



Spruce Railroad Trail

Environmental Assessment (SRRT EA)

May 2012



The National Park Service (NPS) proposes to improve the Spruce Railroad Trail in Olympic National Park in the general area of the historic Spruce Railroad to provide a non-motorized, multiuse, recreational trail that improves accessibility and accommodates hikers, bicyclists, and people traveling with stock. This environmental assessment was developed in accordance with the National Environmental Policy Act (NEPA), National Historic Preservation Act (NHPA), Endangered Species Act (ESA), the Architectural Barriers Act (ABA), and NPS Management Policies. Public review and comment is requested.

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Spruce Railroad Trail Environmental Assessment

Executive Summary

Background and Introduction

The Spruce Railroad Trail (SRRT) is a popular year-round destination for day hikers, mountain bikers and equestrians. This unpaved, 3 ½ mile long, non-motorized, multiple-use trail begins near the outlet of Lake Crescent into the Lyre River. The SRRT trailhead is located in an unpaved parking lot reached via East Beach Road. The trail climbs a hill to bypass an area of private property located to the west of the parking lot on the shore of Lake Crescent. The trail descends the hill to connect with a section of the historic Spruce Railroad grade. The trail bypasses two historic railroad tunnels that are currently closed to visitor use and filled with rocky debris. The trail continues west along the railroad grade, providing access to a new 6 ½ mile long section of paved, non-motorized, multiple-use trail constructed in 2009 by Clallam County above Camp David Junior Road within the park.

The National Park Service (NPS) proposes to improve the existing SRRT described above. This action is identified in the park's 2008 General Management Plan (GMP) and 1998 Lake Crescent Management Plan (LCMP) as a goal for future management of the Lake Crescent area.

This environmental assessment considers specific development and construction designs related to improving the Spruce Railroad Trail as identified above. The development actions considered in this EA are consistent with the 2009 Draft Final Accessibility Guidelines for Outdoor Developed Areas. These guidelines apply to Federal land management agencies, including the U.S. Forest Service, National Park Service, Fish and Wildlife Service, Bureau of Land Management, Bureau of Reclamation, and Army Corps of Engineers. This analysis is being completed in accordance with applicable laws and policies including the National Environmental Policy Act (NEPA), National Historic Preservation Act (NHPA), Endangered Species Act (ESA), and the National Park Service Organic Act and NPS Management Policies.

Purpose of and Need for Action

The purpose of this project is to improve the Spruce Railroad Trail within Olympic National Park, as a non-motorized, multiple purpose trail as identified in the GMP and LCMP. The area proposed for development is zoned for day use in the GMP. Day use areas provide many opportunities to enjoy park scenery, have educational experiences, and participate in trail/water-based day use recreation. Trail classifications approved in the GMP include: nature, all-purpose, multipurpose bicycle, secondary foot, and primitive trails. The GMP also states that some trails will be universally accessible.

Management Goals and Objectives

The goals related to the development of the historic Spruce Railroad grade and the existing SRRT 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

Cultural Resource Management Objectives:

- Avoid or minimize the potential for adverse effects to historic properties.
- Maintain, preserve, and interpret the structures and cultural landscape including, but not limited to the Spruce Railroad Grade.
- Protect contributing physical elements of historic Spruce Railroad grade.
- Protect Cultural Resources, including archeological resources.

Fisheries and Water Resource Management Objectives:

- Protect the pristine quality of the water and ecology of the Lake Crescent watershed.
- Protect critical spawning and rearing areas that are used by the lake's unique fish populations, and maintain natural terrestrial and aquatic communities upon which they depend.
- Maintain slope stability and provide appropriate drainage and sediment control along the trail to minimize erosion and protect water quality.
- Protect shoreline processes, including wood recruitment.
- Protect shoreline – minimize new impacts (bank armoring).
- Design stream crossings to accommodate high water flows and minimize adverse impacts to park resources.

Wildlife Management Objectives:

- Avoid or minimize adverse effects to Threatened and Endangered Species and suitable habitat.
- Minimize disturbance to wildlife during project implementation.
- Provide adequate facilities to avoid visitor use/wildlife conflicts (e.g., animal-resistant trashcans).

Vegetation Management Objectives:

- Retain and preserve old-growth forests and natural processes in the Lake Crescent watershed.
- Protect aquatic vegetation and habitat, including water lobelia (*Lobelia dortmanna*).

- Promote the reestablishment of locally native vegetation in the project area consistent with the surrounding plant community.
- Prevent introduction or spread of invasive exotic plants (from construction, maintenance, and operation of non-motorized, multipurpose trail).

Goal 2: Improve Visitor Experience

Resource Education and Interpretation Objectives:

- Improve interpretation of historic Spruce Railroad Grade.
- Interpret lake ecology and unique resources: plants, fish, water quality, geologic history.
- Improve visitor orientation, interpretation, and visitor services to better serve visitors traveling along the US 101 corridor.

Visitor Access Objectives:

- Provide safe pedestrian and bicycle access through the Lake Crescent area for visitors and the traveling public and reduce conflicts between non-motorized and motorized uses.
- Provide adequate parking and vehicle turnaround space at the Lyre River trailhead for safe pedestrian use.
- Provide all visitors, including those with disabilities, the opportunity to visit, learn about, and enjoy the unique natural and cultural resources of the area.

Visitor Experience Objectives:

- Provide opportunities for a variety of outdoor experiences and recreation uses that minimize conflicts between recreational users, and are compatible with the protection of park resources and values.
- Protect views from Lake Crescent and Highway 101.
- Provide appropriate facilities to support visitor use. This may include, but is not limited to: benches, picnic tables, comfort stations, trash receptacles, and a means for proper pet waste disposal.

Park Operational Objectives:

- Design the improvements to the historic Spruce Railroad grade and the existing SRRT to facilitate effective and sustainable ongoing management, maintenance, and visitor use.
- Protect the trail from future damage by including sustainable trail design measures at stream crossings and slide areas.
- Design trail to preclude unauthorized vehicular access.
- Provide for the continued use of private property within the Lake Crescent watershed while minimizing the impacts and effects of private development on the visitor experience, lake ecology, scenic and visual quality, and the historic setting.

Public Scoping

In 2009, NPS staff began conducting internal scoping for the proposed improvement and expansion of the existing Spruce Railroad Trail (SRRT) addressed in this environmental assessment in response to a proposal submitted by Clallam County. Internal scoping to evaluate the new trail proposal began during the early stages of construction on what is now known as Phase I of the Olympic Discovery Trail (ODT). Internal scoping 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.

A 30-day public scoping for the Spruce Railroad Trail EA was initiated July 2, 2010. A public scoping meeting was held on July 20, 2010 at the Clallam County Courthouse in the Commissioners' Meeting Room. A public site visit was conducted on July 24, 2010 at the existing Spruce Railroad Trail. The public scoping period ended on August 6, 2010. The park received over 140 written responses from individuals, representatives of recreation organizations, and local agencies. Comments received during the scoping period are available for review on the park's Planning, Environment, and Public Comment (PEPC) website at <http://parkplanning.nps.gov/olymp>. 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 trail.
- Consider the cumulative effects of this section of trail development with other park and regional trail systems.
- Design trail to be consistent with recognized standards and guidelines for developing multiple use trails, including accessibility standards and guidelines.
- Design trail construction to minimize/reduce future maintenance needs and accommodate use.
- Include attractive environmental education/interpretive/leave no trace sign at trailhead.
- Improve parking lot to provide additional parking, turnaround, and restroom facility.
- Provide parking and turnaround for stock trailers at the trailhead.
- Provide for an accessible trail experience beyond the existing, short nature trails in the park.
- Avoid or minimize impacts to the forest, lake, and surrounding habitat.
- Consider the effects of new development on current users of the Spruce Railroad Trail.

- Consider the effects of new development on adjacent private lands.
- Consider re-opening the two historic railroad tunnels.

An additional public meeting was held on October 4, 2010 to present the range of preliminary alternatives that were developed in response to feedback provided during public scoping. Park staff shared key details of each alternative, including proposed trail alignment, width, surface materials, access points, and associated visitor services.

The 2011 SRRT EA was made available for public review and comment between September 21 and October 21, 2011. A public meeting to present the alternatives and answer questions was held in Port Angeles at the Vern Burton Community Center on September 21, 2011. Many questions and concerns were voiced, particularly related to accessibility for people with disabilities and trail design standards and guidelines.

After considering public comments the NPS decided to revise and reissue the SRRT EA. The 2012 SRRT EA considers alternatives that were modified in response to public comments described above. The 2012 SRRT EA also describes why some actions proposed during the public review period were considered, but dismissed. This is described in greater detail in Chapter 2.

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.

Impact topics carried forward for consideration in this EA include: geologic resources and soils, hydrology and water quality, air quality, vegetation, wetlands, wildlife and wildlife habitat, unique or important fish or fish habitat, Threatened and Endangered Species, cultural resources, the historic Spruce Railroad, visitor use and experience, soundscapes, scenic values, park operations and safety, and socioeconomics.

The following topics were eliminated from detailed study because there would be no potential impacts or only negligible impacts would be expected: Indian Trust Resources; Designated Critical Habitat, Ecologically Critical Areas, Wild and Scenic Rivers, Other Unique Natural Area, Environmental Justice, Prime Farmland, and Sacred Sites.

Alternatives

The Spruce Railroad Trail (SRRT) environmental assessment considers the environmental consequences of five alternatives, or approaches, to achieving the identified purpose and need

while achieving management objectives related to resource protection and visitor use to the greatest extent possible.

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

The “No Action” alternative would continue current management and is included to provide a baseline against which other alternatives may be considered. No new trail would be developed. The existing Spruce Railroad Trail (SRRT) would not be improved. The two historic railroad tunnels would not be opened. Parking would not be expanded or paved. No new access to the SRRT or ODT Phase 1 would be constructed.

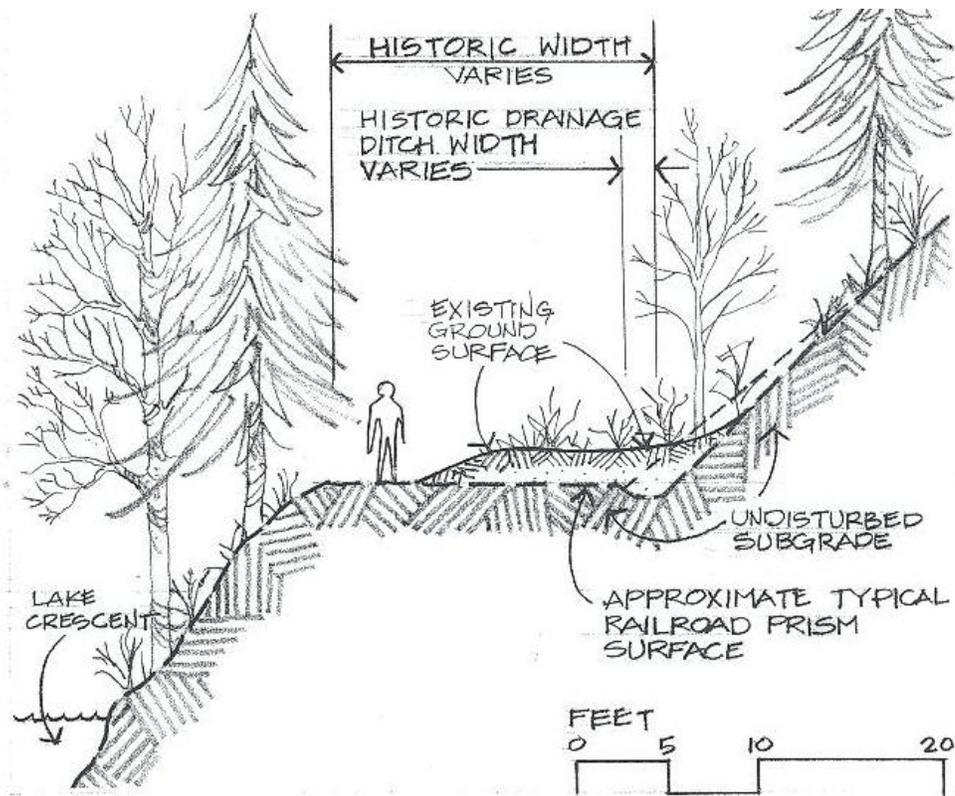


Figure 1. Trail profile (historic railroad sections) existing conditions

Activities Common to All Action Alternatives

The following activities are included in all action alternatives (Alternatives 2, 3, 4, 5). The two historic railroad tunnels on the Spruce Railroad Trail (SRRT) would be opened for trail use.

Two accessible parking spaces would be developed on Camp David Junior Road (CDJR) adjacent to the existing North Shore Picnic Area parking lot. A universally accessible trail from the new parking spaces to the ODT Phase 1 would be constructed. The existing SRRT parking lot near the Lyre River would be expanded once a NPS owned vacant property is removed. The area between the expanded parking lot and the shoreline would be rehabilitated. The parking lots, Water Line Road within the park, and the road between the Lyre River parking lot and the Lyre River Bridge would be paved.

Improved interpretation would be provided at trailheads and along the trail to increase visitor understanding and enjoyment of the natural and cultural history of the area. Trash receptacles and pet waste disposal stations would also be installed.

The conceptual design for trailhead improvements and trail rehabilitation and development presented in this document may be modified during final construction design to best accommodate site-specific conditions and to avoid or minimize resource impacts.

Construction, maintenance, and use of the trail would be managed under all alternatives to comply with laws and policies related to safety and risk management for the visiting public and to provide a safe and healthful workplace for NPS employees, volunteers, and partners.

Alternative 2: Recreation Trail Emphasis – Accessible, 3 ft. asphalt with 4 ft. unpaved shoulder

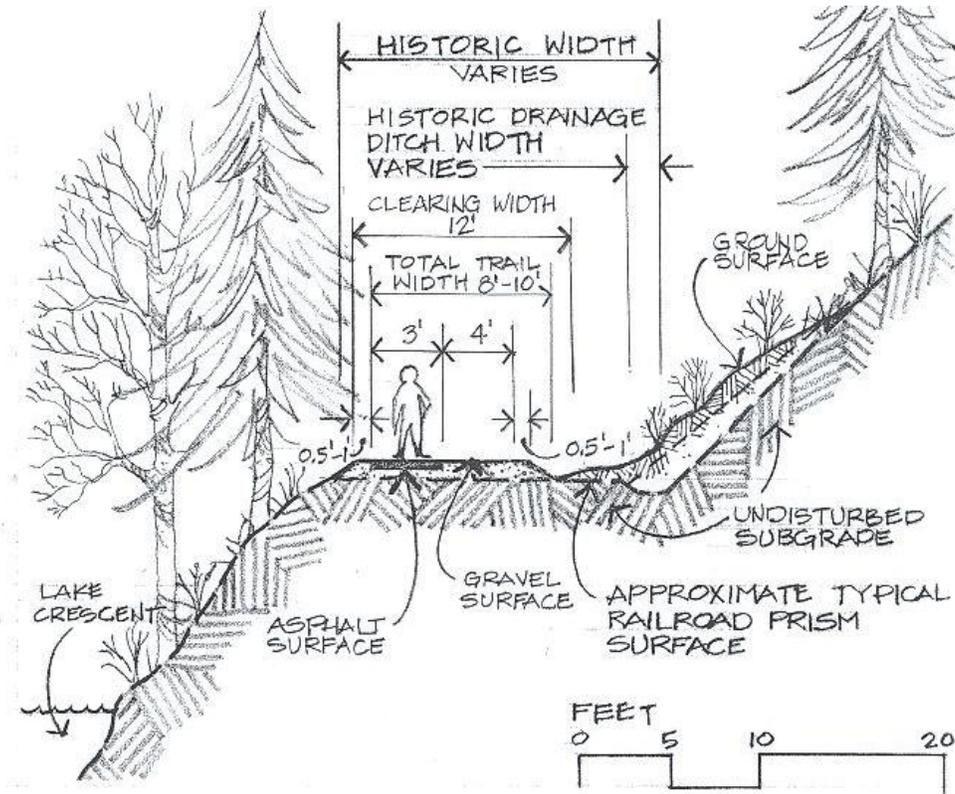


Figure 2. Trail profile for Alternative 2

Under Alternative 2 the existing SRRT would be widened and paved between Phase 1 of the Olympic Discovery Trail (ODT Phase 1), constructed above CDJR in 2009, and the Lyre River Trailhead. The paved trail would be three feet wide with widened passing areas every 1000 feet. A four foot wide gravel shoulder would be maintained upslope of the asphalt trail to accommodate equestrian use. The trail would be designed to meet the outdoor accessibility guidelines described in Chapter 2 of the SRRT EA. The existing railroad bypass trails that go around the two historic railroad tunnels would not be improved, but would be signed and managed for pedestrian use only.

Alternative 3: Accessible from Camp David Jr. Road to beginning of Segment D (not accessible from Lyre River), 6 ft. asphalt and 4 ft. gravel

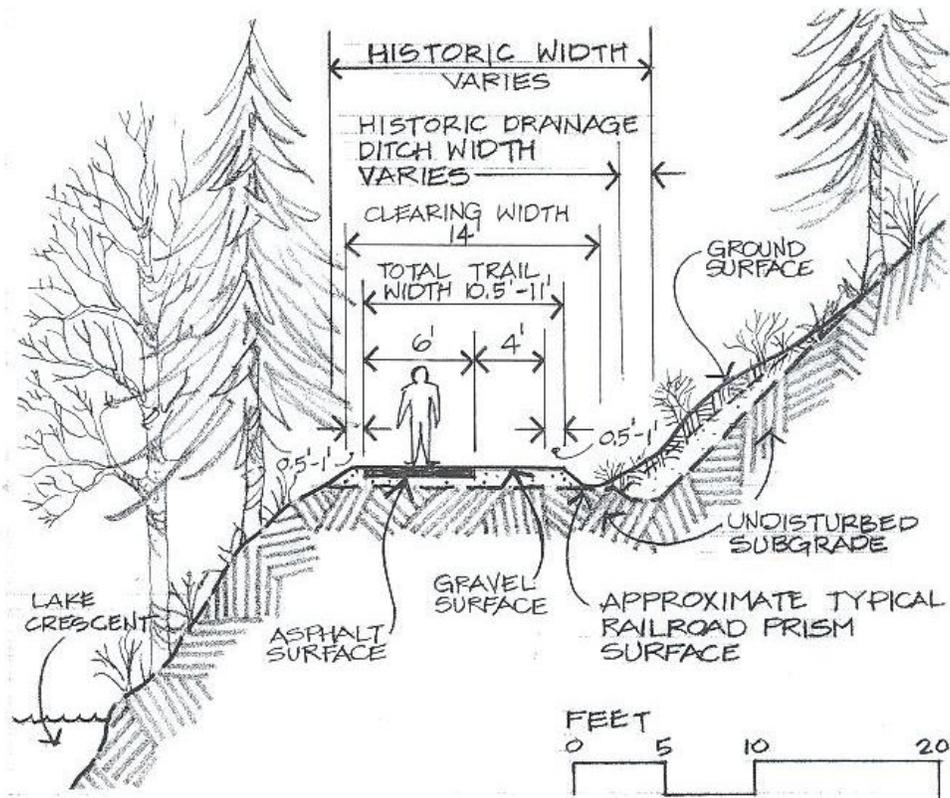


Figure 3. Trail profile for Alternative 3

Under Alternative 3, the NPS would make improvements to the Spruce Railroad Trail (SRRT) near Lake Crescent as described in the 2011 SRRT EA. The trail alignment would remain in its current location with minor lateral adjustments, up to three feet from the current trail alignment on the railroad grade, to better accommodate site conditions. Both railroad tunnels would be reopened to allow the existing trail to be widened and developed to meet accessibility standards along the general route of the historic Spruce Railroad grade. Implementation of the proposed trail improvements would occur over time, in phases.

Segments A, B and C: The existing Spruce Railroad Trail would be developed and maintained in accordance with the new ONP trail standard as described in the table below. This would amend the range of existing park trail standards to provide an accessible trail with six feet of asphalt paved surface and an adjacent 4 feet of gravel surface for equestrian use.

Segment D of the SRRT would be widened and paved to a width of six feet, but would not be developed to create an accessible grade due to the steepness of the terrain in this area of the park. A gravel shoulder would be provided for equestrian use, but would vary in width to avoid disturbance to mature trees and intact soils to the greatest extent possible. The trail would be routed to avoid adjacent private property, including the realignment of a short section of existing trail that is located on a corner of private property.

Alternative 4: Accessible, 10.5 ft. non-asphalt, firm and stable surface (NPS Preferred)

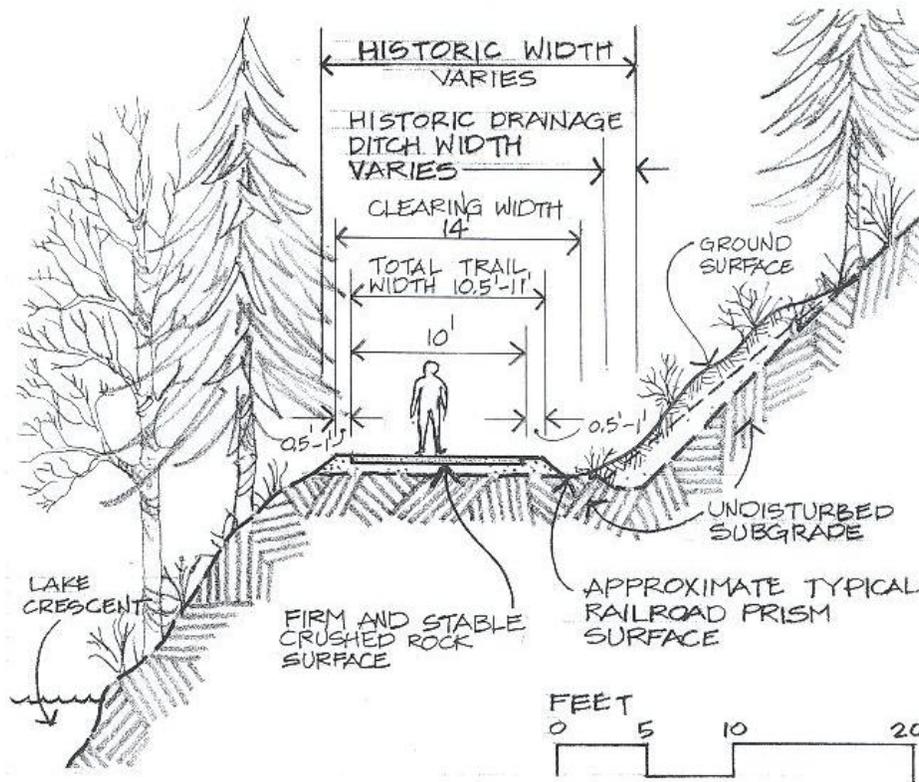


Figure 4. Trail profile for Alternative 4

Under Alternative 4, the NPS would make improvements to the Spruce Railroad Trail (SRRT) to meet and exceed the guidelines for providing an accessible trail as described in the Draft Final Accessibility Guidelines for Outdoor Developed Areas published on October 19, 2009 (Access Board, 2009) described in Chapter 2. These guidelines are proposed by the Architectural and Transportation Barriers Compliance Board (Access Board) pursuant to the Architectural Barriers Act (ABA) for camping facilities, picnic facilities, viewing areas, outdoor recreation access routes, trails, and beach access routes that are constructed or altered by or on behalf of the

Federal government. This would amend the range of existing park trail standards as described in the 2008 General Management Plan (GMP).

All segments of the SRRT would be accessible. This would require that a new alignment be developed in Segment D as described in Alternative 2 to address the steep grades between the historic railroad grade near Lake Crescent and the current SRRT parking lot near the Lyre River. The trail would be constructed to provide a 10.5 foot wide, firm and stable, non-asphalt surface. The trail would be shared by pedestrians, equestrians, bicyclists, and people traveling in wheelchairs. The existing railroad bypass trails that go around the two historic railroad tunnels would not be improved, other than to repair or replace the bridge at the Devil's punchbowl. The bypass trails would be signed and managed for pedestrian and equestrian use only.

Alternative 5: Accessible, 8 ft. asphalt with 3 ft. unpaved shoulder

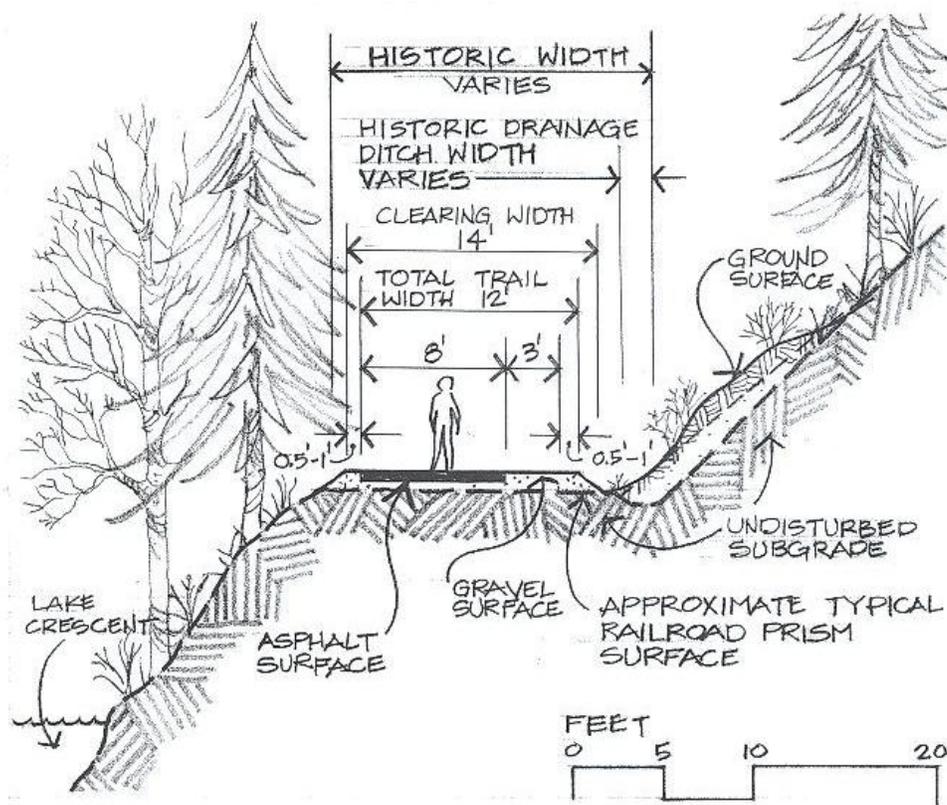


Figure 5. Alternative 5 Trail Profile

Under Alternative 5, the NPS would make improvements to the Spruce Railroad Trail (SRRT) to meet and exceed the guidelines for providing an accessible trail as described in the Draft Final Accessibility Guidelines for Outdoor Developed Areas published on October 19, 2009 (Access

Board, 2009). These guidelines are proposed by the Architectural and Transportation Barriers Compliance Board (Access Board) pursuant to the Architectural Barriers Act (ABA) for camping facilities, picnic facilities, viewing areas, outdoor recreation access routes, trails, and beach access routes that are constructed or altered by or on behalf of the Federal government. These guidelines are described in Alternative 2. This would amend the range of existing park trail standards as described in the 2008 General Management Plan (GMP).

All segments of the SRRT would be accessible. This would require that a new alignment be developed in Segment D to address the steep grades between the historic railroad grade near Lake Crescent and the current SRRT parking lot near the Lyre River. The trail would be paved with asphalt to a width of eight feet. A three foot wide, unpaved shoulder would be developed immediately adjacent to the accessible trail surface to accommodate equestrians and other trail users who prefer to travel on an unpaved surface.

Affected Environment

The proposed project area includes the north shore of Lake Crescent, including Camp David Junior Road, the North Shore Picnic Area parking lot, Phase 1 of the ODT, the existing Spruce Railroad Trail (SRRT), the existing SRRT parking lot near the Lyre River, and East Beach Road and the Water Line Road within the park.

The project area includes both developed and undeveloped areas either in or adjacent to mature forests. Lake Crescent is also within the project area. This area provides habitat for a wide range of wildlife, fish species, and native vegetation. This includes two species listed under the Endangered Species Act, the marbled murrelet and northern spotted owl. Two endemic fish species are also found within the project area, the Beardslee and Crescenti trout. These fish species evolved in Lake Crescent and are found nowhere else. Water lobelia, a rare and sensitive aquatic plant is also found within shallow waters adjacent to the project area. Best management practices are described in Appendix A of this document that would be implemented to avoid or minimize the potential adverse effects to park resources during construction and maintenance of the expanded trail system.

The project area also includes the historic Spruce Railroad. This historic property is eligible for the National Register of Historic Places and was determined to be nationally significant due to its association with World War I and the Spruce Division that supplied materials for airplane construction to support the war effort. The project area also includes sites that were used in the past to support Tribal use, early resort development, recreation, and timber harvest.

The Lake Crescent area currently provides a wide range of visitor experiences. The existing Spruce Railroad Trail is used by hikers, bicyclists and equestrians. Phase 1 of the ODT provides over six miles of universally accessible trail to the west of the SRRT. The SRRT is also accessed by trails located outside the park via the Water Line Road.

Environmental Consequences

Construction of Alternative 2, 3, 4, or 5 would result in impacts to park resources and values. Implementation of conservation measures would be implemented under all alternatives to avoid or reduce adverse impacts to the greatest extent possible. A summary of these measures is included in Appendix A of this document. A summary of environmental consequences (impacts) is included at the end of Chapter 2.

In considering the proposed action, the NPS evaluated the potential for cumulative impacts in the context of previous, ongoing, and reasonably foreseeable actions. A summary of cumulative impacts is included in Appendix C.

Consultation and Coordination

In addition to the public scoping described previously, the NPS has developed this environmental assessment in consultation with interested Tribes and other Federal, state, and local agencies. This includes the U.S. Forest Service, U.S. Fish and Wildlife Service, State Historic Preservation Officer, and Clallam County.

Additional input is requested during the formal public review and comment period. A public meeting will be held to answer questions and accept verbal comments. Written comments will also be accepted, including comments posted on the park's Planning, Environment, and Public Comment (PEPC) website at <http://parkplanning.nps.gov/olym>. The NPS will consider public input in making a final decision regarding the proposed expansion and improvement of the Spruce Railroad Trail. The NPS anticipates a final decision will be made in mid- 2012. If approved, construction would occur as funding becomes available. This would likely occur in phases over multiple years.

Chapter 1: Purpose of and Need for Action

Background and Introduction

The Spruce Railroad Trail (SRRT) is a popular year-round destination for day hikers, mountain bikers and equestrians. This unpaved, 3 ½ mile long, non-motorized, multiple-use trail begins near the outlet of Lake Crescent into the Lyre River. The SRRT trailhead is located in an unpaved parking lot reached via East Beach Road. The trail climbs a hill to bypass an area of private property located to the west of the parking lot on the shore of Lake Crescent. The trail descends the hill to connect with a section of the historic Spruce Railroad grade. The trail bypasses two historic railroad tunnels that are currently closed to visitor use and partially filled with rocky debris. The trail continues west along the railroad grade, providing access to a new 6 ½ mile long section of paved, non-motorized, multiple-use trail constructed in 2009 by Clallam County above Camp David Junior Road within Olympic National Park (ONP). This section of existing trail is referred to in this document as the Olympic Discovery Trail, Phase 1 (ODT Phase 1).

The National Park Service proposes to improve the existing SRRT described above. This action is identified in the park's 2008 General Management Plan (GMP) and 1998 Lake Crescent Management Plan (LCMP) as a goal for future management of the Lake Crescent area. Specific language from these two plans is referenced below. Some of these actions have been completed. A description of the existing visitor experience and resource conditions is included in Chapter 2, Alternative 1 – No Action.

The GMP states that,

- The existing frontcountry trail system at Lake Crescent will be retained and could be improved.
- A universally accessible frontcountry trail will be developed and maintained.
- The Spruce Railroad Trail will be extended west as part of planned improvements by Clallam County to make this trail part of the Olympic Discovery Trail (GMP Vol. 2, p 15).
- When complete, the Olympic Discovery Trail will lead from Port Townsend to Port Angeles and then west to the Pacific Coast.

The LCMP states that the NPS will, among other things,

- **Improve the Spruce Railroad grade to the western park boundary as a non-motorized, multi-purpose trail.** In the short-term, the Spruce Railroad grade would be leveled and cleared of debris to improve its use by mountain bikers, horseback riders and pedestrians. In the long-term, and as it is possible to resolve conflicting uses, the grade would be improved to provide a continuous trail from the Lyre River to the western park boundary for multiple uses, including some or all of the following: pedestrians, wheelchairs, bicycles, horses and rollerblades.

- **Improve the North Shore picnic area.** The park anticipates the increased use of the North Shore picnic area by visitors arriving via foot, bicycle, or boat. In its present condition, the beach area is overgrown with vegetation and few picnic sites are available. Access from the parking lot to the beach would be improved by installing stairs and accessible paths/trails, which would also prevent further erosion of the slope directly above the beach. In the parking area, individual spaces would be delineated with wheel stops. Accessible toilets (vault or composting) would replace existing toilets. Other improvements include interpretive signs and a kiosk showing connections to trails and other destinations.
- **Analyze parking needs and provide for modest expansion at the east and west ends of the Spruce Railroad trail.** As the Spruce Railroad trail is improved and possibly lengthened and developed for multiple uses, the need for parking must be accommodated. The park would analyze the need for modest expansion of the parking areas at the east and west ends of the Spruce Railroad trail.
- **Develop interpretive displays at each end of the Spruce Railroad trail.** The remaining Spruce Railroad grade would be improved to accommodate a full range of non-motorized uses (e.g., hiking, bicycling, and horseback riding). Interpretive displays would be developed to serve the users of this trail.
- **Install accessible toilets at each end of the Spruce Railroad trail.** In anticipation of increased use of the Spruce Railroad trail, accessible toilets (vault or composting) would be constructed at the east and west trailheads.
- **To improve safety and accommodate bicycles, investigate the feasibility of widening East Beach Road, Piedmont Road, and Lyre River Road to provide four-foot wide paved shoulders.** East Beach and Piedmont roads are difficult for bike passage because they are narrow. The park would explore the possibility, with Clallam County and the Washington State Department of Transportation, of widening these roads to provide four-foot wide paved shoulders. This would improve bicycle circulation around Lake Crescent and facilitate bike travel between Lake Crescent and Joyce along U.S. 112.
- **Concession option to provide bike rental service.** The Washington State Department of Transportation analyzed a variety of alternatives for improving bicycle access through the Lake Crescent area (WSDOT 1997a). The preferred alternative called for improving the Spruce Railroad grade as a safer and more enjoyable route for bicycle traffic than U.S. 101. The proximity of Fairholme and Log Cabin Resort to this trail presents an opportunity for establishing a bike rental service, which would be operated by a private concessioner.

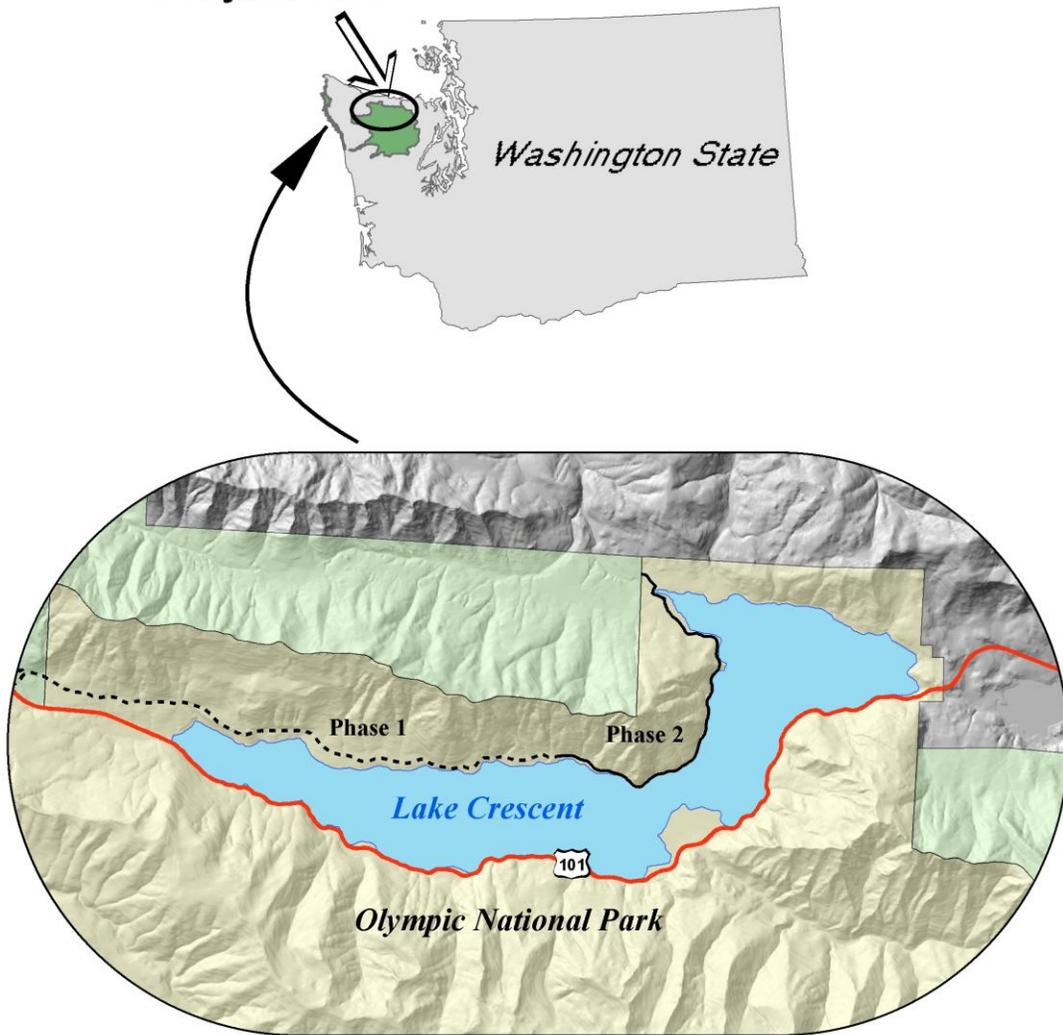
The LCMP Record of Decision (ROD) states that although the LCMP provides specific direction for future management decisions regarding resource protection and public use at Lake Crescent, it does not contain detailed site designs. As funding allows individual site plans for specific areas around the lake will be completed based on the recommendations in the LCMP. The site plans will address various aspects of site development including the location of roads, buildings and facilities, vehicle and pedestrian circulation, recreational facilities, and the protection of natural and cultural resources. In many cases, further environmental analysis will be completed for specific development and construction designs (LCMP ROD. 1998. pp. 2-3).

An environmental assessment that considered a range of development options for the Spruce Railroad Trail was released for public review and comment in 2011. Public comments received called into question the NPS Preferred Alternative. The primary visitor concerns related to the degree of accessibility for people with disabilities, the design standards used to develop the various trail alternatives, the relative safety associated with proposed trail design, and effects to visitor experience.

In response to public comments the NPS reconsidered the trail design and modified the alternatives to reflect a range of public concerns and suggestions. A new NPS preferred alternative was selected as a result of this process, and is described along with three other action alternatives and a no-action alternative in Chapter 2 of this environmental assessment. This analysis was completed in accordance with applicable laws and policies including the National Environmental Policy Act (NEPA), National Historic Preservation Act (NHPA), Endangered Species Act (ESA), the NPS Organic Act, and NPS Management Policies.

Spruce Railroad Trail at Olympic National Park

Project Site



Spruce Railroad Project Location



Figure 6. Vicinity Map

Purpose of and Need for Action

The purpose of this project is to improve the historic Spruce Railroad grade within Olympic National Park, as a non-motorized, multipurpose trail as identified in the GMP and LCMP. This includes the existing Spruce Railroad Trail at Lake Crescent.

The area proposed for development is zoned for day use in the GMP. Day use areas provide many opportunities to enjoy park scenery, have educational experiences, and participate in trail/water-based day use recreation. Trail classifications approved in the GMP include: nature, all-purpose, multipurpose bicycle, secondary foot, and primitive trails. The GMP also states that some trails will be universally accessible.

The development actions considered in this EA are consistent with the 2009 Draft Final Accessibility Guidelines for Outdoor Developed Areas. These guidelines apply to Federal land management agencies, including the U.S. Forest Service, National Park Service, Fish and Wildlife Service, Bureau of Land Management, Bureau of Reclamation, and Army Corps of Engineers. The draft final accessibility guidelines also apply to the following non-federal entities that construct or alter facilities on Federal lands on behalf of the Federal government:

- Private entities that construct or alter camping facilities, picnic facilities, or beach facilities on Federal lands pursuant to a concession contract or other arrangement with a Federal agency under which the Federal agency reviews or approves the design of the facility and has a property interest in the facility;
- State or local government entities that construct or alter camping facilities, picnic facilities, or beach facilities on Federal lands pursuant to an agreement with a Federal agency under which the Federal agency reviews or approves the design of the facility and has a property interest in the facility; and
- Non-profit organizations and State or local government entities that enter into partnerships with a Federal agency to construct or alter trails or viewing areas on Federal lands.

Architectural Barriers Act Accessibility Standards (ABAAS)/Outdoor Recreation Guidelines must be adhered to for any project or program built or operated that uses federal funding. Consistent with the LCMP, the NPS proposes to improve the historic Spruce Railroad grade to provide a continuous trail from the Lyre River to the western park boundary for multiple uses, including some or all of the following: pedestrians, wheelchairs, bicycles, horses, and rollerblades.

Management Goals and Objectives

The goals related to the development of the historic Spruce Railroad grade and the existing SRRT are based on federal legislation, NPS 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

Cultural Resource Management Objectives:

- Avoid or minimize the potential for adverse effects to historic properties.
- Maintain, preserve, and interpret the buildings and cultural landscape including, but not limited to the Spruce Railroad Grade.
- Protect contributing physical elements of historic Spruce Railroad grade.
- Protect Cultural Resources, including archeological resources.

Fisheries and Water Resource Management Objectives:

- Protect the pristine quality of the water and ecology of the Lake Crescent watershed.
- Protect critical spawning and rearing areas that are used by the lake's unique fish populations, and maintain natural terrestrial and aquatic communities upon which they depend.
- Maintain slope stability and provide appropriate drainage and sediment control along the trail to minimize erosion and protect water quality.
- Protect shoreline processes, including wood recruitment.
- Protect shoreline – minimize new impacts (bank armoring).
- Design stream crossings to accommodate high water flows and minimize adverse impacts to park resources.

Wildlife Management Objectives:

- Avoid or minimize adverse effects to Threatened and Endangered Species and suitable habitat.
- Minimize disturbance to wildlife during project implementation.
- Provide adequate facilities to avoid visitor use/wildlife conflicts (e.g., animal-resistant trashcans).

Vegetation Management Objectives:

- Retain and preserve old-growth forests and natural processes in the Lake Crescent watershed.
- Protect aquatic vegetation and habitat, including water lobelia (*Lobelia dortmanna*).
- Promote the reestablishment of locally native vegetation in the project area consistent with the surrounding plant community.
- Prevent introduction or spread of invasive exotic plants (from construction, maintenance, and operation of non-motorized, multipurpose trail).

Goal 2: Improve Visitor Experience

Resource Education and Interpretation Objectives:

- Improve interpretation of historic Spruce Railroad Grade.
- Interpret lake ecology and unique resources: plants, fish, water quality, geologic history.
- Improve visitor orientation, interpretation, and visitor services to better serve visitors traveling along the US 101 corridor.

Visitor Access Objectives:

- Provide safe pedestrian and bicycle access through the Lake Crescent area for visitors and the traveling public and reduce conflicts between non-motorized and motorized uses.
- Provide adequate parking and vehicle turnaround space at the Lyre River trailhead for safe pedestrian use.
- Provide all visitors, including those with disabilities, the opportunity to visit, learn about, and enjoy the unique natural and cultural resources of the area.

Visitor Experience Objectives:

- Provide opportunities for a variety of outdoor experiences and recreation uses that minimize conflicts between recreational users, and are compatible with the protection of park resources and values.
- Protect views from Lake Crescent and Highway 101.
- Provide appropriate facilities to support visitor use. This may include, but is not limited to: benches, picnic tables, comfort stations, trash receptacles, and a means for proper pet waste disposal.

Park Operational Objectives:

- Design the improvements to the historic Spruce Railroad grade and the existing SRRT to facilitate effective and sustainable ongoing management, maintenance, and visitor use.
- Protect the trail from future damage by including sustainable trail design measures at stream crossings and slide areas.

- Design trail to preclude unauthorized vehicular access.
- Provide for the continued use of private property within the Lake Crescent watershed while minimizing the impacts and effects of private development on the visitor experience, lake ecology, scenic and visual quality, and the historic setting.

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 legal mandate:

“... 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 Organic Act – along with other applicable laws, policies, and plans, directs management within ONP.

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.”

The impairment that is prohibited by the Organic Act is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that would otherwise be present for the enjoyment of those resources or values. Whether an impact meets this definition depends on the particular resources and values that would be affected; the severity, duration, and timing of the impact; and the cumulative effects of the impact in question and other impacts.

An impact to any park resource or value may, but does not necessarily, constitute an impairment. An impact would be more likely to constitute impairment to the extent that it affects a resource or value whose conservation is,

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

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

An impact that may, but would not necessarily, lead to impairment may result from visitor activities; NPS administrative activities; or activities undertaken by concessioners, contractors, and others operating in the park. Impairment may also result from sources or activities outside the park (NPS, 2006). A written impairment determination for the proposed improvement of the Spruce Railroad Trail (SRRT) described in Alternative 4 (NPS Preferred Alternative) is included as Attachment C to this environmental assessment.

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 making official decisions or taking actions that have the potential to affect the human environment.

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.

Architectural Barriers Act and Architectural Barriers Act Accessibility Standards (ABAAS)

The Architectural Barriers Act Accessibility Standards (ABAAS) replaced the Uniform Federal Accessibility Standard (UFAS). Accessibility to all newly constructed and altered NPS buildings and facilities is required by the Architectural Barriers Act of 1968, and the Rehabilitation Act of 1973, as amended. Beginning in 1984 the required design and construction standards for compliance with these mandates were in the UFAS and the Americans with Disabilities Act (ADA) accessibility guidelines. The United States Access Board has worked to combine these documents, resulting in the Americans with Disabilities Act and Architectural Barriers Act Accessibility Guidelines (ADAABAAG), published in 2004. The new standards went into effect on May 8, 2006.

