfires has resulted in a campground with unacceptable scenic impacts. The presence of an abandoned trash dump site, although not visible from the trail, is not a scenic or visual resource that most park visitors enjoy when they are aware of it.</p>	<p>Temporary impacts to scenery and visual resources may be expected during the removal of the Elwha and Glines Canyon dams, and the construction of other projects within the Boulder Creek and surrounding areas. Some visitors enjoy seeing construction activities, while others are distressed by the presence of heavy equipment in what is perceived by some as a pristine natural setting. Following the completion of the dam removal project, many visitors will enjoy witnessing the recovery of the Elwha River watershed, particularly the transformation of the former reservoirs into vegetated riparian and upland habitats.</p>	<p>Under All action alternatives there would be short term visual impacts during project implementation, followed by an improvement in visual resources due to the removal of deteriorated asphalt, abandoned concrete foundations, and clogged and eroded culverts from the Boulder Creek Trail and campground areas. Active restoration of natural topography and vegetation will also noticeably improve scenic resources in the project area.</p>	<p>Under All action alternatives there would be short term visual impacts during project implementation, followed by an improvement in visual resources due to the removal of deteriorated asphalt, abandoned concrete foundations, and clogged and eroded culverts from the Boulder Creek Trail and campground areas. Active restoration of natural topography and vegetation will also noticeably improve scenic resources in the project area. Some visitors may feel that the presence of an 80' long steel bridge at the Crystal Creek stream crossing is a visual intrusion in a backcountry setting. Others will likely enjoy both the sight of the bridge and the view from the bridge deck.</p>	<p>Under All action alternatives there would be short term visual impacts during project implementation, followed by an improvement in visual resources due to the removal of deteriorated asphalt, abandoned concrete foundations, and clogged and eroded culverts from the Boulder Creek Trail and campground areas. Active restoration of natural topography and vegetation will also noticeably improve scenic resources in the project area. Some visitors may feel that the presence of a 50' bridge at Cougar Creek and a 150' long steel bridge at the Crystal Creek stream crossings is a visual intrusion in a backcountry setting. Others will likely enjoy both the sight of the bridges and the views from the bridge decks.</p>