Executive Orders

- Executive Order 13112 Invasive Species
- Executive Order 11988 Floodplain Management
- Executive Order 11990 Protection of Wetlands
- Executive Order 13195 Trails for America in the 21st Century
- Presidential Memorandum -- America's Great Outdoors

Management Policies

The NPS Management Policies 2006 (NPS 2006) provide guidance for management of all national park units. Several sections address various elements related to the alternatives considered in this document. For example, Section 9.2 addresses Transportation Systems and Alternative Transportation. This sections states that the location, type, and design of transportation systems and their components (e.g., roads, bridges, trails, and parking areas), and the use of alternative transportation systems, all strongly influence the quality of the visitor experience. These systems also affect, to a great degree, how and where park resources will be impacted. For these reasons, management decisions regarding transportation facilities require a full, interdisciplinary consideration of alternatives and a full understanding of their consequences.

Before a decision is made to design, construct, expand, or upgrade access to or within a park, non-construction alternatives, such as distributing visitors to alternative locations, must be fully explored. If non-construction alternatives will not achieve satisfactory results, then a development solution should consider whether the project:

- Is appropriate and necessary to meet park management needs or to provide for visitor use and enjoyment;
- Is designed with extreme care and sensitivity to the landscape through which it passes;
- Will not cause unacceptable impacts on natural and cultural resources and will minimize or mitigate those impacts that cannot be avoided;
- Will reduce traffic congestion, noise, air pollution, and adverse effects on park resources and values;
- Will not cause use in the areas it serves to exceed the areas' visitor carrying capacities;
- Will incorporate the principles of energy conservation and sustainability;
- Is able to demonstrate financial and operational sustainability;
- Will incorporate universal design principles to provide accessibility for all people, including those with disabilities;
- Will take maximum advantage of interpretive opportunities and scenic values;
- Will not violate federal, state, or local air pollution control plans or regulations;

- Is based on a comprehensive and multidisciplinary approach that is fully consistent with the park’s general management plan and asset management plan;
- Will enhance the visitor experience by offering new or improved interpretive or recreational opportunities, by simplifying travel within the park, or by making it easier or safer to see park features.

Other guidance may be found throughout NPS Management Policies, including

9.2.2 Trails and Walks

9.2.2.1 Cooperative Trail Planning

9.2.2.2 Hiking Trails

9.2.2.3 Equestrian Trails

9.2.2.4 Bicycle Trails

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. 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 Resource Management Planning
- DO-12 Environmental Impact Assessment
- DO-28 Cultural Resources
- DO-42 Accessibility
- Director's Order 50C Public Risk Management Program
- Director's Order 75A Civic Engagement and Public Involvement
- DO-77 Natural Resource Protection

Park Planning Documents Related to the Spruce Railroad Trail Development and Improvement 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 ONP and establishes broad direction for managing the Spruce

Railroad Trail and Lake Crescent area of the park. The SRRT EA guides implementation of the portions of the GMP that deal with the Spruce Railroad Trail.

Lake Crescent Management Plan (LCMP) and Environmental Impact Statement (1998)

The LCMP identified resource protection and visitor experience goals for the Lake Crescent area of the park. The SRRT EA guides implementation of the portions of the LCMP that deal with the Spruce Railroad Trail and historic Spruce Railroad grade.

Spruce Railroad Trail Expansion and Improvement (SRRT) Environmental Assessment (2011)

The SRRT EA considered a range of alternatives related to the development and extension of the Spruce Railroad Trail along the general route of the historic Spruce Railroad Grade. This EA did not result in an approved design. The alternatives considered in the 2011 SRRT EA were revised based on public input and are described and evaluated in the 2012 Spruce Railroad Trail Improvement EA (2012 SRRT EA).

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.

ONP 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 7 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. ONP 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 streams 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 two 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 – including the historic Spruce Railroad that is associated with World War I.

Decisions to be made

The 2012 Spruce Railroad Trail Improvement Environmental Assessment (2012 SRRT EA) analyzes the NPS preferred alternative, 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); NPS 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 2012 SRRT EA will be used to help the NPS make the following decisions:

- What changes to the alignment and design of the Spruce Railroad Trail would result in the greatest benefits to park visitors while protecting natural and cultural resources?
- How should the Lyre River and North Shore parking lots be improved to accommodate visitor use?
- Would the proposed development result in a significant impact to the environment?
- Would the proposed development result in an adverse effect to the historic Spruce Railroad, which is listed on the National Register of Historic Places?
- Would the proposed development be likely to adversely affect species protected by the Endangered Species Act?

Scoping, Issues, and Impact Topics

Scoping

NPS staff began conducting internal scoping for the project in 2009 in response to a proposal for trail development that was submitted by Clallam County. 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.

A 30-day public scoping for the Spruce Railroad Trail EA was initiated July 2, 2010. 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 July 8, 2010 Peninsula Daily News. Respondents had the opportunity to provide written comments, fax comments, or input comments into the NPS Planning, Environment, and Public Comment (PEPC) website.

A public scoping meeting was held on July 20, 2010 at the Clallam County Courthouse in the Commissioners' Meeting Room. Public comments were taken during the workshop.

A public site visit was conducted on July 24, 2010 at the existing Spruce Railroad Trail. Park staff was on site to meet with park visitors to discuss the proposed trail development and answer questions.

The public scoping period ended on August 6, 2010. The park received over 140 responses from individuals, representatives of recreation organizations, and local agencies. Comments received during the scoping period are available for review on the park's Planning, Environment, and Public Comment (PEPC) website at <http://parkplanning.nps.gov/olym>. Respondents provided useful information regarding how the work should be conducted, including:

- The EA should discuss what NPS management actions would be taken to stabilize and prevent future erosion of the trail.
- Consider the cumulative effects of this section of trail development with other park and regional trail systems.
- Design trail to be consistent with recognized standards and guidelines for developing multiple use trails, including accessibility standards and guidelines.
- Design trail construction to minimize/reduce future maintenance needs and accommodate use.
- Include attractive environmental education/interpretive/leave no trace signs at trailheads.
- Improve parking lots to provide additional parking, turnaround, and restroom facilities.
- Provide parking and turnaround for stock trailers at the trailhead.
- Provide for an accessible trail experience beyond the existing, short nature trails in the park.
- Avoid or minimize impacts to the forest, lake, and surrounding habitat.
- Consider the effects of new development on current users of the Spruce Railroad Trail.
- Consider the effects of new development on adjacent private lands.
- Consider re-opening the two historic railroad tunnels.

An additional public meeting was held on October 4, 2010 to present the range of preliminary alternatives that were developed in response to feedback provided during public scoping. Park staff shared key details of each alternative, including the proposed trail alignment, width, surface materials, access points, and associated visitor services. These alternatives were further refined and analyzed as described in the 2011 SRRT EA.

The 2011 SRRT EA was made available for public review and comment between September 21 and October 21, 2011. A public meeting to present the alternatives and answer questions was

held in Port Angeles at the Vern Burton Community Center on September 21, 2011. Many questions and concerns were voiced, particularly related to accessibility for people with disabilities and trail design standards and guidelines.

NPS policy for implementing the National Environmental Policy Act (NEPA) provides the following guidance related to the analysis of public comment on an environmental assessment (EA): screen EA comments for:

- **Important new issues**

For the 2011 SRRT EA public comments, the primary issues of concern were:

- Universal accessibility (applicable laws, design standards, visitor opportunities, personal values)
- Safety (adherence to established design standards, safe access (Hwy 101, East Beach Road, Fairholme Hill, Sol Duc), conflicts among users (passing widths, safe/unsafe speeds, surface (impacts to hikers, walkers, runners from asphalt))
- Visitor Experience (people expressed a wide range of preferences associated with the SRRT, ranging from those who would prefer the park make no changes to those who would prefer even more development than what was considered in the SRRT EA).

- **Reasonable alternatives**

For the SRRT EA new alternatives brought up in public comments included:

- Consideration of a revised proposal by Clallam County (as compared to Alternative 4 included in the 2011 SRRT EA)
- Consideration of an alternative that would provide accessibility to the historic railroad grade by making improvements to the current railroad tunnel bypass trails (while retaining the same trail surface and general design)
- Alternatives that provide for variations of the paved and unpaved trail widths to better accommodate various user groups, including:
 - 10 – 12 feet of paved trail width to meet AASHTO guidelines w/o exception to 8 feet minimum as considered in Alternative 4
 - Six feet asphalt with six feet of adjacent natural tread trail to provide passing width for horses, runners and mountain bikers the same as proposed for wheelchairs, pedestrians and road bicyclists.
 - Trail alignment as proposed in Alternative 3, but with asphalt width reduced to 36” as proposed in Alternative 2.
 - 8 feet asphalt with only 2 feet gravel for equestrian use, or eliminate equestrian use.
- Improve East Beach road to provide a safe bypass for cyclists around Lake Crescent for people arriving on Highway 101 corridor, not just for people arriving via Highway 112 via Water Line Road.
- Work with adjacent landowners to acquire access on historic railroad grade to avoid steep sections of trail (Segment D and Sol Duc)
- Develop a trail underpass to Highway 101 to avoid at-grade crossing proposed by Clallam County.

- Designate tunnel bypass trails for use by pedestrians only to provide an opportunity for people to experience the SRRT without asphalt and in the absence of potentially conflicting trail uses (bicycles, stock use).
- Develop alternative to rip rap for downslope bank stabilization along Lake Crescent shoreline to mitigate impacts to aquatic habitat, such as those developed in other areas of the park that incorporate large woody debris.

- **Mitigation measures**

In addition to alternatives/actions described above, there were comments related to trail surface that requested the park consider permeable alternatives to asphalt for the parking lot and trail surface to reduce impacts to trail runners, walkers, and hikers associated with asphalt paving.

- **Corrections or additions of information related to impact analysis and determination of significant impact**

- Several people provided information about trail design standards, primarily related to compliance with AASHTO guidelines to support safety for multiple use (shared use) trails.
- Multiple people commented about concerns related to visitor safety associated with trail width, trail grade, crossing of Highway 101 at Fairholme, presence of fast-moving bicycles on the trail with other users, trail surface, and trail access along East Beach Road.
- There were requests for additional information about current use of the SRRT, and also for more detailed information about the trail alignment on the east end (Lyre River/Segment D).
- There were several statements and questions regarding how the trail proposals are influenced by the features of the historic Spruce Railroad.
- Information was provided by some regarding the design standards of other segments of the Olympic Discovery Trail (ODT) outside of the park that are different from what was considered in the SRRT EA (specifically related to the use on non-asphalt surface materials and variable trail widths and user groups).

After considering public comments the NPS decided to revise and reissue the SRRT EA. The 2012 SRRT EA considers alternatives that were modified in response to public comments described above. The 2012 SRRT EA also describes why some actions proposed during the public review period were considered, but dismissed. This is described in greater detail in Chapter 2.

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.” The issues and impact topics addressed in the 2012 SRRT EA are the same as those identified in the 2011 SRRT EA.

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; Scoping comments included concerns related to erosion from trail development, 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 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>	Several comments were received regarding potential impacts to the forest and other native plants in the project area. 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>Wetlands</i>	Some alternatives considered may affect wetlands. Therefore, this topic is addressed in the environmental assessment.	<i>Executive Order (EO) 11990, NPS Management Policies 2006 and DO-77-1</i>
<i>Wildlife and Wildlife Habitat</i>	Public comments voiced concern about potential impacts to wildlife due to trail construction. Wildlife and wildlife habitat would be affected under all 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>Impact Topic</i>	Reasons for Retaining Impact Topic	Relevant Laws, Regulations and Policies
<i>Unique or Important Fish or Fish Habitat</i>	Lake Crescent is habitat for rare species of endemic fish. Actions proposed may have the potential to affect habitat quality. Therefore impacts to important fish and fish habitat are addressed in the environmental assessment.	<i>NPS Management Policies 2006</i>
<i>Threatened and Endangered Species</i>	There is suitable habitat for marbled murrelet and northern spotted owl in the project area. Threatened and endangered (T & E) species may be affected under all 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>Cultural Resources</i>	Several public comments expressed support for improving the condition of historic features, particularly the two railroad tunnels. The Spruce Railroad Trail includes segments of the historic Spruce Railroad grade that are eligible for inclusion on the National Register of Historic Places. 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>Visitor Use, Experience and Accessibility</i>	Many comments were received expressing support for improving the accessibility of the trail, and also for retaining the current condition of the trail. Visitor experience would be affected under all alternatives. A short section of the trail would not meet federal outdoor accessibility guidelines due to the steepness of the terrain and extent of adverse effects to other park resources to achieve an accessible grade; therefore, impacts to visitor experience and accessibility are addressed in the environmental assessment.	<i>NPS Organic Act; NPS Management Policies 2006; NPS-77; The Redwood Act, 1978; Draft Final Federal Outdoor Accessibility Guidelines, 2009</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>	Public comments included some statements of concern regarding the impacts of new development on the north shore area of Lake Crescent. 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.	<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>Land Use</i>	The project area is adjacent to several privately owned parcels within ONP. Some land owners expressed concern regarding the impacts of trail development, maintenance and use on their private property. The alternatives considered would have variable effects on adjacent land use; therefore, impacts to land use are addressed in the environmental assessment.	<i>NPS Management Policies 2006</i>
<i>Socioeconomics</i>	Some comments were received related to the potential for trail development to support economic gains for local communities. 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>

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 Indians rights and advance their interests.

No lands comprising ONP are held in trust by the Secretary of Interior solely for the benefit of American Indians due to their status as American Indians. No Tribal concerns were voiced during the development of this environmental assessment. 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. 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 five management strategies (alternatives) that the National Park Service (NPS) is considering to achieve resource protection and visitor experience goals in the Lake Crescent area of Olympic National Park (ONP) as identified in the 2008 General Management Plan (GMP) and 1998 Lake Crescent Management Plan (LCMP) related to the development of a non-motorized, multiple use trail along the general route of the historic Spruce Railroad grade. 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 and during the public review and comment period for the 2011 Spruce Railroad Trail Expansion and Improvement Environmental Assessment (2011 SRRT EA).

Changes in response to public comment are described for all action alternatives. The primary changes considered in the 2012 Spruce Railroad Trail Environmental Assessment (2012 SRRT EA) as compared to the 2011 SRRT EA are:

- Alternatives 2, 4, and 5 are universally accessible. The NPS has identified a new trail alignment for Segment D (Lyre River Trailhead) that conforms to 2009 Final Draft Accessibility Guidelines for Outdoor Developed Areas published by the Federal Access Board while minimizing impacts to park resources and adjacent private lands. In contrast, Alternative 3 considers the alignment originally proposed by the NPS in the 2011 SRRT EA as the preferred alternative to allow comparison of the 2011 SRRT EA and 2012 SRRT EA preferred alternatives.
- The trail segments proposed for the Sol Duc area in the 2011 SRRT EA are not included in the 2012 SRRT EA. The reasons for this are described later in this chapter under “Actions Considered but Dismissed.”
- Alternative 4 (NPS Preferred) considers a firm and stable trail surface that would meet accessibility standards and provide one continuous trail surface rather than the asphalt and gravel combinations considered in the other action alternatives. This was in response to public comments that requested a firm and stable surface be considered, and comments that firm and stable surfaces have been used successfully for accessible, multiple use trails in many locations, including other sections of the Olympic Discovery Trail located outside ONP. This alternative also responds to public comments related to providing adequate trail width to allow passing.

Alternative 1 is the no-action alternative, which describes current management of the existing Spruce Railroad Trail (SRRT) and associated parking lots and trail access. The no-action alternative provides a baseline against which other alternatives may be compared.

Alternatives 2, 3, 4, and 5 (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 to protect natural and cultural resources and improve visitor experience. The Action Alternatives described in this chapter vary in how the park proposes to meet the management objectives defined for each goal, but differ primarily in the extent to which the objectives of Goal 2 are met. The objectives of Goal 2 are:

Resource Education and Interpretation Objectives:

- Improve interpretation of historic Spruce Railroad Grade.
- Interpret lake ecology and unique resources: plants, fish, water quality, geologic history.
- Improve visitor orientation, interpretation, and visitor services to better serve visitors traveling along the US 101 corridor.

Visitor Access Objectives:

- Provide safe pedestrian and bicycle access through the Lake Crescent area for visitors and the traveling public and reduce conflicts between non-motorized and motorized uses.
- Provide adequate parking and vehicle turnaround space at the Lyre River trailhead for safe pedestrian use.
- Provide all visitors, including those with disabilities, the opportunity to visit, learn about, and enjoy the unique natural and cultural resources of the area.

Visitor Experience Objectives:

- Provide opportunities for a variety of outdoor experiences and recreation uses that minimize conflicts between recreational users, and are compatible with the protection of park resources and values.
- Protect views from Lake Crescent and Highway 101.
- Provide appropriate facilities to support visitor use. This may include, but is not limited to: benches, picnic tables, comfort stations, trash receptacles, and a means for proper pet waste disposal.

Park Operational Objectives:

- Design the improvements to the historic Spruce Railroad grade and the existing SRRT to facilitate effective and sustainable ongoing management, maintenance, and visitor use.
- Protect the trail from future damage by including sustainable trail design measures at stream crossings and slide areas.
- Design trail to preclude unauthorized vehicular access.

- Provide for the continued use of private property within the Lake Crescent watershed while minimizing the impacts and effects of private development on the visitor experience, lake ecology, scenic and visual quality, and the historic setting.

All Action Alternatives considered were developed in accordance with the 2009 Final Draft Accessibility Guidelines for Outdoor Developed Areas published by the Federal Access Board. These guidelines apply to the construction or alteration of new facilities on federal lands or on behalf of the federal government. Only Alternative 3 contains a section of trail (Segment D) that would not meet these guidelines.

This chapter is organized as follows:

- Alternative 1 (No-Action, Continue Current Management Approach)
- Activities Common to All Action Alternatives
- Alternative 2 (Accessible Trail – 3 ft. wide asphalt with 4 ft. wide gravel)
- Alternative 3 (2011 Preferred Alternative – 6 ft. wide asphalt with 4 ft. wide gravel)
- Alternative 4 (2012 NPS Preferred Alternative – Accessible Trail: 10.5 ft. wide, firm and stable)
- Alternative 5 (Accessible Trail – 8 ft. wide asphalt with 3 ft. wide gravel)
- 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 the No Action Alternative, the (NPS) would not implement additional trail improvement actions identified in the 2008 GMP and 1998 LCMP. Only routine maintenance of the existing trail system 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 project area.

Spruce Railroad Trail – existing conditions

ONP manages a trail system that includes over 600 miles of trail. Trails are maintained in accordance with park-specific trail standards adopted by ONP during the development of the 2008 GMP.

The SRRT addressed in this document is approximately 4 miles long and contains several distinct segments, described below. This trail was developed primarily along a portion of the historic Spruce Railroad grade adjacent to Lake Crescent. The trail is unpaved and varies in

width from approximately 36 inches of clear trail tread up to approximately 6 feet of clear tread in highly compacted areas on the rail grade. Several small drainages cross the existing trail. One of the drainages flows year-round, others flow seasonally. The trail is located along a steep hill slope that descends to Lake Crescent below. Rock slides occur in several locations and have partially buried several sections of the rail grade and associated ditches.

Current maintenance is routine. Seasonal repairs consist of removing downed trees from the trail and limited cleaning of drainage structures. The SRRT was not originally developed to meet accessibility guidelines or to meet a specific park trail standard. The SRRT is best defined as a Multipurpose Bicycle Trail. Maintenance and use is most consistent with the “nature” and “all-purpose” trail standards described for ONP in the GMP. Volunteers complete most routine trail maintenance. NPS staff maintains the trailheads and parking areas

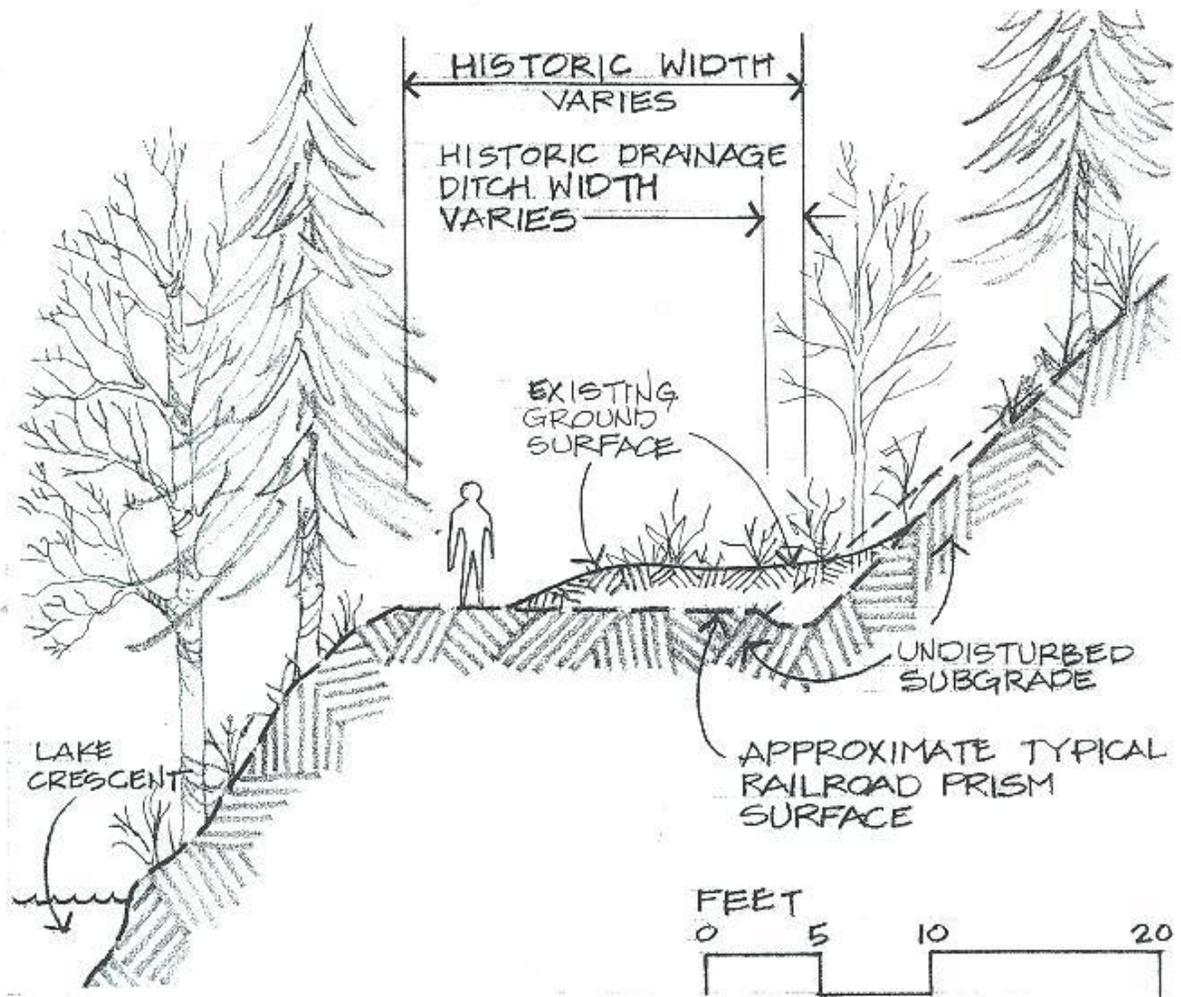


Figure 7. Trail profile (historic railroad segments) existing conditions

Table 2. Olympic National Park Trail Standards

Olympic National Park Trail Standards (2008 General Management Plan)				
STANDARD	NATURE	ALL-PURPOSE & MULTIPURPOSE BICYCLE	SECONDARY & FOOT	PRIMITIVE
Tread width	60" maximum	24" standard	18" standard	18" standard
		30" maximum	24" maximum	18" maximum
Clearing and Brushing	8' lateral	8' lateral	6' lateral	4' lateral
	10' vertical	10' vertical	8' vertical	8' vertical
Maintenance frequency	Annual +	Annual	Usually semi-annual	Occasional (for route definition & resource protection)
Bridge width	8' decking maximum	6' decking maximum	6' decking maximum	None
Puncheon width	60" maximum	48" maximum	48" maximum	None
Turnpike width	60" maximum	48" maximum	36" maximum	Not generally allowed, 24" maximum
<p>Nature Trails — These trails are generally paved or gravel surfaced, and are designed for large numbers of relatively inexperienced users. Stock is prohibited except for occasional administrative use, or when a nature trail is the only trail available for stock to access all-purpose or secondary trails. Nature trails are maintained to a standard for higher use volumes.</p> <p>All-Purpose Trails — These trails are main routes; they are open to hikers and stock, and are maintained to a standard for stock travel.</p> <p>Multipurpose Bicycle Trails — Located outside of wilderness, these trails are open to hikers, stock, and bicycles, and are maintained to all-purpose standards.</p> <p>Secondary Trails — These trails are open to hikers and stock, and will be maintained to a standard for foot travel. These trails are designed for experienced horses and riders.</p> <p>Foot Trails — These trails are open to hikers, and are maintained to a standard for foot travel. They are closed to stock, except for occasional administrative use.</p> <p>Primitive Trails — These trails are open to hikers only, for high elevation or low-use area access. Primitive trails include both constructed trails and trails established by continual use. These trails have minimal improvements — enough to protect the resources. Occasional maintenance is performed, as time and budget allow keeping routes open and protecting park resources.</p> <p>Universally Accessible Trails — These trails are accessible to and usable by people with disabilities.</p>				

The SRRT is immediately bordered by trees and herbaceous plants that have established since the railroad was abandoned and later closed to vehicular access. In several areas the cut slope above the trail has slumped onto the railroad grade, burying the trail and abandoned railroad ditches, reducing the width of exposed railroad corridor and providing a medium for the growth of both native and non-native vegetation.

The SRRT is located on a south-facing terrace with scenic views of Lake Crescent and the surrounding mountains and is a popular, year-round destination.

For the purpose of this EA, the existing SRRT is broken into four separate planning segments:

- **Segment A** (from the western end of the SRRT at Camp David Junior Road (CDJR) to the west side of the short railroad tunnel),
- **Segment B** (the trail segment between the two historic railroad tunnels),
- **Segment C** (the trail east of the long railroad tunnel near Lake Crescent on the historic railroad grade),
- **Segment D** (the trail between Lake Crescent and the current Spruce Railroad Trail parking lot near the Lyre River – not on the historic railroad grade).



Figure 8. Project Area Map (only lands within the boundary of Olympic National Park are addressed in this EA)

Segment A: The trail begins in the west at a trailhead located at the end of Camp David Junior Road (milepost (MP) 0.0 to MP 1.07). The trailhead is identified by a small sign and bulletin board at the end of the road. A spur trail climbs a short distance to reach the historic Spruce Railroad grade. The trail continues east along the railroad grade for approximately one mile to the partially collapsed, west railroad tunnel (short tunnel) and bypass trail. There are five downslope bank failures located in Segment A, including four with exposed, historic wood cribbing.

West Railroad Tunnel (short tunnel) & Bypass: A geotechnical evaluation of the western railroad tunnel (short tunnel) was conducted in late 2010 (PanGEO, 2011). This evaluation found that the short tunnel is approximately 140 feet long, and is oriented northeast-southwest. The tunnel ranges between 19 to 22 feet in width and between 25 to 30 feet in height. In the past, attempts to close the tunnel through the use of blasting resulted in a large debris pile at the east tunnel portal. An approximately 425 foot long bypass trail provides access around the tunnel to the south between MP 1.07 and MP 1.13. The bypass trail averages three feet in width and is immediately adjacent to Lake Crescent.

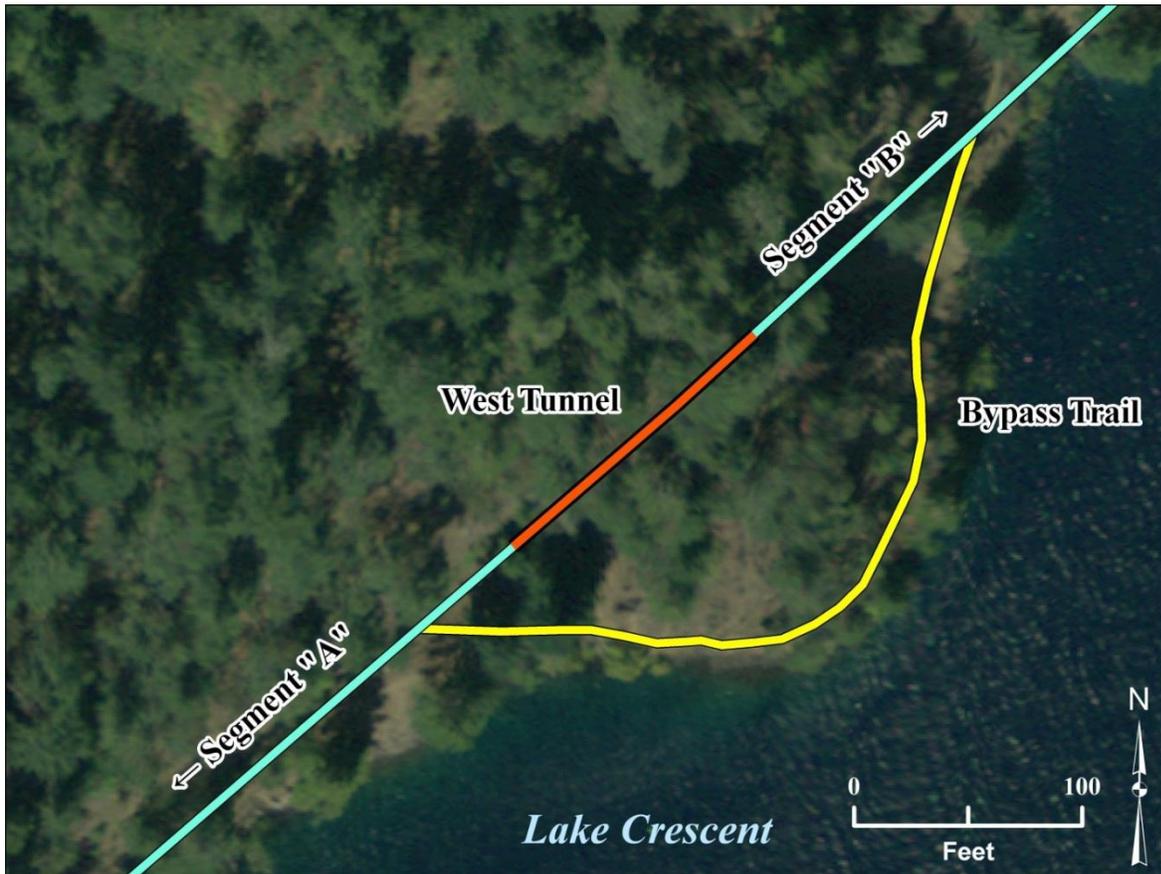


Figure 9. West railroad tunnel and bypass trail

Segment B: The trail continues from the east side of the west (short) railroad tunnel along the historic railroad grade (MP 1.13 to MP 2.72). The grade has eroded in several places, both above and below the trail, leaving a narrowed trail corridor. This trail segment continues east for

approximately 1.59 miles to a second partially collapsed railroad tunnel and bypass trail. There are nine downslope bank failures located in Segment B. This includes two bank failures with exposed, historic wood cribbing and two locations with historic dry laid rock. In one location the dry laid rock is intact, in the second the dry laid rock has failed.

East Railroad Tunnel (long tunnel) & Bypass: A geotechnical evaluation of the eastern railroad tunnel (long tunnel) was conducted in late 2010 (PanGEO, 2011). This evaluation found that the long tunnel is approximately 390 feet long, and is generally oriented north-south with a constant, gentle curve to the west. The tunnel ranges between 21 to 24 feet in width and between 26 to 28 feet in height. In the past, attempts to close the tunnel through the use of blasting resulted in large debris piles at the tunnel portals, leaving as little as three feet of clearance at the north portal where a large volume of rock is accumulated.

A bypass trail between MP 2.72 and MP 2.80 provides access around the long tunnel and to the Devil's Punchbowl, a small, deep bay with steep drop-offs located along the southern edge of the rock outcrop containing the railroad tunnel. The bypass trail is approximately 1,225 feet in length and averages three feet in width. The Devil's Punchbowl is a destination for trail users, including those who are not planning to hike the full length of the Spruce Railroad Trail. It is also a destination for many boaters on Lake Crescent. The Devil's Punchbowl is reached via a rocky trail that departs from the Spruce Railroad grade on both sides of the long tunnel to an existing footbridge. The bridge crosses the small bay and connects trail users to the bypass trail grade.

The footbridge is a steel box truss pedestrian bridge with wood decking. The bridge is approximately 85 feet long and 6 feet wide. A routine inspection of the bridge recently found that it is no longer structurally suitable for use by people traveling with stock. The park has posted safety information to notify trail users of this change in conditions. The bridge remains suitable for use by people traveling on foot or by bicycle.

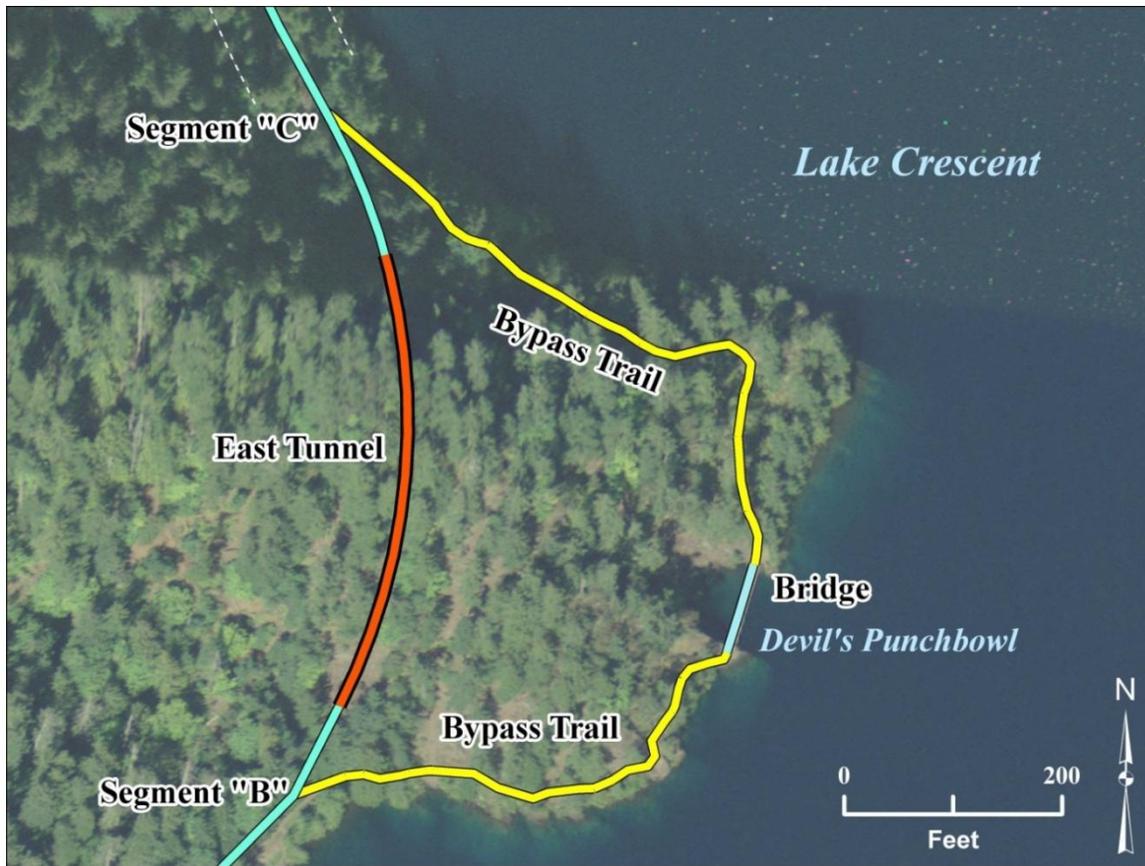


Figure 10. East (long) railroad tunnel, bypass trail and Devil's Punchbowl bridge

Segment C: The trail continues east along the railroad grade for approximately 0.5 miles from the east side of the long railroad tunnel (MP 2.80 to MP 3.27). This trail segment contains multiple seasonal water crossings and is frequently wet or muddy.

Segment D: The easternmost segment of the existing trail leaves the historic railroad grade near the shore of Lake Crescent and climbs approximately 90 feet to bypass private property before descending to the eastern trailhead parking lot at the end of East Beach Road near the Lyre River (MP 3.27 to MP 3.86). There are three small bridges located on the current trail that cross small drainages and wetland areas.

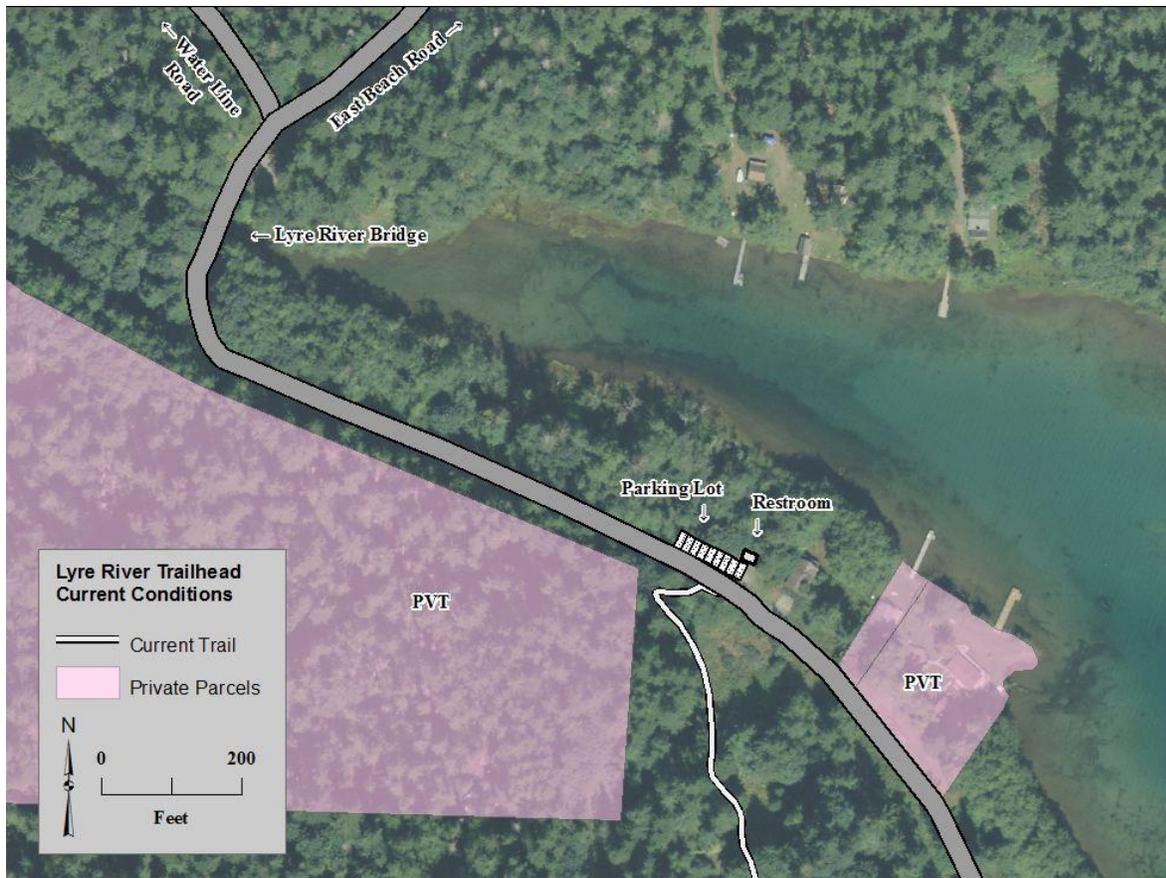


Figure 11. Existing Configuration of Spruce Railroad Trail parking lot area.

Spruce Railroad Trailhead Parking Lot: A small, unpaved parking lot is located at the eastern end of the trail, west of the Lyre River. The parking lot does not provide adequate turnaround space for vehicles with a large turning radius, such as large motorhomes or vehicles towing trailers. The trailhead contains one unisex vault toilet, one picnic table, and a bulletin board with visitor information about the park and trail. The NPS owns a vacant building located immediately adjacent to the current parking area. This structure has been identified for removal. A small, abandoned dock associated with the property remains in Lake Crescent near the outlet to the Lyre River and has also been identified for removal.

Private Lands: Several private landowners access their property on Lake Crescent via a spur road that continues west beyond the existing parking lot. A short segment of the existing Spruce Railroad Trail bisects the corner of a private parcel.

Olympic Discovery Trail – Phase 1 existing conditions

Clallam County received approval from the NPS to construct approximately 6.5 miles of new trail on the historic Spruce Railroad grade above Camp David Junior Road in 2009. This new trail segment was completed in 2011 after improvements to slope stability and drainage were constructed following a slope failure during the winter of 2010.

The Phase 1 trail segment begins outside the boundaries of Olympic National Park, adjacent to Highway 101 west of Fairholme, and opposite the NPS entrance road to the Sol Duc area of the park. The trail extends northeast from Highway 101 into the park. Within the park the trail varies between 12.5 to 14 feet in width. This includes an asphalt paved section that is between 8 and 10 feet in width, and adjacent gravel shoulders that vary between 0.5 to 4 feet in width on each side. The Phase 1 trail segment follows the Spruce Railroad grade to the east, paralleling Camp David Junior Road and ending near the western end of the existing Spruce Railroad Trail.

Clallam County proposes to extend the trail to the west on U.S. Forest Service (USFS) and other lands, eventually connecting with the community of LaPush at the Pacific Ocean as part of a regional trail system known as the Olympic Discovery Trail (ODT). Work on USFS lands was addressed in an environmental assessment completed by Olympic National Forest, Department of Agriculture in 2006. Construction of a new trail section by Clallam County on USFS lands is proposed to begin in 2012. Clallam County proposed to construct trail on the historic Spruce Railroad Grade in the Sol Duc area of Olympic National Park. This action was considered in the 2011 SRRT EA, but was dismissed in the 2012 SRRT EA for reasons described later in this chapter.

Activities Common to All Action Alternatives

The following activities are included in all action alternatives (Alternatives 2, 3, 4, 5). See Chapter 3 (Affected Environment) for a more detailed profile of the current environmental situation in the project area. The conceptual design for trailhead improvements and trail rehabilitation and development presented in this document may be modified during final construction design to best accommodate site-specific conditions and to avoid or minimize resource impacts.

Construction, maintenance, and use of the trail would be managed under all alternatives to comply with laws and policies related to safety and risk management for the visiting public and to provide a safe and healthful workplace for NPS employees, volunteers, and partners.

The Spruce Railroad Trail would be closed to visitor access during construction activities. The length and extent of the closure would depend on the alternative selected and site conditions encountered during construction. Construction under any alternative may be phased to allow any approved actions to occur as funding becomes available and in accordance with best management practices related to visitor use and resource protection.

Traffic control would be required along East Beach Road, Camp David Junior Road, and portions of Highway 101 during construction. The extent and duration of traffic control would depend on the alternative selected. Traffic control would be implemented in coordination with the applicable state or local transportation management agency.

Camp David Junior Road Construction Access

Vehicular access for trucks and other construction equipment would be established from Camp David Junior Road (CDJR) at milepost 4.6 as measured from Highway 101. This construction access point would be located approximately 300 feet from the eastern end of the road.

Construction vehicles would enter the project site via Highway 101 onto CDJR. Trailered equipment would be unloaded on CDJR before moving up the access to the work area.

A new construction access is required to avoid damage to the trail constructed above CDJR in 2009 (ODT Phase 1). A graded gravel ramp would be constructed at an approximately 12% grade. Construction would include removal of all vegetation in the access corridor, including trees < 11" dbh. Construction would include grading and placement of fill between CDJR and the ODT Phase 1. The grade would be stabilized through the placement and compaction of 1-1/4-inch minus road base. All materials would come from a park-approved, weed-free source.

Table 3. Installation of a construction access ramp along Camp David Junior Road

Installation of a construction access ramp along Camp David Junior Road	
Construction Requirements	Quantities
Length of access ramp	250 linear feet
Width of access ramp	20' wide at bottom, 14' wide at top
Volume of excavation/cut required	N/A
Volume of fill required	1200 cubic yards
Volume of base material placed	125 cubic yards
Volume of asphalt placed	N/A
Volume of rip rap placed	N/A
Number of trees removed ($\geq 11''$ dbh)	N/A
Work type	Duration (approx.)
Clearing and grubbing, placing fill and base	4 days

Camp David Junior Road (CDJR) Trailhead Development

Under all action alternatives the North Shore Picnic Area parking lot would be rehabilitated within the existing developed area to meet outdoor accessibility standards. This would include improving parking and access to the existing vault toilet, and may also include modifications or additions to the vault toilet if changes in use levels warrant additional development. All or a portion of the parking lot would be paved to provide a firm and stable surface. Parking spaces would be clearly delineated to maximize the number of vehicles that could park in the lot. Accessible parking would be identified adjacent to the restroom.

Additionally, two accessible parking spaces would be constructed along Camp David Junior Road (CDJR) in an existing widened turnout area adjacent to the existing North Shore Picnic

Area parking lot. The accessible parking spaces would be designated and signed for use by people with disabilities only. The widened area of CDJR would be graded. Gravel (1-1/4-minus) would be placed over an area 35-feet long and 12-feet wide. Asphalt would be placed on the gravel with an additional six inches of asphalt in a turndown edge along the road. The entire area would be graded so that the asphalt elevation matches the adjacent gravel road elevation.

Compacted gravel and asphalt six feet in width would be extended from the accessible parking spaces across CDJR to connect with a newly developed accessible spur trail. The spur trail would provide access to the ODT Phase 1 trail segment and the extended Spruce Railroad Trail.

The centerline of the spur trail would be marked using tape and stakes at intervals to clearly identify both straight and curved sections. Once the alignment is marked, a tracked loader would be used to clear duff and vegetative overburden to a width of ten feet. This material would be loaded onto trucks, removed from the park, and disposed of at an approved site.

The trail grade would be constructed along the hillside through the removal of trees and other vegetation and the excavation of the trail grade. The spur trail would include switchbacks on the hill above CDJR at a grade of five percent. In areas where an upslope cut bank is exposed, class 2 and 3 rip rap would be placed to support the exposed bank while leaving the full width of trail.

After the base of the trail is in place and the cut banks supported, 1-1/4-inch minus gravel would be placed and compacted to a depth of six inches and a width of seven feet for the entire length of the spur trail. The gravel would be compacted in place; asphalt three-inches thick and six-feet wide would be placed on the compacted gravel base and centered so that six inches of compacted gravel remains on each side of the trail outside the edges of the asphalt. Additional gravel would be placed and compacted outside of the edges of asphalt to raise the gravel elevation to level with the completed asphalt grade.

Table 4. Construction requirements of a new universally accessible parking and trail access along Camp David Junior Road near the North Shore Picnic Area parking lot

Construction of new universally accessible parking and trail access along Camp David Junior Road near the North Shore Picnic Area parking lot.	
Construction Requirements	Quantities
Length of trail segment	495 linear feet
Area of accessible parking development	420 square feet
Volume of excavation/cut required	155 cubic yards
Volume of fill required	325 cubic yards
Volume of base material placed	64 cubic yards
Volume of asphalt placed	35 cubic yards
Volume of rip rap placed	30 cubic yards
Number of trees removed ($\geq 11''$ dbh)	3
Work type	Duration (approx.)
Clearing and grubbing; excavation; placing fill, base and asphalt	13 days

Animal-resistant trash receptacles and recycling containers would be placed at the CDJR trailhead to accommodate increased visitor use. Trail information and interpretation signs would also be installed.

Establishing Primary Trail Centerline

The trail centerline would be surveyed and staked for horizontal alignment and vertical grade as established in the construction drawings. Olympic National Park (ONP) archeology staff would inspect and adjust the surveyed alignment as necessary to conform to the historic railroad alignment (where present) to establish a final centerline.

The final centerline would be used to establish the construction limits. The width of the construction limits varies and is described for each alternative considered. The construction limits would be marked using flagging or other accepted means to allow for identification of the area to the contractor. The construction limits identify the external boundary where construction-related disturbance may occur. The approved construction limits would be of sufficient size to accommodate trail development, construction access, passing zones, turnaround, resting, and staging areas. Construction limits would be minimized and kept within previously disturbed areas to the greatest extent possible.

Site Preparation – Vegetation Removal and Grading

After the construction limits are marked and identified to the contractor, the area would be cleared of vegetation, duff, and overburden. Trees within the construction limits would be cut as close to ground level as possible using a chain saw. Overhanging limbs in the construction limits

would be pruned using approved horticultural standards to create a clear zone up to 12-feet high. Once cut, trees would be dispersed into the surrounding forest using an excavator. Some trees may be utilized during trail development. This may include using logs to rehabilitate historic wood cribbing, to help delineate portions of the trail, or to develop benches or other appropriate trail features. Small woody material up to six inches in diameter would be disposed of outside the Park or mechanically shredded and placed in the surrounding forest to avoid the creation of large piles of material. Removed vegetation would be loaded onto a dump truck using either a loader or excavator and disposed of at a permitted location outside the Park. Areas containing invasive plant species would be cleared of those plants and the area protected from reintroduction of non-native plants until the entire project is revegetated through the application of weed-free mulch.

After vegetation removal is complete, removal of duff and other overburden from the trail corridor would be completed using a small bulldozer and/or grader. Where feasible, the duff layer would be salvaged from areas free of non-native plants as identified by the park's vegetation specialist and applied to newly finished slopes following trail construction. Where the historic Spruce Railroad grade is within the construction limits, the overburden would be removed to an elevation identified by a park archeologist as the top of the railroad ballast or higher. The intent would be to minimize disturbance to remaining historic materials to the greatest extent possible while allowing for the development of a firm and stable surface for trail construction. The overburden would be loaded into trucks using construction equipment (excavator, loader) and disposed of at a permitted location outside the Park.

If excessively muddy or wetted areas are encountered within the construction limits the contractor would place and compact 1-1/4-inch minus gravel from a park-approved source as necessary to stabilize the surface and allow passage of trucks and construction equipment along the route.

Upslope Bank Failures

Within Segments A, B, and C upslope bank failures have resulted in slide materials within the proposed construction limits at approximately eight locations. Slide materials within the construction limits would be removed, as appropriate to maintain slope stability and trail integrity, by loading materials onto a dump truck using either a loader or excavator. Slide materials would be removed down to the grade of the railroad ballast or higher, creating a vertical cut against the slope. Where necessary, the slope would be stabilized through the placement of Class 2, 3 and 4 rip rap against the vertical cut, raised to a height sufficient to support the entire exposed face and prevent continued migration of slide materials onto the trail. Work would be accomplished using a tracked excavator and dump truck.

If park staff determine that the removed slide material is acceptable for use in other areas of proposed trail construction it would be transported and stockpiled for later use. Suitability for

reuse would be based on whether or not the materials are suitable from an engineering standpoint. Best management practices would be utilized to ensure that such use would not introduce or spread non-native plants within the park. If materials are not acceptable for such use they would be removed from the park to a permitted disposal site.

Downslope Bank Failures

Where bank failures have occurred along proposed trail segments, the desired width would be established either through modifying the alignment to move the trail away from the bank failure or through the placement of downslope bank stabilization. All areas of the existing trail that propose the use of large construction equipment would be rehabilitated and stabilized to provide a stable corridor for construction and maintenance access and trail use.

Within Segments A and B, fourteen areas between the proposed trail bed and lake edge have failed. Six of these sections contain historic log cribbing from the original construction of the rail grade. Historic dry laid masonry from the construction of the rail grade is also present. The combined length of failed bank measured along the water's edge is 1,409 linear feet.

In the six areas where historic log cribbing is present, the trail bed would be reconstructed. The trail bed would be excavated using a tracked excavator to an elevation slightly above the water level. Log cribbing would be removed to allow for new bank stabilization to be installed. This would be done in accordance with cultural resource guidelines to rehabilitate the historic appearance of the log cribbing. No work would occur below the ordinary high water mark.

In the area of historic dry laid masonry, all failed areas would be reconstructed in accordance with a treatment plan developed in consultation with cultural resource specialists. Bank stabilization would be designed to protect the remaining section of intact masonry wall. The lowest 12 inches to 18 inches of wall would be at or below the ordinary high water mark. Where the masonry wall is intact, it would remain. Concrete abutments would be placed into the bank and structural steel bridging with wood decking would be placed on top of the trail section to provide a driving platform for construction equipment, and a permanent trail surface.

Where masonry wall is not intact, initial work would entail the removal of the identified masonry elements along the bank down to the lake level. Material identified by cultural specialists as historic dry laid masonry wall would be treated in a manner consistent with NPS cultural resource guidelines. The excavated rock material would remain at the site and be used for reconstruction. A steel bridging structure would be placed on the trail grade as described above. New material matching the intact wall material would be transferred to the site using dump trucks. The material would be hand placed, beginning with the larger material at the bottom and extending up the wall. Rock would be placed to create a lock between adjoining pieces. As the wall is raised, previously excavated material would be replaced behind the wall and compacted into place.

The six areas that contain no log cribbing or dry laid masonry would be reconstructed through the placement of Class 3, 4, and 5 rip rap, placed beginning at the lakeshore and extending upslope to the level of the trail. The lower 12 to 18 inches of the rip rap fill would be below the ordinary high water level of the lake. As the rip rap is constructed, voids would be filled with graduated rock sized between three inches down to 1-1/4 minus road base. Where appropriate, alternatives to rip rap would be used to stabilize areas. All downslope bank stabilization would be designed and constructed to avoid or minimize impacts to water quality, shoreline habitat and native vegetation to the greatest extent possible. Any rip rap used would be placed using the minimum design necessary to establish a structurally sound bank. Bank reconstruction would utilize a tracked excavator to place the rip rap and a dump truck to transport rip rap and backfill.

Trail Drainage

Areas where water flows across the trail would be contained through the placement of a buried plastic culvert, a trail bridge, boardwalk, or a low water crossing. Where culverts are placed, the trench would be excavated using a tracked excavator and the culvert placed in the trench at the design slope. The trench would be backfilled using native material and compacted. The inlet and outlet ends would be protected through the placement of class 2 and 3 rip rap. Where low water crossings are installed, the trail grade would be slightly depressed at the location of the crossing, rising for 25 feet on each side to match the trail grade.

In Segments A & B, approximately 3 culverts and 8 low water crossings would be installed. Water flow across the trail within Segments C and D would be contained through the placement of low water crossings, boardwalk or trail bridges. Low water crossings would be placed at approximately 12 locations. Concrete, rather than asphalt, would be used to create a swale, providing a flow path for water. Where identified as necessary, the inlet and outlet sides of the low water crossing would be channelized through the placement of 3-inch minus rock to direct the water and maintain the channel alignment.

Cross Drainage by Culvert, Low Water Crossings, and Concrete Panel Bridge

Water flow across the trail would be contained through the placement of buried plastic culverts, low water crossings or elevated crossings. Five cross drains have been identified and additional minor drains may be identified in the future and these cross drains would be contained through the placement of an appropriately sized plastic culvert at each location. Inlet and outlet ends of culverts would be protected from erosion through the placement of rip rap around the inlets and outlets. At approximately 2-3 cross drain locations water would be contained through the placement of concrete low water crossings. The trail grade would be slightly depressed for 50 feet on each side of the crossing to match the trail grade. The trail surfacing would utilize concrete in the depressed grade, providing a flow path for water and a cleanable surface for maintenance. Where identified as necessary, the inlet and outlet sides of the low water crossing would be channelized through the placement of 3-inch minus rock to direct the water and maintain the channel alignment while minimizing erosion. Three locations in Segment D-ADA

would require large culverts. One location within Segment C would require the placement of an elevated water crossing consisting of a bridge structure approximately 16 feet in length and 12 feet in width. This bridge would span a year-round stream channel. The bridge would be placed on concrete abutments excavated into the ground. The trail would be raised over a 100-foot length to match the elevation of the bridge. Culverts, elevated water crossings, and low water crossing placement would utilize a tracked excavator, dump trucks, and compaction equipment.

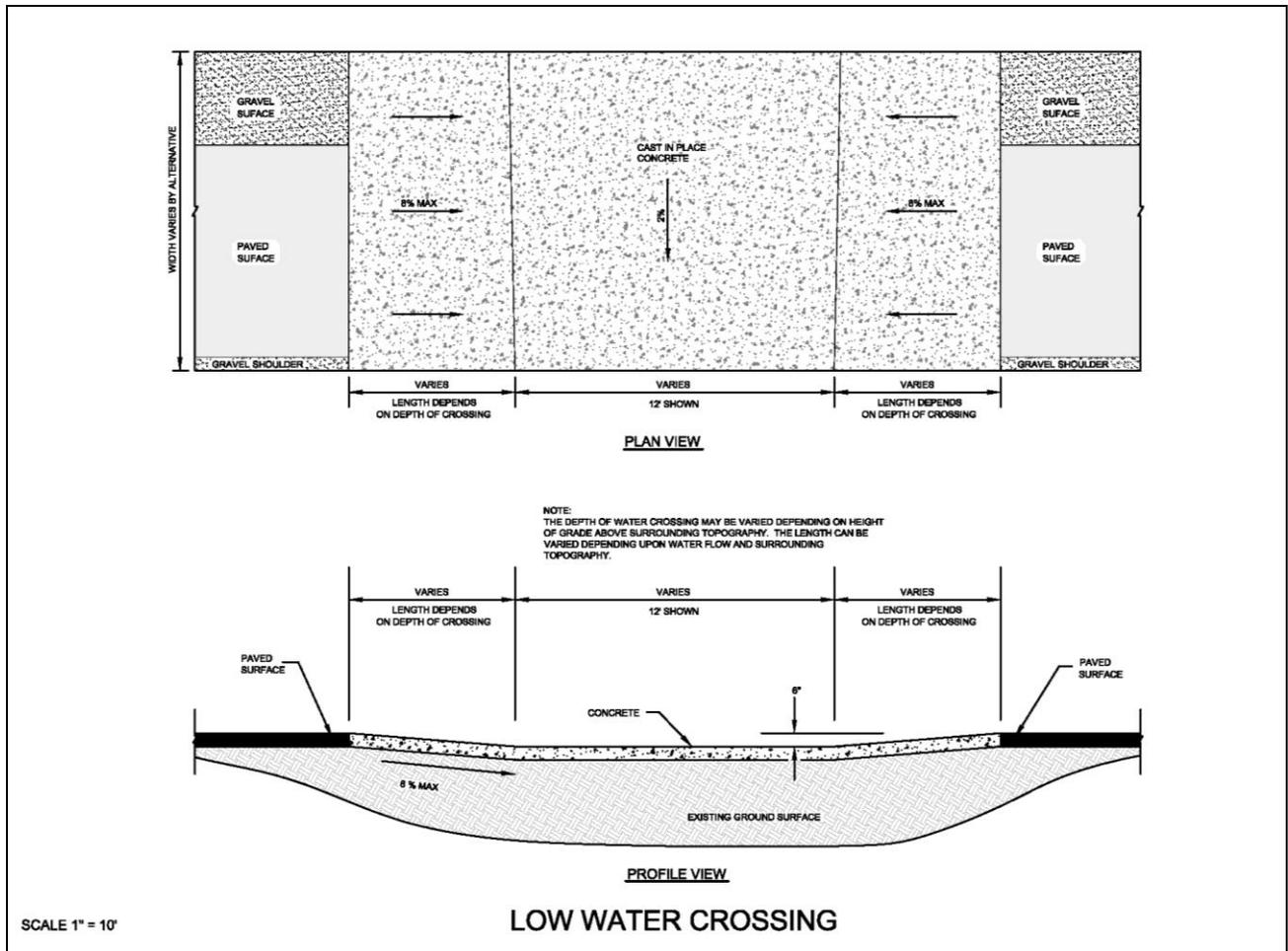


Figure 12. Plan and profile views showing low water crossing

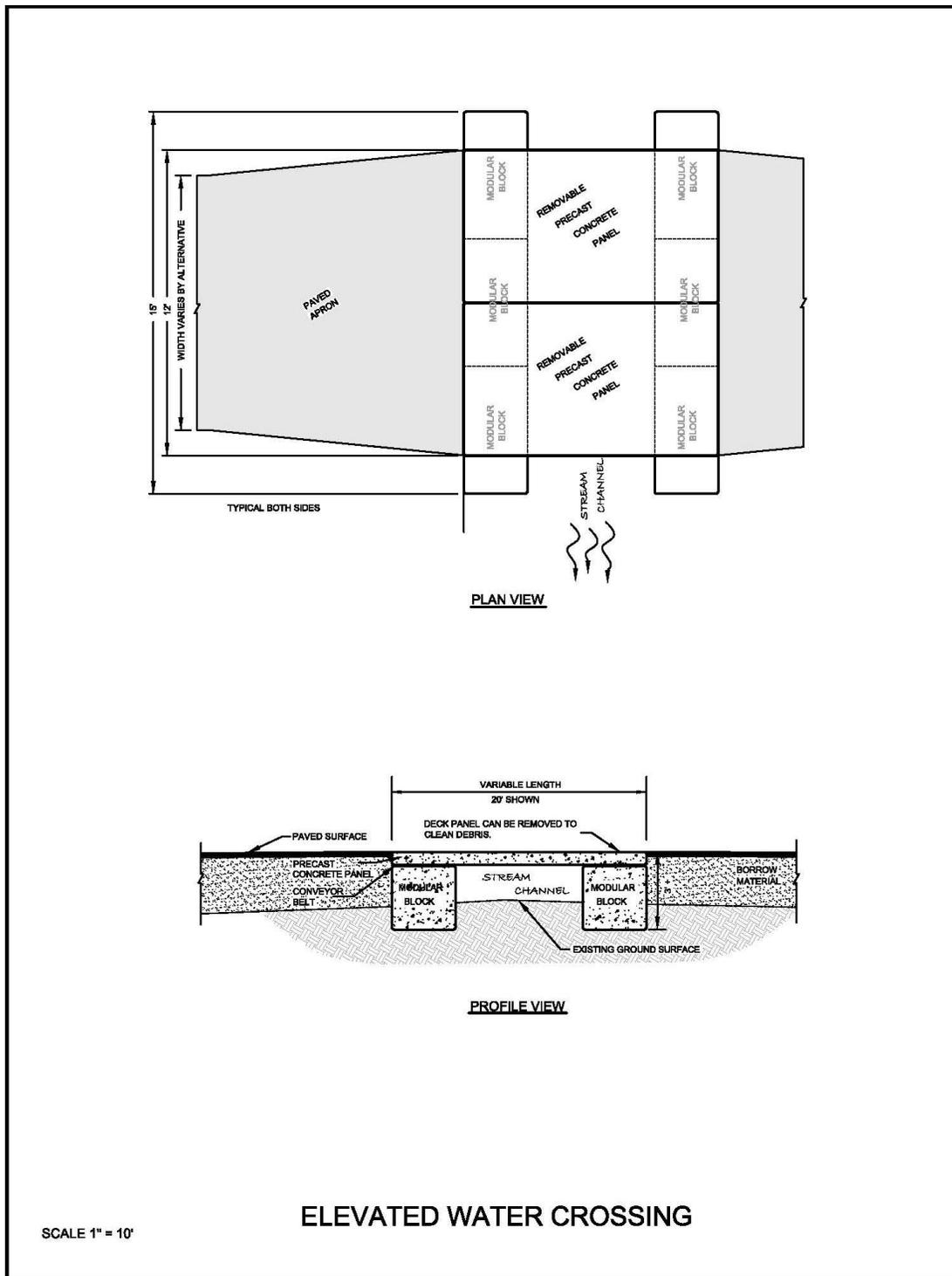


Figure 13. Plan and profile views showing elevated water crossing

Four locations would require the placement of bridges in accordance with the NPS SRRT trail standards. Bridge lengths would vary from 16 to 26 feet. These bridges would span year-round stream channels. The bridges would be placed on concrete abutments excavated into the ground.

The trail would be raised over a 100-foot length to match the elevation of the bridge. Bridge and low water crossing placement would utilize a tracked excavator and dump truck.

Spruce Railroad Trailhead Parking Lot, Lyre River Road and Water Line Road

The existing parking lot would be expanded after the NPS-owned vacant property is removed (house and dock). Parking lot expansion would be limited to the footprint of the demolished building extended laterally to the adjoining property line, leaving an undeveloped buffer adjacent to the adjoining property. An accessible sidewalk would be constructed along the perimeter of the parking lot to provide a path to the accessible restroom, relocated bulletin board and trailhead signs, and also to guide people to a new trailhead access point that would be moved slightly to the east as shown in the drawing below.

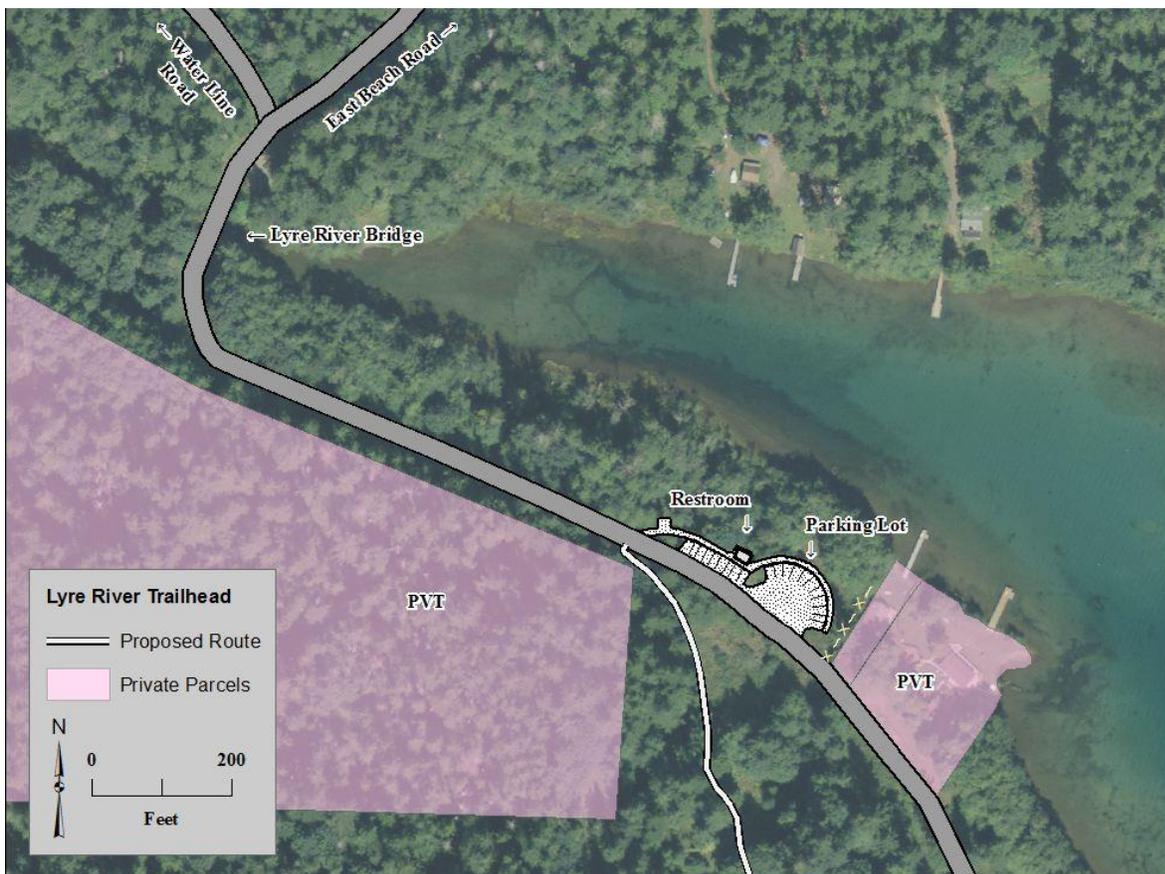


Figure 14. Improved Lyre River trailhead parking lot

The area has been surveyed for wetlands. No wetland areas would be developed. The lands between the expanded parking lot and Lake Crescent would be rehabilitated to natural conditions. The parking lot would be paved with 3” thick asphalt in the existing and expanded parking area. The paved lot would be striped to delineate 19 parking spaces and a large vehicle turnaround area. Two disabled-access parking spaces would be designed and marked in accordance with ABA accessibility standards.

The NPS would pave the road from the Lyre River Bridge to the expanded Spruce Railroad Trail parking lot, and would also pave the 0.2 mile long section of the existing Water Line Road within the park. A bike lane would be striped along the road.

Table 5. Parking lot at Lyre River (Spruce Railroad Trailhead)

Parking lot at Lyre River (Spruce Railroad Trailhead)	
Construction Requirements	Quantities
Surface area of parking lot	17,800 square feet
Volume of excavation/cut required	165 cubic yards
Volume of fill required	1750 cubic yards
Volume of base material placed	220 cubic yards
Volume of asphalt placed	165 cubic yards
Work type	Duration (approx.)
Clearing and grubbing; excavation; placing fill, base and asphalt	6 days

Table 6. Road from parking lot to the Lyre River Bridge

Road from parking lot to the Lyre River Bridge	
Construction Requirements	Quantities
Length/width	950 feet long/ 22 feet wide
Volume of base material placed	258 cubic yards
Volume of asphalt placed	158 cubic yards
Work type	Duration (approx.)
Clearing and grubbing; excavation; placing fill, base and asphalt	6 days

Table 7. Water Line Road

Water Line Road	
Construction Requirements	Quantities
Length/width	1050 feet long, 11 feet wide
Excavation	194 cubic yards
Volume of base material placed	143 cubic yards
Volume of asphalt placed	97 cubic yards
Work type	Duration (approx.)
Clearing and grubbing; excavation; placing fill, base and asphalt	6 days

Railroad Tunnels & Bypass

Both historic railroad tunnels would be opened and developed for trail access. Re-opening of the short tunnel would commence after construction access is provided through Segment A through clearing and bank stabilization. The area near the west tunnel portal would be sufficiently cleared to allow for trucks and equipment to turn around. The tunnel would be scaled and any loose rock would be removed from the entire length of the tunnel and at portal locations.

All removed materials would be loaded onto a dump truck utilizing an excavator. Once access through the tunnel is established, work would continue on Segment B to clear the grade and stabilize the downslope bank. The tunnel floor would be filled with 1-1/4-inch minus road base and sloped with a high spot at its center to provide flow of water from any point to the outside ends of the tunnel and out into the lake. Once access to the East (long tunnel) is secure, work would proceed with clearing and opening the long tunnel. Once open, trail development would continue through the long tunnel to complete development of Segment C.

Table 8. West Railroad Tunnel Segment and bypass: Construction Requirements

West Railroad Tunnel Segment and bypass: Construction Requirements	
Construction Requirements	Quantities
Length of trail segment	200 linear feet
Volume of excavation/cut required	2000 cubic yards
Volume of fill required	N/A
Volume of base material placed	68 cubic yards
Volume of asphalt placed	7 cubic yards
Work type	Duration (approx.)
Clearing and grubbing; excavation; placing fill, base and asphalt	5 days

Short Tunnel Rehabilitation Details

The stability of the tunnel portals and the large rock block failure that has occurred throughout the middle and northeast ends of the west tunnel in the tunnel crown and quarter arches would be addressed as recommended in the *Final Geotechnical Report Spruce Railroad Tunnel Evaluation* (PanGEO. 2011). A tunnel profile and cross-sections showing the details of these recommendations are included in Appendix B.

- Loose rock would be scaled throughout the entire length of the tunnel and at the portal locations. In particular, the large rock block in the tunnel crown above the northeast portal would be removed so that it does not pose a risk of falling and endangering pedestrians. All rock and timber debris would be removed from within the tunnel and the

large pile of rock accumulation at the east portal that resulted from the attempt to close the tunnel via blasting.

- A minimum of four inches of fiber reinforced microsilica shotcrete (FRMS - steel or synthetic fiber) would be installed to the exposed bedrock in the crown and quarter arches from the middle of the tunnel to the east portal. FRMS creates a self-supporting lining in the tunnel. The fibers in the shotcrete act as reinforcement, instead of using traditional reinforcing bars. Adding FRMS to the interior of the tunnel would enhance the tunnel performance during seismic events and would inhibit further weathering and deterioration of the exposed rock surface, thereby preventing further rock fall.
- A minimum of four inches of FRMS would be applied to the exposed bedrock portals in the vicinity of the tunnel opening for the same reasons listed above. This would include the sidewalls, crown, and quarter arches.
- Rock bolts would also be installed to anchor potentially loose rock blocks within the tunnel and at portals. These rock bolts would be placed into the rock blocks as needed, and not in a pattern. An example plan sheet showing shotcrete lining and rock bolt details is included as Appendix B.
- Seepage along major joint sets that are producing water within the tunnel and at the portals would be controlled by installing strip drains on the rock prior to placing shotcrete. The drain strips would be extended down to the tunnel invert or bike path drainage so that any captured water flows to an acceptable location. Strip drains usually consist of a Geosynthetic drainage board, or dimple board, that can be cut into varying widths.
- At least one drainage ditch would be installed along one of the tunnel walls. The tunnel invert and drainage grade would be established so water within the tunnel naturally drains out of the tunnel and prevents any water from collecting within the tunnel. Drain pipes would not be placed in the ditches.
- When removing the large rock pile at the tunnel portal, care would be taken to grade the bike path away from the tunnel to facilitate drainage.

East Railroad Tunnel & Bypass: The east railroad tunnel would be cleared of debris and developed for trail use. The bypass trail would be retained, routine maintenance would continue. Under alternatives 3, 4, and 5 the bridge at the Devil's Punchbowl would be replaced with a new structure of the same length, width and general design, constructed to support stock and pedestrians. The new bridge would be constructed off-site, staged on the lawn adjacent to the Storm King Ranger Station and flown into the site using a heavy lift helicopter. The flight would occur after September 15 and before April 1 to avoid potential noise disturbance to marbled murrelet during the breeding season.

Long Tunnel Rehabilitation Details

The long tunnel would be rehabilitated and maintained as recommended in the *Final Geotechnical Report Spruce Railroad Tunnel Evaluation* (PanGEO. 2011). A tunnel profile and cross-sections showing the details of these recommendations are included in Appendix B.

Although the ground within the long tunnel is self-supporting on a large scale with only localized spalling and raveling, rehabilitation actions are needed to support opening the tunnel for use as a trail. The main areas requiring work are the tunnel portals. At a minimum, the following actions would be taken to allow for safe access.

- Loose rock would be scaled throughout the entire length of the tunnel and at the portal locations.
- All rock and timber debris would be removed from within the tunnel and the large piles of rock accumulation at the north and south portals that resulted from the attempt to close the tunnel via blasting.
- The two remaining timber sets that are standing in the tunnel would be removed to prevent them from becoming a hazard when they fall.
- A minimum of four inches of fiber reinforced microsilica shotcrete (FRMS - steel or synthetic fiber) would be installed to the exposed bedrock. Adding FRMS to the portal locations would enhance the tunnel performance during seismic events and would inhibit further weathering and deterioration of the exposed rock surface, thereby preventing further rock fall.
- Where seeps are encountered at the tunnel portals, water would be controlled by installing strip drains on the rock prior to placing shotcrete. The strip drains may be extended down to the tunnel invert or the bike path drainage so that any captured water flows to an appropriate location. Strip drains usually consist of a geosynthetic drainage board, or dimple board, that may be cut into varying widths.
- At least one drainage ditch would be installed along one of the tunnel walls. The tunnel invert and drainage grade would be established so water within the tunnel naturally drains out of the tunnel and prevents any water from collecting within the tunnel. Drain pipes would not be placed in the ditches.
- When removing the large rock pile at the tunnel portal, care would be taken to grade the bike path away from the tunnel.

Table 9. East Railroad Tunnel Segment and bypass: Construction Requirements

East Railroad Tunnel Segment and bypass: Construction Requirements	
Construction Requirements	Quantities
Length of trail segment	500 linear feet
Volume of excavation/cut required	7,500 cubic yards
Volume of fill required	N/A
Volume of base material placed	170 cubic yards
Volume of asphalt placed	19 cubic yards
Work type	Duration (approx.)
Clearing and grubbing; excavation; placing fill, base and asphalt	20 days

East Approach to West (short) Tunnel – Missing Trestle Area

A short bridging structure is proposed to be installed on the east approach to the short tunnel where a short trestle formerly existed. A steel or concrete bridge structure with either concrete or heavy wooden decking would be installed at this location to bridge a small cove-like indentation in the shoreline. This location would be made passable for construction equipment and regular trail maintenance vehicle passage. It is likely that the bridge would be brought down the trail from the west side (Camp David Junior side) and placed by cranes located on both sides of the trail gap.

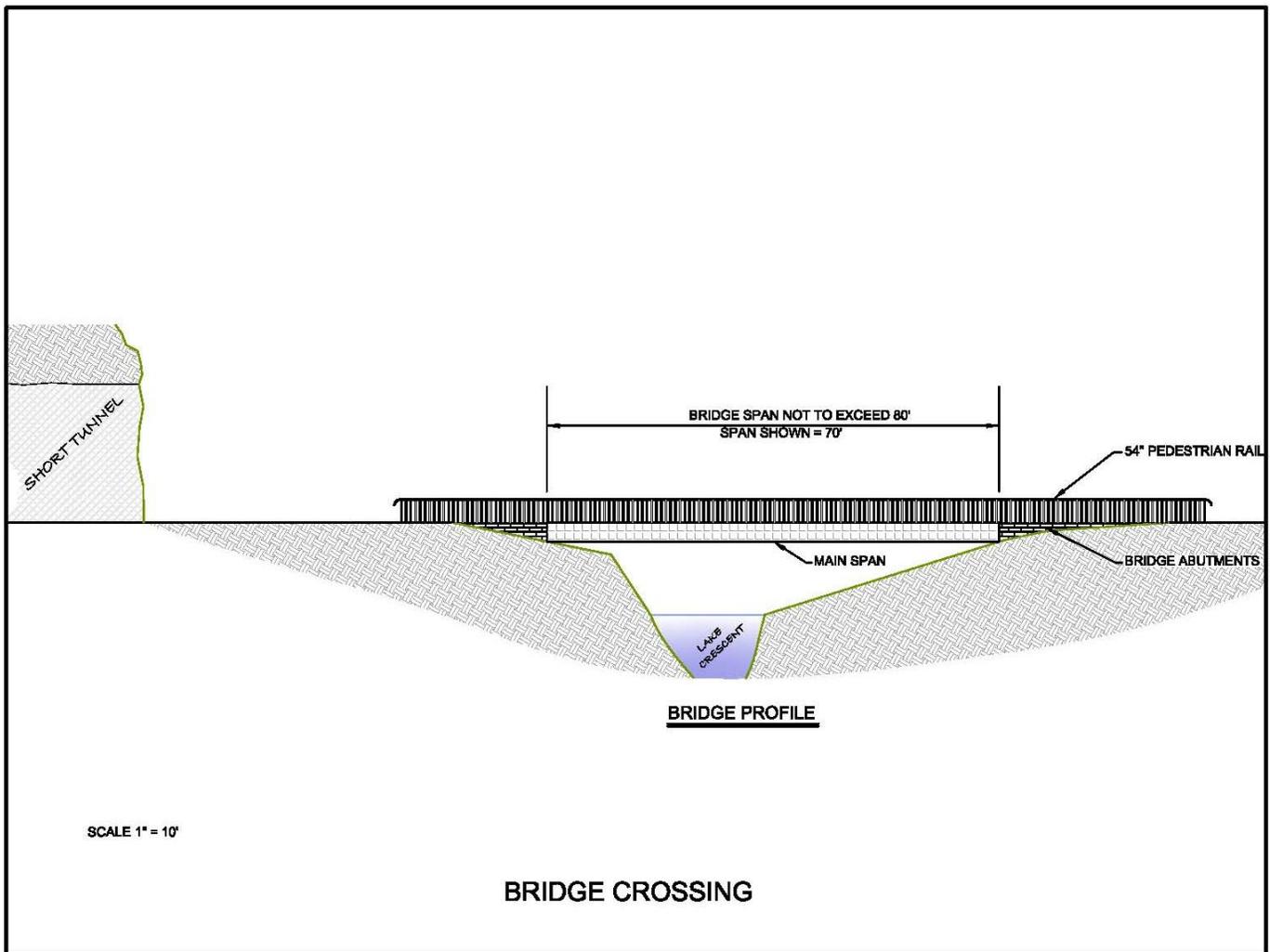


Figure 15. Profile view of bridge crossing

Asphalt Paving Sequence (Alternatives 2, 3, 5)

In areas where a paved trail surface is proposed, following establishment of the approved construction limits and site preparation described above, the contractor would compact the sub-base of the entire route using a mechanical compactor. Once compacted, 1-1/4-inch minus gravel road base would be centered in the construction limits and placed to the width and depth identified in the approved alternative. This would be completed using dump trucks to supply the road base and bulldozers and graders to spread the material. The road base would be compacted to 90 percent of a standard proctor using a mechanical compactor. The compacted base would be tested for compaction utilizing industry standard tools and methods.

Once the road base is placed and compacted, the contractor would pave each approved trail segment with hot mix asphalt using an asphalt mix design submitted in advance of the work by the contractor and approved by the park. Asphalt would be placed between 2 and 3 inches thick to the width identified in the approved alternative. The thickness of asphalt would be increased to

the 3 inch section in areas where the base material is less stable. This would be completed using dump trucks to supply hot mix asphalt which would be placed using an approved laydown machine and then mechanically compacted. Material would be compacted per Washington State Department of Transportation guidelines (WSDOT 5.04), including testing for compaction.

Rehabilitation of Construction-related Disturbed Areas

At the completion of construction, areas intended for use as permanent passing or resting areas for trail users would be developed as such. Temporary construction, truck staging and turning areas would be rehabilitated to natural conditions through removal of any gravel surfacing, tilling of the surface using construction equipment, and seeding with a park-approved seed stock to avoid the introduction or spread of non-native plant species, or placement of weed-free duff salvaged from the project area.

Precluding Unauthorized Vehicles

Administrative vehicle use would occur on sections of the new trail to support trail maintenance and emergency response by park staff. Steel bollards, approximately four to six inches in diameter, would be placed on all trail access points where the width of the trail would otherwise allow automobile access. Bollards would be bolted into concrete foundations and would be designed with a hinged base to fold down to accommodate authorized vehicle access. Bollards would be spaced to allow access for pedestrians, bicyclists, and equestrians. Adequate clearance would be maintained to provide wheelchair access.

Installation of Minor Trail Features to Improve Visitor Experience

Once the entire route is paved, interpretive media, pet sanitation facilities, and trash receptacles would be placed at trailheads and at select points along the trail as indicated on the construction drawings. The work would entail the use of a small utility truck, tracked loader fitted with an auger, and a portable concrete mixer.

Private Lands

NPS would coordinate with adjacent property owners to avoid or minimize impacts related to trail improvements. This includes ensuring continued access during and after construction, minimizing noise during construction, and protecting water supplies that are within the project area. NPS would confirm ownership of land prior to new development and would seek permission from private land owners regarding any proposed access on private lands associated with trail construction. Additionally, a fence or vegetative screen would be installed between the Spruce Railroad Trail parking area and adjacent private property to discourage trespassing and to improve privacy for residents.

Construction Equipment Used

A variety of equipment would be used to construct the trail. The table below provides an estimate of the noise level that would be generated for each type of construction equipment.

Table 10. Construction noise equipment

Equipment Used	Noise Level (dBA) ¹ Avg. L_{max} at 50'
Tracked Excavator	81 (170)
Wheeled Front End Loader	79 (96)
Dump Truck	76 (31)
Dozer	82 (55)
Grader	85 --
Paver	77 (9)
Compactor	80 (57)
One Man Lift	84 (46)
Pickup Truck	55 (1)
Shotcrete Applicator (Concrete Pump)	81 (30)
Rock Scaler - Manual	n/a
Rock Screen (Excavator)	81 (170)
Rock Drill	81 (3)

From FHWA Construction Noise Handbook (2009) and WSDOT Environmental Assessment Preparation, Advance Training Manual (2010) as submitted by Clallam County

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 – Accessible (3 ft. asphalt) with 4 ft. unpaved shoulder

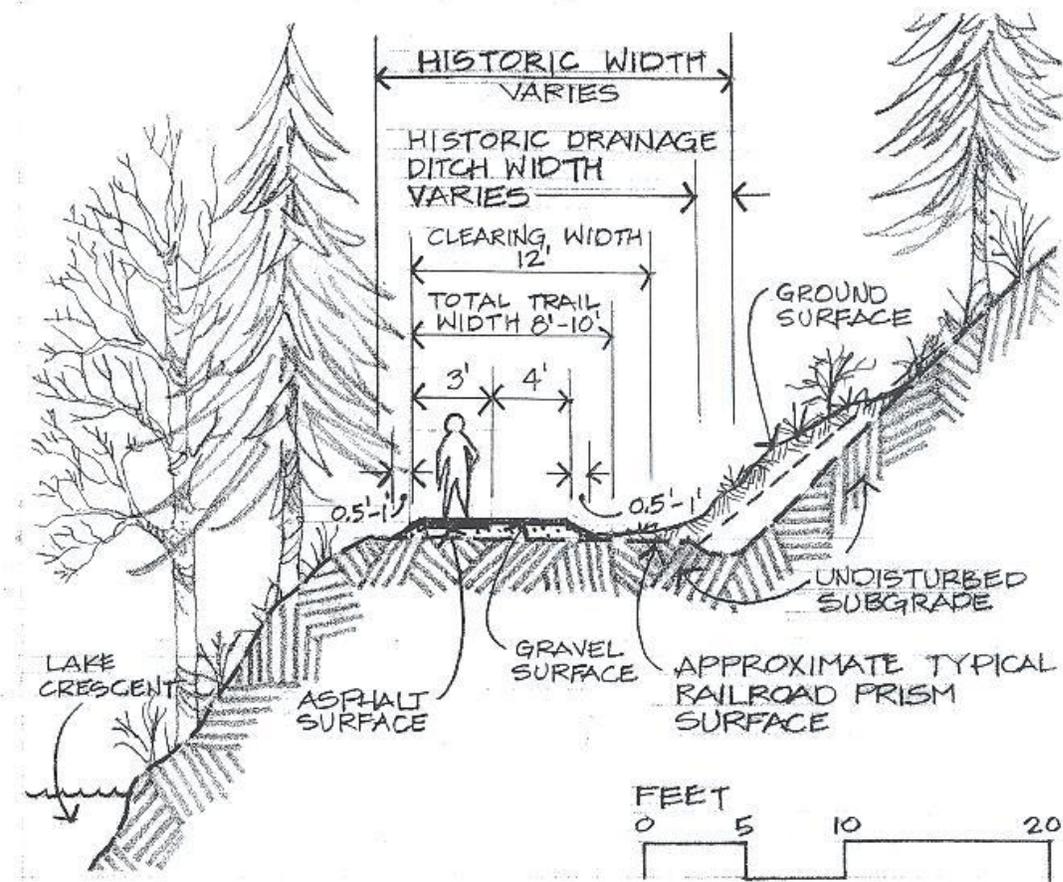


Figure 16. Alternative 2 trail profile

Spruce Railroad Trail

Under Alternative 2, the NPS would make improvements to the Spruce Railroad Trail (SRRT) to meet the minimum guidelines for providing an accessible trail as described in the Draft Final Accessibility Guidelines for Outdoor Developed Areas published on October 19, 2009 (Access Board, 2009). These guidelines are proposed by the Architectural and Transportation Barriers Compliance Board (Access Board) pursuant to the Architectural Barriers Act (ABA) for camping facilities, picnic facilities, viewing areas, outdoor recreation access routes, trails, and beach access routes that are constructed or altered by or on behalf of the Federal government. This

would amend the range of existing park trail standards as described in the 2008 General Management Plan (GMP).

All segments of the SRRT would be accessible. This would require that a new alignment be developed in Segment D to address the steep grades between the historic railroad grade near Lake Crescent and the current SRRT parking lot near the Lyre River. The trail would be paved with asphalt to a width of three feet with passing areas paved to a width of five feet as described in the outdoor accessibility guidelines. A four foot wide, unpaved shoulder would be developed immediately adjacent to the accessible trail surface to accommodate equestrians and other trail users who prefer to travel on an unpaved surface.

Table 11. Alternative 2, trail standards accessible (alt 2)

TRAIL STANDARD	ACCESSIBLE RECREATION TRAIL (Alt 2)
Firm & Stable Tread width	36" minimum 5' maximum
Gravel or Natural Tread width	48" maximum
Clearing and Brushing	12' lateral 12' vertical
Maintenance frequency	Annual +
Bridge width	8' decking maximum
<p>Accessible Recreation Trails — these trails are open to hikers, stock, and bicycles and are designed to meet federal outdoor accessibility guidelines for recreational trails. These trails are a combination of firm & stable (hardened) surface and gravel or natural tread surface (in areas where stock use is permitted), and are designed for relatively inexperienced users. Accessible recreation trails are maintained to a standard for higher use volumes.</p>	

The specific accessibility design guidelines that would apply to Alternative 2 are included below.

1017 Trails (Access Board, 2009)

1017.1 General. Trails shall comply with 1017.

EXCEPTIONS: 1. where an entity determines that a condition in 1019 does not permit full compliance with a specific requirement in 1017 on a portion of a trail, that portion of the trail shall comply with the specific requirement to the maximum extent feasible. The entity shall document the basis for the determination, and shall maintain the

documentation with the records for the construction or alteration project.

2. Where an entity determines that it is impracticable for an entire trail to comply with 1017, the trail shall not be required to comply with 1017. The entity shall document the basis for the determination, and shall maintain the documentation with the records for the construction or alteration project.

Advisory 1017.1 General Exception 1. Exception 1 can be applied to specific requirements in 1017 on a portion of a trail where full compliance with the requirement cannot be achieved due to any of the conditions in 1019.

Advisory 1017.1 General Exception 2. An entity should first apply Exception 1 to determine the portions of a trail where full compliance with the specific requirements in 1017 cannot be achieved. An entity should then evaluate the entire trail, taking into account the portions of the trail that can and cannot fully comply with the requirements in 1017 and the extent of compliance where full compliance cannot be achieved to determine whether it would be impracticable for the entire trail to comply with 1017. The determination is made on a case-by-case basis.

1017.2 Surface. The surface of trails and their related passing spaces and resting intervals shall be firm and stable.

Advisory 1017.2 Surface. A stable surface remains unchanged by applied force so that when the force is removed, the surface returns to its original condition. A firm surface resists deformation by indentations.

1017.3 Clear Tread Width. The clear tread width of trails shall be 36 inches (915 mm) minimum.

EXCEPTION: The clear tread width shall be permitted to be reduced to 32 inches (815 mm) minimum for a length of 24 inches (610 mm) maximum provided that reduced width segments are separated by segments that are 48 inches (1220 mm) long minimum and 36 inches (915 mm) wide minimum.

1017.4 Passing Spaces. Trails with a clear tread width less than 60 inches (1525 mm) shall provide passing spaces complying with 1017.4 at intervals of 1000 feet (300 m) maximum. Where the full length of the trail does not comply with 1017, the last passing space shall be located at the end of the trail segment complying with 1017. Passing spaces and resting intervals shall be permitted to overlap.

Advisory 1017.4 Passing Spaces. Entities should consider providing either a 60 inches (1525 mm) minimum clear tread width, or passing spaces at shorter intervals if the clear tread width is less than 60 inches (1525 mm), where a trail is:

- Heavily used;
- A boardwalk; or
- Not at the same level as the ground surface adjoining the trail.

Where the full length of the trail does not comply with 1017, placing the last passing space at the end of the trail segment complying with 1017 enables a person using a wheelchair to turn around and exit the trail.

1017.4.1 Size. The passing space shall be either:

1. A space 60 inches (1525 mm) minimum by 60 inches (1525 mm) minimum; or
2. The intersection of two trails providing a T-shaped space complying with 304.3.2 where the base and the arms of the T-shaped space extend 48 inches (1220 mm) minimum beyond the intersection. Vertical alignment at the intersection of the trails that form the T-shaped space shall be nominally planar.

1017.5 Obstacles. Tread obstacles on trails and their related passing spaces and resting intervals shall comply with 1017.5.

1017.5.1 Concrete, Asphalt, or Boards. Where the surface is concrete, asphalt, or boards, tread obstacles shall not exceed ½ inch (13 mm) in height measured vertically to the highest point.

1017.5.2 Other Surfaces. Where the surface is other than specified in 1017.4.1, tread obstacles shall not exceed 2 inches (50 mm) in height measured vertically to the highest point.

Advisory 1017.5 Tread Obstacles. The vertical alignment of joints in concrete, asphalt, or board surfaces can be tread obstacles. Natural features, such as tree roots and rocks, within the trail tread can also be tread obstacles. Where possible, tread obstacles should be separated by a distance of 48 inches (1220 mm) minimum so persons who use wheelchairs can maneuver around the obstacles.

1017.6 Openings. Openings in the surface of trails and their related passing spaces and resting intervals shall comply with 302.3.

EXCEPTION: Openings shall be permitted to be to be a size that does not permit passage of a ¾ inch (19 mm) sphere where openings that do not permit the passage of a ½ inch (6.4 mm) sphere cannot be provided due to the conditions in 1019.

1017.7 Slopes. The slopes of trails shall comply with 1017.7.

1017.7.1 Running Slope. No more than 30 percent of the total length of a trail shall have a running slope steeper than 1:12. The running slope of any segment of a trail shall not be steeper than 1:8. Where the running slope of a segment of a trail is steeper than 1:20, the maximum length of the segment shall be in accordance with Table 1017.7.1, and a resting interval complying with 1017.8 shall be provided at each end of the segment.

Table 1017.7.1 Running Slope and Resting Intervals

Running Slope of Trail Segment		Maximum Length of Segment
Steeper than	But not Steeper than	
1:20	1:12	200 feet (61 m)
1:12	1:10	30 feet (9 m)
1:10	1:8	10 feet (3050 mm)

Advisory 1017.7.1 Running Slope. Running slope can also be expressed as a percentage (grade).

1017.7.2 Cross Slope. The cross slope shall comply with 1017.6.2.

1017.7.2.1 Concrete, Asphalt, or Boards. Where the surface is concrete, asphalt, or boards, the cross slope shall not be steeper than 1:48.

1017.7.2.2 Other Surfaces. Where the surface is other than specified in 1017.7.2.1, the cross slope on other surfaces shall not be steeper than 1:20.

1017.8 Resting Intervals. Resting intervals shall comply with 1017.8.

1017.8.1 Length. The resting interval length shall be 60 inches (1525 mm) long minimum.

1017.8.2 Width. Where resting intervals are provided within the trail tread, resting intervals shall be at least as wide as the widest segment of the trail tread leading to the resting interval. Where resting intervals are provided adjacent to the trail tread, the resting interval clear width shall be 36 inches (915 mm) minimum.

1017.8.3 Slope. Resting intervals shall have a slope complying with 1017.8.3.

1017.8.3.1 Concrete, Asphalt, or Boards. Where the surface is concrete, asphalt, or boards, the slope shall not be steeper than 1:48 in any direction.

1017.8.3.2 Other Surfaces. Where the surface is other than specified in 1017.8.3.1, the slope on other surfaces shall not be steeper than 1:20 in any direction.

1017.8.4 Turning Space. Where resting intervals are provided adjacent to the trail tread, a turning space complying with 304.3.2 shall be provided. Vertical alignment between the trail tread, turning space, and resting interval shall be nominally planar.

1017.9 Protruding Objects. Constructed elements on trails and their related resting intervals and passing spaces shall comply with 307.

Advisory 1017.9 Protruding Objects. Protruding objects on trails and their related resting intervals and passing spaces can be hazardous for persons who are blind or have low vision. Signs and other post mounted objects are examples of constructed elements that can be protruding objects.

1017.10 Gates and Barriers. Where gates or barriers are constructed to control access to trails, gates and barriers shall comply with 1017.10.

1017.10.1 Clear Width. Gate openings and openings in barriers for hiker passage shall provide a clear width complying with 404.2.3.

1017.10.2 Gate Hardware. Gate hardware shall comply with 404.2.7.

1017.11 Trail Signs. Trail signs shall include the following information:

1. Length of the trail or trail segment;
2. Surface type;
3. Typical and minimum tread width;
4. Typical and maximum running slope; and
5. Typical and maximum cross slope.

Construction Details

The trail corridor would be cleared to a maximum width of 12 feet. Road base would be placed to a width of 8 feet, with future passing areas receiving a road base 10 feet wide to allow for wider pavement while retaining the width of gravel shoulder in these locations. A 36 inch wide, asphalt paved trail with 5 foot wide asphalt paved passing spaces placed at regular intervals of approximately 1,000 feet at locations designed to minimize resource impact, as described above. An approximately 4-foot wide gravel shoulder would be retained upslope and immediately adjacent to the paved trail to provide access for stock users. An 8"- 12" gravel shoulder would be retained on the downslope side of the paved trail to protect the edge of the asphalt.

Lake Crescent Trail Segment D Construction Details

A new alignment would be developed to create a trail grade that meets outdoor accessibility guidelines previously described. The alignment would utilize the existing trail corridor where

practicable, and would develop new trail in areas where the current alignment is too steep to provide accessible grades. The trail alignment would be cleared to a width of no more than 12 feet. Road base would be placed to a width of up to 8 to 10 feet. Trail surface would match what is described above. The trail alignment would be slightly modified to avoid new construction on the corner of private property. A gravel shoulder up to 4 feet wide would be retained upslope and immediately adjacent to the paved trail to provide access for stock users. This shoulder may be narrowed in some areas to avoid impacts to large trees or avoid other resource impacts. An 8"-12" gravel shoulder would be retained on the downslope side of the paved trail to protect the edge of the asphalt. Where necessary, a retaining structure would be placed to support the uphill bank.

Table 12. Alternative 2, Segment A

Alt 2 Segment A	
Construction Requirements	Quantities
Length of trail segment	5,650 linear feet
Volume of excavation/cut required	1,645 cubic yards
Volume of fill required	250 cubic yards
Volume of base material placed	1438 cubic yards
Volume of asphalt placed	107 cubic yards
Maximum number of trees removed (11" – 23" dbh)	21
Maximum number of trees removed (\geq 24" dbh)	1 (26" dbh)
Work type	Duration (approx.)
Clearing and grubbing; excavation; placing fill, base and asphalt	30 days

Table 13. Alternative 2, Segment B

Alternative 2, Segment B	
Construction Requirements	Quantities
Length of trail segment	8400 linear feet
Volume of excavation/cut required	5633 cubic yards
Volume of fill required	1354 cubic yards
Volume of base material placed	2138 cubic yards
Volume of asphalt placed	159 cubic yards
Maximum number of trees removed (11" – 23" dbh)	60
Maximum number of trees removed (\geq 24" dbh)	0
Work type	Duration (approx.)
Clearing and grubbing; excavation and placement of gravel where needed	42 days

Table 14. Alternative 2, Segment C

Alternative 2, Segment C	
Construction Requirements	Quantities
Length of trail segment	2475 linear feet
Volume of excavation/cut required	21.5 cubic yards
Volume of fill required	8.6 cubic yards
Volume of base material placed	630 cubic yards
Volume of asphalt placed	47 cubic yards
Maximum number of trees removed (11" – 23" dbh)	-5
Maximum number of trees removed (≥ 24" dbh)	0
Work type	Duration (approx.)
Clearing and grubbing; excavation and placement of gravel where needed	8 days

Table 15. Alternative 2, Segment D

Alternative 2, Segment D	
Construction Requirements	Quantities
Length of trail segment	3,832 linear feet
Volume of excavation/cut required	1,041 cubic yards
Volume of fill required	308 cubic yards
Volume of base material placed	975 cubic yards
Volume of asphalt placed	72 cubic yards
Maximum number of trees removed (11" – 23" dbh)	26
Maximum number of trees removed (≥ 24" dbh)	10
Work type	Duration (approx.)
Clearing and grubbing; excavation and placement of gravel where needed	85 days

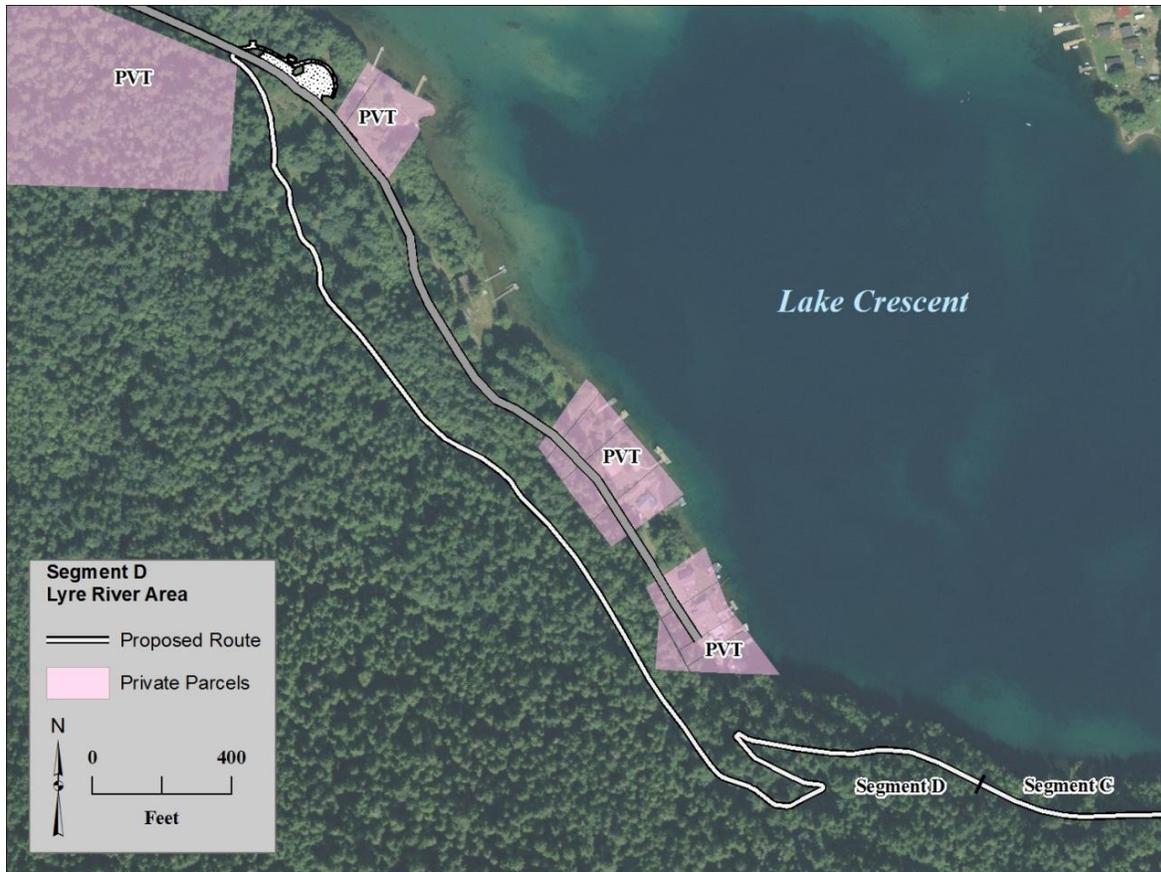


Figure 17, Segment D Trail Alignment for Alts 2, 4, 5.

Railroad Tunnels & Bypass Trails

Under Alternative 2, both historic railroad tunnels would be opened as described under “Activities Common to All Action Alternatives.” The accessible trail standard described above would extend through both tunnels, providing a continuous trail experience from the Lyre River Trailhead to the intersection with Phase 1 above Camp David Junior Road.

Both tunnel bypass trails would be maintained in substantially the same condition. The tunnel bypass trails would be signed and managed for pedestrian use only to provide an opportunity for people to have a trail experience at Lake Crescent without bicycles or stock use. The bridge located on the east (long) railroad tunnel bypass trail at the Devil’s Punchbowl would be maintained to accommodate use by pedestrians, consistent with park trail guidelines.

Alternative 3 - Accessible from Camp David Jr. Road to beginning of Segment D (not accessible from Lyre River), 6 ft. asphalt and 4 ft. gravel

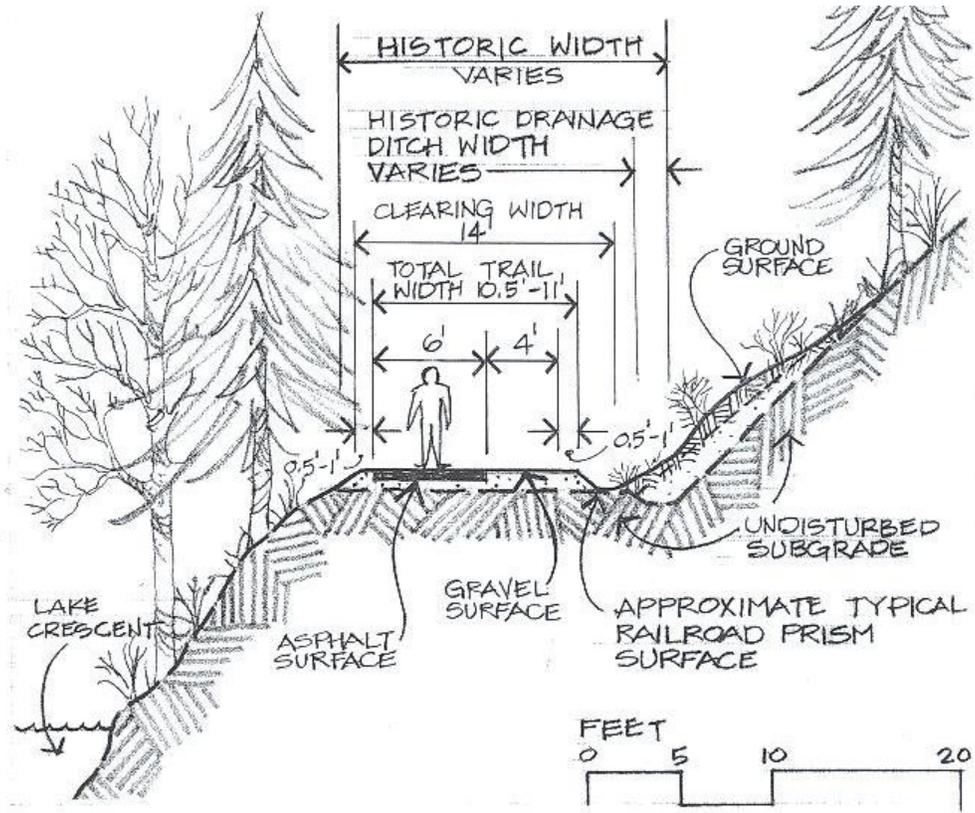


Figure 18. Alternative 3 Trail Profile

Spruce Railroad Trail

Under Alternative 3, the NPS would make improvements to the Spruce Railroad Trail (SRRT) near Lake Crescent as described in the 2011 SRRT EA. The trail alignment would remain in its current location with minor lateral adjustments, up to three feet from the current trail alignment on the railroad grade, to better accommodate site conditions. Both railroad tunnels would be re-opened to allow the existing trail to be widened and developed to meet accessibility standards along the general route of the historic Spruce Railroad grade. Implementation of the proposed trail improvements would occur over time, in phases.

Segments A, B and C: The existing Spruce Railroad Trail would be developed and maintained in accordance with the new ONP trail standard as described in the table below. This would amend the range of existing park trail standards to provide an accessible trail with six feet of asphalt paved surface and an adjacent 4 feet of gravel surface for equestrian use.

Table 16. Alternative 3, trail standards accessible (asphalt)

ONP TRAIL STANDARD	SRRT – ACCESSIBLE (asphalt)
Firm & Stable Tread width	6' maximum
Gravel or Natural Tread width	4' maximum
Clearing and Brushing	14' lateral 12' vertical
Maintenance frequency	Annual +
Bridge width	8' decking maximum
<p>SRRT Accessible (asphalt) — these trails are open to hikers, stock, and bicycles and are designed to meet federal outdoor accessibility guidelines for shared use paths to provide access for people with disabilities. These trails are a combination of accessible firm & stable (hardened) surface and gravel or natural tread surface, and are designed for large numbers of relatively inexperienced users. SRRT accessible trails are maintained to a standard for higher use volumes.</p>	

This new ONP trail standard would adopt guidance described in the proposed rulemaking for developing guidelines for federal shared use paths. The guidance described meets and exceeds the minimum outdoor accessibility guidelines described for Alternative 2. These paths are designed for both transportation and recreation purposes and are used by pedestrians, bicyclists, skaters, equestrians, and other users. An advance notice of the proposed rulemaking was published in the Federal Register on March 28, 2011 (Access Board, 2011). These guidelines are proposed by the Architectural and Transportation Barriers Compliance Board (Access Board) to include technical provisions for making newly constructed and altered shared use paths covered by the Americans with Disabilities Act of 1990 (ADA) and the Architectural Barriers Act of 1968 (ABA) accessible to persons with disabilities. Excerpts from the proposed rulemaking are included below.

Draft Technical Provisions for Shared Use Paths (Access Board, 2011)

The draft technical provisions establish criteria for the following components of a shared use path: surface; changes in level (vertical alignment and surface

discontinuities); horizontal openings; width; grade and cross slope; protruding objects; gates and barriers; and intersections and curb ramps.

1. Surface

Surface. The surface of the shared use path shall be firm, stable, and slip resistant.

A firm, stable, and slip resistant surface is necessary for persons with disabilities using wheeled mobility devices. Bicyclists with narrow-tired bicycles and in-line skaters also need a hard, durable surface. Shared use paths typically are comprised of asphalt or concrete and these surfaces are generally accessible for people with disabilities. These surfaces perform well in inclement weather and require minimal maintenance. Unpaved surfaces that are firm, stable, and slip resistant may be used; however, they may erode over time requiring regular maintenance.

2. Changes in Level

Vertical Alignment. Vertical alignment shall be planar within curb ramp runs, blended transitions, landings, and gutter areas within the shared use path. Grade breaks shall be flush.

Surface Discontinuities. Surface discontinuities shall not exceed 0.50 inch (13 mm) maximum. Vertical discontinuities between 0.25 inch (6.4 mm) and 0.5 inch (13 mm) maximum shall be beveled at 1:2 maximum. The bevel shall be applied across the entire level change.

In addition to firm, stable, and slip resistant surfaces, smooth surfaces are also necessary for the safe use of wheeled mobility devices, as well as bicycles and in-line skaters. The draft technical provisions allow vertical changes in level up to 1/4 inch without treatment and other vertical changes in level from 1/4 to 1/2 inch if they are beveled with a slope no greater than 1:2. Surfaces with individual units laid out of plane and those that are heavily textured, rough, or chamfered, will greatly increase rolling resistance and will subject pedestrians who use wheelchairs, scooters, and rolling walkers to the stressful (and often painful) effects of vibration. Surface discontinuities are also dangerous for bicyclists and in-line skaters. It is highly desirable to minimize surface discontinuities. However, when discontinuities are unavoidable, they should be widely separated.

3. Horizontal Openings

Joints and Gratings. Openings shall not permit passage of a sphere more than 0.5 inch (13 mm) in diameter. Elongated openings shall be placed so that the long dimension is perpendicular to the dominant direction of travel.

Surface openings or gaps must be minimized in order to ensure a smooth surface on shared-use paths. Utility covers and drainage grates can be hazards and, for the safety of all users, must be treated.

The draft technical provisions for surface gaps in shared use paths are consistent with the draft provisions in the Pedestrian Access Route - Sidewalk Guidelines. In

most cases, the guidelines will require surface gaps or openings on shared use paths to be no wider than 1/2 inch.

4. Width

Width. The clear width of shared use paths shall be 5 feet (1.5 m) minimum.

The Board is considering requiring accessible shared use paths to provide at least 5 feet minimum width to address those rare circumstances where the AASHTO Bicycle Facilities Guide is not applied so that sufficient space is provided for wheelchair turning and to allow wheelchair users and others to pass one another.

5. Grade and Cross Slope

Grade. The maximum grade of a shared use path shall be 5 percent.

Exception: Where the shared use path is contained within a street or highway border, its grade shall not exceed the general grade established for the adjacent street or highway.

Cross Slope. The maximum cross slope shall be 2 percent.

6. Protruding Objects

Protruding Objects. Protruding objects along or overhanging any portion of the shared use path shall not reduce the clear width of the shared use paths.

Protrusion Limits. Objects with leading edges more than 27 inches (685 mm) and not more than 80 inches (2 m) above the finish surface or ground shall not protrude more than 4 inches (100 mm) horizontally into shared use paths.

Post-Mounted Objects. Where objects are mounted on free-standing posts or pylons and the objects are 27 inches (685 mm) minimum and 80 inches (2030 mm) maximum above the finish surface or ground, the objects shall not overhang shared use paths more than 4 inches (100 mm) beyond the post or pylon base measured 6 inches (150 mm) minimum above the finish surface or ground. Where a sign or other obstruction is mounted between posts or pylons and the clear distance between the posts or pylons is greater than 12 inches (305 mm) the lowest edge of sign or obstruction shall be 27 inches (685 mm) maximum or 80 inches (2 m) minimum above the finish surface or ground.

The draft technical provisions for protruding objects are derived from the Board's ADA and ABA Accessibility Guidelines and Pedestrian Access Route – Sidewalk Guidelines. The provisions addresses objects that may project into shared use paths in a manner hazardous to people with vision impairments. Any protrusion on a shared use path is considered hazardous for all users, including individuals with disabilities. These technical provisions would apply to the full width of the shared use path. Objects mounted on walls or posts with leading edges above the standard sweep of canes (27 inches) and below the standard head room clearance (80 inches) would be limited to a 4 inch protrusion.

7. Gates and Barriers

Clear Width. Where gates or other barriers are provided, openings in gates and barriers shall provide a clear width of 32 inches (815 mm) minimum.

The draft technical provisions for gates and barriers are based on the Board's ADA and ABA Accessibility Guidelines and Trails Guidelines. Gates or barriers often are wider than 32 inches to allow for the safe passage of bicycles and other authorized users of shared use paths. The Board is proposing to require a 32 inch minimum clearance to address the rare circumstance where gate or barrier openings are deliberately narrow and could restrict access by wheelchair users unless a minimum width applies. A 32 inch wide clear opening provides the minimum clearance necessary to allow passage of an occupied wheelchair or other mobility device. The operation and location provisions for gate hardware are necessary to ensure that individuals with disabilities can operate the hardware.

Lake Crescent Segments A, B, & C Construction Details

The trail corridor would be cleared to a width of 14 feet, with minimal additional cleared areas to accommodate construction access and turnaround areas. Road base would be placed to a width of 11 feet and depth of 10 inches to rehabilitate the feeling and appearance of the historic railroad profile and ditches. Asphalt would be placed to provide a 6-foot wide, universally accessible paved trail surface, consistent with the draft shared use path guidelines published by the Access Board as described above. A 4-foot wide gravel shoulder would be retained upslope and immediately adjacent to the paved trail to provide access for stock users. An 8"- 12" gravel shoulder would be retained on the downslope side of the paved trail to protect the edge of the asphalt.

Historic railroad ditches would be cleared of debris and stabilized where appropriate to rehabilitate historic features. Historic railroad ditches would not be cleared outside of the construction limits or in areas where this would create slope instability that would compromise the integrity of the trail, including surface drainage patterns.

Table 17. Alternative 3, Segment A

Alternative 3, Segment A	
Construction Requirements	Quantities
Length of trail segment	5650 linear feet
Volume of excavation/cut required	5050 cubic yards
Volume of fill required	325 cubic yards
Volume of base material placed	1918 cubic yards
Volume of asphalt placed	209 cubic yards
Maximum number of trees removed (11" – 23" dbh)	26
Maximum number of trees removed (≥ 24" dbh)	2 (24" and 26" dbh)
Work type	Duration (approx.)
Clearing and grubbing; excavation; placing fill, base and asphalt	35 days

Table 18. Alternative 3, Segment B

Alternative 3, Segment B	
Construction Requirements	Quantities
Length of trail segment	8400 linear feet
Volume of excavation/cut required	6550 cubic yards
Volume of fill required	1575 cubic yards
Volume of base material placed	2852 cubic yards
Volume of asphalt placed	311 cubic yards
Maximum number of trees removed (11" – 23" dbh)	69
Maximum number of trees removed (≥ 24" dbh)	2 (24" dbh)
Work type	Duration (approx.)
Clearing and grubbing; excavation; placing fill, base and asphalt	48 days

Table 19. Alternative 3, Segment C

Table 2.14 Alternative 3, Segment C	
Construction Requirements	Quantities
Length of trail segment	2475 linear feet
Volume of excavation/cut required	25 cubic yards
Volume of fill required	10 cubic yards
Volume of base material placed	840 cubic yards
Volume of asphalt placed	92 cubic yards
Maximum number of trees removed ($\geq 11''$ dbh)	6
Maximum number of trees removed ($\geq 24''$ dbh)	0
Work type	Duration (approx.)
Clearing and grubbing; excavation; placing fill, base and asphalt	9 days

Segment D: The existing Spruce Railroad Trail would be developed and maintained in accordance with the new SRRT trail standard. This would amend the range of existing park trail standards.

Table 20. Alternative 3, trail standards (SRRT)

ONP TRAIL STANDARD	SRRT
Firm & Stable Tread width	6' maximum
Gravel or Natural Tread width	4' maximum
Clearing and Brushing	14' lateral
	10' vertical
Maintenance frequency	Annual +
Bridge width	8' decking maximum
<p>SRRT — these trails are open to hikers, stock, and bicycles. These trails are a combination of firm & stable (hardened) surface and gravel or natural tread surface, and are designed for large numbers of relatively inexperienced users. SRRT trails are maintained to a standard for higher use volumes.</p>	

Lake Crescent Trail Segment D Construction Details

Road base would be placed to a width of up to 11 feet. The existing Spruce Railroad Trail would be developed to provide a 6 feet wide paved trail surface. The trail alignment would be slightly modified to avoid new construction on the corner of private property. A gravel shoulder up to 4 feet wide would be retained upslope and immediately adjacent to the paved trail to provide access for stock users. This shoulder may be narrowed in some areas to avoid impacts to large trees or avoid other resource impacts. An 8"- 12" gravel shoulder would be retained on the downslope side of the paved trail to protect the edge of the asphalt. Where necessary, a retaining structure would be placed to support the uphill bank. Segment D would not be developed to achieve a universally accessible trail grade due to the steepness of the slope (18%) to minimize disturbance to park resources that would be required to achieve an accessible grade.

Table 21. Alternative 3, Segment D

Alternative 3, Segment D	
Construction Requirements	Quantities
Length of trail segment	3,250 linear feet
Volume of excavation/cut required	250 cubic yards
Volume of fill required	200 cubic yards
Volume of base material placed	389 cubic yards
Volume of asphalt placed	117 cubic yards
Length of retaining structure	200 feet
Maximum number of trees removed (11" – 23" dbh)	11
Maximum number of trees removed (\geq 24" dbh)	7 (24", 26", 30" dbh)
Work type	Duration (approx.)
Clearing and grubbing; excavation; placing fill, base and asphalt	39 days

Alternative 4 – NPS Preferred Alternative, Accessible 10.5 ft. non-asphalt, firm and stable surface

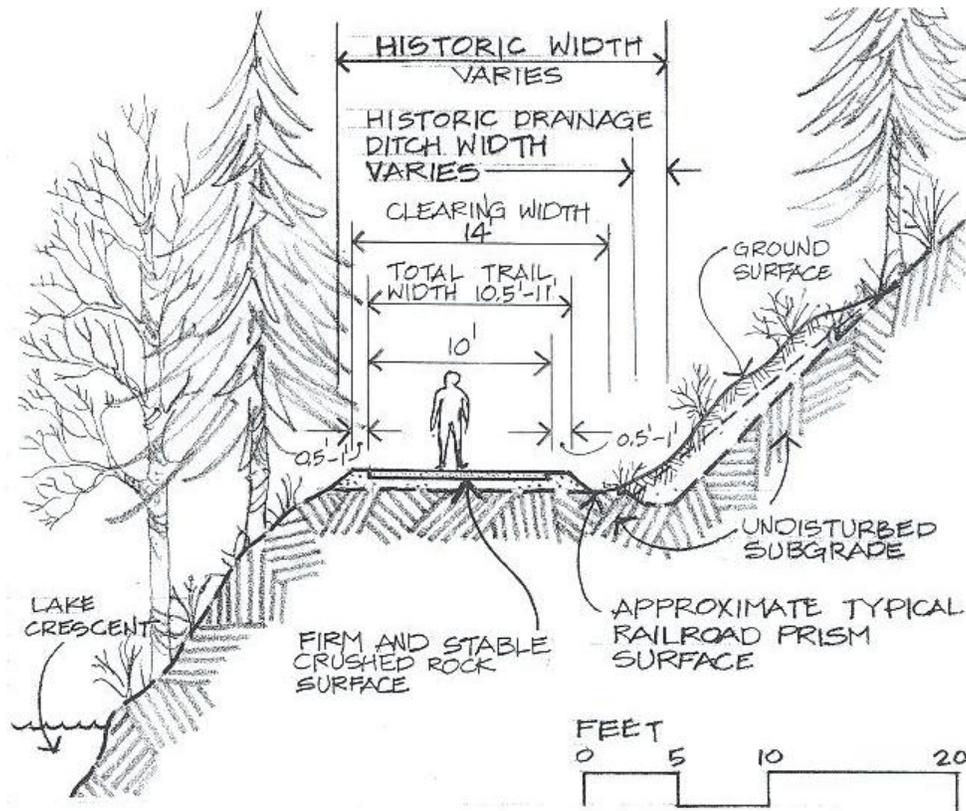


Figure 19. Alternative 4 Trail Profile

Spruce Railroad Trail

Under Alternative 4, the NPS would make improvements to the Spruce Railroad Trail (SRRT) to meet and exceed the guidelines for providing an accessible trail as described in the Draft Final Accessibility Guidelines for Outdoor Developed Areas published on October 19, 2009 (Access Board, 2009) described in Chapter 2. These guidelines are proposed by the Architectural and Transportation Barriers Compliance Board (Access Board) pursuant to the Architectural Barriers Act (ABA) for camping facilities, picnic facilities, viewing areas, outdoor recreation access routes, trails, and beach access routes that are constructed or altered by or on behalf of the Federal government. This would amend the range of existing park trail standards as described in the 2008 General Management Plan (GMP).

Table 22. Alternative 4, trail standards, SRRT (accessible)

ONP TRAIL STANDARD	SRRT – ACCESSIBLE
Firm & Stable Tread width (non-asphalt)	8' minimum 11' maximum
Clearing and Brushing	14' lateral 12' vertical
Maintenance frequency	Annual +
Bridge width	8' decking maximum
<p>SRRT Accessible — these trails are open to hikers, stock, and bicycles and are designed to meet federal outdoor accessibility guidelines to provide access for people with disabilities. These trails provide an accessible firm & stable surface (non-asphalt), and are designed for large numbers of relatively inexperienced users. SRRT accessible trails are maintained to a standard for higher use volumes.</p>	

All segments of the SRRT would be accessible. This would require that a new alignment be developed in Segment D as described in Alternative 2 to address the steep grades between the historic railroad grade near Lake Crescent and the current SRRT parking lot near the Lyre River. The trail would be constructed to provide a 10.5 foot wide, firm and stable, non-asphalt surface. The trail would be shared by pedestrians, equestrians, bicyclists, and people traveling in wheelchairs.

The trail corridor would be cleared to a width of 14 feet, with minimal additional cleared areas to accommodate construction access and turnaround areas. Road base would be placed to a width of 11 feet and depth of 10 inches to rehabilitate the feeling and appearance of the historic railroad profile and ditches. Historic railroad ditches would be cleared of debris and stabilized where appropriate to rehabilitate historic features. Historic railroad ditches would not be cleared outside of the construction limits or in areas where this would create slope instability that would compromise the integrity of the trail, including surface drainage patterns.

Table 23. Alternative 4, Segment A

Alternative 4, Segment A	
Construction Requirements	Quantities
Length of trail segment	5650 linear feet
Volume of excavation/cut required	5050 cubic yards
Volume of fill required	325 cubic yards
Volume of base material placed	1918 cubic yards
Volume of asphalt placed	N/A
Maximum number of trees removed (11" – 23" dbh)	26
Maximum number of trees removed (≥ 24" dbh)	2 (24" and 26" dbh)
Work type	Duration (approx.)
Clearing and grubbing; excavation; placing fill, base and asphalt	32 days

Table 24. Alternative 4, Segment B

Alternative 4, Segment B	
Construction Requirements	Quantities
Length of trail segment	8400 linear feet
Volume of excavation/cut required	6550 cubic yards
Volume of fill required	1575 cubic yards
Volume of base material placed	2852 cubic yards
Volume of asphalt placed	N/A
Maximum number of trees removed (11" – 23" dbh)	69
Maximum number of trees removed (≥ 24" dbh)	2 (24" dbh)
Work type	Duration (approx.)
Clearing and grubbing; excavation; placing fill, base and asphalt	45 days

Table 25. Alternative 4, Segment C

Alternative 4, Segment C	
Construction Requirements	Quantities
Length of trail segment	2475 linear feet
Volume of excavation/cut required	25 cubic yards
Volume of fill required	10 cubic yards
Volume of base material placed	840 cubic yards
Volume of asphalt placed	N/A
Maximum number of trees removed ($\geq 11''$ dbh)	6
Maximum number of trees removed ($\geq 24''$ dbh)	0
Work type	Duration (approx.)
Clearing and grubbing; excavation; placing fill, base and asphalt	8 days

Table 26. Alternative 4, Segment D

Alternative 4, Segment D	
Construction Requirements	Quantities
Length of trail segment	3,832 linear feet
Volume of excavation/cut required	1,210 cubic yards
Volume of fill required	358 cubic yards
Volume of base material placed	1,248 cubic yards
Volume of asphalt placed	N/A
Maximum number of trees removed (11" – 23" dbh)	26
Maximum number of trees removed ($\geq 24''$ dbh)	10
Work type	Duration (approx.)
Clearing and grubbing; excavation and placement of gravel where needed	75 days

Railroad Tunnels & Bypass Trails

Under Alternative 4, both historic railroad tunnels would be opened as described under “Activities Common to All Action Alternatives.” The accessible trail standard described above would extend through both tunnels, providing a continuous trail experience. Both tunnel bypass trails would be maintained in substantially the same condition. The tunnel bypass trails would be signed and managed for pedestrian and equestrian use only to provide an opportunity for people to have a less developed trail experience at Lake Crescent while allowing a bypass for equestrians who may be uncomfortable bringing their stock through the railroad tunnels. The bridge located on the east (long) railroad tunnel bypass trail at the Devil’s Punchbowl would be repaired or replaced to accommodate use by pedestrians and equestrians, consistent with park trail guidelines.

Alternative 5 - Accessible (8 ft. asphalt) with 3 ft. unpaved shoulder

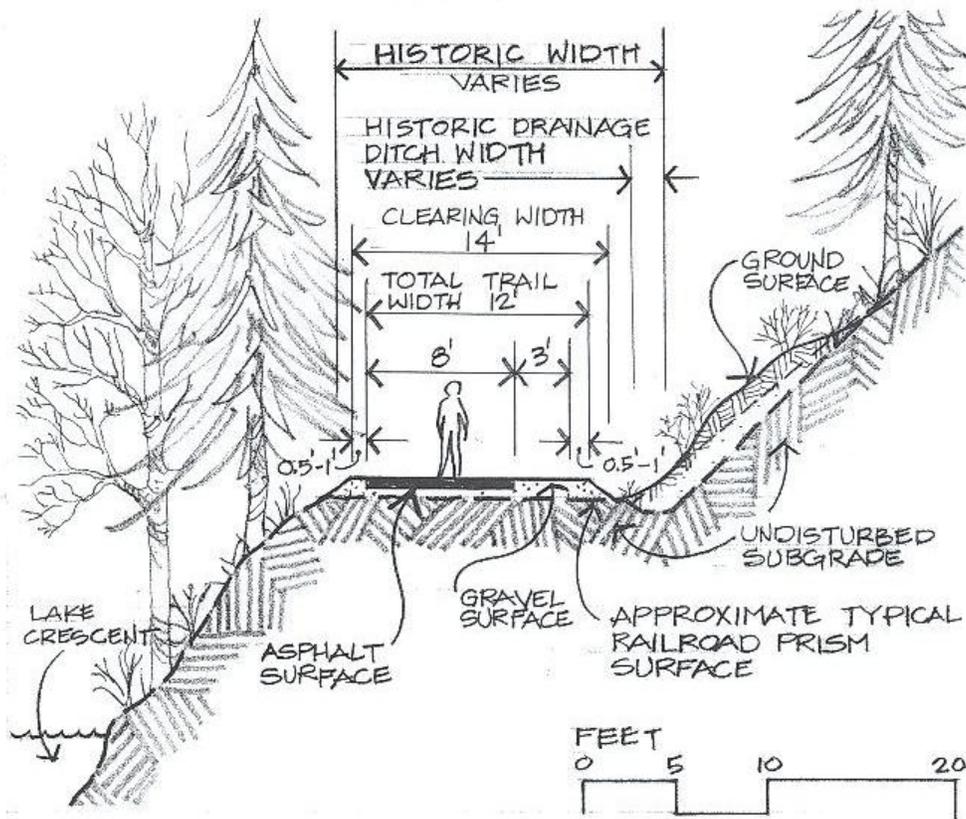


Figure 20. Alternative 5 Trail Profile

Spruce Railroad Trail

Under Alternative 5, the NPS would make improvements to the Spruce Railroad Trail (SRRT) to meet and exceed the guidelines for providing an accessible trail as described in the Draft Final Accessibility Guidelines for Outdoor Developed Areas published on October 19, 2009 (Access Board, 2009). These guidelines are proposed by the Architectural and Transportation Barriers Compliance Board (Access Board) pursuant to the Architectural Barriers Act (ABA) for camping facilities, picnic facilities, viewing areas, outdoor recreation access routes, trails, and beach access routes that are constructed or altered by or on behalf of the Federal government. These guidelines are described in Alternative 2. This would amend the range of existing park trail standards as described in the 2008 General Management Plan (GMP).

All segments of the SRRT would be accessible. This would require that a new alignment be developed in Segment D to address the steep grades between the historic railroad grade near Lake Crescent and the current SRRT parking lot near the Lyre River. The trail would be paved

with asphalt to a width of eight feet. A three foot wide, unpaved shoulder would be developed immediately adjacent to the accessible trail surface to accommodate equestrians and other trail users who prefer to travel on an unpaved surface.

Table 27. Alternative 5, trail standards (accessible)

TRAIL STANDARD	ACCESSIBLE RECREATION TRAIL (Alt 5)
Firm & Stable Tread width	8' maximum
Gravel or Natural Tread width	36" maximum upslope 12" maximum downslope
Clearing and Brushing	14' lateral 12' vertical
Maintenance frequency	Annual +
Bridge width	8' decking maximum
<p>Accessible Recreation Trails — these trails are open to hikers, stock, and bicycles and are designed to meet and exceed federal outdoor accessibility guidelines for recreational trails. These trails are a combination of firm & stable (hardened) surface and gravel or natural tread surface (in areas where stock use is permitted), and are designed for relatively inexperienced users. Accessible recreation trails are maintained to a standard for higher use volumes.</p>	

Construction Details

The trail corridor would be cleared to a maximum width of 14 feet. Road base would be placed to a width of 12 feet. A maximum 8 foot wide, asphalt paved trail would be placed on the road base to leave an approximately 3-foot wide gravel shoulder upslope and immediately adjacent to the paved trail to provide access for stock users. An 8"-12" gravel shoulder would be retained on the downslope side of the paved trail to protect the edge of the asphalt.

Table 28. Alternative 5, Segment A

Alternative 5, Segment A	
Construction Requirements	Quantities
Length of trail segment	5,650 linear feet
Volume of excavation/cut required	5,807 cubic yards
Volume of fill required	374 cubic yards
Volume of base material placed	2,205 cubic yards
Volume of asphalt placed	285 cubic yards
Maximum number of trees removed (11" – 23" dbh)	24
Maximum number of trees removed (≥ 24" dbh)	3
Work type	Duration (approx.)
Clearing and grubbing; excavation; placing fill, base and asphalt	35 days

Table 29. Alternative 5, Segment B

Alternative 5, Segment B	
Construction Requirements	Quantities
Length of trail segment	8400 linear feet
Volume of excavation/cut required	7,532 cubic yards
Volume of fill required	1,811 cubic yards
Volume of base material placed	3,279 cubic yards
Volume of asphalt placed	423 cubic yards
Maximum number of trees removed (11" – 23" dbh)	69
Maximum number of trees removed (≥ 24" dbh)	2
Work type	Duration (approx.)
Clearing and grubbing; excavation and placement of gravel where needed	48 days

Table 30. Alternative 5, Segment C

Alternative 5, Segment C	
Construction Requirements	Quantities
Length of trail segment	2475 linear feet
Volume of excavation/cut required	25 cubic yards
Volume of fill required	10 cubic yards
Volume of base material placed	3,279 cubic yards
Volume of asphalt placed	125 cubic yards
Maximum number of trees removed (11" – 23" dbh)	6
Maximum number of trees removed (≥ 24" dbh)	0
Work type	Duration (approx.)
Clearing and grubbing; excavation and placement of gravel where needed	9 days

Table 31. Alternative 5, Segment D

Alternative 5, Segment D	
Construction Requirements	Quantities
Length of trail segment	3,832 linear feet
Volume of excavation/cut required	1,424 cubic yards
Volume of fill required	421 cubic yards
Volume of base material placed	1,362 cubic yards
Volume of asphalt placed	193 cubic yards
Maximum number of trees removed (11" – 23" dbh)	32
Maximum number of trees removed (≥ 24" dbh)	10
Work type	Duration (approx.)
Clearing and grubbing; excavation and placement of gravel where needed	90 days

Railroad Tunnels & Bypass Trails

Under Alternative 5, both historic railroad tunnels would be opened as described under “Activities Common to All Action Alternatives.” The accessible trail standard described above would extend through both tunnels, providing a continuous trail experience. Both tunnel bypass trails would be maintained in substantially the same condition. The tunnel bypass trails would be open to pedestrians, equestrians, and bicyclists. The bridge located on the east (long) railroad tunnel bypass trail at the Devil’s Punchbowl would be repaired or replaced as described in Alternatives 3 and 4 to accommodate use by equestrians, bicyclists, and pedestrians consistent with park trail guidelines.

Alternatives Considered but Dismissed

The action alternatives described in the 2011 SRRT EA were considered and dismissed in response to public concerns raised regarding accessibility for people with disabilities and the safety of developing trail in the park that would encourage people to utilize planned and unplanned at-grade crossings on Highway 101. The 2012 SRRT EA analyzes revised alternatives that were developed in response to public comments.

As described in the 2011 SRRT EA, the preliminary range of alternatives considered included an option that would be built to the standard AASHTO design guidelines for shared use paths. This would include a 10 feet wide asphalt paved surface with an adjacent 2 feet wide downslope shoulder to retain the edge of the asphalt, and a 4 feet wide upslope shoulder to provide access for people traveling with stock. This alternative would have resulted in a universally accessible route throughout the entire project area to connect with new sections of the Olympic Discovery Trail that are proposed for future construction outside the park.

This alternative was dismissed from the 2011 SRRT EA because the adverse impacts to natural and cultural resources near Lake Crescent that would be required to construct a trail to the standard AASHTO guidelines was determined to be unacceptable. Several people commented on the 2011 SRRT EA requesting that a fully AASHTO compliant alternative be considered. This alternative was considered but dismissed for the 2012 SRRT EA. Development of a fully AASHTO compliant trail would result in unacceptable impacts to park resources. This determination was based on a variety of factors, including the potential to adversely affect the historic Spruce Railroad, the degree of excavation required in areas with steep grades where slopes would be destabilized, and the extent of vegetation removal and associated impacts to wildlife habitat and visitor experience.

Management Actions Considered but Dismissed

The following management actions were identified during internal and public scoping for SRRT EA, 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.

Construct trail along historic railroad grade to the west of the existing Spruce Railroad Trail parking lot and to the immediate south of Highway 101 to avoid impacts to the surrounding areas in the park. Several comments were received during public scoping suggesting that the NPS consider a trail development alternative that was completely on the historic Spruce Railroad grade. Although the alternatives considered in this plan propose most trail development on the historic railroad grade, Segment D is proposed on other park lands because segments of the railroad grade are privately owned or outside the boundary of Olympic

National Park. This environmental assessment only considers actions that may be taken on NPS lands or under NPS jurisdiction. For this reason, no alternative is considered that would be built entirely on the historic Spruce Railroad grade. If in the future the owners of these private lands become willing sellers and the park has the opportunity to purchase these lands, additional opportunities for trail development on the historic railroad grade may exist.

Construct trail to road standards to allow use by emergency vehicles in the event Highway 101 is closed. The park received comments suggesting that the proposed trail be developed to road standards so that it may be used as an alternate vehicular route if Highway 101 was unavailable. This was dismissed as being outside of the scope of this plan. The purpose of this project is to make improvements to the Spruce Railroad Trail to provide for enhanced non-motorized trail use. Trail development would accommodate administrative vehicular use for trail maintenance and emergency response to the trail only.

Construct an underpass beneath Highway 101 to connect the proposed Lake Crescent and Sol Duc Trails while avoiding the at-grade crossing proposed by Clallam County. The park received numerous comments requesting an alternative to the at-grade trail crossing proposed by Clallam County on Highway 101. The at-grade trail crossing is proposed outside the boundary of Olympic National Park, and the NPS does not have jurisdiction related to this decision. The NPS would be willing to coordinate with the Washington State Department of Transportation and other adjacent property owners to evaluate the feasibility of a Highway 101 underpass should the opportunity become available in the future. However, this alternative is not feasible at this time due to the lack of NPS jurisdiction. This safety concern is one of the primary reasons the park has removed the Sol Duc trail sections from the 2012 SRRT EA. Public comments pointed out that even if the park develops a separate trailhead access at the current Sol Duc entrance road parking lot, people would still be likely to cross Highway 101 between Fairholme Hill and the Sol Duc Road in a location where sight lines are poor and could result in serious visitor injury or fatality. If this issue is resolved in the future, the NPS would consider trail development in the Sol Duc area through an updated, site-specific, public planning process.

Relocate the Spruce Railroad Trail parking lot near the Lyre River to minimize impacts to adjacent property owners. The park conducted a survey of an alternate and overflow parking lot location near the eastern trailhead to the Spruce Railroad Trail. Unfortunately, development of a new parking lot would require extensive removal of intact forests and the altering of surface drainage patterns, including in wetlands and areas adjacent to highly sensitive fish spawning areas and rare shoreline vegetation habitat. The NPS determined that this would result in unacceptable impacts to park resources. For this reason, this alternative was considered but dismissed.

Consideration of a revised proposal by Clallam County (as compared to Alternative 4 included in the SRRT EA). The National Park Service has received updated trail proposals from Clallam County, including a revised proposal submitted in January, 2012. The County's updated

proposals were considered as part of the public review and comment on the 2011 SRRT EA. The NPS incorporated several elements of the County's proposal into the alternatives considered in the 2012 SRRT EA. This includes consideration of an eight foot wide asphalt paved trail surface to meet AASHTO minimum width guidelines for bicycle trails in Alternative 5. The NPS also incorporated elements of Clallam County's proposed treatment of low-water crossings and bridges into the 2012 SRRT EA alternatives. The NPS considered, but dismissed the County's proposed trail alignment in Segment D because the County proposal would cross private lands and the NPS was successful in identifying a new alignment that would meet accessibility guidelines while staying entirely on NPS lands. The NPS considered but dismissed Clallam County's proposed construction methods because the NPS construction methods allow for the trail to be completed with fewer impacts to park resources. This includes less excavation and clearing on steep slopes and adjacent to Lake Crescent and the loss of fewer trees and associated wildlife habitat.

Develop SRRT to provide six feet asphalt and six feet of adjacent natural tread trail to provide passing width for horses, runners and mountain bikers the same as proposed for wheelchairs, pedestrians and road bicyclists. This alternative was considered but dismissed because the construction clearing limits would have required additional clearing and excavation beyond what was proposed in the NPS Preferred Alternative. The NPS chose to consider new alternatives that better achieve the goals and objectives of the project while avoiding or minimizing the extent of adverse impacts. This alternative would not avoid or minimize disturbance beyond what was initially considered in the 2011 SRRT EA.

Develop SRRT to provide 8 feet asphalt with only 2 feet gravel for equestrian use, or eliminate equestrian use. This alternative was considered but dismissed because equestrian use is one of the intended recreational uses of the Spruce Railroad Trail. Eliminating equestrian use is outside of the scope of the SRRT EA. Providing only two feet of shoulder adjacent to a paved trail that would attract a wide range of other user groups was determined to be insufficient for a front-country day use area where higher use levels are anticipated. Two feet was considered to be insufficient to allow for adequate passing distances between equestrians and other trail users.

Improve East Beach road to provide a safe bypass for cyclists around Lake Crescent for people arriving on Highway 101 corridor, not just for people arriving via Highway 112 via Water Line Road. East Beach Road is not entirely within the boundaries of Olympic National Park. Any improvements to East Beach Road would be considered through a separate planning process that involves all affected land managers and property owners. This action was determined to be outside of the scope of the SRRT EA.

Develop alternative to rip rap for downslope bank stabilization along Lake Crescent shoreline to mitigate impacts to aquatic habitat, such as those developed in other areas of the park that incorporate large woody debris. The NPS considered the action carefully, but determined that areas where downslope bank stabilization is proposed are associated with naturally steep and rocky drop-offs where large woody debris would not naturally accumulate. For this reason the proposed actions was considered but dismissed as a complete replacement to rip rap. As described in the SRRT EA, downslope bank stabilization in areas with remnants of the historic Spruce Railroad would be rehabilitated to provide structural stability in a manner consistent with cultural resource guidelines while minimizing potential impacts to water quality

and shoreline processes to the greatest extent possible. In areas where remnants of the historic railroad are not present, the NPS would utilize the minimum amount of bank stabilization necessary to provide structural integrity for the trail. In areas where appropriate, use of vegetation for bank stabilization would be incorporated into the project design.

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 Council on Environmental Quality (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).

Ordinarily, this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources. The following paragraphs compare how well each of the alternatives considered meet criteria 1- 5 described above. The alternatives considered in this document do not measurably vary in how well they meet criteria 6.

- 1) Fulfilling the responsibilities of each generation as trustee of the environment for succeeding generations:
 - Alternative 1 reflects implementation of National Park Service legal and policy guidance related to the protection of the environment for future generations. There

would be no new impacts to natural or cultural resources, although there would be some continued deterioration of some elements of the historic Spruce Railroad Grade (wood culverts, wood tunnel support beams, historic timber half-bridges/cribbing, and dry laid rock wall due to a lack of preservation maintenance or rehabilitation).

- Alternatives 2, 3, 4, and 5 all would require construction related impacts to the environment within the project area, but these impacts would be mitigated to ensure that the integrity of the environment is not impaired over the long-term for future generations. Of these alternatives, Alternative 2 would result in the least construction related impacts, to natural resources. Alternatives 3, 4, and 5 would result in greater disturbance to natural resources because the trail corridor would be wider than what is proposed under Alternative 2. Alternative 3 would result in slightly less disturbance in Segment D because a new accessible trail alignment would not be constructed.
- Under Alternative 1 the historic Spruce Railroad would be adversely affected by the deterioration of wood culverts and timber tunnel supports. Alternatives 2, 3, 4, and 5 would rehabilitate the historic railroad grade, wood cribbing, and railroad tunnels. The dry laid retaining wall would be retained. Wood culverts would remain in place, but would continue to deteriorate.

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

- The NPS would manage the trail to provide safe and healthful surroundings under all alternatives.
- Alternative 1 would continue to provide the existing level of esthetically and culturally pleasing surroundings. This alternative would create no new visual disturbance, but the culturally significant features of the historic Spruce Railroad would continue to deteriorate.
- Alternative 2 would maintain esthetically and culturally pleasing surroundings, providing the least visual disturbance of the action alternatives.
- Alternatives 3, 4, and 5 would result in short-term esthetic impacts during construction but would maintain esthetically pleasing surroundings in the long-term. The action alternatives would result in culturally pleasing surroundings related to the rehabilitation of the historic Spruce Railroad.
- Alternative 5 would result in the most extensive short-term esthetic impacts during construction.

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 would maintain the existing range of beneficial uses of the environment, without any new degradation, risk of health or safety, or other undesirable and unintended consequences.
 - Alternatives 2, 3, 4, and 5 would provide increased visitor opportunities, but with additional impacts to the natural environment associated with trail development. (nearly 3.8 miles on the SRRT). There would be some potential for undesirable and unintended consequences related to the widening of the existing SRRT and development of new trail in Segment D under Alternatives 2, 4, and 5 to provide an accessible trail grade and surface. Some current users of the SRRT may be displaced because the trail experience will be modified from a narrow unpaved trail to a wider trail with asphalt sections proposed in Alternatives 2, 3, and 5.
- 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 reflects the current management of the SRRT by the NPS. Important aspects of our historic, cultural, and natural heritage are protected, but elements of the historic Spruce Railroad are deteriorating and may eventually be lost. This is particularly true of the remaining log cribbing and rock walls along Lake Crescent, and also the areas of the railroad grade in areas where the bank is eroding. Alternative 1 does support diversity and variety of individual choice related to recreation by providing 6 miles of accessible trail constructed in 2009 by Clallam County above Camp David Jr. Road (CDJR). Alternative 1 would result in no new impacts to natural resources or construction related impacts to cultural resources. The existing SRRT is not accessible, but is used year-round by hikers, equestrians, and bicyclists (although the trail surface is not designed to provide a road-like surface).
 - Alternatives 2, 4, and 5 would make the entire SRRT accessible (Segments A, B, C, and D). Alternative 3 would provide an additional 2.9 miles of accessible trail (Segments A, B, C).
 - Alternatives 2, 3, 4, and 5 would preserve and rehabilitate important historic, cultural, and natural resources.
 - Alternative 5 would result in the greatest construction related disturbance to natural resources, although mitigation measures would be implemented to avoid or reduce impact in accordance with Olympic National Park standard mitigation measures. The two historic railroad tunnels would be re-opened under all action alternatives, and accessible trail would be developed along the existing SRRT. This level of development would attract new user groups to the SRRT, but would also displace some current trail users.

- 5) Achieving a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities.
- Alternative 1 would continue to provide the existing balance between population and resource use in a way that permits a high standard of living and a wide sharing of life's amenities. Phase 1 of the ODT would provide six miles of accessible trail in the Lake Crescent area and the existing SRRT would continue to provide recreational opportunities for the current range of visitors. People would be able to access regional trail to the west from Phase 1 of the ODT and to the northeast on the Adventure Trail that is accessed via the Water Line Road.
 - Alternatives 2, 3, 4, and 5 would provide a balance between population and resource use in a way that permits a high standard of living and a wide sharing of life's amenities.

The alternative that causes the least damage to the biological and physical environment is Alternative 1, the No Action Alternative. The alternative that best protects, preserves, and enhances cultural and historic resources is Alternative 2, followed by Alternative 4, 3, and 5. The alternative that best protects, preserves and enhances natural resources is Alternative 1, although Alternatives 2, 3, 4, and 5 would enhance natural resources at the Lyre River by removing an abandoned building and restoring the adjacent shoreline.

All alternatives meet the criteria listed above to varying degrees, but Alternative 1 is the Environmentally Preferred Alternative because the existing conditions are consistent with the national environmental policy as expressed in Section 101 of NEPA as described above, and Alternative 1 would require the least impact to natural and cultural resources, although deterioration of some elements of the historic Spruce Railroad would continue as described above.

Table 32. 2012 SRRT Alternatives Summary

2012 SRRT Alternatives Summary					
Factor	Alt 1: No Action	Alt 2	Alt 3	Alt 4	Alt 5
Railroad Tunnels					
open/remain closed	remain closed	open	open	open	open
bypass trails (around tunnels)	Pedestrian, bicycle, equestrian	pedestrian only	Pedestrian, bicycle, equestrian	Pedestrian & equestrian only	Pedestrian, bicycle, equestrian
Downslope Bank Stabilization					
historic wood cribbing and rock walls	deteriorated	rehabilitate with site-specific rehab emphasis for cultural and natural resources	rehabilitate with site-specific rehab emphasis for cultural and natural resources	rehabilitate with site-specific rehab emphasis for cultural and natural resources	rehabilitate with site-specific rehab emphasis for cultural and natural resources
SRRT: Segments A, B, and C (3.2 miles)					
accessible (yes/no)	no	yes	yes	yes	yes
total trail width (top surface w/shoulders)	~36"	8 - 10 feet	10.5 - 11 feet	10.5 - 11 feet	12 feet
Segments A, B, C trail surface	natural tread	3 ft. asphalt, 4 ft. crushed rock upslope, up to 1 ft. downslope to hold asphalt edge	6 ft. asphalt, 4 ft. crushed rock upslope, up to 1 ft. downslope to hold asphalt edge	10 feet firm and stable unpaved surface	8 ft. asphalt, 3 ft. crushed rock upslope, up to 1 ft. downslope to hold asphalt edge
Segments A, B, C widened passing areas along trail	n/a	Yes, 5 ft. wide asphalt passing areas	No	No	No
Segments A, B, C primary trail corridor clearing limits (width)	n/a	12 feet	14 feet	14 feet	14 feet
SRRT: Segment D (0.5 miles - 0.75 miles)					
alignment	current	new alignment	2011 EA alignment	new alignment	new alignment
accessible (yes/no)	NO	YES	NO	YES	YES

Segment D trail width	~36"	8 - 10 feet	9 - 10.5 feet	8 - 10.5 feet	12 feet
Segment D trail surface	natural tread	3 feet asphalt, 4 feet crushed rock upslope, up to 1 foot downslope to hold asphalt edge plus 5 ft. wide asphalt passing areas	6 feet asphalt, 4 feet crushed rock upslope, up to 1 foot downslope to hold asphalt edge	8- 10 feet firm and stable unpaved surface	8 feet asphalt, 3 feet crushed rock upslope, up to 1 foot downslope to hold asphalt edge
Segment D primary trail corridor clearing limits (width)	n/a	up to 12 feet	up to 12 feet	up to 12 feet	up to 14 feet
SRRT: Parking Lot to Lyre River Bridge					
accessible (yes/no)	n/a	yes	yes	yes	yes
Trail corridor	n/a	striped bike lane	striped bike lane	striped bike lane	striped bike lane
surface	gravel road	asphalt paved road	asphalt paved road	asphalt paved road	asphalt paved road
SRRT: Water Line Road (in park, 10 - 11 feet wide)					
surface	gravel road	paved road	paved road	paved road	paved road
Lyre River Trailhead					
vehicle turnaround	no	yes	yes	yes	yes
surface	gravel	asphalt	asphalt	asphalt	asphalt
# parking spaces	8	19	19	19	19
North Shore Picnic Area parking lot					
surface	gravel	asphalt	asphalt	asphalt	asphalt
Accessible	No	Yes	Yes	Yes	Yes
CDJR trail access adjacent to North Shore Picnic Area					
Accessible trail	no	yes	yes	yes	yes
Accessible parking	0	2 spaces	2 spaces	2 spaces	2 spaces
Improve signage (orientation, information, interpretation)					
Provide additional	no	yes	yes	yes	yes
Improve trail-related visitor services (waste disposal, benches, picnic tables)					
Provide additional	no	yes	yes	yes	yes

Chapter 3: Affected Environment

Introduction

The purpose of this chapter is to describe park resources within and adjacent to the Spruce Railroad Trail (SRRT) near Lake Crescent that would be affected by the alternatives described in Chapter 2. This provides a baseline for evaluating environment consequences in Chapter 4.

This chapter is organized as follows:

- **Physical Environment**
 - Geologic Features and Soils
 - Hydrology and Water Quality
 - Air Quality

- **Biological Environment**
 - Vegetation & Wetlands
 - Wildlife and Wildlife Habitat
 - Unique or Important Fish or Fish Habitat
 - Threatened and Endangered Species

- **Cultural Environment**
 - Cultural Resources and Historic Properties
 - Spruce Division Railroad

- **Experiential Environment**
 - Visitor Use and Experience
 - Soundscapes
 - Scenic Values
 - Park Operations and Safety
 - Land Use
 - Socioeconomic Values

Physical Environment



Figure 21. Lake Crescent, Olympic National Park

Geologic features, Topography and Soils

Olympic National Park lies on the western edge of the North American continental plate, in a zone of mountain building and glaciation. Surface features that contribute to the scenic beauty of the Olympic Peninsula are the result of forces that elevated the Olympic Mountains. Glaciation, earthquakes, subsidence, and erosion have further shaped the topography. Alpine glaciers have scoured the peninsula, creating characteristic U-shaped valleys and leaving behind glacial deposits. The park's landscapes are continually being modified by landslides, river erosion, deposition, and uplift.

The Lake Crescent watershed is situated within a unique geologic formation called the Crescent Formation, so named because of the horseshoe-shaped band of marine basalt that comprises the northern and eastern perimeters of the Olympic mountain range. Inside the configuration, the predominant geologic materials are sedimentary in origin. The northwestern portion of the watershed is comprised mainly of basalt, with the southwestern portion comprised of sandstone, shale, and conglomerate.

There are three major assemblages of rock in the Lake Crescent area: argillite and greywacke along the south shore of the lake, Crescent Basalt on the north shore, and marine sedimentary rocks of the Aldwell, Lyre, and Twin Rivers Formation north of the Crescent Formation outcrop. The Spruce Railroad grade and tunnels are within the Crescent Basalt and the Aldwell Formation of marine sedimentary rocks (PanGEO, Incorporated 2011).



Figure 22. West Tunnel (short tunnel)

Lake Crescent was originally covered by glaciers during the late Wisconsin Glaciation. Glacial retreat left a typical U-shaped valley with steep sides. Eocene basalt occurs along the northeast shore of the lake while the rest of the basin is comprised of sandstone, shale, and conglomerate. After glaciers retreated from the area, modern day lakes Crescent and Sutherland were connected. Both lakes emptied into Indian Creek and then into the Elwha River. A large landslide separated the two lakes, causing Lake Crescent to rise until it formed a new outlet via the Lyre River. The slide occurred near the northeast corner of Lake Crescent and originated from the north valley wall where Highway 101 now crosses from the Elwha to the Lyre watershed.

The topography of the watershed is one of extremes. Lake Crescent is enclosed by steep ridges on all sides. Elevations range from approximately 575 feet at lake level to roughly 1,500 feet on the northern ridge, and 4,500 feet on southerly ridges. Evidence of the underlying rock formations can be seen in the depth of the stream channels on the major north and south slopes and in the lake. Streams on the north side of the watershed are underlain by harder basalt which is resilient to down cutting. Over time, this resistance to erosion has produced a fairly even slope

with relatively shallow stream valleys. The south slope, which is formed in a softer sandstone base typically has much deeper and more numerous stream channels.

Soils have formed from a variety of geologic materials. No official soil classification or mapping has been conducted within Olympic National Park, however, some generalizations about soil characteristics can be made based upon mapping and classification conducted by the Washington State Department of Natural Resources and the U.S. Department of Agriculture's Natural Resources Conservation Service for areas adjacent to Olympic National Park that contain the same parent material.

In general, soils tend to be thin and poorly developed due to glacial scouring of the bedrock of the northern foothills belt (Brown and Grower 1960). Subsoils strongly resemble original bedrock material. Upland soils are typically well drained, with low to moderate water retention and very high infiltration rates. Soils along the lakeshore contain greater amounts of clay and are poorly drained. Sensitive soils are associated with steep slopes, incised stream channels, unstable bedrock, and water seepage areas. There is evidence of mass slope failure within the watershed; four areas of landslide deposits have been mapped by the U.S. Geological Survey. Additionally, rockfall along U.S. 101 is not uncommon during the wetter months. During the fall of 1995, a bridge on Camp David Junior Road (North Shore Road) was washed out when a landslide occurred during a period of heavy rain. Based on this history, the potential for on-going mass-wasting (slope failures) is high.

The National Park Service mapped Lake Crescent's landforms in 2006. The project area occurs on four types of landform: valley wall – comprising steep forested slopes between 20° and 60° from the ridge top to the lake surface; debris aprons – a zone of debris accumulation at the base of a mountain slope comprised of colluvium and till; debris cones – sloped, conical debris deposits usually associated with small drainages; and terraces – level surfaces comprised of glacial till, which are remnants of a previous outwash flood plain. Nearly the entire eastern portion of the current Spruce Railroad Trail occurs on valley wall. Beyond the point defined as USGS Benchmark 581, just west of the railroad tunnels, the trail travels across a debris apron, occasionally split by large debris cones. On the western portion of the ODT (Phase 1 of the project within Olympic National Park), the old railroad grade travels across several sections of remnant terrace, comprised of glacial outwash materials.

There are several areas along the existing Spruce Railroad Trail and Phase 1 of the ODT where rock slide and debris flow activity is ongoing. In some sections of the trail vegetation has become established on materials deposited by slide activity.



Figure 23. Lake Crescent sunset (NPS)

Water and Hydrology

Lake Crescent is a pristine deep-water lake of glacial origin located 15 miles west of Port Angeles in the northern portion of Olympic National Park. Situated between the Strait of Juan de Fuca's coastal foothills and the main range of the Olympic Mountains, the lake is 11 miles long, with a surface area of 8 square miles that comprises 17% of the total area of the watershed. The lake elevation is approximately 579 feet, with a mean depth of 332 feet and a maximum depth of 624 feet off of La Poel Point.

Surface water temperatures between June and September typically range from 57° F to 68° F, with the lowest temperatures recorded off La Poel Point. About 50% of the surface area overlays waters deeper than 312 feet. The watershed is 39 square miles, excluding the lake area, with 32 streams feeding the lake. Of these, 22 are intermittent. Only one stream, the Lyre River, drains the lake.

Barnes Creek is the largest tributary to the lake, with significant inflow also provided by La Poel and Piedmont creeks plus approximately 15 smaller perennial streams. These streams are high gradient but stable with no glacial influence. The Lyre River exits the lake at its northeast corner. The Lyre River flows north 5¼ miles to the Strait of Juan de Fuca. A major roadway, Highway 101 is located along the south shore and the historic Spruce Railroad grade runs along the north shore of the lake. Both of these transportation corridors cut through riparian areas.

Water Quality - several water quality studies (Lake Crescent Water Quality Status Report 1984-1989 and Trophic Status and Assessment of Non-Point Nutrient Enrichment of Lake Crescent, 1991) were conducted for the purpose of establishing a baseline for further water quality testing within Lake Crescent watershed. Conclusions derived from these studies indicate that the lake is in extraordinary condition. Lake Crescent has been characterized as an oligotrophic lake with no problems requiring any form of mitigation (NPS 1991a). Oligotrophic lakes are low in nutrients, thereby limiting the growth of algae. The Washington State Department of Ecology uses Lake Crescent as a reference lake in its ongoing study of freshwater lakes in Washington, due to its pristine water quality.

Drain fields and septic tanks close to the shoreline are at risk of exposure as a result of erosive forces associated with extreme winter storms. However, studies completed in the late 1980s found no indication of pollution from septic systems. No water quality information is available for streams and remote lakes in the watershed.

Potential sources of water pollution include unburned fuel released from two-cycle engines, spills or leaks from gas pumps, and gas tanks on motorized watercraft. Runoff from parking lots is also a potential source of non-point pollution. Expansion or construction of parking facilities, unless adequately designed to treat and store surface runoff, may result in increased amounts of these pollutants into Lake Crescent. Unexpected events such as hazardous material spills from vehicles along U.S. 101 are a significant concern of Olympic National Park.

Limnology - despite its popularity and prominence, little limnological work has been conducted on Lake Crescent. Most of the studies to date have been of a limited nature, focusing largely on fish. Only recently has attention begun to be turned towards long-term monitoring of water quality and acquisition of basic limnological data such as seasonal physical/chemical profiles in the deep basins, seasonal and inter-annual nutrient dynamics, and plankton and algal dynamics (Meyer and Fradkin 2002).

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.

Biological Environment

Vegetation and Wetlands

Vegetation - On the Olympic Peninsula, vegetation patterns reflect environmental gradients of moisture and temperature. Moisture increases from east to west and from lower to higher elevations. Temperature decreases from lower to higher elevations. The direction the slope faces affects these variables as well.

Vegetation within the Lake Crescent watershed is influenced by many factors including precipitation, topography, bedrock material, soils, slope, aspect, wind, landslides, fire, and human use. Vegetation can be classified within three major zones: the western hemlock, silver fir, and mountain hemlock zones (Henderson et al. 1989). The entire project area is located within the western hemlock zone. This is the most widespread zone in the park. Located inland and at higher elevations than the Sitka spruce zone, climatic extremes are somewhat greater here.

Dominant tree species are western hemlock, Douglas-fir, and western red cedar; very old stands may lack Douglas fir because it is less shade-tolerant than the other two species and more dependent on fire or other disturbance for regeneration. Madrone is also found within the project area. Common shrubs include salal, vine maple, Oregon grape, red huckleberry, Alaska huckleberry, salmonberry, and rhododendron. The understory also contains a variety of ferns and mosses.

Some botanists describe Lake Crescent as the place where “east meets west” in terms of vegetation of the Olympic Peninsula. Species common to the western peninsula, such as Sitka spruce and Oregon oxalis are relatively uncommon east of Fairholme. Conversely, grand fir, which is common on the eastern side of the Olympics, is not known west of Fairholme. Similarly, madrone is found at Lake Crescent and farther east on the Olympic Peninsula, usually on dry sites at low elevations (Franklin and Dyrness 1988, Buckingham et al. 1995). It is not found further west on the peninsula.



Figure 24. Oregon oxalis (NPS)

Several disjunct populations of plants are found within the watershed. Disjunct populations are relatively small populations of plants that are separated, often by hundreds of miles, from the main population. Poison oak (*Toxicodendron diversilobum*) is found along the northern and eastern shores of Lake Crescent, the only known locations for it on the north Olympic peninsula. Yerba de selva (*Whipplea modesta*), known mainly as a plant of the Oregon and California coast, is found at only two locations on the Olympic Peninsula, one of them Lake Crescent. The seaside juniper (*Juniperus maritima*), found only in southwestern British Columbia and northwestern Washington, was previously considered a disjunct population of Rocky Mountain juniper (*Juniperus scopulorum*) (Adams 2007, Adams et al. 2010). It occurs at several locations on the north Olympic Peninsula, including Lake Crescent (Adams et al. 2010).

Rare and Sensitive Plants - The list of threatened or sensitive plant species in the park is reviewed and revised as necessary to maintain an up-to-date database. Based on information provided by the U.S. Fish and Wildlife Service, there are no federally listed, proposed, or candidate plant species likely to occur within the project area. However, there is one vascular plant species of special status as listed by the Washington State Natural Heritage Program within the project area: water lobelia (*Lobelia dortmanna*), which is listed as “threatened.” Branching montia (*Montia diffusa*) has been found within a few miles of the Lake Crescent watershed (outside of the park). This species is listed as “sensitive” (i.e., vulnerable or declining with the potential to become endangered or threatened). Areas where soil and/or vegetation may be disturbed should be surveyed for branching montia.

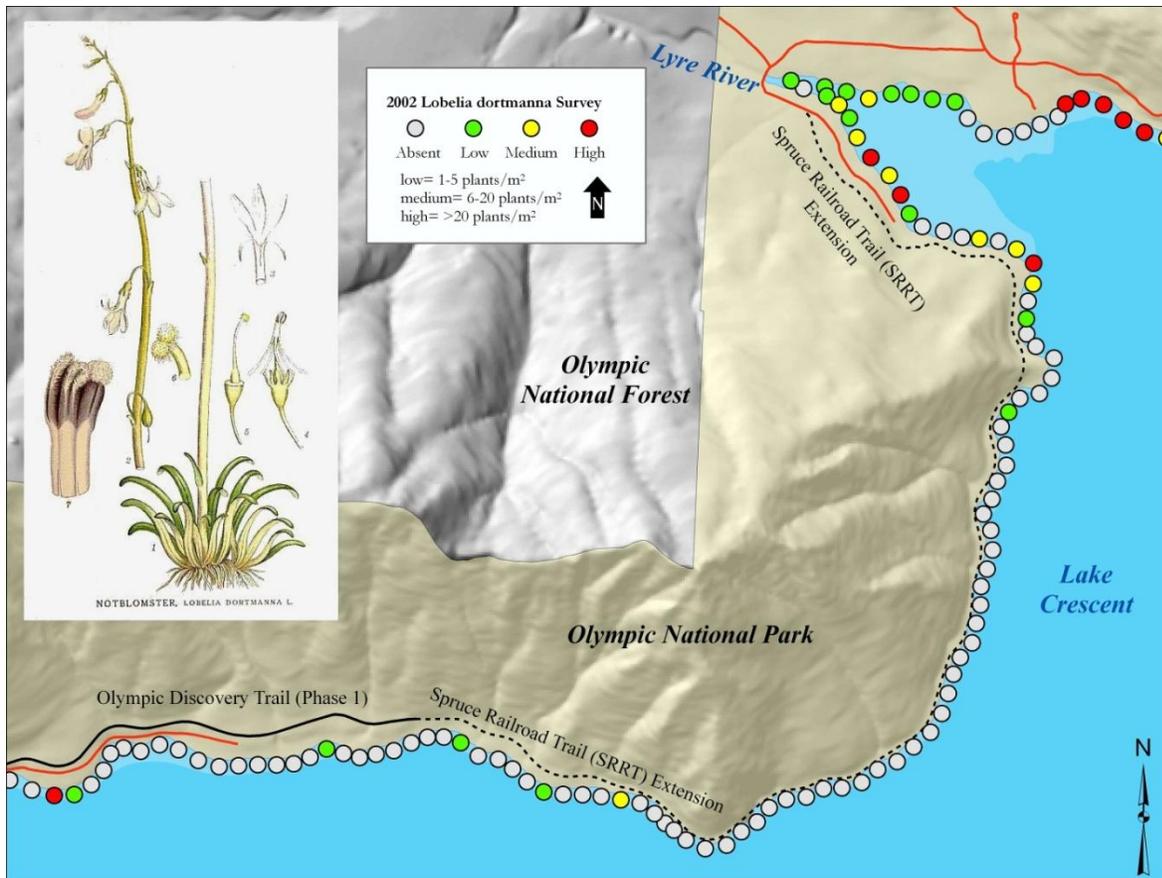


Figure 25. Map showing locations where water lobelia was found during a 2002 survey

Water lobelia is an evergreen, perennial aquatic plant which is usually submerged except for some flowering stalks. The leaves consist almost entirely of a basal rosette. The plant is found in shallow water on the edges of lakes and ponds. The species occurs in nutrient-poor water bodies with exceptionally clear water. The basal leaves of the *Lobelia* are harmed by sediment, which can't photosynthesize if they are covered. It is susceptible to damage from application of herbicides to control aquatic weeds, shoreline development, water pollution from recreational equipment, and trampling (Washington Natural Heritage Program Field Guide to Selected Rare Plants, <http://www1.dnr.wa.gov/nhp/refdesk/fguide/hm/fgmain.htm>, viewed June 22, 2011).



Figure 26. Water lobelia (*Lobelia dortmanna*) “with peduncles raising flowers towards the water surface. *Lobelia dortmanna* grows in low-alkaline lakes and is one out of several submerged plants that takes up CO₂ for photosynthesis from the sediment” (USGS)

Forest Stand Disturbances - Forest stands within the watershed have experienced a great deal of disturbance at various times, including fire, wind, and logging. Fire plays a major role in altering the forest structure, and available information indicates significant fire activity within the Lake Crescent watershed. Major fires have moved through the watershed during periods of drier climactic conditions. The most notable was in 1701, when much of the Olympic Peninsula, from the Hood Canal to the northwest tip of the peninsula, was burned (Agee 1993).

Other major fires moved through the watershed during the late 1800s into the early 1900s. One of these fires, which occurred sometime between 1850 and 1890, burned a large portion of the Barnes Creek drainage. The Sol Duc burn of 1907 is pictured below. In 1914, a large area on the north side of the watershed west of Pyramid Peak was burned. Two fires in July of 1919, started by a defective flue on the Spruce Production engine, burned over 300 acres near Muller summit and the other, a crown fire on the north side of the lake (Rixon 1919). Fires in the more recent past have been relatively small (a few acres) and caused by escaped campfires or lightning strikes along surrounding ridge tops.

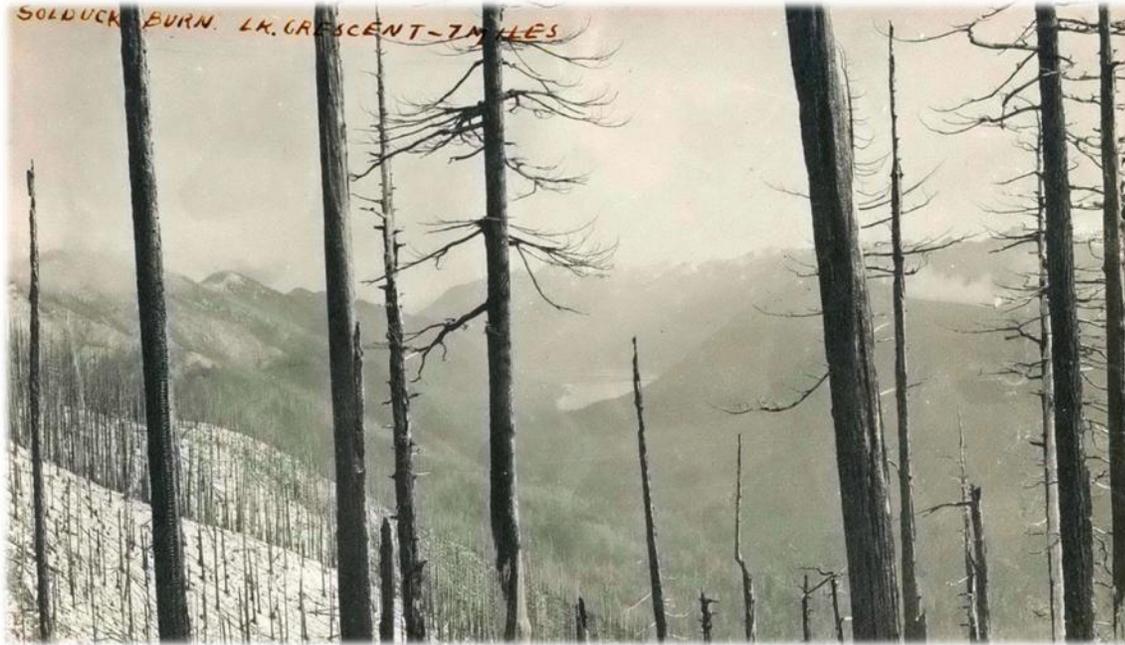


Figure 27. Sol Duc burn 1907 (OLYM1840093)

Prior to the creation of Olympic National Park in 1938, the Lake Crescent area was under the management of the U.S. Forest Service, which would have allowed timber harvesting within the watershed. Trees were also removed for the construction of homes and summer cabins around the lake, and during World War I, along the Spruce Railroad. In the mid-1950s the park utilized timber salvage and exchange operations to fund the purchase of private land. Olympic National Park records from 1953 to 1957 indicate that approximately seven million board feet of timber were removed from the township (T30N R9W) within this area.

Because the Lake Crescent watershed has experienced a good deal of disturbance, there is considerable diversity of forest stand structure. The majority of the watershed is in old-growth forest (52%), followed by mature stands (39%). The remaining nine percent is in young forest, shrubs, meadows, and rocks.

Nonnative Species - Over 200 nonnative plant species are found in the park. Some of the most commonly found nonnative plants include Scot's broom (*Cytisus scoparius*), English holly (*Ilex aquifolium*), English ivy (*Hedera helix*), reed canarygrass (*Phalaris arundinacea*), Canada thistle (*Cirsium arvense*), herb Robert (*Geranium robertianum*), giant knotweed and close relatives (*Polygonum cuspidatum*, *Polygonum sachalinense*, and *Polygonum x bohemicum*), and Jerusalem star (*Hypericum calycinum*). Most park nonnative plants are perennials, which are the most persistent and difficult plants to control or eradicate. Attempts to limit species invasion by hand pulling, use of select herbicides, and other techniques on known sites has had some success in certain areas of the park. Most nonnative plants are found in disturbed frontcountry areas and near park roads, however, nonnative plants occur in both wilderness and the frontcountry of the park, including within the Spruce Railroad Trail project area.

Wetlands - The presence of certain soil types, plant species, and water define wetlands. Wetlands are found in the interior of the park and along the coast and serve important functions including flood protection, erosion protection, sediment filtration, and water storage for release during droughts. Wetlands provide habitat and food for a variety of animals including mammals, fish, birds, insects, and microscopic organisms. Wetlands also provide other benefits such as recreation and opportunities for learning and research. Freshwater wetland ecosystems in the park include ponds, marshes, seasonally flooded meadows, and riparian areas.

Lakes and wetlands are catalogued as waterbodies in the park's geographic information system (GIS) database. According to this database, there are about 650 lakes and wetlands, including more than 300 high mountain lakes, totaling 13,978 acres in Olympic National Park. This number is derived from the National Wetlands Inventory, and is likely an underestimate because mapping did not include many of the forested wetland areas of the park.

The Lake Crescent watershed contains 22 wetlands identified on National Wetlands Inventory maps (Fish and Wildlife Service National Wetlands Inventory maps, 1987). Most of these wetlands are located in the upper reaches of the watershed and are classified as palustrine or riverine wetlands.

An initial assessment of the Spruce Railroad Trail (SRRT) project area found several areas with wetland characteristics. These areas include lands adjacent to the SRRT parking lot, several small areas along the existing SRRT that are currently spanned by small trail bridges, and the shoreline at the outlet to the lake.

Wildlife and Wildlife Habitat

Large native mammals found within the project area include Roosevelt elk, Columbia black-tailed deer, black bear, and cougar. Nonnative mountain goats, which were introduced into the park in 1925 and 1929, are commonly observed at higher elevations within the watershed. Columbia black-tailed deer are frequently seen in clearings and forest margins around the lake, while Roosevelt elk are rarely seen, and then only on the western and southern portions of the watershed. Black bear are common throughout the area. Cougar are occasionally seen near Lake Crescent, as they are throughout the park. River otters inhabit the lake and can sometimes be seen swimming and playing along the shore. Fishers were recently reintroduced in the park, and several have established home ranges around Lake Crescent.

Douglas squirrels and chipmunks are frequently-seen residents along the lake, and Pacific Townsend's big-eared bats occupy the two Spruce Railroad tunnels. A variety of other smaller mammals, such as snowshoe hares, mountain beaver, flying squirrels, spotted skunks, raccoons, voles, and mice are less readily noticed by visitors. Several species of amphibians and reptiles occur in the area, including the rarely seen rubber boa and alligator lizard.

Resident bird species found in lake and riparian habitats of the Lake Crescent area include pied-billed and western grebes; great blue and green heron; wood duck; green-winged teal; mallard; northern shoveler; northern pintail; hooded, common, and red-breasted mergansers; American coot; osprey; and belted kingfisher.

Expected year-round woodland residents include sharp-shinned, Cooper's, and red-tailed hawks; northern goshawk; merlin; sooty and ruffed grouse; killdeer; band-tailed pigeon; western screech, barred, great horned, northern pygmy, and northern saw-whet owl; red-breasted sapsucker; downy, hairy, and pileated woodpecker; northern flicker; gray and Steller's jay; American crow; common raven; black-capped and chestnut-backed chickadee; bushtit; red-breasted nuthatch; brown creeper; Bewick's and winter wrens; American dipper; golden-crowned, savannah, and fox sparrows; red crossbill; pine siskin; and evening grosbeak. The European starling and house sparrow are introduced species, found in developed areas throughout the watershed, and domestic turkeys have been released near the area and are occasionally seen in or near the park.

Migratory birds breeding in the Olympic lowlands, including Lake Crescent, include common nighthawk; rufous hummingbird; western wood-pewee; willow, Hammond's, Pacific-slope, and olive-sided flycatcher; tree, violet-green, northern rough-winged, cliff, and barn swallow; Swainson's thrush; solitary and warbling vireo; yellow, orange-crowned, yellow-rumped, Townsend's, black-throated gray, MacGillivray's, and Wilson's warbler; western tanager; black-headed grosbeak; white-crowned sparrow; brown-headed cowbird; and American goldfinch.

Non-breeding migrants coming through the Lake Crescent area include trumpeter swan; turkey vulture; solitary and spotted sandpipers; glaucous-winged gull; ruby-crowned kinglet; Townsend's solitaire; and hermit thrush.

Species of special concern include a pair of bald eagles which have been observed nesting within the watershed for many years; there may be more bald eagle activity in the area, but without an active monitoring program this cannot be confirmed. Various park research studies have documented northern spotted owl and Vaux's swift, both dependent on old-growth forests, nesting within the Lake Crescent watershed. Park biologists have observed marbled murrelets, also dependent on old-growth forests, and harlequin ducks, both believed to nest in the area.

Unique or Important Fish or Fish Habitat

Lake Crescent supports a unique assemblage of fish populations that evolved in response to the distinctive geologic history of the region. The lake was historically connected to the Elwha River basin through an outlet draining to the east, through the Indian Creek valley. Anadromous fish occupied the area after the retreat of the Cordilleran ice sheet but a massive landslide within the last 10,000 years isolated the lake from the Elwha basin (Tabor 1987). As the water level rose, a

new outlet formed down the Lyre River drainage. A waterfall a short distance downstream from the new outlet left the fish landlocked.

Two endemic trout species - the Beardslee trout (*Oncorhynchus mykiss*) and the Crescenti trout (*O. clarkii*) - evolved in Lake Crescent. Both Beardslee and Crescenti trout were originally identified as distinct species, though subsequently each was reclassified as a variety of rainbow and cutthroat trout respectively. Other fish species present in the lake are kokanee salmon (*O. nerka*), prickly sculpin (*Cottus asper*), pygmy whitefish (*Prosopium coulteri*), and perhaps Pacific lamprey (*Lampetra tridentata*) (Meyer and Fradkin, 2002).



Figure 28. Crescenti trout (*O. clarkia*) (forum.varalicar.com)

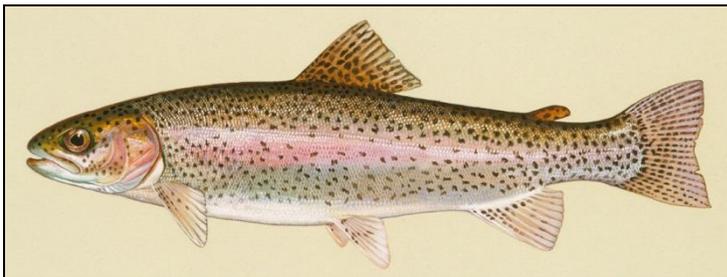


Figure 29. Beardslee trout (*Oncorhynchus mykiss*) (USFWS)

Kokanee salmon are believed to be the most abundant fish species in Lake Crescent and have been identified as the primary food source for the adult Beardslee and Crescenti trout (Scheffer 1935; Garlick 1949; Pierce 1984; Meyer and Fradkin 2002). Kokanee eggs are also a significant food source for the juvenile trout (Pierce 1984). Stomach content analyses of larger trout in the lake have found that nearly all prey items were kokanee (Garlick 1949). Little information exists on the status of pygmy whitefish, prickly sculpin, or Pacific lamprey, although whitefish spawning has been video documented at depths in excess of 100 feet.

In the early 1990s, both Beardslee trout and Crescenti trout appeared to be at risk of extirpation. Annual spawning ground surveys accounted for less than 100 individuals of each species (Meyer and Fradkin 2002). Beardslee trout in particular were at risk, as they are known to spawn solely in a 1-acre section of gravel at the outlet of Lake Crescent. Crescenti trout, also in very low abundance, have developed a number of unique life history traits - including multiple spawning locations that include tributaries to the lake, the lakeshore, and downstream in the Lyre River

lake outlet. These several locations buffer the potential for a catastrophic event to decimate the population.



Figure 30. Beardslee Trout at La Poel ca. 1925. Right - Ed Brooks and Jack Riedel - left (POL.009.005)

Included within the Olympic National Park boundaries at the park's inception in 1938, Lake Crescent has always been one of park's most popular visitor attractions, now drawing more than half of the park's annual visitors (National Park Service 1998). The large body size and fighting strength of the lake's trout populations have long made Lake Crescent a popular destination for angling (Jordon 1896; Webster 1923; Garlick 1949).

From 1913 to 1975, approximately 14,000,000 hatchery origin fish were released into Lake Crescent in an attempt to support the lake's popular fishery (Meyer and Fradkin 2002). Nearly 8,000,000 of these releases were of kokanee salmon, intended to provide a food source for the larger trout species. Other releases included Beardslee and Crescenti trout collected from the lake and raised in a hatchery located on Barnes Creek. Kamloops trout, Westslope cutthroat trout, Yellowstone cutthroat trout, lake trout, Eastern brook trout, and other non-native rainbow trout populations had been released as well. The extent to which these hatchery releases affected the native trout population is unclear, but it does not appear that any non-native trout populations of Kamloops Trout, Westslope or Yellowstone cutthroat trout, or Eastern brook trout have become established.

Resource management actions taken to date in an effort to preserve the lake's unique fish populations have focused on harvest regulations intended to minimize direct fishing mortality, stock assessment surveys targeting the Beardslee and Crescenti trout, and land and water use practices intended to ensure critical habitat for the Beardslee and Crescenti trout remains intact. Since 2001 catch-and-release fishing regulations have been implemented on the lake. The

abundance of both Beardslee and Crescenti trout has slowly grown, though annual spawning escapement estimates for both species remain well under 500 fish. The status of the kokanee population is less well understood, but recent work by the park's fisheries program is providing insight into the population's relative abundance and spawning distribution.



Figure 31. Map showing Beardslee Trout spawning area

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 Olympic National Park 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.

Section 7 of the 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.

The U.S. Fish and Wildlife Service has identified two listed T and E (threatened or endangered) avian species that are known to occur in the Lake Crescent watershed and likely nest here; the marbled murrelet and northern spotted owl, both classified as threatened.

Marbled Murrelet (*Brachyramphus marmoratus*) - The marbled murrelet is a pigeon-sized seabird that lives primarily in the near-shore marine environment but nests in old-growth forests up to 50 or more miles inland. Suitable nesting habitat for murrelets consists of old-growth coniferous stands that are multilayered with moderate to high canopy closure. Potential habitat of this type occurs along the major drainages in lower elevations in the park, overlapping most of the suitable habitat for the northern spotted owls. Murrelets will occasionally nest in younger stands if remnant large trees or deformities provide large enough limbs.



Figure 32. Marbled Murrelet winter plumage (NPS)

Murrelets occur within all the major drainages within the park. Habitat considered suitable for murrelet occupation includes forested areas to 3,500 feet on the east side of the park, and to 3,000 feet on the west side of the park, including the Lake Crescent watershed.

Approximately 327,000 acres of forested area within the park is considered suitable marbled murrelet habitat. The park represents the largest contiguous block of suitable nesting habitat remaining within the listed range of marbled murrelets in the lower 48 states. Inland surveys have been conducted according to Pacific Seabird Group protocols in all developed areas and in

a sampling of backcountry valleys. Murrelet presence was documented at every site surveyed. Approximately 83% of sites surveyed in the park were occupied.

The park is located in two different murrelet recovery zones (Zone 1: Puget Sound and Zone 2: Western Washington Coast Range). The line of demarcation between the two zones essentially bisects the park on a northwestern to southeastern diagonal. Murrelet populations in both zones have declined over the last decade, including an estimated 50% decline in Zone 1 (USFWS 2011).

For purposes of analysis, the murrelet breeding season in Washington is broken into two periods: early breeding season is April 1 through August 5, and late breeding season is August 6 to September 15.

Northern Spotted Owls (*Strix occidentaliscaurina*) - Northern spotted owls have large home ranges containing extensive acreage of old-growth forest to meet their habitat needs. There is extensive suitable habitat for spotted owls in the park, primarily in lower elevations of major drainages. Spotted owl habitat is similar to that for marbled murrelets but extends to higher elevations in the park. The park's interior (exclusive of the Pacific coastal section and the Queets River corridor) contains about 494,000 acres of forested areas that are considered potential spotted owl habitat. The park represents the largest contiguous block of suitable nesting habitat remaining within the listed range of northern spotted owls. One concern is the trend of lower elevation areas increasingly being used by barred owls rather than spotted owls. Northern spotted owls formerly occurred along the north shore of Lake Crescent in the project area but none have been detected since 2002, despite regular monitoring of both known territories. The lakeshore area is heavily used by barred owls and as a result it is unlikely that spotted owls will use this area for nesting or roosting.

For purposes of analysis, spotted owl breeding season in Washington is broken into two periods: early breeding season is March 1 through July 15, and late breeding season is July 16 to September 30.

One candidate species for listing under the Endangered Species Act that occurs at Lake Crescent is the Pacific fisher, which is found in forested habitats along the lake, including in the project area.

Figure 33. Pacific fisher (NPS), peregrine falcon (Dennis Jarvis), northern goshawk (Norbert Kenntner)



Federal species of concern that occur in Clallam County and may be found near Lake Crescent include four bird species: bald eagle (which nests and forages on the lake), northern goshawk, peregrine falcon, and olive-sided flycatcher; three bat species: Pacific Townsend’s big-eared bat (have been detected in the area during a survey of mine sites at the lake), long-eared myotis, and long-legged myotis; four amphibian species: Olympic torrent salamander, tailed frog, Van Dykes salamander, and western toad. Olympic torrent salamander and tailed frogs can be found in swift and cool streams which feed into the lake. Van Dykes are terrestrial salamanders that are most often associated with moist areas such as streams and seeps. Western toads can be found in shallow lakes and ponds.



Figure 34. Olive-sided flycatcher, western toad, Van Dykes salamander (NPS), Townsend’s big-eared bat (BLM)

Water lobelia (*Lobelia dortmana*) is not a federally listed threatened and endangered species, but it is listed as a rare plant within Washington State. It grows in shallow areas along the edge of Lake Crescent. Further information about this plant is provided in the vegetation section.

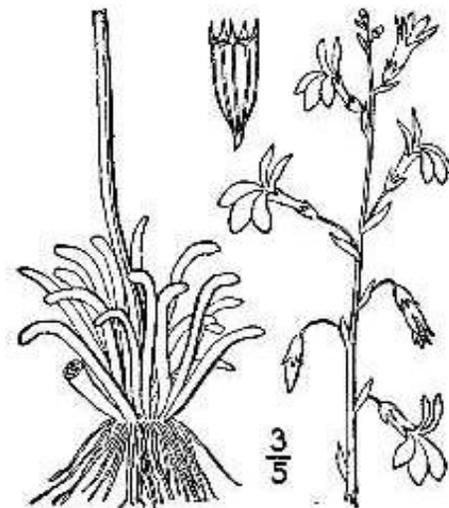


Figure 35. *Lobelia dortmana* (USDA-NRCS PLANTS Database / Britton, N.L., and A. Brown. 1913. *An illustrated flora of the northern United States, Canada and the British Possessions. 3 vols.* Charles Scribner's Sons, New York. Vol. 3: 300)

Cultural Environment

The Lake Crescent basin contains a rich cultural history. The lake's earliest residents have left physical remnants of the past, as well as descriptions of past events as stories that describe the landscape. The natural beauty of the area attracted people to Lake Crescent and many resorts were built to support early recreational use of the lake.

The area's logging history begins with the U.S. Army's Spruce Production Division Railroad #1 in World War I, continuing with use of the railroad line and additional spurs for post-war logging. Manganese mining took place on the lake in the early 1900s and transportation of manganese was also facilitated by the logging line.

Transportation through the area, beginning with the first Indian canoes, and followed by steamboats, and side-wheeler ferries, was primarily by water over Lake Crescent. The *Lady of the Lake*, a small steamboat began trips from Piedmont to Fairholme as early as 1891. In 1914-1915 Clallam County began operating the ferries *Marjory* and *Storm King*, which were capable of carrying cars and wagons, as well as passengers to each end of the highway before it was built around the lake. The *Betty Earles* was a small gasoline-powered vessel built in 1913 on Lake Crescent and was probably one of two ferries used by the Spruce Production Division while building the railroad. A few submerged pilings from old docks and moorings can still be found from by-gone days where resorts and homes were located.



Figure 36. Spruce Railroad officer and the *Betty Earles* (FUL.001.006)

The Spruce Railroad, constructed during World War I, is described in detail later in this chapter. Construction of U.S. Highway 101 began in 1922, providing greater access to and around the Lake Crescent area.

Cultural Resources

“Cultural resources” is a term used in reference to aspects of a cultural system that are valued by or significantly representative of a culture or that contain significant information about a culture, but may, or may not yet be evaluated for eligibility to the National Register of Historic Places. A cultural resource may be a physical object or a cultural practice.

NPS manages five different types of cultural resources based on disciplines. The five types are:

- **Archeological Resources.** The remains of past human activity recorded and documented through scientific analysis of archeological features and artifacts. Archeological resources can be found above and below ground and may date back thousands of years or to more recent historic archeology (50 years or older).
- **Historic Structures.** A building or other structure (such as a bridge, mine, canal, ship, highway, railroad, or locomotive) that is significant because of its link to an important period in the past. Areas with a large number of historic structures may be designated as historic districts.
- **Cultural Landscapes.** 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.** Park sites, structures, objects, landscapes, and natural resources that traditionally associated people define as significant to their present way of life.
- **Museum Objects.** The objects, specimens, 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 or natural.

Archeological Resources

Due to the long history of human use on the north Olympic Peninsula, both prehistoric and historic sites are found at Lake Crescent. There are six recorded archeological sites along the north shore of Lake Crescent that are potentially eligible for listing on the National Register of

Historic Places: Crescent Mine, Log Cabin Creek, Spruce Railroad Dump, and three submerged archeological resources from early boat sinkings.

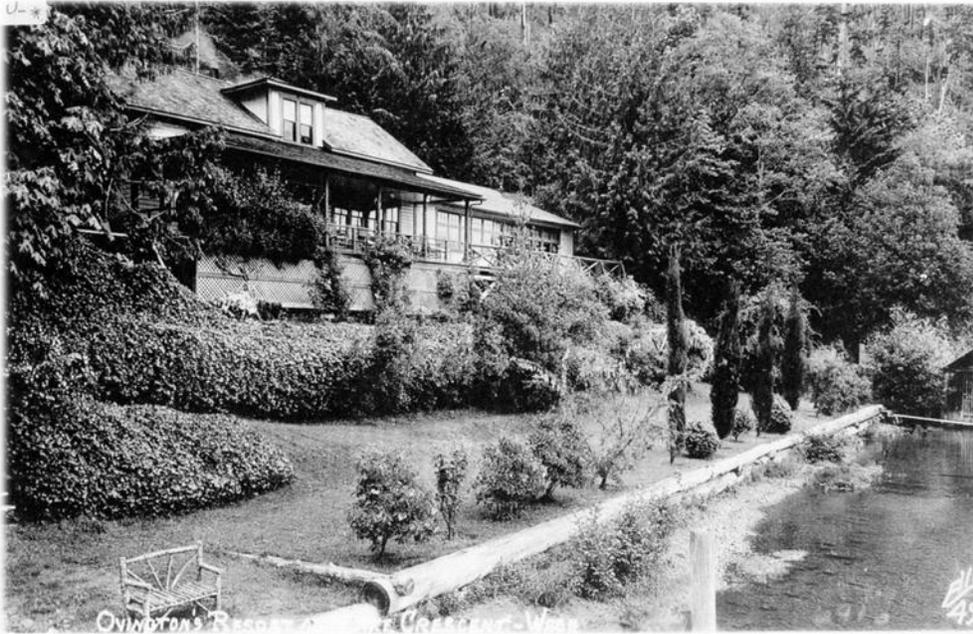


Figure 37. Ovington's Resort and small marina began operations circa 1895, (HPC-001.337)

Resorts on the lake served as destinations and stopping places for those traveling by ferry to the west end. In addition to Rosemary Inn (1914) and Lake Crescent Lodge (Singer's Tavern 1915) on the south shore, early lodging facilities were established in the vicinity of today's Log Cabin Resort: These were Hotel Piedmont (1895), Hotel Crescent (1906), and on the north shore Ovington's Resort (1895), Delebarre's Lodge (1910s), and Sunshine Lodge (1910s). These locations may yield information about the early resort period as archeological resources or cultural landscapes. One or more of the resorts were reportedly quarters for the Spruce Production Division.

The historic railroad includes 15 grade segments and one recorded archeological site within the park. There are also several unrecorded archeological sites associated with both the Spruce Railroad and later logging operations on the railroad such as Crescent Logging Camp No. 3, known as Piedmont. Additionally, the Crescent Mine or Manganese Station played an important role in early mineral exploration on the Olympic Peninsula and potentially contributes to the significance of the Spruce Railroad. This site included a station and siding where train cars could pick up materials from the mine (Tonsfeldt 2005).

Early homesteading began around Lake Crescent in the 1880s. By the early 1890s there were several homesteads near the Lyre River that had been settled by Mary Hanson Anderson,

Michael Carrigan (later misidentified as Harrigan), John Lutz, and Dave Gastman to name a few. By 1892 there were 15 homesteads around the lake. No historic homestead structures remain today within the affected environment, however the Anderson Homestead has been surveyed and documented as an archeological site and is potentially eligible to the national register.

There is the potential to discover further archeological sites based on the location of these logging camps, railroad stations, and homesites, the park's Archeological Overview and Research Design by Randall Schalk (1988); the Klallam tribes' knowledge of settlement sites near the Lyre River; and archeological sites consisting of lithic material already documented in the Lake Crescent watershed.



Figure 38. Hanson Anderson homestead east of Harrigan Point, courtesy of John Helpenstill



Figure 39. Crescent Logging Camp, courtesy of Dan Peacock

Historic Structures

As noted above, historic structures can be a building or other type of structure. The Spruce Railroad was found eligible as a 36-mile long structure. The roadbed or grade being the structural foundation for the track and evaluated to the national register based on the integrity of its features.

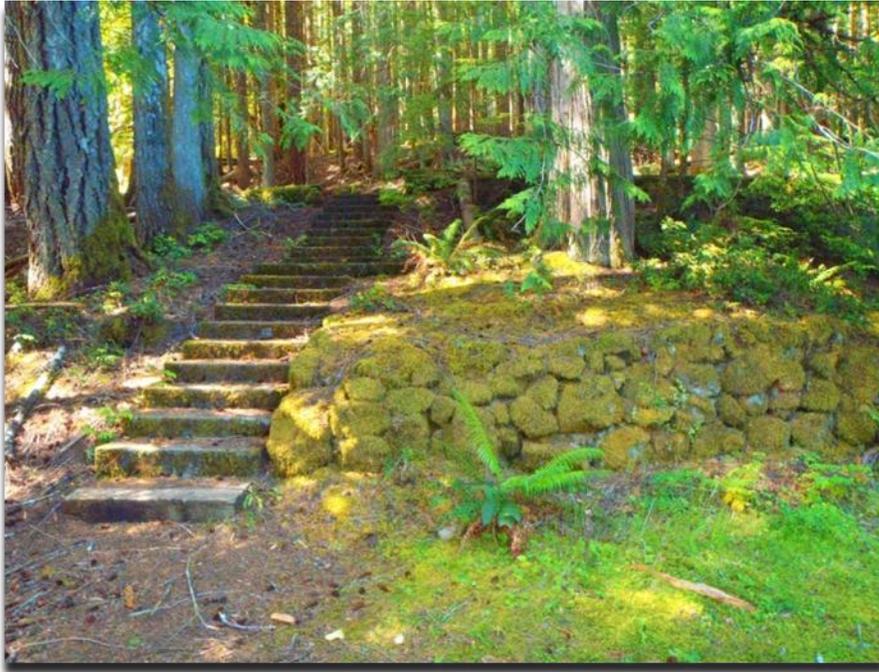


Figure 40. Rock wall and steps from Ovington's Resort within the park's North Shore picnic area (NPS)

Cultural Landscapes

The settings that humans have created in the natural world reveal fundamental ties between people and the land, a pattern of things both natural and constructed. Elements of a cultural landscape may be features, such as the dry-laid stone wall and concrete steps where Ovington's Resort was located; or ornamental plantings, orchard trees, fences, posts, or fence lines remaining at a homestead location.

Ethnographic Resources

The Klallam name for Lake Crescent is *Cə́mət*, and the Quileute word for the lake means "moon-shaped." The Klallam Indians' territory encompasses Lake Crescent, while Quileute territory encompasses the Sol Duc drainage to the west of the lake. Mount Storm King is an ethnographic resource featured in the Klallam's history of the creation of Lake Crescent that ties directly to geological events that happened several thousand years ago.

Mount Muller appears in a Quileute story about the Quileute and Klallam (USFS 1995). Early Native American transportation across the lake was likely in hand-hewn canoe more often than walking along the steep lakeshore.



Figure 41. Train coming out of railroad tunnel, courtesy of Dan Peacock

The U.S. Army Spruce Production Division Railroad # 1 The 36-mile Spruce Railroad from Disque to Lake Pleasant is eligible to the National Register of Historic Places as a historic district of national significance based on its association with the U.S. Army Spruce Production Division #1 and World War I (period of significance is 1918-1922), and its potential for industrial archeological knowledge (Tonsfeldt 2009a). This decision was concurred with by the Department of Archaeology and Historic Preservation on March 1, 2006.

The railroad's history was important in the larger context of the timber industry, in that the objective of producing aircraft-quality spruce surpassed labor problems of the time. In 1917 west coast lumbermen were on strike against unsafe working conditions, salary, and poor accommodations so no timber workers were available to harvest the Sitka spruce needed for World War I. The U.S. Army was put in charge of the Spruce Production Division, utilizing enlisted men in January, 1918 (Tonsfeldt 2006). The Spruce Production Division #1 contracted to build the Spruce Railroad from an area west of Joyce, along the north shore of Lake Crescent to Tyee at Lake Pleasant, as well as 100 miles of logging spurs, and two new saw mills. They also bought the Olympic Hotel in Port Angeles and at least one lodge on the lake for housing the men and they took over operation of two Lake Crescent ferries to facilitate construction of the railroad. The goal was to harvest 2 million board feet of Sitka spruce located in the center of the Olympic Peninsula.

Construction of the railroad began in July 1918. The shoreline of Lake Crescent required stone revetments and timber half-bridges (cribbing) to support the rail bed on the steep bank. The national register nomination states that the "most important segment of the grade" in terms of

engineering and features includes these revetments, the two tunnels, and two very large wooden drainage culverts (Tonsfeldt 2009:14,16).

The railroad was nearly complete by the fall of 1918, however, the Armistice on November 11 ended the operation and no Sitka spruce was ever processed at the Port Angeles or Lake Pleasant mills. The Lyon, Hill Company of Portland, Oregon purchased the railroad from the government in 1922 and utilized it as a common-carrier line and logging railroad after the war. The Crescent Logging Company also acquired an interest in the railroad (Rixon 1919). The railroad remained in use as the Port Angeles and Western Railroad until it went bankrupt in 1951 and was then salvaged.



Figure 42. "Log railroad bridge under construction, U. S. Army Signal Corps Railroad, Spruce Production Division, Lake Crescent area." Asahel Curtis Photo Collection (PH Coll. 482)

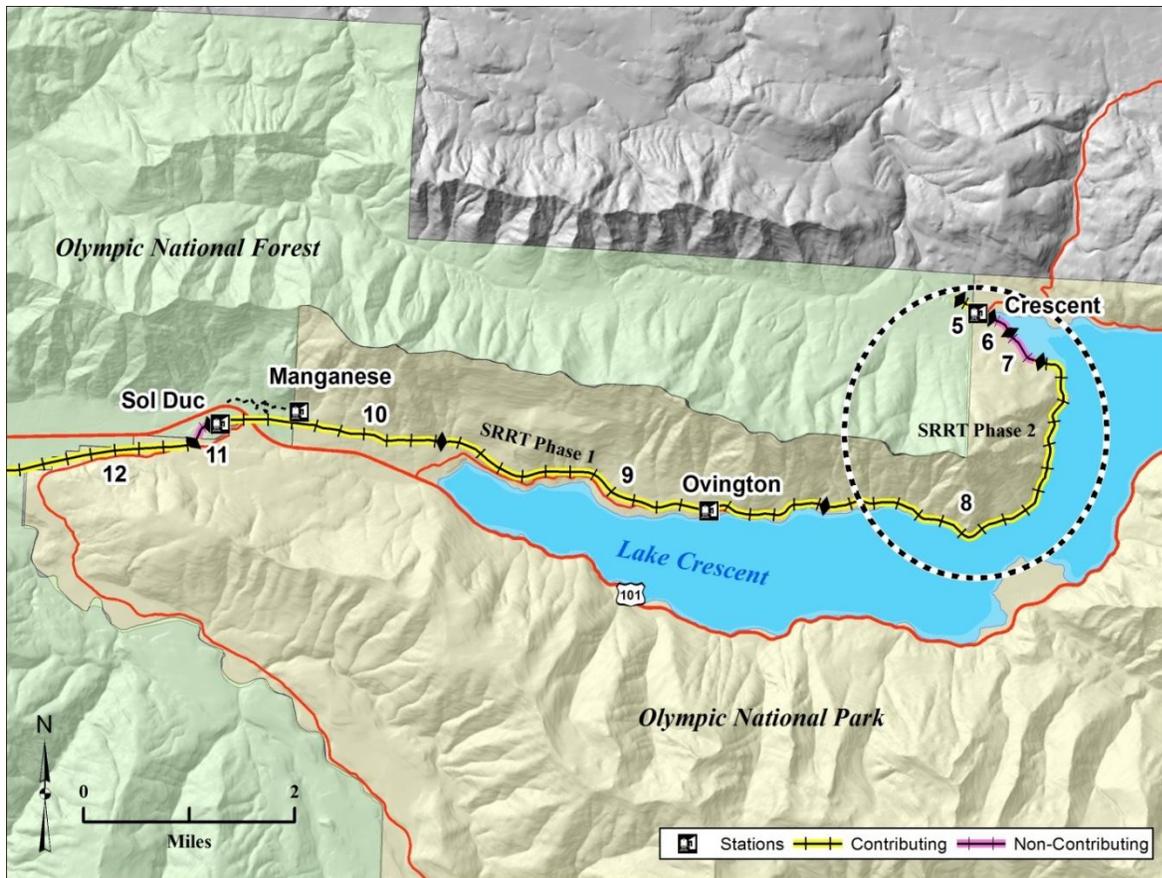


Figure 43. Historic Spruce Railroad Grade with stations and contributing and non-contributing sections identified.

Integrity is a critical element of a resource’s eligibility to the National Register of Historic Places. For historic railroads the integrity of the following character-defining elements are evaluated.

Table 33. National Register of Historic Places Character-Defining Elements

Civil engineering design	location and route
Construction and earthwork	gradient, curvature, and drainage (cuts and fills)
Features	trestles, bridges, culverts, revetments, tunnels, junctions, sidings, wyes, telegraph poles, wire
Railroad Artifacts	artifacts including track hardware, ties

There are seven important elements that are used to evaluate a national register property: location, design, setting, materials, workmanship, feeling, and association. An example of Spruce Railroad #1 workmanship includes leveling the grade and laying out maneuverable curves in the design. Association is a direct link between an important event or person and a historic property. In the case of the Spruce Railroad the association is with World War I and General Brice P.

Disque. Some integrity of these elements has been lost on the Spruce Railroad, but enough of three important earthworks; gradient, curvature, and drainage remain to represent the railroad's scope and scale.

The railroad was designed to carry 400 loaded cars every day, each train consisting of 40 cars. The railroad was significant for its tunnels, Howe truss bridges, and a drainage system built to accommodate streams feeding into Lake Crescent. The existing railroad orientation, ditches, culverts, grade, and sub-grade or ballast retain integrity. The railroad grade of as much as 4 feet or higher was created to allow for runoff and to maintain as level a gradient for the trains as possible. Some cuts and fills exceed 20 feet in order to make the railroad as straight and flat as possible to reduce derailments. The steepest gradient was westbound over the Muller summit between Lake Crescent and Sol Duc divide. Westbound trains were empty so this was an acceptable gradient, but loaded eastbound trains were limited to 1.25%.

There were three sidings designated along Lake Crescent, located about every five miles: Crescent (5.5) Ovington (11), and Sol Duc (17), and an additional siding at the Manganese mine site (15.5). These stations were not depots, but were used as stopping points for freight or railroad service. Sidings were tracks laid parallel to the main line to allow the eight trains that traveled on the railroad each day to pass each other. Sidings were also important day work sites for crews. During the construction period, workers lived in rail car quarters on the sidings. The sidings required a wider roadbed, so their evidence remains in the form of 16-20 foot roadbeds. There is also evidence of habitation above the siding at Ovington's (ODT milepost 1.38), which may have been the tent camp quarters of Palmer, Pearson, and Woods Spruce Production camp #3. This camp wrote of their recreation activities, including diving off a spring board at Ovington's Resort (Spruce 1918).



Figure 44. Spruce Railroad employee housing on siding (Tonsfeldt 4-38056)

The Commercial Salvage Company bought the railroad and began breaking up the equipment and taking up track for salvage in early 1954, leaving the earthwork design elements of curves, tangents, and gradients. Today evidence of earthwork from the railroad still exists in the form of elevated grade with characteristic cuts, fills, ditches, and borrows. Other railroad features that remain include trestle and bridge approaches, tunnels, wooden culverts, telephone or telegraph lines and poles, timber half-bridges, dry laid fieldstone wall revetment, and cleared areas where there were sidings or spurs.

In order to evaluate the railroad's integrity the railroad is divided into segments and the integrity is segregated into five classes for national register evaluation (Tonsfeldt 2009a). Segments are portions of the grade with uniform integrity. A segment ends when the integrity changes for more than 50 meters. Only small changes in integrity are acceptable within each segment to maintain eligibility.

The first criterion of integrity is the extent to which the features and artifacts remain for us to interpret. A segment in very good condition has ties remaining on the ground and clear evidence of features still visible. Surface artifacts are also visible, indicating that the segment has not been disturbed. At the other end of the condition scale, a very poor segment has only traces of the grade and features left and no surface artifacts remain. Segments in condition classes A and B were considered eligible for nomination. Those in condition class C-E were considered non-contributing.

Nearly half of the original grade is in class B (ties removed, grade retains original dimensions, curves and gradients may be blurred by overgrowth or damage, features can be deduced but may not be apparent, railroad artifacts on surface). Grades and engineering features remain in original

condition, but the ties have been removed. Artifacts appear in much lower frequency on B grades than on A grades, and what features remain are less distinct, but could be discovered by excavating below ground.

The Spruce Railroad comprises a series of features tied together by railroad grade. Grade segments were evaluated and those that retained the earthwork and landscape features that can be easily interpreted as a historic railroad within the context of the entire railroad system were found to contribute to the railroad's eligibility. When engineering or landscape features are lost this affects the integrity that makes the railroad eligible. The segments that are included within the affected environment are segments 5-9, of which three segments contribute to the integrity of the railroad (5, 8, and 9). The most important segment is number 8, which includes the two tunnels, rail and track hardware, two wooden culverts, timber half-bridge and dry laid fieldstone revetment to provide grade and stabilize the slope along the narrow shore (Tonsfeldt 2009b).

In accordance with Section 106 of the National Historic Preservation Act and the archeology scope of work (Conca 2005) park archeologists conducted a pedestrian survey of the grade along the north shore portion of this trail. The archeologists documented visible features including, cuts, fills, debris flows, ballasts, wooden culverts, rock revetments, timbers from half-bridges, telegraph poles, ditches, and berms. Metal detecting was conducted at 3 locations along the Lake Crescent trail. At the west end of Lake Crescent a 100 foot segment was metal detected and 99 hits were marked. Of these hits, 90% contained metal artifacts.

A detailed inventory has not been conducted at the former stations Manganese (Phase 1), Ovington (Phase 1), and Crescent (private, USFS, and NPS) where features associated with habitation and day use could offer evidence of the railroad worker's lives. Timber workers of the later Crescent logging Company were mostly of Norwegian descent and some were local Elwha Klallam according to an interview with a man whose father ran the Crescent camp when he was a boy (Pearson 2010). The men lived in bunkhouses or in boxcar dorms and had a central washroom, light plant, and wood stoves (Pearson 2010). Other items that might tell archeologists about these men's lives include cans for food, tobacco, old boots, ceramic and glass remains, and other ordinary items that were left in places where they lived and worked. Further research into this part of the railroad's history would contribute to the historic district's integrity and interest.



Figure 45. Location of historic railroad features affected by alternatives

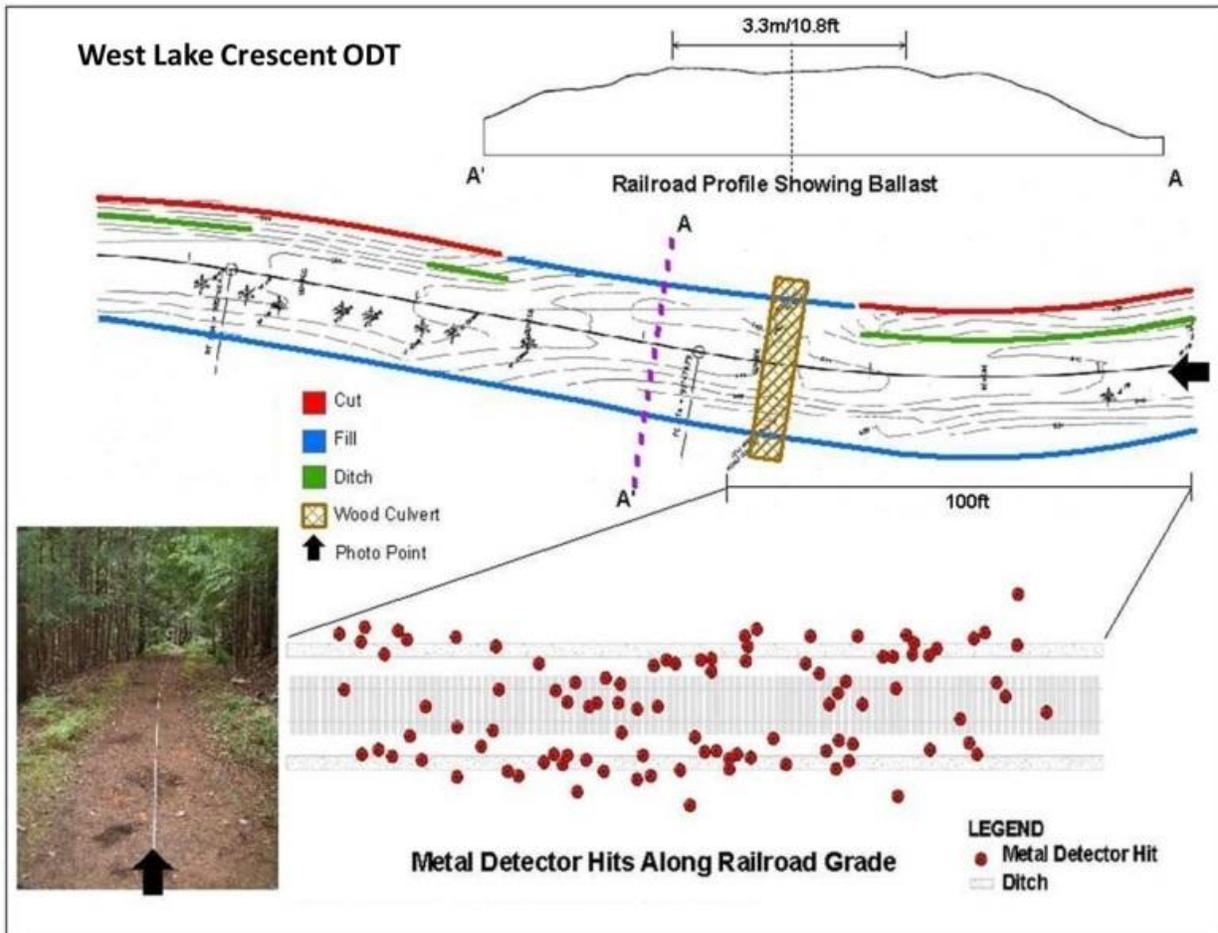


Figure 46. Figure showing area sampled with metal detector along railroad grade near Lake Crescent (Kwarsick)

Much of the construction of the proposed trail work would involve adaptive reuse of this eligible National Register District. Associated character defining features that still exist include earthwork cuts, fills, and borrows that lowered or raised the grade; drainage systems and wooden culverts; retaining walls or revetments and timber half-bridges to create grade on the steep lakeshore. The latter two are visible from both the trail and the lake.



Figure 47. Historic image of timber half-bridge

Experiential Environment

Visitor Use and Experience

The Lake Crescent District is the most highly visited within Olympic National Park. The NPS recorded 2,094,902 visits to the Lake Crescent District in 2010 and 2,195,166 visits in 2011. The Lake Crescent area offers a wide range of day use, overnight, front-country and wilderness experience opportunities for park visitors. The entire project area considered in this environmental assessment is located within an area that was zoned for day use under the 2008 General Management Plan for Olympic National Park. The day use zone is intended to accommodate high to moderate levels of day use with no campgrounds or overnight lodging. Road access may be via either paved or unpaved roads.

Three NPS concession-operated resorts provide nearby lodging in the district, including Lake Crescent Lodge, Log Cabin Resort, and the Sol Duc Hot Springs Resort. The NPS operates front-country campgrounds at both Lake Crescent and Sol Duc, and a concession campground exists at the nearby Log Cabin Resort.

Visitor Opportunities - Day use areas provide many opportunities to enjoy park scenery, have educational experiences, and participate in trail and water-based day use recreation. There is minor risk and challenge present in day use areas. There is some opportunity for solitude, remoteness, and the presence of natural sounds. Appropriate activities include scenic driving (providing opportunities for intermediate and distant views of lakes and mountains), motorized and non-motorized boating, hiking, swimming, fishing, and bicycling. Stock use is allowed in designated areas, but no grazing or stock camping is permitted. Day use areas are designed to reduce or avoid user conflicts.

Within day use areas the probability of meeting other visitors may be high to extremely high, crowded on occasion, and may vary seasonally. The likelihood of encountering NPS staff is intended to be moderate to high in day use areas.

Day use within the project area occurs primarily along the existing Spruce Railroad Trail (SRRT), at the North Shore picnic area located off Camp David Jr. Road (CDJR), the Fairholme convenience store and boat rental area located at the intersection of CDJR and Highway 101 near the NPS campground on Lake Crescent, and at the Devil's punchbowl, located along the SRRT and accessed via trail and by boat.

Trails - The existing trail types defined for day use areas include: nature, all-purpose, multipurpose bicycle, secondary, foot, and primitive trails. Some trails are universally accessible. Numerous trails provide access to the park's wilderness hiking and backpacking destinations in the Lake Crescent area. There are two park trails on the north side of the lake that provide access to destinations within the Lake Crescent watershed as well as access into the backcountry. These trails include the 7-mile long Pyramid Peak trail, with access from CDJR and the ODT Phase 1. This trail is currently closed because of a dangerous rock slide. The existing Spruce Railroad Trail (SRRT), which follows the historic railroad grade, begins at the Lyre River outlet or the east end of the North Shore Road (CDJR). A small gravel parking lot is located at the existing SRRT trailhead near the Lyre River. The existing parking lot has space for approximately 8 vehicles and provides a picnic table, bulletin board with trail information, and a vault toilet. There is no developed parking on CDJR at the current SRRT access point, although there is limited space at the end of the road for a few vehicles to park. Neither access point provides turnaround space for large vehicles or vehicles towing long trailers.

The SRRT is an unpaved, non-motorized, multiple use trail. This popular route is the only trail in the park that is currently open to bicycle use, and is a frequent destination for people using the existing ODT Adventure Route. The SRRT does not meet accessibility guidelines due to the uneven terrain, steep grades of some areas, and lack of a consistent firm and stable surface. The trail is very popular with day hikers and trail runners, and is also popular with pet owners, as this is one of very few trails within the park that allow leashed dogs. The trail is also used by people riding on horseback, although the existing trail access points within the park are not suited to people hauling stock trailers. Some visitors access the SRRT near the Lyre River from adjacent

private and state lands. The NPS does not currently count the number of people using the SRRT, and the specific visitor use patterns related to various recreational activities is not known.

Olympic Discovery Trail (ODT) - There are approximately 40 miles of completed ODT segments in separate trail corridors on the Olympic Peninsula, with additional trails under construction or proposed for construction in the next several years. Of the 40 miles that were complete at the writing of this EA, an estimated 7.8 miles are a hard pack gravel surface, with the remaining 32 miles paved 8-10 feet wide with an additional 3-4 feet of packed gravel for horses. The Larry Scott Trail from Port Townsend to Blyn, is the 7.8 mile section that is hard pack gravel, which may be paved when funds are available. Additional unpaved sections of trail were completed in Port Angeles in 2011. No horse trail exists on approximately 30% of the trail between Blyn and Port Angeles, either because horses are not allowed in the area or the trail passes through dense residential areas.

There are 13 designated access points for these trail corridors with facilities ranging from parking, toilets, and picnic tables to portable toilets. There are three other access points under construction between Port Angeles and the Elwha River, and construction is ongoing to connect the trail to the lower Elwha Bridge. Parking spaces vary from existing public parking to permission granted by private property owners. Discontinuous paved sections of the trail comprise 10.3 miles, including over six miles built in 2009 within Olympic National Park.

Clallam County received permission from the NPS to construct approximately 6½ miles of new trail on the historic Spruce Railroad grade above CDJR in 2009. This new trail segment, now known as Phase 1 of the ODT, was completed in 2011. The Phase 1 segment begins outside the boundary of Olympic National Park adjacent to Highway 101, to the west of Fairholme, and north of the NPS entrance road to Sol Duc. The trail extends northeast from Highway 101 into the park. Within the park the 6½ mile trail varies between 12 and 16 feet in total width. This includes an asphalt paved section that is between 8 and 10 feet in width, and adjacent gravel shoulders that vary between ½ to 4 feet in width on each side. This new trail segment follows the Spruce Railroad grade east, paralleling CDJR and ending near the western terminus of the existing Spruce Railroad Trail.

Accessibility - All practicable efforts are made by the NPS to make facilities accessible and usable by all people. This policy reflects our commitment to provide access to the widest cross section of the public and ensure compliance with the Architectural Barriers Act (ABA) of 1968 and the Americans with Disabilities Act (ADA) of 1990, as appropriate.

In choosing methods for providing accessibility, higher priority will be given to methods that offer programs and activities in the most integrated setting appropriate. Special, separate, or alternative facilities, programs, or services will be provided only when existing ones cannot reasonably be made accessible (NPS 2006:1.9.3).

Accessibility Guidelines for Outdoor Developed Areas - Achieving accessibility in outdoor environments has challenges and constraints posed by terrain, the degree of development, construction practices and materials, and other factors. New guidelines have been drafted for outdoor developed areas to clarify how, and to what extent, access can be achieved. These guidelines cover outdoor developed areas managed by the Federal government and are used to inform the development of all trail development alternatives considered in this planning document.

Soundscapes

The natural sounds within national parks are an important natural and experiential resource that the National Park Service seeks to protect and restore. *NPS Management Policies 2006* state that “the National Park Service will preserve, to the greatest extent possible, the natural soundscapes of parks.” Natural soundscapes encompass all the natural sounds that occur in parks, including the physical capacity for transmitting those sounds and the interrelationships of the sounds. Management Policies require protection of natural soundscapes from unacceptable impacts and also restoration of soundscapes degraded from unnatural sounds (noise) whenever possible (*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 through monitoring as being acceptable to or appropriate for visitor uses at the sites being monitored” (*NPS Management Policies 2006*, sec. 4.9). Superintendents, through management planning, identify what levels and types of unnatural sound constitute acceptable impacts on a park’s natural soundscapes.

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 (NPS 2008:174). Olympic provides not only one of the most pristine sets of natural sounds in the NPS but also a great diversity of natural soundscapes: crashing Pacific Ocean waves, pouring rain, dripping showers, trickling mist, the bugling of Roosevelt elk, and thunderous avalanches. Natural sounds generally predominate throughout most of the park.

The level of non-natural sounds within Olympic National Park varies by location and time of year, a result of the seasonal nature of visitor numbers and park operations. The majority of non-natural sounds in the park originates in developed areas and along major roads and is generated primarily by visitor use, NPS project activities, and over flights. A source of noise in the Lake Crescent area is traffic noise, including engine-assisted brakes used (illegally) by some commercial trucks on Highway 101, which runs along the lake’s south shore.

Impacts to the park's natural soundscapes also originate in areas outside but adjacent to park boundaries such as noise from construction activities or logging operations occurring on nearby private lands. One of the most pervasive impacts to the natural soundscape arises in the airspace over and adjacent to the park. Commercial, military, and private sector aircraft as well as NPS project-related aircraft have a widespread impact on the natural soundscape. In certain areas, such as on the coast or beside a major river, the natural sound level has a volume great enough to override some human-caused sounds.

Sound-sensitive resources and values in the project area include wildlife, visitor experience, and adjacent property owners. Noise, sound that is negatively evaluated (undesired) or extraneous to an environment, can result in an adverse effect by modifying or intruding upon the natural soundscape. Functioning ecosystems depend on natural acoustical environments and wildlife can be adversely affected by sounds and sound characteristics that intrude on their habitats. Noise can interfere with sounds important for animal communication, navigation, mating, nurturing, predation, and foraging. Noise can also adversely affect park visitor and area resident experiences by intruding upon or disrupting experiences of solitude, serenity, tranquility, contemplation, or a completely natural or historical environment.

Maintenance of the existing SRRT and associated parking lots and access roads requires the use of motorized vehicles and equipment that alter the natural soundscape. Chainsaws are used to clear downed trees from the trail; construction equipment is used to maintain the grade of the existing gravel roads and parking lot. Vehicles are used to access the trailheads to service the existing vault toilets and remove trash.

Scenic Values

The Lake Crescent watershed offers abundant scenic resources; from the lake itself to the surrounding mountains, forests, rocky outcrops, and clear-flowing streams. Nestled in the deep glacial valley beneath steep forested hillsides, Lake Crescent is a spectacular sight with dramatic views of Mount Storm King, Pyramid Mountain, and forested ridgelines. From high on Mount Storm King and Pyramid Mountain visitors can find sweeping views of the watershed and Olympic Mountains. Perhaps the most significant scenic resource is the lake itself, with steep drop offs, its turquoise hue and clarity is exceptional.

Park Operations and Safety

The National Park Service is committed to providing a healthy and safe environment for visitors and employees; to protect human life and provide for injury-free visits and appropriate responses when accidents and injuries do occur. The goals of Olympic National Park include ensuring that

basic visitor needs are met, while keeping with the park's purpose, 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 purpose of this EA, refer to the quality and effectiveness of the infrastructure and the ability of park staff to maintain the resources and provide for a high quality visitor experience.

Park operations in the project area include providing infrastructure to support visitor use, on-going trail monitoring and maintenance, interpretive and educational opportunities, visitor and park resource protection, including responding to emergencies.

Access to SRRT trailheads via Camp David Jr. Road presents challenges for emergency response. The road is very narrow and winding at the base of a steep ridgeline that is frequently blocked by tree or rock fall and landslides. Cell coverage in the area is spotty and could prevent phone communication by people seeking assistance and emergency responders. Public health and safety refers to the ability of the NPS to provide for a healthy and safe environment for visitors and employees, and to provide for appropriate and adequate emergency response.

The current Spruce Railroad trailhead at the Lyre River is small with a limit of approximately 8 cars. There is an accessible vault toilet at this trailhead. The Camp David Jr. Road trailhead does not have a parking lot, but 2-3 cars can use pullouts along the side of the road. The parking area in the nearby North Shore picnic area can accommodate about 25 cars and it has an accessible vault toilet adjacent to the parking area. Neither parking area has designated accessible parking sites. The size and configuration of the sites present access issues for large RVs and vehicles with trailers.

Maintenance personnel maintain the facilities at Lake Crescent, including the Fairholme campground, Storm King visitor use area on the south shore, East Beach and North Shore day use areas, and Lyre River trailhead at least three times a week. Routine maintenance includes restroom cleaning and trash removal.

The park road crew use graders and other equipment to smooth and grade CDJR as needed, based on inspections by the area maintenance staff. Maintenance of the East Beach Road is conducted in partnership with Clallam County, including repairs to road failures and cyclic ditch cleaning and striping

Maintenance staff inspects the Spruce Railroad Trail, but most routine trail maintenance is done by park volunteers from the Olympic Chapter of the Backcountry Horsemen and other volunteer organizations.

Educational Programs - Areas within the day use zone are intended to provide a full range of educational services on-site. This includes personal services (guided talks or trips), wayside exhibits, visitor centers, and ranger stations. Orientation and information may be provided at

trailheads, along pedestrian and vehicle routes, and at parking lots. Way-finding to activities and facilities is intended to be easy and may include elements such as temporary barriers, fencing, signs, and paving to direct use.

Educational programs offered in the Lake Crescent area include evening programs at the Fairholme campground and publication of a brochure used on both the “Moments in Time Trail” and the Spruce Railroad Trail titled, *Ever changing, ever green: the low-elevation forests*.

NatureBridge, an education partner of the NPS, operates programs from the south shore of Lake Crescent and conducts private environmental science education hikes for grades K-12 on the Spruce Railroad Trail. Their hikes include biotic inventory, forest plant studies, and railroad history. These trips occur at least twice a week and up to a full day is spent on the trail.

Commercial Activities - Adventures Through Kayaking, Inc., a private business, holds a commercial use authorization to conduct educational trips of up to 12 people by kayak and stand-up paddle board on the lake along the Spruce Railroad Trail. They also provide guided bicycling trips along the Spruce Railroad Trail, where the goal is appreciation of the railroad’s history. Their operating season is mainly April through October, but they will take people between November and March as well. The World Outdoors is also authorized to conduct a one day bike trip on the Spruce Railroad Trail in July and August.

Land Use

There are numerous private property owners within the boundaries of Olympic National Park, including within the project area. Multiple year-round and seasonal residences are maintained along CDJR on the north shore of Lake Crescent and near the current SRRT parking lot near the Lyre River. The NPS policy and intent is to coordinate with, and be sensitive and respectful of private property owners and private property rights. The existing SRRT bisects a corner of an existing private lot. A verbal agreement between the NPS and the landowner exists. Several private lands are immediately adjacent to the existing SRRT, particularly near the SRRT parking lot. Some residences are served by water sources or water delivery systems located within the project area.

Socioeconomic Values

The Lake Crescent area is a popular destination within Olympic National Park that attracts local, regional, national and international visitors. Tourism to the area supports a wide range of businesses that include resorts, hotels, motels, bed & breakfasts, campgrounds, transportation

providers, gasoline stations, restaurants, convenience stores, grocery stores, and a wide range of retail operations. Tourism to the park generates revenue both within and outside of the park boundaries. The existing Spruce Railroad Trail is a destination for guided bicycle trips under a current commercial use authorization. Guided kayak trips on Lake Crescent take advantage of the existing environment, as do the lodges and campgrounds located along the shore of Lake Crescent, particularly those with views of the forested north shore where the SRRT is located and proposed for expansion.

Chapter 4: Environmental Consequences

Introduction

The purpose of this chapter is to evaluate the potential impacts to each resource that would be expected to occur under each of the alternatives described in Chapter 2. The end of Chapter 2 also contains a summary of environmental impacts.

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 Department of Archaeology and Historic Preservation and interested local tribes, professional expertise, knowledge of park staff, and public input. This chapter is organized as follows:

- **Methodology for Impact Assessment**
- **Physical Environment**
 - Geologic Features and Soils
 - Hydrology and Water Quality
 - Air Quality
- **Biological Environment**
 - Vegetation & Wetlands
 - Wildlife and Wildlife Habitat
 - Unique or Important Fish or Fish Habitat
 - Threatened and Endangered Species
- **Cultural Environment**
 - Cultural Resources
 - Spruce Division Railroad
- **Experiential Environment**
 - Visitor Use and Experience
 - Soundscapes
 - Scenic Values
 - Park Operations and Safety
 - Socioeconomics
- **Unavoidable Adverse Impacts**
- **Relationship of Short-Term Uses and Long-Term Productivity**
- **Irreversible and Irretrievable 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).

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 resources within the park. Olympic National Park currently manages over 600 miles of trail within the park. Most of the park's trail system is located within designated wilderness. This EA guides implementation of the portions of the GMP that address the Spruce Railroad. The GMP states that "the existing frontcountry trail system would be retained and could be improved. A universally accessible frontcountry trail would be developed and maintained" (NPS 2008: Map 16).

Lake Crescent Management Plan (LCMP) Final Environmental Impact Statement (1998)

The LCMP Final Environmental Statement provides guidance for the development and use of Lake Crescent over the next 15 to 20 years. Visitor-related use and development is concentrated in six general areas around the lake: Fairholme, Barnes Point, Log Cabin, La Poel, East Beach, and the north shore. The remainder of the watershed receives relatively little use due to steep terrain and limited access. Furthermore, the southern portion of the watershed (south of U.S. 101) is managed uniformly as designated wilderness, proscribing many uses and improvements. Consequently, this plan focuses on management of uses occurring on and immediately around the lake. The continuation of the existing management direction would prevail for the greater watershed.

It should be noted that while the plan provides for specific direction for future management decisions regarding resource protection and public use for Lake Crescent, it does not contain detailed site designs for any of the management areas. Over the next several years, as funding allows, individual site plans for specific areas around the lake would be contemplated based upon the recommendations in this plan. These site plans will address various aspects of site development including the location of roads, buildings and facilities, vehicle and pedestrian circulation, recreational facilities, and the protection of natural and cultural resources. In many cases, further environmental analysis will be completed for specific development and construction designs. Many of the proposed actions will also require further cooperation and coordination with other public agencies, Native American tribes, private landowners, area residents, concessioners, and business, recreational, and environmental interests.

The Lake Crescent EIS established direction to “Improve the Spruce Railroad grade to the western park boundary as a non-motorized, multipurpose trail. In the short-term, the Spruce Railroad grade would be leveled and cleared of debris to improve its use by mountain bikers, horseback riders and pedestrians. In the long-term, and as it is possible to resolve conflicting uses, the grade would be improved to provide a continuous trail from the Lyre River to the western park boundary for multiple uses, including some or all of the following: pedestrians, wheelchairs, bicycles, horses, and rollerblades.”

The Lake Crescent EIS also addresses improvement of the North Shore picnic area. “The park anticipates the increased use of the North Shore picnic area by visitors arriving via foot, bicycle, or boat. In its present condition, the beach area is overgrown with vegetation and few picnic sites are available. Access from the parking lot to the beach would be improved by installing stairs and accessible paths/trails, which would also prevent further erosion of the slope directly above the beach. In the parking area, individual parking spaces would be delineated with wheel stops. Accessible toilets (vault or composting) would replace existing toilets. Other improvements include interpretive signs and a kiosk showing connections to trails and other destinations. Also included in the Lake Crescent EIS are parking needs: “As the Spruce Railroad trail is improved and possibly lengthened and developed for multiple users, the need for parking must be accommodated. The park would analyze the need for modest expansion of the parking areas at the east and west ends of the Spruce Railroad trail” (NPS 1998:36-37).

Other Planned or Ongoing Projects

Olympic Discovery Trail (this regional trail project was not initiated by the NPS, sections of this trail are currently proposed on NPS and other adjacent public and private lands by Clallam County and others)

The Olympic Discovery Trail (ODT) is proposed as a 140 mile long regional trail system that when complete would link communities across the north Olympic Peninsula from Port Townsend, on Puget Sound, with LaPush on the Pacific Coast. The trail would cross multiple jurisdictions, including federal, state, county and private lands.

Approximately 6.5 miles of paved trail has been constructed by the County in Olympic National Park above the north shore of Lake Crescent between Highway 101 and the trailhead of the existing Spruce Railroad Trail east of the North Shore picnic area. The 6.5 miles of asphalt trail is proposed as part of the Olympic Discovery Trail. This segment of trail was constructed in 2009 and provides an accessible trail for hikers, bicyclists, equestrians, and people using wheelchairs.

Additional trail is proposed for construction to the west of the park on U.S. Forest Service lands. This work was approved through an environmental assessment completed by the USFS and approved through a Finding of No Significant Impact (FONSI) on October 20, 2006. Trail construction is also ongoing east of the park in the community of Port Angeles.

Physical Environment

The following section describes the anticipated effects to the geology and soils, hydrology, water quality, and air quality of the project area. It also includes a description of the methodology used to define 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

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 34. Geologic Features and Soils Impact and Intensity

Impact Intensity	Intensity Description
Negligible	The effects to geologic features or soils would be at or below the 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 or topography, 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.

Table 35. Total Construction Related Impacts to Geological Resources by Alternative					
	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5
length of trail (miles)	3.8	3.9	3.8	3.9	3.9
volume of new excavation/cut required (CY)	0	8341	11875	12835	14788
volume of fill required (CY)	0	1921	2110	2268	2616
volume of base material placed (CY)	0	5181	5999	6858	7812
volume of asphalt placed (CY)	0	385	729	0	1026
total paved trail surface (acres)	0	1.5	2.7	0	3.7
total new construction disturbed area (acres)	0	5.6	6.4	6.5	6.5

Environmental Consequences to Geologic Features and Soils

Alternative 1 – No Action

Direct and Indirect Impacts of the Alternative

Under Alternative 1 the existing Spruce Railroad Trail and parking lot would be maintained, as is. There would be no lengthening or widening of the existing trail, and no expansion of the parking lot. Routine clearing of the trail and grading of the parking lot would continue. This would result in adverse, site-specific, long-term to permanent negligible to minor adverse impacts associated with the use and maintenance of the existing Spruce Railroad Trail and Lyre River parking lot.

Impacts Common to All Action Alternatives (Alts 2, 3, 4, and 5)

Direct and Indirect Impacts of the Alternatives.

Both railroad tunnels would be cleared and developed for trail use as described in Chapter 2. This would result in adverse, site-specific, short-term moderate to major adverse impacts associated with the excavation required to provide access to the railroad tunnels and to clear the slide debris from inside and immediately adjacent to the historic railroad tunnels.

The existing parking lot near the Lyre River would be expanded and paved. The road between the Lyre River Bridge and the parking lot and the 0.2 miles of the Water Line Road within the park boundary would also be paved. The park would construct two paved, accessible parking spaces on Camp David Junior Road (CDJR) adjacent to the existing North Shore Picnic Area parking lot. The park would also construct a six foot wide, asphalt paved, and universally accessible trail from the new parking area to Phase 1 of the Olympic Discovery Trail within the park and directly above CDJR.

A construction access ramp would be built from CDJR to Phase 1 of the Olympic Discovery Trail in the park. This would require the placement and compaction of fill material. If the construction access ramp is removed after new trail development is complete it would result in adverse, site-specific, short-term, minor impacts. If the access ramp is kept in place to provide access to ongoing maintenance of the trail these effects would be long-term to permanent.

The existing Spruce Railroad Trail would be cleared and graded to support improved visitor access, including for people with disabilities. Areas within the construction clearing limits would be excavated and graded as described in Chapter 2. Upslope and downslope retaining structures would be installed to prevent additional erosion that may otherwise be associated with trail improvements. Best management practices would be implemented to avoid or minimize erosion and transport of sediment during construction. This would result in adverse, local, long-term to permanent, moderate impacts associated with excavation, grading, placement of fill, and compaction of soils.

Alternative 2 – Three foot wide asphalt trail with four foot wide gravel shoulder and widened passing areas

Direct and Indirect Impacts of the Alternative

Under Alternative 2 the existing Spruce Railroad Trail (SRRT) would be widened and paved to a width of three feet, with additional five foot wide passing areas as described in Chapter 2. A four foot wide gravel surface would be retained upslope and immediately adjacent to the paved trail to provide access for equestrians. The trail would be developed to provide a continuous trail surface between Phase 1 of the ODT and the Lyre River trailhead parking lot.

This work would occur along the general route of the historic Spruce Railroad in segments A, B, and C. Approximately two-thirds of Segment D would remain on the current trail alignment. New trail would be developed in portions of Segment D to provide a trail grade the meets outdoor accessibility guidelines as described in Chapter 2. Best management practices would be implemented to avoid or minimize erosion and transport of sediment during construction.

Alternative 2 would result in adverse, local, long-term to permanent, minor to moderate impacts associated with excavation, grading, placement of fill, and compaction of soils in the Lake Crescent area.

Alternative 3 – Six foot wide asphalt trail with four foot wide gravel shoulder

Direct and Indirect Impacts of the Alternative

Under Alternative 3 the existing Spruce Railroad Trail (SRRT) would be widened and paved to a width of six feet as described in Chapter 2. A four foot wide gravel surface would be retained upslope and immediately adjacent to the paved trail to provide access for equestrians. The trail would be developed to provide a continuous trail surface between Phase 1 of the ODT and the Lyre River trailhead parking lot.

This work would occur along the general route of the historic Spruce Railroad in segments A, B, and C. Segment D would remain on the current trail alignment and would not meet outdoor accessibility guidelines as described in Chapter 2. Best management practices would be implemented to avoid or minimize erosion and transport of sediment during construction.

Alternative 3 would result in adverse, local, long-term to permanent, minor to moderate impacts associated with excavation, grading, placement of fill, and compaction of soils in the Lake Crescent area.

Alternative 4 – Ten foot wide non-asphalt trail

Direct and Indirect Impacts of the Alternative

Under Alternative 4 the existing Spruce Railroad Trail (SRRT) would be widened and developed to provide an accessible, firm and stable, non-asphalt surface as described in Chapter 2. The trail would be developed to provide a continuous surface between Phase 1 of the ODT and the Lyre River trailhead parking lot.

This work would occur along the general route of the historic Spruce Railroad in segments A, B, and C. Approximately two-thirds of Segment D would remain on the current trail alignment.

New trail would be developed in portions of Segment D to provide a trail grade that meets outdoor accessibility guidelines as described in Chapter 2. Best management practices would be implemented to avoid or minimize erosion and transport of sediment during construction. The non-asphalt trail surface would be designed and maintained to prevent additional erosion impacts by ensuring the design supports proper drainage. This would be monitored by park staff and minor adjustments to the trail design may be implemented that would result in no, or only minimal additional impact to park resources.

Alternative 4 would result in adverse, local, long-term to permanent, moderate impacts associated with excavation, grading, placement of fill, and compaction of soils in the Lake Crescent area.

Alternative 5 – Eight foot wide asphalt trail with three foot wide gravel shoulder

Direct and Indirect Impacts of the Alternative

Under Alternative 5 the existing Spruce Railroad Trail (SRRT) would be widened and paved to a width of eight feet as described in Chapter 2. A three foot wide gravel surface would be retained upslope and immediately adjacent to the paved trail to provide access for equestrians. The trail would be developed to provide a continuous trail surface between Phase 1 of the ODT and the Lyre River trailhead parking lot.

This work would occur along the general route of the historic Spruce Railroad in segments A, B, and C. Approximately two-thirds of Segment D would remain on the current trail alignment. New trail would be developed in portions of Segment D to provide a trail grade that meets outdoor accessibility guidelines as described in Chapter 2. Best management practices would be implemented to avoid or minimize erosion and transport of sediment during construction.

Alternative 5 would result in adverse, local, long-term to permanent, moderate impacts associated with excavation, grading, placement of fill, and compaction of soils in the Lake Crescent area.

Cumulative Impacts (all alternatives)

The cumulative impacts to geologic features and soils associated with the expansion of the Spruce Railroad Trail, when added to the park's existing 600 + miles of trail and the proposed 140 mile long Olympic Discovery Trail would result in continued adverse, regional, long-term to permanent impacts to topography and soils associated with the excavation, grading, filling and compacting of soils. The cumulative impacts associated with the existing trail system in Olympic National Park were addressed in the 2008 General Management Plan Final Environmental Impact Statement (FEIS). The additional impacts associated with the expansion of the Spruce Railroad Trail would result in additional impacts that are minor in the context of the larger system of trails existing and planned on the north Olympic Peninsula.

Hydrology and Water Quality

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 36. Hydrology and Water Quality Impact and Intensity

Impact Intensity	Intensity Description
Negligible	Action 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	Action 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	Action 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	Action 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.

Environmental Consequences to Hydrologic Processes and Water Quality

Alternative 1 – No Action

Direct and Indirect Impacts of the Alternative

Under Alternative 1 the existing Spruce Railroad Trail and parking lot would be maintained, as is. There would be no lengthening or widening of the existing trail, and no expansion of the parking lot. Routine clearing of the trail and grading of the parking lot would continue. There would be no increase in hardened, impermeable surfaces. Best management practices would continue to be implemented during routine maintenance activities to avoid the transport of sediments into Lake Crescent, although some degree of sediment transport would continue to occur during rainfall events when surface water from the trail and parking lot eventually enters the lake. There would be no increase in bank armoring along the lake, and no additional placement of rip rap or fill below the ordinary high water level of Lake Crescent.

The ongoing failure of the rail grade in some locations along the lake is resulting in the periodic delivery of fine sediments to the lake. In the absence of new bank stabilization this would be likely to continue over time, particularly as the existing log cribbing continues to decay. This would result in adverse, local, long-term to permanent minor adverse impacts associated with the use and maintenance of the existing Spruce Railroad Trail and Lyre River parking lot.

Impacts Common to All Action Alternatives (Alts 2, 3, 4, and 5)

Direct and Indirect Impacts of the Alternatives.

Both railroad tunnels would be cleared and developed for trail use as described in Chapter 2. This would result in the potential for adverse, site-specific and local, short-term minor impacts associated with the excavation required to provide access to the railroad tunnels and to clear the slide debris from inside and immediately adjacent to the historic railroad tunnels. Best management practices would be implemented to avoid or minimize the potential for water quality impacts to the greatest extent possible.

The existing parking lot near the Lyre River would be expanded and paved. The road between the Lyre River Bridge and the parking lot and the 0.2 miles of the Water Line Road within the park boundary would also be paved. The park would construct two paved, accessible parking spaces on Camp David Junior Road (CDJR) adjacent to the existing North Shore Picnic Area parking lot. The park would also construct a six foot wide, asphalt paved, and universally accessible trail from the new parking area to Phase 1 of the Olympic Discovery Trail within the park and directly above CDJR. This would result in adverse, site-specific, permanent, negligible impacts to surface hydrology and water quality.

A construction access ramp would be built from CDJR to Phase 1 of the Olympic Discovery Trail in the park. This would require the placement and compaction of fill material. If the construction access ramp is removed after new trail development is complete it would result in adverse, site-specific, short-term, negligible to minor impacts. If the access ramp is kept in place to provide access to ongoing maintenance of the trail these effects would be long-term to permanent.

The existing Spruce Railroad Trail would be cleared and graded to support improved visitor access, including for people with disabilities. Areas within the construction clearing limits would be excavated and graded as described in Chapter 2. Upslope and downslope retaining structures would be installed to prevent additional erosion that may otherwise be associated with trail improvements. Best management practices would be implemented to avoid or minimize erosion and transport of sediment during construction. This would result in adverse, local, long-term to permanent, negligible to minor impacts associated with surface flow from newly hardened surfaces to adjacent areas that drain to Lake Crescent.

Bank hardening would occur in areas along the lake where it is necessary to support trail development and maintenance and avoid erosion of the trail corridor into Lake Crescent. There are five areas in Segment A where erosion has occurred and bank stabilization would be implemented along 0.12 miles of trail. An estimated total of 1,450 cubic yards rip rap would be used to hold the bank. Approximately 10% of this volume (145 cubic yards) would be placed below the ordinary high water level of Lake Crescent. An additional nine bank failure areas in

Segment B would also be addressed. This would include the placement of an additional 4,745 cubic yards of rip rap. Approximately 10% (475 cubic yards) would be below the ordinary high water level of Lake Crescent. Rip rap would be placed in areas where steep and rocky drop-offs naturally occur. Alternative designs that avoid or minimize rip rap would be implemented in areas where adequate structural stability could be achieved while minimizing disturbance to water quality and hydrologic process.

During construction, all action alternatives would result in adverse, site-specific and local, short-term, negligible to moderate impacts to surface hydrology and water quality associated with excavation and grading. After construction, all action alternatives would result in adverse, site-specific and local, permanent, negligible to moderate impacts to surface hydrology and water quality associated with the increase in developed area and hardened surfaces, including the areas of bank hardening described above.

Alternative 2 – Three foot wide asphalt trail with four foot wide gravel shoulder and widened passing areas

Direct and Indirect Impacts of the Alternative

Under Alternative 2 the existing Spruce Railroad Trail (SRRT) would be widened and paved between Phase 1 of the ODT and the Lyre River trailhead as described in Chapter 2. This includes the development of new trail in Segment D to provide an accessible trail grade. Best management practices would be implemented during construction and routine maintenance activities to avoid the transport of sediments into Lake Crescent. Some degree of sediment transport would continue to occur during rainfall events when surface water from the trail and parking lot eventually enters the lake.

During construction, Alternative 2 would result in adverse, site-specific and local, short-term, negligible to moderate impacts to surface hydrology and water quality associated with excavation and grading.

Alternative 3 – Six foot wide asphalt trail with four foot wide gravel shoulder

Direct and Indirect Impacts of the Alternative

Under Alternative 3 the existing Spruce Railroad Trail (SRRT) would be widened and paved between Phase 1 of the ODT and current Lyre River trailhead parking lot. Best management practices would be implemented during construction and routine maintenance activities to avoid the transport of sediments into Lake Crescent. Some degree of sediment transport would continue to occur during rainfall events when surface water from the trail and parking lot eventually enters the lake.

During construction, Alternative 3 would result in adverse, site-specific and local, short-term, negligible to moderate impacts to surface hydrology and water quality associated with excavation and grading.

Alternative 4 – Ten foot wide non-asphalt trail

Direct and Indirect Impacts of the Alternative

Under Alternative 4 the existing Spruce Railroad Trail (SRRT) would be widened between Phase 1 of the ODT and the Lyre River trailhead as described in Chapter 2. This includes the development of new trail in Segment D to provide an accessible trail grade. Best management practices would be implemented during construction and routine maintenance activities to avoid the transport of sediments into Lake Crescent. Some degree of sediment transport would continue to occur during rainfall events when surface water from the trail and parking lot eventually enters the lake.

During construction, Alternative 4 would result in adverse, site-specific and local, short-term, negligible to moderate impacts to surface hydrology and water quality associated with excavation and grading. All trail segments, particularly segment D, would be monitored to ensure trail design ensures proper drainage and does not contribute an unacceptable sediment load to adjacent waters, including Lake Crescent. Minor changes to avoid or minimize water quality impacts would be implemented as needed to avoid or minimize potential impacts.

Alternative 5 – Eight foot wide asphalt trail with three foot wide gravel shoulder

Direct and Indirect Impacts of the Alternative

Under Alternative 5 the existing Spruce Railroad Trail (SRRT) would be widened and paved between Phase 1 of the ODT and the Lyre River trailhead as described in Chapter 2. This includes the development of new trail in Segment D to provide an accessible trail grade. Best management practices would be implemented during construction and routine maintenance activities to avoid the transport of sediments into Lake Crescent. Some degree of sediment transport would continue to occur during rainfall events when surface water from the trail and parking lot eventually enters the lake.

During construction, Alternative 5 would result in adverse, site-specific and local, short-term, minor to moderate impacts to surface hydrology and water quality associated with excavation and grading in a slightly wider construction corridor to accommodate a finished trail width of twelve feet.

Cumulative Impacts (all alternatives)

The cumulative impacts to hydrology and water quality associated with the expansion of the Spruce Railroad Trail, when added to the park's existing 600 + miles of trail and the proposed 140 mile long Olympic Discovery Trail would result in adverse, regional, short-term to permanent, minor to major impacts associated with construction of trail and associated modification of surface hydrology and water quality due to the increase in disturbed area and hardened surfaces. The cumulative impacts associated with the existing trail system in Olympic National Park were addressed in the 2008 General Management Plan Final Environmental Impact Statement (FEIS). The additional impacts associated with the expansion of the Spruce Railroad Trail would result in additional impacts that are negligible in the context of the larger system of trails existing and planned on the north Olympic Peninsula.

Air Quality

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 37. 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.

Environmental Consequences to Air Quality

Alternative 1 – No Action

Direct and Indirect Impacts of the Alternative

The No Action Alternative would result in ongoing, adverse, site-specific and local, negligible to minor impacts to air quality associated with the use of motorized equipment to maintain the existing trail system and parking lots and the use of motorized transport to and from trailheads. There would continue to be beneficial, site-specific and local, negligible impact associated with use of the existing Spruce Railroad Trail by people who access the area using non-motorized transportation, such as long-distance hikers, equestrians, and bicyclists.

Alternatives 2, 3, 4 and 5

Direct and Indirect Impacts of the Alternatives

All action alternatives would result in adverse, site-specific and local, short-term, negligible to minor impacts associated with the use of motorized equipment to construct new trail and improve the existing trail. Adverse, site-specific and local, negligible to minor impacts would occur to air quality associated with the use of motorized equipment to maintain the expanded trail system and parking lots and the use of motorized transport to and from trailheads. There would be beneficial, site-specific and local, negligible impacts associated with use of the expanded trail system by people who access the area using non-motorized transportation, such as long-distance hikers, equestrians, and bicyclists.

Cumulative Impacts (all alternatives)

The cumulative impacts to air quality associated with the expansion of the Spruce Railroad Trail, when added to the park’s existing 600 + miles of trail and the proposed 140 mile long Olympic Discovery Trail would result in adverse, regional, short-term to permanent, negligible to minor impacts associated with use of motorized equipment and vehicles in the construction, maintenance, and access of the trail systems. Beneficial, regional, long-term to permanent, negligible to minor impacts would be associated with people who access the trail system using non-motorized transportation, such as long-distance hikers, equestrians, and bicyclists.

Biological Environment

Vegetation

Impact Assessment Methodology

Type: Beneficial impacts protect or restore native vegetation or remove non-native vegetation. Adverse effects diminish or remove native vegetation or increase the likelihood of introducing or spreading 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 38. Vegetation Impact and Intensity

Impact Intensity	Intensity Description
Negligible	Impacts to vegetation (individuals or communities) would not be measurable. The abundance or distribution of individuals would not be affected or would be slightly affected. No trees greater than 6" diameter at breast height (dbh) would be removed. 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	Action would not decrease or increase the project area's overall biological productivity. The alternative would affect the abundance or distribution of individual plants, including trees, in a localized area but would not affect the viability of local or regional populations or communities of any special status species. Areas disturbed during construction would be expected to recover naturally within a single growing season. Individual trees would be removed, but would be limited to no more than five trees per acre that are ≥11" dbh. No trees ≥ 24" dbh would be removed. Mitigation may be needed to offset adverse effects, would be relatively simple to implement, and would likely be successful.
Moderate	Action would not decrease or increase the project area's overall biological productivity. The alternative would affect the abundance or distribution of individual plants, including trees, in a localized area but would not affect the viability of local or regional populations or communities of any special status species. Most areas disturbed during construction would be expected to recover naturally within a single growing season, although some areas would require active revegetation. Additional monitoring and treatment for new populations of exotic plant species would be required for no more than three years. Some vegetated areas would be converted to development. Individual trees < 24" dbh would be removed, but would be limited to no more than 20 trees per acre that are ≥11" dbh. No trees ≥ 36" dbh would be removed. Mitigation would be needed to offset adverse effects, would be relatively simple to implement, and would likely be successful.
Major	Action would have highly visible effects on native plant populations, including special status species, or would affect a relatively large area within and outside the park. Some areas disturbed during construction would be expected to recover naturally within a single growing season, but many areas would require active revegetation. Additional monitoring and treatment for new populations of exotic plant species would be required for more than three years. Widespread vegetated areas would be converted to development. More than 20 trees per acre that are ≥11" dbh would be removed, and may include trees 36" dbh or larger. Extensive mitigation measures to offset the adverse effects would be required; success of the mitigation measures would not be guaranteed.

Environmental Consequences to Vegetation

Table 39. Vegetation Clearing & Tree Removal by Alternative

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Maximum number of trees 24 - 35" dbh	0	11	15	15	15
Number of trees ≥ 36" dbh	0	0	0	0	0
TOTAL number of trees ≥ 11" dbh	0	122	140	140	146
total construction/cleared area (acres)	0	5.6	6.4	6.5	6.5
Total number of trees ≥ 11" dbh per acre	0	22	22	22	22

Alternative 1 – No Action

Direct and Indirect Impacts of the Alternative

The No Action Alternative would result in ongoing clearing of vegetation as necessary to maintain the existing Spruce Railroad Trail and parking lots. This includes the occasional removal of hazard trees, clearing of dead and down trees from the trail, and brushing and clearing of any growth within the horizontal and vertical clearing limits of the trail corridor. Best management practices are implemented to avoid the introduction or spread of non-native plant species. However, the open areas associated with trail and parking lots remain vulnerable to new and expanded exotic plant invasions. Use of the trails and parking lots also provides a means of transport for weed seeds on the shoes and clothing of park visitors and staff, and also from stock animals that may transmit undigested weed seeds via manure or on their coats or hooves.

Impacts Common to All Action Alternatives

Direct and Indirect Impacts of the Alternatives

Best management practices would be implemented during trail construction and maintenance to avoid the introduction or spread of non-native plant species. However, the open areas associated with trail and parking lot development remain vulnerable to new and expanded exotic plant invasions. Use of the trails and parking lots also provides a means of transport for weed seeds on the shoes and clothing of park visitors and staff, and also from stock animals as described above. This would result in adverse, local to regional, long-term to permanent, minor to moderate adverse impacts.

Alternative 2 – Three foot wide asphalt trail with four foot wide gravel shoulder and widened passing areas

Direct and Indirect Impacts of the Alternative

Under Alternative 2 the existing Spruce Railroad Trail would be widened between Phase 1 of the ODT and the existing Lyre River parking lot. New clearing of vegetation would occur to develop a new, accessible trail alignment in Segment D. This would require clearing of vegetated lands and conversion to developed area within the park resulting in a total construction footprint of 5.6 acres. This clearing would include removal of vegetation, including a maximum of 122 trees greater than 11” diameter at breast height (dbh). Tree species removed would include cedar, fir, maple and alder. None of the trees proposed for removal are old growth. There are 10 mature second growth trees that range from 24” to 34” dbh. Tree species removed in this size range would include fir, hemlock, and maple. Understory vegetation would also be cleared. This would include small trees < 11” dbh, shrubs, herbaceous plants, ferns and mosses as described in Chapter 3, Affected Environment.

Best management practices would be implemented to avoid the transport of sediment during construction and maintenance of the expanded trail. However, some sediment transport would occur during rainfall events. Increased sediment in areas containing water lobelia may occur as a result of expansion and maintenance of the Lyre River parking lot, although revegetation of the shoreline area between the expanded parking lot and the lake is expected to minimize this effect. Alternative 2 would result in adverse, site-specific and local, long-term to permanent, moderate to major impacts to vegetation.

Alternative 3 – Six foot wide asphalt trail with four foot wide gravel shoulder

Direct and Indirect Impacts of the Alternative

Under Alternative 3 the existing Spruce Railroad Trail would be widened between Phase 1 of the ODT and the existing Lyre River parking lot. This would require clearing of vegetated lands and conversion to developed area within the park resulting in a total construction footprint of 6.4 acres. This clearing would include removal of 140 trees \geq 11” dbh. Tree species removed would include cedar, fir, alder, maple and hemlock. None of the trees proposed for removal are old growth. There are 15 mature second growth trees that range from 24” to 34” dbh. Tree species removed in this size range would include fir, hemlock, and maple. Understory vegetation would also be cleared. This would include small trees < 11” dbh, shrubs, herbaceous plants, ferns and mosses as described in Chapter 3, Affected Environment.

Best management practices would be implemented to avoid the transport of sediment during construction and maintenance of the expanded trail. However, some sediment transport would likely occur during rainfall events. Increased sediment in areas containing water lobelia may occur as a result of expansion and maintenance of the Lyre River parking lot, although paving the parking lots and revegetation of the shoreline area between the expanded parking lot and the lake is expected to minimize this effect. Alternative 3 would result in adverse, site-specific and local, long-term to permanent, moderate impacts to vegetation.

Alternative 4 – Ten foot wide non-asphalt trail

Direct and Indirect Impacts of the Alternative

Under Alternative 4 the existing Spruce Railroad Trail would be widened between Phase 1 of the ODT and the existing Lyre River parking lot. New clearing of vegetation would occur to develop a new, accessible trail alignment in Segment D. This would require clearing of vegetated lands and conversion to developed area within the park resulting in a total construction footprint of 6.5 acres. This clearing would include removal of vegetation, including a maximum of 140 trees greater than 11” dbh. Tree species removed would include cedar, fir, maple and alder. None of the trees proposed for removal are old growth. There are 15 mature second growth trees that range from 24” to 34” dbh. Tree species removed in this size range would include fir, hemlock, and maple. Understory vegetation would also be cleared. This would include small trees < 11” dbh, shrubs, herbaceous plants, ferns and mosses as described in Chapter 3, Affected Environment.

Best management practices would be implemented to avoid the transport of sediment during construction and maintenance of the expanded trail. However, some sediment transport would occur during rainfall events. Increased sediment in areas containing water lobelia may occur as a result of expansion and maintenance of the Lyre River parking lot, although revegetation of the shoreline area between the expanded parking lot and the lake is expected to minimize this effect. Alternative 4 would result in adverse, site-specific and local, long-term to permanent, moderate to major impacts to vegetation.

Alternative 5 – Eight foot wide asphalt trail with three foot wide gravel shoulder

Direct and Indirect Impacts of the Alternative

Under Alternative 5 the existing Spruce Railroad Trail would be widened between Phase 1 of the ODT and the existing Lyre River parking lot. New clearing of vegetation would occur to develop a new, accessible trail alignment in Segment D. This would require clearing of vegetated lands and conversion to developed area within the park resulting in a total construction footprint of 6.5 acres. This clearing would include removal of vegetation, including a maximum of 146 trees greater than 11” dbh. Tree species removed would include cedar, fir, maple and alder. None of the trees proposed for removal are old growth. There are 15 mature second growth trees that range from 24” to 34” dbh. Tree species removed in this size range would include fir, maple, and hemlock. Understory vegetation would also be cleared. This would include small trees < 11” dbh, shrubs, herbaceous plants, ferns and mosses as described in Chapter 3, Affected Environment.

Best management practices would be implemented to avoid the transport of sediment during construction and maintenance of the expanded trail. However, some sediment transport would occur during rainfall events. Increased sediment in areas containing water lobelia may occur as a result of expansion and maintenance of the Lyre River parking lot, although revegetation of the shoreline area between the expanded parking lot and the lake is expected to minimize this effect. Alternative 4 would result in adverse, site-specific and local, long-term to permanent, moderate to major impacts to vegetation.

Cumulative Impacts (all alternatives)

The cumulative impacts to vegetation associated with the expansion of the Spruce Railroad Trail, when added to the park's existing 600 + miles of trail and the proposed 140 mile long Olympic Discovery Trail would result in adverse, regional, long-term to permanent, minor to moderate impacts associated with conversion of native vegetation and forested lands to developed trails and parking lots. Not all areas are surveyed for rare plants prior to development. As a result, it is possible for rare or sensitive species to be adversely affected. Additionally, trails provide an opening that may be more readily exposed to the introduction and spread of non-native plant species, particularly in comparison to intact forested areas. Construction near the shoreline at Lake Crescent also adds cumulatively to the amount of sediment and disturbance to shallow shoreline areas that provide habitat to water lobelia.

The cumulative impacts associated with the existing trail system in Olympic National Park were addressed in the 2008 General Management Plan Final Environmental Impact Statement (FEIS). The additional impacts associated with the expansion of the Spruce Railroad Trail were considered in the Lake Crescent Management Plan Final Environmental Impact Statement (FEIS), as well as this site-specific EA. These impacts would result in additional impacts that are minor to moderate in the context of the larger system of trails existing and planned on the north Olympic Peninsula and at Lake Crescent.

Wetlands

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).

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 preliminary wetland assessment of the project area has been conducted. A complete wetland delineation will be completed prior to construction of the selected alternative to ensure that no wetlands would be adversely affected by new trail development. If wetlands are found within the project area they would be avoided, or development would occur using techniques that prevent adverse effects to wetlands and wetland processes.

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 40. 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.

Environmental Consequences to Wetlands

Alternative 1 – No Action

Direct and Indirect Impacts of the Alternative

The existing Spruce Railroad Trail includes potential wetland areas. Impacts associated with the presence of the trail are minimized in some locations through the placement of short sections of elevated trail (bridge or boardwalk). Additionally, the park currently owns a vacant building along the Lake Crescent shoreline that may include development within what would otherwise be a wetland. Impacts to wetlands that are ongoing are adverse, site-specific, long-term, and negligible to moderate.

Alternatives 2, 3, 4, and 5

Direct and Indirect Impacts of the Alternatives

The existing Spruce Railroad Trail would be improved. In areas where the existing trail alignment is resulting in impacts to wetlands, the trail would either be re-routed to avoid additional impacts to wetlands (without resulting to adverse effects to other park resources), or the trail would be elevated through the placement of boardwalks or bridges that are suitable for all intended recreational uses. The vacant building along the Lake Crescent shoreline would be removed. Planned expansion of the parking lot would avoid filling identified wetlands near the project area. The area between the expanded parking lot and Lake Crescent would be restored to natural conditions.

Impacts to wetlands would be adverse, site-specific, long-term to permanent, and negligible to minor in areas where elevated trail is placed. Adverse effects would be mitigated by beneficial, site-specific, long-term to permanent, minor to moderate effects in areas where previously impacted wetlands would be restored in the area of the Lyre River parking lot.

Cumulative Impacts (all alternatives)

Human use and development both within and outside of the park has reduced the quantity and quality of wetlands. Efforts to restore and improve wetland habitat is also occurring both within and outside of park boundaries, including within the project area. The cumulative impacts associated with the existing trail system in Olympic National Park were addressed in the 2008 General Management Plan Final Environmental Impact Statement (FEIS). The additional impacts associated with the expansion of the Spruce Railroad Trail were initially addressed in the Lake Crescent Management Plan FEIS. These actions would result in additional impacts that are negligible to minor in the context of the larger system of trails existing and planned on the north Olympic Peninsula.

Wildlife and Wildlife Habitat

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 41. 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, but 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 (breeding, feeding, sheltering) could be expected on an occasional basis, but would not 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. Mortality or interference with activities necessary for survival (breeding, feeding, sheltering) would be expected. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed.

Environmental Consequences to Wildlife

Alternative 1 – No Action

Direct and Indirect Impacts of the Alternative

Use and maintenance of the existing Spruce Railroad Trail and parking lots results in ongoing, adverse, site-specific and local, negligible to minor adverse impacts associated with the noise and presence associated with human activity.

Impacts Common to All Action Alternatives

Direct and Indirect Impacts of the Alternatives

All action alternatives would result in construction-related disturbance due to noise associated with the presence of work crews during project implementation and ongoing use and maintenance of the trail system. Work would be completed in stages, most likely over the course of multiple construction seasons or years as funding becomes available. The total duration of construction is similar for all action alternatives, and is expected to require between 160 and 182 days to implement trail development as described in Chapter 2.

Best management practices would be implemented to avoid or minimize disturbance to wildlife during construction and maintenance of the trail. However, all action alternatives would result in adverse, site-specific to regional, short-term moderate impacts associated with construction related-disturbance and site-specific to regional, long-term to permanent, negligible to moderate impacts associated with ongoing use and maintenance.

Alternative 2 – Three foot wide asphalt trail with four foot wide gravel shoulder and widened passing areas

Direct and Indirect Impacts of the Alternative

Alternative 2 would result in conversion of habitat to developed area where widening of the existing Spruce Railroad Trail is proposed between Phase 1 of the ODT and the Lyre River trailhead. Typical construction clearing limits in the trail corridor would be 12 feet. Other than No Action, Alternative 2 would result in the least widening of the overall trail corridor, minimizing exposure for wildlife crossing the trail.

New trail would be developed in Segment D to provide an accessible trail grade. This would create a new trail corridor in an area of intact second-growth forest habitat. Removal of vegetation would occur outside of the primary breeding season, but trees and snags that would otherwise provide nesting, roosting, or shelter for wildlife would be removed within the construction area. An estimated 5.6 acres of land would be affected by construction related disturbance. This would result in adverse, site-specific and local, long-term to permanent moderate impacts.

Alternative 3 – Six foot wide asphalt trail with four foot wide gravel shoulder

Direct and Indirect Impacts of the Alternative

Alternative 3 would result in conversion of habitat to developed area where widening of the existing Spruce Railroad Trail is proposed between Phase 1 of the ODT and the Lyre River trailhead. Typical construction clearing limits in the trail corridor would be 14 feet. Removal of

vegetation would occur outside of the primary breeding season, but trees and snags that would otherwise provide nesting, roosting, or shelter for wildlife would be removed within the construction area. An estimated 6.4 acres of land would be affected by construction related disturbance. This would result in adverse, site-specific and local, long-term to permanent moderate impacts.

Alternative 4 – Ten foot wide non-asphalt trail

Direct and Indirect Impacts of the Alternative

Alternative 4 would result in conversion of habitat to developed area where widening of the existing Spruce Railroad Trail is proposed between Phase 1 of the ODT and the Lyre River trailhead. Typical construction clearing limits in the trail corridor would be 14 feet.

New trail would be developed in Segment D to provide an accessible trail grade. Construction clearing limits in Segment D would be up to 14 feet, although this width may be reduced in short sections to avoid large trees or to minimize soil disturbance to the extent possible while providing for an accessible trail grade with a firm and stable trail surface between 8 and 10.5 feet wide.

This would create a new trail corridor in an area of intact second-growth forest habitat. Removal of vegetation would occur outside of the primary breeding season, but trees and snags that would otherwise provide nesting, roosting, or shelter for wildlife would be removed within the construction area. An estimated 6.5 acres of land would be affected by construction related disturbance. This would result in adverse, site-specific and local, long-term to permanent moderate impacts.

Alternative 5 – Eight foot wide asphalt trail with three foot wide gravel shoulder

Direct and Indirect Impacts of the Alternative

Alternative 5 would result in conversion of habitat to developed area where widening of the existing Spruce Railroad Trail is proposed between Phase 1 of the ODT and the Lyre River trailhead. Typical construction clearing limits in the trail corridor would be 14 feet.

New trail would be developed in Segment D to provide an accessible trail grade. Construction clearing limits in Segment D would be up to 14 feet. This would create a new trail corridor in an area of intact second-growth forest habitat. Removal of vegetation would occur outside of the primary breeding season, but trees and snags that would otherwise provide nesting, roosting, or shelter for wildlife would be removed within the construction area. An estimated 6.5 acres of land would be affected by construction related disturbance. This would result in adverse, site-specific and local, long-term to permanent moderate impacts.

Cumulative Impacts (all alternatives)

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 provides 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, although not specifically within the project area. The cumulative impacts associated with the existing trail system in Olympic National Park were addressed in the 2008 General Management Plan Final Environmental Impact Statement (FEIS). The additional impacts associated with the expansion of the Spruce Railroad Trail were initially addressed in the Lake Crescent Management Plan FEIS. These actions would result in additional impacts that are negligible to minor in the context of the larger system of trails existing and planned on the north Olympic Peninsula.

Unique or Important Fish or Fish Habitat

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 42. Unique or Import 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 project area. 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.

Environmental Consequences to Fish and Essential Fish Habitat

Alternative 1 – No Action

Direct and Indirect Impacts of the Alternative

Under Alternative 1 the existing Spruce Railroad Trail and parking lot would be maintained, as is. There would be no lengthening or widening of the existing trail, and no expansion of the parking lot. Routine clearing of the trail and grading of the parking lot would continue. There would be no increase in hardened, impermeable surfaces. Best management practices would continue to be implemented during routine maintenance activities to avoid the transport of sediments into Lake Crescent, although some degree of sediment transport would continue to occur during rainfall events when surface water from the trail and parking lot eventually enters the lake. There would be no increase in bank armoring along the lake, and no additional placement of rip rap or fill below the ordinary high water level of Lake Crescent. There would be some periodic delivery of fine sediment to the lake continuing as the historic crib walls fail.

Visitor use of the area would be expected to neither measurably increase nor decrease. Some visitor use of the Lyre River area as a kayak launch point or to access the shoreline would likely continue. This would result in adverse, site-specific and local, long-term to permanent negligible to minor adverse impacts to fish and fish habitat associated with the use and maintenance of the existing Spruce Railroad Trail and Lyre River parking lot.

Alternatives 2, 3, 4, 5

Direct and Indirect Impacts of the Alternatives

The existing Spruce Railroad Trail (SRRT) would be widened between Phase 1 of the ODT and current Lyre River parking lot. The existing parking lots at the North Shore Picnic Area and at the trailhead near the Lyre River would be paved, as would the road from the Lyre River Bridge to the parking lot, and the Water Line Road within the park. Best management practices would be implemented during construction and routine maintenance activities to avoid the transport of sediments into Lake Crescent. Some degree of sediment transport would continue to occur during rainfall events when surface water from the trail and parking lot eventually enters the lake.

Bank stabilization would be installed in areas along the lake where it is necessary to support trail development and maintenance and prevent erosion of the trail corridor into Lake Crescent. This includes placement of up to 1,450 cubic yards of rip rap at five locations in Segment A and up to 4,745 cubic yards of rip rap at nine locations in Segment B. Approximately 10% of the rip rap would be placed below the ordinary high water level Lake Crescent. This would affect slightly more than ¼ mile (0.28 miles) of shoreline. After the parking lot at the Lyre River has been expanded and paved, the remaining area between the parking lot and the lake would be rehabilitated to natural conditions.

Construction activities would result in adverse, site-specific and local, short-term, negligible to moderate impacts to fish habitat from water quality impacts associated with excavation and grading. After construction, trail development would result in adverse, site-specific and local, permanent, negligible to minor impacts to fish habitat associated with bank hardening and the increase in sediment transport into Lake Crescent from developed areas, although this would be minimized by paving of the North Shore Picnic Area and Lyre River parking lots, the road to the Lyre River Bridge, and the 0.2 miles of Water Line Road within the park. Restoration of the shoreline area between Lake Crescent and the expanded parking lot would also mitigate adverse impacts associated with development and use of the area.

Alternative 4 – Ten foot wide non-asphalt trail

Direct and Indirect Impacts of the Alternative

In addition to the effects described above, under Alternative 4 specific trail design and mitigation measures would be implemented to ensure that surface flow across the non-asphalt trail surface does not result in erosion of the trail and loss of the firm and stable surface required to provide for accessibility. If implemented correctly, this would result in no additional impacts to water quality and fish habitat. Otherwise, additional adverse, site-specific and local, short to long-term, minor to moderate impacts may occur to fish habitat associated with sediment transport.

Cumulative Impacts (all alternatives)

The cumulative impacts to fisheries and essential fish habitat associated with the expansion of the Spruce Railroad Trail, when added to the park's existing 600 + miles of trail, current and proposed use and development at Lake Crescent, and the proposed 140 mile long Olympic Discovery Trail would result in additional impacts associated with construction of trail and

associated modification of surface hydrology, water quality, and fish habitat due to the increase in disturbed area, hardened surfaces and bank stabilization.

The cumulative impacts associated with the existing trail system in Olympic National Park were addressed in the 2008 General Management Plan Final Environmental Impact Statement (FEIS). The additional impacts associated with the expansion of the Spruce Railroad Trail were initially addressed in the Lake Crescent Management Plan FEIS. These actions would result in additional impacts that are negligible to minor in the context of the larger system of trails existing and planned on the north Olympic Peninsula and the ongoing use at Lake Crescent.

Threatened and Endangered Species

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 43. Threatened and Endangered Species Impact and Intensity

Impact Intensity	Intensity Description
Negligible	The action would potentially result in a change in behavior to 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 “no effect.”
Minor	The action could result in a change to 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 may occur over a large area. Breeding animals of concern are present, animals are present during particularly vulnerable life stages; mortality is not expected, but interference with activities necessary for survival could be expected on an occasional basis, but is not expected to threaten the continued presence 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,” but take would be associated with disturbance to individual animals, not mortality or loss of suitable habitat or trees with structural elements suitable for nesting.
Major	The action would result in noticeable effects to the viability of the population or individuals of a species within all or a portion of their range. 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 adversely affect,” including the potential for mortality of an individual animal or loss of suitable habitat, including trees with structural elements suitable for nesting.

Environmental Consequences to Threatened and Endangered Species

Alternative 1 – No Action

Direct and Indirect Impacts of the Alternative

Use and maintenance of the existing Spruce Railroad Trail and parking lots results in higher noise levels associated with human activity and use of motorized equipment and vehicles. Although many maintenance activities are timed to occur outside the early breeding season for northern spotted owl and marbled murrelet, use of chainsaws to clear dead and down trees occurs year-round. Motorized equipment is also used year-round to maintain existing paved road, trail and parking lot areas. Recreational use in developed areas is associated with increased trash and food scraps that have been correlated with an increase in the abundance of corvids, (ravens, jays, crows) that are known to depredate the nests of marbled murrelets.

Impacts to threatened and endangered species from ongoing maintenance of the existing road and trail system was addressed through formal consultation between the NPS and U.S. Fish and Wildlife Service (FWS) during the development of the park’s General Management Plan. Ongoing impacts include adverse, long-term to permanent, site-specific and local, negligible to moderate impacts.

Impacts Common to All Action Alternatives

Direct and Indirect Impacts of the Alternatives

All action alternatives would result in construction-related disturbance due to noise and activity associated with the presence of work crews during project implementation and ongoing use and maintenance of the trail system. Work would be completed in stages, most likely over the course of multiple construction seasons or years as funding becomes available. The total duration of construction is similar for all action alternatives, and is expected to require between 160 and 182 days to implement trail development as described in Chapter 2.

Removal of vegetation within suitable habitat would occur outside of the breeding season for northern spotted owl and marbled murrelet (September 16 – February 28), as would any construction that would generate noise levels equal to or greater than 92 decibels within the disturbance range of suitable habitat. Removal of vegetation in non-suitable habitat would occur outside of the early breeding season (August 6 – February 28) to minimize potential noise related disturbance to any breeding birds in adjacent suitable habitat. No removal of suitable nest trees would occur.

This would result in adverse, site-specific and local, long-term to permanent, minor to moderate impacts. The determination of effect, pursuant to the federal Endangered Species Act (ESA) would be, *may affect, not likely to adversely affect* (NLAA) since no vegetation removal or construction would occur within suitable habitat during the breeding season and noise disturbance within non-suitable habitat that is adjacent to suitable habitat would only occur during, or after, the late breeding season. Since trail improvements would occur along a route that is already in use as a recreational trail, measurable increases in corvid populations that would have the potential to impact marbled murrelets in the area is not expected.

Alternative 2 – Three foot wide asphalt trail with four foot wide gravel shoulder and widened passing areas

Direct and Indirect Impacts of the Alternative

Alternative 2 would result in conversion of habitat to developed area where widening of the existing Spruce Railroad Trail is proposed between Phase 1 of the ODT and the Lyre River trailhead. Typical construction clearing limits in the trail corridor would be 12 feet. Other than No Action, Alternative 2 would result in the least widening of the overall trail corridor. New trail would be developed in Segment D to provide an accessible trail grade. This would create a new trail corridor in an area of intact second-growth forest habitat. No trees with structure suitable to provide nesting habitat would be removed. Removal of vegetation would occur outside of the primary breeding season. An estimated 5.6 acres of land would be affected by construction related disturbance. Most of this disturbance would occur along the existing Spruce Railroad Trail, although new trail development in Segment D would affect intact second growth forest. This would result in adverse, site-specific and local, long-term to permanent moderate impacts.

Alternative 3 - Six foot wide asphalt trail with four foot wide gravel shoulder

Direct and Indirect Impacts of the Alternative

Alternative 3 would result in conversion of habitat to developed area where widening of the existing Spruce Railroad Trail is proposed between Phase 1 of the ODT and the Lyre River trailhead. Typical construction clearing limits in the trail corridor would be 14 feet. Alternative 3 would result in conversion of habitat to developed area where widening of the existing Spruce Railroad Trail is proposed between Phase 1 of the ODT and the Lyre River trailhead. No trees with structure suitable to provide nesting habitat would be removed. Removal of vegetation would occur outside of the primary breeding season. An estimated 6.4 acres of land would be affected by construction related disturbance. Most of this disturbance would occur along the existing Spruce Railroad Trail. This would result in adverse, site-specific and local, long-term to permanent moderate impacts.

Alternative 4- Ten foot wide non-asphalt trail

Direct and Indirect Impacts of the Alternative

Alternative 4 would result in conversion of habitat to developed area where widening of the existing Spruce Railroad Trail is proposed between Phase 1 of the ODT and the Lyre River trailhead. Typical construction clearing limits in the trail corridor would be 14 feet.

New trail would be developed in Segment D to provide an accessible trail grade. Construction clearing limits in Segment D would be up to 14 feet, although this width may be reduced in short sections to avoid large trees or to minimize soil disturbance to the extent possible while providing for an accessible trail grade with a firm and stable trail surface between 8 and 10.5 feet wide.

No trees with structure suitable to provide nesting habitat would be removed. Removal of vegetation would occur outside of the primary breeding season. An estimated 6.5 acres of land would be affected by construction related disturbance. Most of this disturbance would occur along the existing Spruce Railroad Trail, although new trail development in Segment D would affect intact second growth forest. This would result in adverse, site-specific and local, long-term to permanent moderate impacts.

Alternative 5 – Eight foot wide asphalt trail with three foot wide gravel shoulder

Direct and Indirect Impacts of the Alternative

Alternative 5 would result in conversion of habitat to developed area where widening of the existing Spruce Railroad Trail is proposed between Phase 1 of the ODT and the Lyre River trailhead. Typical construction clearing limits in the trail corridor would be 14 feet.

New trail would be developed in Segment D to provide an accessible trail grade. Construction clearing limits in Segment D would be up to 14 feet. This would create a new trail corridor in an area of intact second-growth forest habitat. No trees with structure suitable to provide nesting habitat would be removed. Removal of vegetation would occur outside of the primary breeding season. An estimated 6.5 acres of land would be affected by construction related disturbance. Most of this disturbance would occur along the existing Spruce Railroad Trail, although new trail

development in Segment D would affect intact second growth forest. This would result in adverse, site-specific and local, long-term to permanent moderate impacts.

Cumulative Impacts (all alternatives)

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 and marbled murrelet. 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 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.

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.

The cumulative impacts to federally listed Threatened and Endangered species associated with the expansion of the Spruce Railroad Trail, when added to the park's existing 600 + miles of trail and the proposed 140 mile long Olympic Discovery Trail would result in adverse, regional, short-term to permanent, minor to moderate impacts associated with construction and maintenance of trail and associated conversion of forest to developed area. The determination of effect for the ongoing administration and maintenance of the trail system and road system within Olympic National Park pursuant to the federal Endangered Species Act (ESA) would be, "may affect, likely to adversely affect." Olympic National Park consulted with the FWS during the development of the GMP to address the cumulative adverse effects of park operations. The populations of both marbled murrelet and northern spotted owl continues to decline, both within and outside of Olympic National Park. Due to the conservation practices included as part of the proposed SRRT improvement, the cumulative effects of this action in combination with other ongoing actions would be negligible to minor.

Cultural Environment

Cultural Resources

The Spruce Railroad#1 is eligible for the National Register of Historic Places and was found to be nationally significant.

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 44. Cultural Environment 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 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 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 not 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 compromised. 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, and 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> .

Environmental Consequences to Cultural Resources

Alternative 1 – No Action

Direct and Indirect Impacts of the Alternative

Under Alternative 1 there would be no further plan to enhance or rehabilitate the existing Spruce Railroad Trail; however, the National Park Service will insure that the historic property will be stabilized so no further degradation occurs as required under the National Historic Preservation Act. The No Action Alternative would result in local and regional, long-term negligible to major impacts to the historic railroad due to continued use without reconstruction of the historic revetments, drainage systems, and opening and shoring of the historic tunnels.

Table 45. Environmental Consequences to Cultural Resources – No Action Alternative

No Action Alternative: Maintain Existing Conditions			
Project Area	Contributing Elements/ Affected Resource	NHPA Effect	Environmental Consequences
CDJR accessible parking and trail access, North Shore Picnic Area parking lot	Ovington siding, telegraph poles, railroad artifacts	No Effect	Local, long-term to permanent, negligible impacts
SRRT Segments A, B, C	Railroad grade, alignment and earthwork (cut, fill, gradient, profile, curvature, tangents, ditches)	No Effect	Local, long-term to permanent, negligible impacts
	Timber half-bridge/cribbing (Segments A & B), rock wall (Segment B), wooden culverts	Adverse Effect	Local, long-term to permanent, moderate to major impacts
	Railroad artifacts	No Effect	Local, long-term to permanent, negligible impacts
Railroad tunnels	Tunnels, portals, timber tunnel support beams, associated artifacts	Adverse Effect	Local, long-term to permanent, moderate to major impacts
SRRT Segment D	Anderson Homestead, heritage trees, structural remains, artifacts, historic archeological resources	No Effect	Local, long-term to permanent, negligible impacts
SRRT Lyre River parking lot and access road	Crescent siding, Crescent Logging Company camp	No Effect	Local, long-term to permanent, negligible impacts

Alternatives 2, 3, 4, 5

Direct and Indirect Impacts of the Alternative

In compliance with a historic treatment plan the existing Spruce Railroad Trail (SRRT) would be widened between Phase 1 of the ODT and the current Lyre River parking lot. Trail design would rehabilitate the historic railroad profile and ditches, where present. Both railroad tunnels would be cleared and developed for trail use. The existing parking lot near the Lyre River would be expanded and paved. The existing North Shore Picnic Area parking lot would also be graded and paved.

Both beneficial and adverse impacts would occur to cultural resources. These alternatives would result in regional, long-term minor to moderate adverse impacts by removal of railroad subgrade on steep slopes to restore dry laid fieldstone and to reconstruct timber half-bridge. Minor adjustment may be made of the historic alignment to avoid bank failure, and minor changes to grade would occur to address trail drainage associated with low water crossings.

The following actions common to alternatives 2 through 5 will be implemented in consultation with the State Historic Preservation Officer (SHPO) and would incorporate and enhance the characteristics of the 36-mile long historic Spruce Railroad by preserving features that contribute to its eligibility. These alternatives would result in local and regional, long-term minor to major beneficial impacts by maintaining the historic Spruce Railroad trail alignment and tie ballast to improve drainage and stabilize embankments. New base material would be placed to a depth of 10 inches on the historic railroad grade to rehabilitate the historic grade profile and ditch lines.

In compliance with a historic treatment plan the following actions would incorporate and enhance the characteristics of the historic railroad by preserving features that contribute to the eligibility of the entire 36-mile long Spruce Railroad. The tread surface of the rehabilitated trail should be more or less consistent from one end to the other; not arbitrarily widening and narrowing.

The historic dry laid fieldstone revetment wall would be stabilized and restored where damaged. Timber half-bridge log cribbing would be replaced with concrete cribbing faced with timbers to closely replicate the historic appearance. The base of the revetment would be rock to avoid placing timber supports below the lake level. A representative number of timber culverts would be cleaned and stabilized or restored in-kind, while the others would continue to deteriorate. Both historic tunnels would be stabilized with shotcrete and opened to use as described in Chapter 2. Entrance portals would be reconstructed to capture the design, materials, workmanship, feeling, and association of the historic railroad. Historic timbers from cribbing would continue to deteriorate.

Archeological monitoring and implementation of an inadvertent discovery plan would avoid or minimize the potential for impacts to prehistoric and historic archeological resources. A plan for the management of artifacts would be developed. Timbers and artifacts found along the trail would be left in place where feasible and not subject to looting. A plan for the interpretation of cultural resources would be developed. The following list highlights the process for treatment:

- *Formulate a plan to protect sites like the tunnels, revetments, wood culverts, telegraph poles, grade, alignment, etc.*
- *Develop and implement a plan to manage artifacts (on ground and/or collected).*
- *Monitoring by cultural personnel during critical stages of construction*
- *Include cultural personnel in final inspection and solicit report on status of cultural elements.*
- *Provide contractors and inspectors with specific information about historic railroad features on the segments proposed for construction. These should focus on the grade*

itself with cuts, fills, and drainage. Other elements would include sidings, tunnels, bridges, revetments, cribbing, and historic (or prehistoric) sites needing protection. Protecting and preserving these elements should be reflected in the construction plans and methods. The goal is to be certain that construction will not compromise the railroad's eligibility to the National Register. (Tonsfeldt 2009)

Table 46. Environmental Consequences to Cultural Resources – All Action Alternatives

Alternatives 2, 3, 4, 5			
Project Area	Contributing Elements/ Affected Resource	NHPA Effect	Environmental Consequences
CDJR accessible parking and trail access, North Shore Picnic Area parking lot	Ovington siding, telegraph poles, railroad artifacts	No Adverse Effect	Local, long-term to permanent, minor negative impacts
SRRT Segments A, B, C	Railroad grade, alignment and earthwork (cut, fill, gradient, profile, curvature, tangents, ditches)	No Adverse Effect	Local, long-term to permanent, minor adverse and beneficial impacts
	Timber half-bridge/cribbing (Segments A & B), rock wall (Segment B), wooden culverts	No Adverse Effect	Local, long-term to permanent, minor adverse impacts and minor to moderate beneficial impacts
	Railroad artifacts	No Adverse Effect	Local, long-term to permanent, minor adverse impacts
Railroad tunnels	Tunnels, portals, timber tunnel support beams	No Adverse Effect use of rock bolts/shotcrete (may be mitigated)	Local, long-term to permanent, minor to moderate adverse impacts and moderate to major beneficial impacts
SRRT Segment D	Anderson Homestead, heritage trees, structural remains, artifacts, prehistoric artifacts (potential), historic archeological resources	No Adverse Effect	Local, long-term to permanent, negligible to minor impacts
SRRT Lyre River parking lot and access road	Crescent siding, Crescent logging company camp	No Adverse Effect	Local, long-term to permanent, negligible to minor impacts

Alternative 2 – Three foot wide asphalt trail with four foot wide gravel shoulder and widened passing areas

Direct and Indirect Impacts of the Alternative

The historic railroad grade would be cleared to a width of 12 feet. Placement of road base material to a width of eight feet and depth of 10 inches would help rehabilitate the historic railroad profile and ditch lines. However, this would result in a trail surface that is approximately two feet narrower than the top of the historic railroad materials identified by park archeologists. This would result in a slightly more narrow profile than what was present originally and would be inconsistent with the historic feeling. Additional clearing of the railroad grade would not occur outside of the construction limits or in areas where this would create slope instability that would compromise the integrity of the trail, including surface drainage patterns.

Alternative 3 - Six foot wide asphalt trail with four foot wide gravel shoulder

Direct and Indirect Impacts of the Alternative

The historic railroad grade would be cleared to a width of 14 feet. Placement of road base to a width of 11 feet and depth of 10 inches would rehabilitate the historic railroad profile and ditch lines. This would result in a trail surface that is consistent with the historic railroad materials identified by park archeologists and would result in a trail profile that is representative of the historic railroad grade. Additional clearing of the railroad grade would not occur outside of the construction limits or in areas where this would create slope instability that would compromise the integrity of the trail, including surface drainage patterns. A six-foot wide asphalt surface would be constructed on the road base to provide an accessible trail corridor while leaving a four foot wide unpaved gravel surface for use by equestrians. would be inconsistent with the historic feeling.

Alternative 4- Ten foot wide non-asphalt trail

Direct and Indirect Impacts of the Alternative

The historic railroad grade would be cleared to a width of 14 feet. Placement of road base to a width of 11 feet and depth of 10 inches would rehabilitate the historic railroad profile and ditch lines. This would result in a trail surface that is consistent with the historic railroad materials identified by park archeologists and a trail profile that is representative of the historic railroad grade. Additional clearing of the railroad grade would not occur outside of the construction limits or in areas where this would create slope instability that would compromise the integrity of the trail, including surface drainage patterns. The absence of an asphalt surface would be consistent with the general appearance of the historic railroad ballast after the rails were removed.

Alternative 5- Eight foot wide asphalt trail with three foot wide gravel shoulder

Direct and Indirect Impacts of the Alternative

The historic railroad grade would be cleared to a width of 14 feet. Placement of road base to a width of 12.5 feet and depth of 10 inches would help rehabilitate the historic railroad profile and ditch lines. However, this would result in a trail surface that is approximately two feet wider than the top of the historic railroad materials identified by park archeologists. The result is a slightly wider profile than the historic railroad grade, which is inconsistent with the historic feeling. Additional clearing of the railroad grade would not occur outside of the construction limits or in areas where this would create slope instability that would compromise the integrity of the trail, including surface drainage patterns. An eight-foot wide asphalt surface would be constructed on the road base to provide an accessible trail corridor while leaving an approximately three-foot wide unpaved gravel surface for use by equestrians would be inconsistent with the historic feeling.

Direct and Indirect Impacts of the Alternatives

Cumulative Impacts (all alternatives)

The historic Spruce Railroad has been adversely affected by actions taken in the past, both within and outside of Olympic National Park that have diminished the integrity of this historic property. This includes the removal of the railroad tracks and ties, blasting the two historic railroad tunnels, and converting some sections of the railroad grade into roads and trails that did not retain the character defining elements of the historic earthwork and railroad features. Some contributing elements are deteriorating and in need of preservation maintenance to avoid loss of remaining historic materials. Due to past actions, some segments of the historic Spruce Railroad no longer contribute to the railroad's eligibility in the National Register of Historic Places (NRHP). Some segments, including those currently proposed for trail development within the Park, retain historic integrity and are currently listed on the NRHP. Any additional adverse effects on contributing segments of the Spruce Railroad #1 would be cumulative adverse effects that could affect National Register eligibility of the entire 36-mile railroad structure, since each segment contributes to the eligibility of the entire historic Spruce Railroad #1.

Experiential Environment

Visitor Use and Experience

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 47. 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 no changes to visitor use and experience within the project area. Universal accessibility would be provided on over six miles of trail constructed in 2009 on Phase 1 of the ODT above Camp David Junior Road (CDJR). Hikers, bicyclists, and people traveling with stock or on horseback would continue to use the existing Spruce Railroad Trail, although stock use would not be available across the Devil’s Punchbowl Bridge due to recently identified issues associated with the bridge’s integrity for heavy loads. The two partially collapsed historic railroad tunnels would remain closed.

Road bicyclists who are seeking an alternative to Highway 101 along Lake Crescent would continue to route their trip outside of Olympic National Park, some may use the existing SRRT, or utilize a different mode of transportation through this area. Some road bicyclists would continue to ride on the south shore of Lake Crescent along Highway 101.

The trail design would not provide a consistent experience for visitors traveling across the north Olympic Peninsula on the regional Olympic Discovery Trail (ODT), although people accessing the SRRT from the Adventure Route near the Lyre River would continue to connect unpaved trails outside of the park to the existing trail in the park. The existing parking lots would not be expanded or paved; this would result in ongoing challenges on busy summer weekends when the existing parking spaces do not meet the recreational demand. Adequate turnaround space for people in long vehicles or towing trailers would not be available. Some people would prefer the No Action alternative because they enjoy and use the trail in its present condition. Some people prefer natural tread trails as compared to hardened trail surfaces. Some people are not comfortable, or not able to make use of the SRRT in its current condition. This would result in ongoing, beneficial and adverse, local and regional, long-term to permanent, negligible to major impacts.

Impacts Common to All Action Alternatives

Under all action alternatives the project area, including the existing SRRT, would be closed to visitor use during construction. It is anticipated that construction would occur in phases, potentially over several seasons or years. During construction there would be considerable noise and visual disturbance associated with construction equipment and traffic. Vehicular access along Camp David Junior Road (CDJR), East Beach Road, the Water Line Road, and Highway 101 would be affected and subject to delays. Temporary closures on sections of CDJR and East Beach Road may be required. Closures would be kept to the shortest duration feasible while ensuring safety of area residents, employees, and visitors during construction. This would result in adverse, local and regional, short-term, minor to moderate impacts.

After trail improvements are complete hikers, bicyclists and people traveling with stock or on horseback would be able use the existing Spruce Railroad Trail. Road bicyclists who are seeking an alternative to Highway 101 along Lake Crescent would have the option of riding on the newly developed SRRT, although riders continuing through the area would need to ride on East Beach Road or the Joyce Road to connect to areas outside of the park. Some road bicyclists would continue to route their trip outside of Olympic National Park, or utilize a different mode of transportation through this area. Some road bicyclists would continue to ride on the south shore of Lake Crescent along Highway 101.

Both historic railroad tunnels would be opened and developed for trail use. Both tunnels would be universally accessible from CDJR. The existing trailhead parking lot near the Lyre River would be expanded, paved, and striped to provide 19 parking spaces. Adequate turnaround space for people in long vehicles or towing trailers would be developed. Two accessible parking spaces would be developed along CDJR near the North Shore Picnic Area parking lot to provide access to the SRRT. Grading and paving of the North Shore Picnic Area parking lot would also occur to improve accessibility in this area, including to the accessible vault toilet.

Visitor experience would be improved through the development and installation of trailhead signs and interpretive signs and materials that would provide information to help with trip planning, and to better understand the natural and cultural history of the area. Information about trail safety and trail etiquette for multiple-use trails would also be provided. This would result in beneficial, site-specific, local, and regional, long-term, minor to major impacts.

Alternative 2 – Three foot wide asphalt trail with four foot wide gravel shoulder and widened passing areas

Direct and Indirect Impacts of the Alternative

In addition to the effects described above, under Alternative 2 the NPS would improve 3.9 miles trail to meet outdoor accessibility guidelines as described in Chapter 2. This would include all segments of the existing Spruce Railroad Trail (SRRT), resulting in a total of nearly 10.5 miles of accessible trail at Lake Crescent when combined with the 6.5 miles constructed in 2009 as Phase 1 of the ODT. Two universally accessible trail access points would be developed, one on CDJR near the North Shore Picnic Area as described previously, and a second at the Lyre River trailhead of the SRRT.

Hikers, bicyclists, and people traveling with stock or on horseback would continue to use the Spruce Railroad Trail. However, the bridge located at the Devil’s Punchbowl would not be repaired or replaced to restore use by people traveling with stock. The existing bypass trails that go around the two historic railroad tunnels would be signed and managed for pedestrian use only to provide an area on the SRRT that supports visitor use at a slower pace with fewer potentially conflicting recreational uses.

The trail design would not be consistent for visitors traveling across the north Olympic Peninsula on the regional Olympic Discovery Trail (ODT) or Adventure Route, although the same recreational uses would be accommodated. Some visitors would prefer Alternative 2 because it provides a universally accessible trail option with the least development footprint of the alternatives considered. Some visitors would be uncomfortable sharing the more narrow paved trail with a wide range of other recreational uses. This would result in ongoing, beneficial and adverse, local and regional, long-term to permanent, minor to major impacts.

Alternative 3 – Six foot wide asphalt trail with four foot wide gravel shoulder

Direct and Indirect Impacts of the Alternative

Under Alternative 3 the NPS would construct or improve 3.7 miles of universally accessible trail. This would include Segments A, B, and C of the existing SRRT, resulting in a total of 10.2 miles of accessible trail in the Lake Crescent area when combined with the 6.5 miles constructed in 2009 as Phase 1 of the ODT. One universally accessible trail access point would be developed on CDJR near the North Shore Picnic Area.

The trail would be improved to provide a moderately consistent experience for visitors traveling across the north Olympic Peninsula on the regional Olympic Discovery Trail (ODT). However, the trail section from the existing Lyre River parking lot to Segment C of the SRRT would not be developed to provide an accessible grade due to the steepness of the slope and disturbance to other park resources and values. People accessing the SRRT from the Adventure Route near the Lyre River would continue to connect unpaved trails outside of the park to the existing trails

within the park, although the trail experience along Lake Crescent would be noticeably different. This would result in beneficial and adverse, site-specific, local and regional, long-term to permanent, minor to major impacts.

Alternative 4 – Ten foot wide non-asphalt trail

Direct and Indirect Impacts of the Alternative.

In addition to the effects described above, under Alternative 4 the NPS would improve 3.9 miles trail to meet outdoor accessibility guidelines as described in Chapter 2. This would include all segments of the existing Spruce Railroad Trail (SRRT), resulting in a total of nearly 10.5 miles of accessible trail at Lake Crescent when combined with the 6.5 miles constructed in 2009 as Phase 1 of the ODT. Two universally accessible trail access points would be developed, one on CDJR near the North Shore Picnic Area as described previously, and a second at the Lyre River trailhead of the SRRT.

Hikers, bicyclists, and people traveling with stock or on horseback would continue to use the Spruce Railroad Trail. The bridge located at the Devil’s Punchbowl would be repaired or replaced to restore use by people traveling with stock. The existing bypass trails that go around the two historic railroad tunnels would be signed and managed for pedestrian and equestrian use only to provide an area on the SRRT that supports visitor use at a slower pace with fewer potentially conflicting recreational uses while also providing an alternate route for equestrians who are not comfortable taking their animals through the railroad tunnels.

The trail design would not be moderately consistent for visitors traveling across the north Olympic Peninsula on the regional Olympic Discovery Trail (ODT) or Adventure Route, although no asphalt is proposed. The firm and stable surface that would be constructed would accommodate the same recreational uses as the ODT. Alternative 4 would provide the broadest spectrum of recreation opportunities when combined with Phase 1 of the ODT by providing an alternative to the asphalt paved trail developed above CDJR while still providing a firm and stable, accessible grade throughout the length of the SRRT.

Some visitors would prefer Alternative 4 because it provides a universally accessible trail option that provides greater width to allow for visitors to pass each other on the trail. Some visitors would be uncomfortable with the non-asphalt trail surface, while others would prefer it. Some visitors would appreciate the shared uses this trail would accommodate, while others would be uncomfortable sharing the trail with other recreational uses that may conflict with their preferred experience. This would result in ongoing, beneficial and adverse, local and regional, long-term to permanent, minor to major impacts.

Alternative 5 – Eight foot wide asphalt trail with three foot wide gravel shoulder

In addition to the effects described above, under Alternative 5 the NPS would improve 3.9 miles trail to meet outdoor accessibility guidelines as described in Chapter 2. This would include all segments of the existing Spruce Railroad Trail (SRRT), resulting in a total of nearly 10.5 miles of accessible trail at Lake Crescent when combined with the 6.5 miles constructed in 2009 as Phase 1 of the ODT. Two universally accessible trail access points would be developed, one on

CDJR near the North Shore Picnic Area as described previously, and a second at the Lyre River trailhead of the SRRT.

Hikers, bicyclists, and people traveling with stock or on horseback would continue to use the Spruce Railroad Trail. The bridge located at the Devil's Punchbowl would be repaired or replaced to restore use by people traveling with stock. No other improvements are proposed to the bypass trails. All current uses would continue.

The trail design would largely consistent for visitors traveling across the north Olympic Peninsula on the regional Olympic Discovery Trail (ODT). The trail design would not be consistent with the Adventure Route, although the same recreational uses would be accommodated. Some visitors would prefer Alternative 5 because it provides a universally accessible trail option with the greatest level of development of the alternatives considered. Some visitors would appreciate the trail's mixed uses, while others would be uncomfortable sharing the trail with other potential conflicting recreational uses. Some visitors may prefer the wider asphalt paved trail surface, while others would not. Some equestrians may feel the gravel shoulder is too narrow for their use, while others may find it adequate. This would result in ongoing, beneficial and adverse, local and regional, long-term to permanent, minor to major impacts.

Cumulative Impacts (all alternatives)

Cumulative effects to visitor experience would be highly variable depending on the type of experience people are seeking. All alternatives considered would be consistent with the zoning guidance provided in the park's General Management Plan. Improvement of the Spruce Railroad Trail would provide improved access and visitor experience for people seeking less rigorous and more developed, frontcountry recreation. People seeking a more rigorous, less developed recreation experience that is more consistent with a backcountry setting would be affected differently. These changes, although major in the context of the project area, are minor to moderate in the context of the park's existing trail system, and negligible to moderate in the context of the trail network that is present or planned on the north Olympic Peninsula.

Soundscapes

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 48. 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 frequent activity noise 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.

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, minor to moderate impacts due to kinds and amounts of visitor use and administrative management actions occurring in the project area that generate noise. This includes noise made during routine maintenance of the roads, parking lots, trailheads and trails from maintenance equipment, park vehicles, and staff. Clearing of dead and downed trees from the trail, or the removal of identified hazard trees also results in noise impacts that may occur at any time of the year. There would be noise disturbance due to routine activities to maintain the trail, particularly paved sections that would require regular clearing and sweeping to maintain an accessible surface. Visitor use of the existing trail and trailheads also results in noise associated with vehicular access on roads and by boat, and the sounds of people using the area recreationally.

Impacts Common to All Action Alternatives

Direct and Indirect Impacts of the Alternatives

Construction activities would result in impacts to soundscapes due to noise generated by heavy equipment, motorized tools, and construction vehicles during trail construction. Additional noise would be generated by blasting to remove rock from both railroad tunnels and the potential use of a heavy lift helicopter to deliver a trail bridge to Segment B, and to the Devil’s Punchbowl for all alternatives except Alternative 2. This would result in adverse, short-term, local to regional, moderate to major impacts. Noise would also be generated by maintenance activities. This would include removing downed trees using chainsaws and clearing using motorized equipment to maintain a firm and stable, accessible surface. Development and use of the trails post-construction would result in adverse, long-term to permanent, site-specific and local, negligible to moderate impacts.

Cumulative Impacts (all alternatives)

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 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. Noise related to construction and maintenance of this project would be minor to moderate in the broader context of Lake Crescent, and negligible to moderate in the broader context of the park's overall trail system and the north Olympic Peninsula.

Scenery and Visual Resources**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 49. 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, and 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.

Environmental Consequences to Scenery and Visual Resources

Alternative 1 – No Action

Direct and Indirect Impacts of the Alternative

Under Alternative 1 the scenery and visual resources within the Lake Crescent would remain unchanged. There would be no additional clearing of forested areas in the park or additions to the built environment. This would result in beneficial, local and regional, long-term to permanent, negligible to moderate impacts due to the retained vistas of the north shore of Lake Crescent from Highway 101 and other locations with views toward the Spruce Railroad grade.

Impacts Common to All Action Alternatives

Direct and Indirect Impacts of the Alternatives

Under all alternatives the scenery and visual resources within the Lake Crescent areas would be affected by trail construction from the end of CDJR to Lyre River trailhead. Average clearing of vegetation in this area would range between 12 to 14 feet in width, with additional use of existing widened areas for construction staging and vehicle turnaround areas. Trail construction would be visible from Lake Crescent and Highway 101 under all alternatives. This would include the placement of several areas of visible bank stabilization along Segments A and B of the SRRT. This would result in adverse, site-specific and local, short-term, minor to moderate impacts.

Both historic railroad tunnels would be opened and universally accessible trail would be developed through the tunnels. This would result in improved views of this historic property, and would also provide for greater access to the scenic SRRT route along the north shore of Lake Crescent. Views of the lake and surrounding highcountry would be more accessible for a wider range of visitors. This would result in beneficial, site-specific and local, long-term to permanent, minor to major impacts.

There would be some new disturbance at the Lyre River parking lot when the vacant building is removed; the parking lot would be expanded and paved, and native vegetation would be restored

between the parking lot and lakeshore. There would also be some visual disturbance during the paving of the Water Line Road and the road between the Lyre River Bridge and the trailhead parking lot. This would result in adverse, site-specific and local, short-term to permanent, minor to moderate impacts.

Alternative 2 – Three foot wide asphalt trail with four foot wide gravel shoulder and widened passing areas

Direct and Indirect Impacts of the Alternative

In addition to the effects described above, under Alternative 2, Segment D would include new trail development to provide a trail grade that meets outdoor accessibility standards as described in Chapter 2. Clearing would be minimized to a corridor not exceeding 12 feet in width. This would be visible during construction, but would likely blend in to the surrounding hillside as trees adjacent to the trail continue to grow and provide canopy cover. This trail has the most narrow trail corridor and final trail width. This would result in adverse, site-specific and local, short-term to permanent, minor to moderate impacts.

Alternative 3 – Six foot wide asphalt trail with four foot wide gravel shoulder

Direct and Indirect Impacts of the Alternative

In addition to the effects described above, under Alternative 3 clearing would be minimized to a corridor not exceeding 14 feet in width. This would be visible during construction, but would likely blend in to the surrounding hillside as trees adjacent to the trail continue to grow and provide canopy cover. This alternative has the least new trail development with the majority of improvements occurring on the existing Spruce Railroad Trail alignment. This alternative provides a moderate change in trail appearance as compared to the other alternatives, providing a wider trail corridor than Alternative 2 and less visual change than Alternative 5. This would result in adverse, site-specific and local, short-term to permanent, moderate impacts.

Alternative 4 – Ten foot wide non-asphalt trail

Direct and Indirect Impacts of the Alternative

In addition to the effects described above, under Alternative 4, Segment D would include new trail development to provide a trail grade that meets outdoor accessibility standards as described in Chapter 2. Clearing would be minimized to a corridor not exceeding 14 feet in width. This would be visible during construction, but would likely blend in to the surrounding hillside as trees adjacent to the trail continue to grow and provide canopy cover. This alternative would provide a moderate change in trail appearance, although this alternative varies from the others in that no asphalt surface is proposed. Instead, a continuous trail surface of firm and stable material, such as compacted crushed gravel, would be used. This would result in adverse, site-specific and local, short-term to permanent, moderate impacts.

Alternative 5 – Eight foot wide asphalt trail with three foot wide gravel shoulder

Direct and Indirect Impacts of the Alternative

In addition to the effects described above, under Alternative 5, Segment D would include new trail development to provide a trail grade that meets outdoor accessibility standards as described in Chapter 2. Clearing would be minimized to a corridor not exceeding 14 feet in width. This would be visible during construction, but would likely blend in to the surrounding hillside as trees adjacent to the trail continue to grow and provide canopy cover. This alternative has the widest final trail width and the widest asphalt surface. This would result in adverse, site-specific and local, short-term to permanent, moderate impacts.

Cumulative Impacts (all alternatives)

Scenery and visual resources 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 altered the visual landscape over time. Visual disturbance generated from ongoing maintenance and use of the trail would continue. Disturbance related to construction of this project would be minor to moderate in the broader context of Lake Crescent, and negligible to moderate in the broader context of the park's overall trail system and the north Olympic Peninsula.

Park Operations and Safety

Existing facilities analyzed include the existing Spruce Railroad Trail (SRRT), the current trailhead and parking lot near the Lyre River; including the picnic table, trash cans, bulletin board, and vault toilet. Portions of East Beach and the Water Line Road located within the project area are addressed, as is Camp David Junior Road (CDJR), and Highway 101 along Lake Crescent. Phase 1 of the Olympic Discovery Trail is considered, as is the North Shore Picnic Area and parking lot. The Devil's Punchbowl Bridge and other existing small bridges and boardwalk in Segment D is also considered.

Response to lost and injured visitors, and regular law enforcement presence to ensure visitor safety and resource protection needs are considered as well. 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.

Impact Assessment Methodology

Type: Beneficial impacts maintain or improve park operations and safety. Adverse impacts increase park operations or hinder 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 50. 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

Under Alternative 1, no changes to park operations and safety would occur. Park operations would continue as described in Chapters 2 and 3. This would result in beneficial, local, long-term to permanent, negligible to minor impacts. Visitors would continue to use the SRRT in its present condition. Hikers, equestrians, and bicyclists would share the trail, including sections of varying width and grade. Visitors would continue to manage their own exposure to risk associated with travel on the SRRT, which was not developed to meet or exceed any trail standards or guidelines with relevance to areas outside of Olympic National Park. Visitor injury and accident rates would likely continue at current levels, which have been very low given the nature of the trail and the current range of recreational activities that occur on the trail. Response time to various points on the trail may be delayed on occasion if visitors are located in areas where rapid response by boat is unsafe or infeasible. Under Alternative 1, impacts to park operations and visitor safety may be adverse, site-specific to local, short to long-term, negligible to moderate.

Impacts Common to All Action Alternatives

Direct and Indirect Impacts of the Alternatives

Under all alternatives the park would implement and manage the development, maintenance, and use of the expanded trail system to meet the safety objectives of the National Park Service for park visitors, area residents, and park staff.

The safety and health of employees, contractors, volunteers, and the public are core values of the National Park Service. In making decisions on matters concerning employee safety and health, NPS managers must exercise good judgment and discretion and, above all, keep in mind that the safeguarding of human life must not be compromised. The NPS must ensure that all employees are trained and informed on how to do their jobs safely, and that they have the necessary materials and equipment to perform their duties with minimal personal risk.

While recognizing that there are limitations on the ability to totally eliminate all hazards, the NPS seeks to provide a safe and healthful environment for visitors and employees. However, park visitors must assume a degree of risk and responsibility for their own safety when visiting areas that are managed and maintained as natural, cultural, or recreational environments (NPS 2006).

Under all alternatives a wide range of visitor uses would be accommodated on the improved SRRT. Access for emergency response would be improved under all action alternatives, resulting in beneficial, site-specific and local, long-term to permanent, negligible to moderate impacts associated with shorter response times in the event of a visitor or employee injury.

Increased development and use would require additional maintenance, visitor education, ranger presence, resource monitoring and management, and administrative oversight. NPS would need to obtain expertise related to the ongoing monitoring and maintenance of the railroad tunnels to ensure visitor and employee safety. The expanded level of development would require hiring of additional staff, or redirecting existing staff, supplies, and materials from other work in the park to support the new development. Areas of trail that are paved or are intended for use by wheelchairs or road bikes would require more frequent maintenance to ensure the trail surface firm and stable, and is clear of obstacles. Use of construction and hauling equipment on CDJR, East Beach, and the Joyce-Piedmont Road would result in additional wear and tear that may require repairs or rehabilitation. This would result in adverse, local and regional, long-term to permanent, minor to major impacts.

Alternative 2 – Three foot wide asphalt trail with four foot wide gravel shoulder and widened passing areas

Direct and Indirect Impacts of the Alternative

This Alternative would provide for a mixed surface trail with a three-foot wide asphalt surface designed and maintained to meet the outdoor accessibility guidelines described in Chapter 2, and an adjacent four-foot wide unpaved gravel surface designed and maintained to provide a travel route for equestrians, mountain bikes, or people who prefer an alternative to asphalt. Alternative 2 would best suit the needs of people seeking a slower-paced, less developed trail experience. The narrow trail corridor would accommodate mixed recreational uses and would be best suited

to people who are familiar with multiple-use trail etiquette. The NPS would provide visitor information and education to support the responsible use of the SRRT for all users.

In addition to the operation and maintenance requirements described above for all alternatives, Alternative 2 would require the use of more specialized equipment to maintain the narrow asphalt trail and adjacent unpaved surfaces. This work may also be accomplished through the use of standard equipment if additional NPS staff or park volunteers were available to keep the trail corridor clear for all intended user groups. It is expected that this alternative would result in both beneficial and adverse impacts to park operational requirements, with impacts to other park operations if staff and equipment is redirected from other areas to maintain the SRRT.

Alternative 3 – Six foot wide asphalt trail with four foot wide gravel shoulder

Direct and Indirect Impacts of the Alternative

This Alternative would provide for a mixed surface trail with a six-foot wide asphalt surface designed and maintained to meet the outdoor accessibility guidelines described in Chapter 2, and an adjacent four-foot wide unpaved gravel surface designed and maintained to provide a travel route for equestrians, mountain bikes, or people who prefer an alternative to asphalt. Alternative 3 would suit the needs of people seeking a casual, moderately developed trail experience. The trail corridor would accommodate mixed recreational uses and would be best suited to people who are familiar with multiple-use trail etiquette. The NPS would provide visitor information and education to support the responsible use of the SRRT for all users.

In addition to the operation and maintenance requirements described above for all alternatives, Alternative 3 would require the use of motorized equipment to maintain the asphalt trail and adjacent unpaved surfaces. This work may also be accomplished through the use of standard equipment if additional NPS staff or park volunteers were available to keep the trail corridor clear for all intended user groups. It is expected that this alternative would result in both beneficial and adverse impacts to park operational requirements, with impacts to other park operations if staff and equipment is redirected from other areas to maintain the SRRT.

Alternative 3 would not provide an accessible trail grade to Segment D. This trail section would remain on the current trail alignment at the same grade. This steeper section of trail would result in the potential for some visitors to travel at higher speeds than under the other alternatives on a more frequent basis. This steep section would provide a more challenging physical experience and would require additional awareness and courtesy of other people using the trail.

Alternative 4 – Ten foot wide non-asphalt trail

This Alternative would provide for a single surface trail with a 10.5 foot wide firm and stable, non-asphalt surface on Segments A, B, and C, and an eight to ten-foot wide firm and stable, non-asphalt surface on Segment D. The trail would be designed and maintained to meet the outdoor accessibility guidelines described in Chapter 2. Alternative 4 would suit the needs of people seeking a moderately developed trail experience that is surfaced with an alternative to asphalt. The trail corridor would accommodate mixed recreational uses and would be best suited to people who are familiar with multiple-use trail etiquette. This alternative provides the greatest continuous trail surface to allow for people to more comfortably pass each other without having

to cross multiple trail surfaces. The NPS would provide visitor information and education to support the responsible use of the SRRT for all users.

In addition to the operation and maintenance requirements described above for all alternatives, Alternative 4 would require the use of motorized equipment to maintain the non-asphalt trail to provide a firm and stable surface that meets accessibility guidelines. This would require more frequent maintenance than a trail paved with asphalt. This work may also be accomplished through the use of standard equipment if additional NPS staff or park volunteers were available to keep the trail corridor clear for all intended user groups. It is expected that this alternative would result in both beneficial and adverse impacts to park operational requirements, with impacts to other park operations if staff and equipment is redirected from other areas to maintain the SRRT.

Direct and Indirect Impacts of the Alternative

Alternative 5 – Eight foot wide asphalt trail with three foot wide gravel shoulder

This Alternative would provide for a mixed surface trail with an eight-foot wide asphalt surface designed and maintained to meet the outdoor accessibility guidelines described in Chapter 2, and an adjacent three-foot wide unpaved gravel surface designed and maintained to provide a travel route for equestrians, mountain bikes, or people who prefer an alternative to asphalt. Alternative 5 would suit the needs of people seeking a more developed trail experience. The trail corridor would accommodate mixed recreational uses and would be best suited to people who are familiar with multiple-use trail etiquette, particularly due to the potential for people to travel at higher speeds on the wider asphalt surface. Alternative 5 would provide the greatest width of asphalt, but also provides the least unpaved gravel shoulder to accommodate passing for people traveling with stock. The NPS would provide visitor information and education to support the responsible use of the SRRT for all users.

In addition to the operation and maintenance requirements described above for all alternatives, Alternative 5 would require the use of motorized equipment to maintain the asphalt trail and adjacent unpaved surfaces. This work may also be accomplished through the use of standard equipment if additional NPS staff or park volunteers were available to keep the trail corridor clear for all intended user groups. It is expected that this alternative would result in both beneficial and adverse impacts to park operational requirements, with impacts to other park operations if staff and equipment is redirected from other areas to maintain the SRRT.

Cumulative Impacts (all alternatives)

Increased development and use would require additional maintenance, visitor education, ranger presence, resource monitoring and management, and administrative oversight. NPS would need to obtain expertise related to the ongoing monitoring and maintenance of the railroad tunnels to ensure visitor and employee safety. The expanded level of development would require either the hiring of additional staff, or redirecting existing staff from other work in the park to support the new development. Areas of trail that are intended to provide a firm and stable surface consistent with outdoor accessibility guidelines would require more frequent maintenance to ensure the trail surface is clear of obstacles. The cumulative effects of the proposed development on park

operations and safety would result in adverse, local and regional, long-term to permanent, minor to moderate impacts in the broader context of the park.

Land Use

Impact Assessment Methodology

Type: Beneficial impacts maintain or improve land use in a manner consistent with current existing land ownership and use. Adverse impacts alter land use in ways that affect land ownership or impede use and enjoyment of privately held lands.

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 land use.

Table 51. Land Use Impact and Intensity

Impact Intensity	Intensity Description
Negligible	No effects would occur or the effects to land use would be below the level of detection.
Minor	The effects to adjoining property would be noticeable. 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 adjoining land use and property owners would be readily apparent. Any effects would result in changes to land use 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 land use conditions would be readily apparent and would cause substantial changes to adjoining property owners. Mitigation measures to offset potential adverse effects would be extensive and success could not be guaranteed.

Environmental Consequences to Land Use

Alternative 1 – No Action

Direct and Indirect Impacts of the Alternative

The No Action Alternative would result in no changes to current land use. The existing SRRT would continue to cross a small corner of adjacent private land on the hillside above the existing Lyre River parking lot. The trailhead parking lot would remain in its current location at the current size. This would continue to result in some degree of disturbance to adjacent residents who own lands adjacent to the project area. Disturbance includes occasional noise from maintenance and use of the trail, road, and parking areas. Some landowners have reported trespass onto their lands by trail users, both intentional (such as people asking to use a telephone) and unintentional (such as by visitors who do not know when they have crossed from park lands

into private property). This is resulting in adverse, site-specific and local, short-term to permanent, negligible to moderate impacts.

Impacts Common to All Action Alternatives

Direct and Indirect Impacts of the Alternatives

Implementation of the action alternatives would all result in construction related disturbance to adjoining land owners and residents due to the noise and presence of construction equipment and crews. Additionally, several residents have water systems that cross the project area.

Coordination between the NPS and residents would occur to ensure water systems are not damaged by trail construction or maintenance. Traffic delays on CDJR and East Beach Road would also affect residents, to varying degrees, under all alternatives. Increased use of the SRRT would also affect residents due to the increased presence of people in the parking lot and on the trail. This would result in construction and maintenance related impacts that are adverse, site-specific and local, short and long-term, and minor to major in intensity.

The existing Spruce Railroad Trail and the Lyre River trailhead and parking area would be widened to provide greater accessibility. The Lyre River parking lot, North Shore Picnic Area parking lot, and the 0.2 miles of Water Line Road in the park would be paved with asphalt, as would the road between the Lyre River Bridge and the Lyre River parking lot. A new access trail would be developed from CDJR near the North Shore Picnic Area. Both historic railroad tunnels would be opened and developed for trail use.

Increased development and use would require additional maintenance and would likely result in additional visitor use adjacent to private lands. This would result in adverse, site-specific and local, long-term to permanent, minor to moderate impacts. The existing short section of the SRRT that crosses the corner of a privately owned parcel would be re-aligned to ensure the improved trail is built and maintained on NPS lands. This would result in beneficial, site-specific, permanent, minor impacts.

Cumulative Impacts (all alternatives)

Increased development and use would require additional maintenance and would likely encourage additional use of the SRRT adjacent to private lands near Lake Crescent. The cumulative effects of the proposed development on land use would result in adverse, site-specific and local, long-term to permanent, negligible to minor impacts in the broader context of Lake Crescent and Olympic National Park.

Socioeconomics

Impact Assessment Methodology

Type: Beneficial impacts sustain or enhance socioeconomic values. Adverse impacts diminish socioeconomic values.

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 values.

Table 52. Socioeconomics Impact and Intensity

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

Environmental Consequences to Socioeconomic Values

Alternative 1 – No Action

Direct and Indirect Impacts of the Alternative

The No Action Alternative would result in no changes to socioeconomic conditions. Existing economic uses related to the Lake Crescent area would be unaffected. Commercial use of the SRRT would be unaffected. Use of the SRRT by NatureBridge would be unaffected. The area would continue to accommodate uses that support local and regional socioeconomic values. This would result in beneficial, local and regional, long-term to permanent, minor impacts associated with current use of the SRRT.

Impacts Common to All Action Alternatives

Direct and Indirect Impacts of the Alternatives

Implementation of any of the action alternatives considered in this EA would result in potential short-term disruption of economic use of the Lake Crescent area during construction when all or portions of the project area are closed to visitor use. Additionally, traffic delays associated with construction may also result in construction-related impacts. This would result in adverse, local to regional, short to long-term, negligible to moderate impacts.

Construction would result in the expenditure of money to implement the selected action. Construction activity would support socioeconomic values associated with the provision of all or some of the following: crews, equipment, materials, lodging, supplies, food, and disposal service

during construction. This would result in beneficial, site-specific to local, short to long-term, negligible to moderate impacts.

Both historic railroad tunnels would be opened and developed for trail use under all action alternatives. This would likely generate additional interest in touring the area, either as part of a day trip to the park or as part of an extended visit. The railroad tunnels and all sections of trail on the historic railroad grade (Segments A, B, and C) would be designed and maintained to comply with outdoor accessibility guidelines. This would result in approximately ten or more miles of accessible trail in the Lake Crescent area under all alternatives. Additionally, a firm and stable surface would be provided to all trail segments under all alternatives, providing an alternative to Highway 101 for people touring the area without a car. The Lyre River trailhead parking lot would be expanded and paved to provide additional parking and room for large vehicles and vehicles towing trailers to turn around. The North Shore Picnic Area parking lot would also be paved, and an accessible trail access would be developed from CDJR to Phase 1 of the ODT adjacent to the North Shore Picnic Area. The road between the Lyre River parking lot and the Lyre River Bridge would be paved, as would the Water Line Road within Olympic National Park. It is likely that under all alternatives, visitor use would increase, and this would support increased socioeconomic benefits for the area. This would provide beneficial, local to regional, long-term to permanent, negligible to moderate impacts.

Alternative 2 – Three foot wide asphalt trail with four foot wide gravel shoulder and widened passing areas

Direct and Indirect Impacts of the Alternative

The estimated cost to construct Alternative 2 as proposed is \$3,543,827. The estimated cost of maintaining the trail over a 50 year period is \$920,000 for a combined cost of \$4,463,827. Funding is not currently available, but would be sought from NPS and other potential funding sources. Expenditure of these funds to improve and expand the SRRT would provide socioeconomic benefits to the local and regional area, as would the increased visitation and use of the area. This would result in beneficial, local to regional, short to long-term construction related, minor impacts. Increased use and visitation would result in beneficial, local to regional, long-term to permanent, minor to moderate impacts.

Alternative 3 – Six foot wide asphalt trail with four foot wide gravel shoulder

Direct and Indirect Impacts of the Alternative

The estimated cost to construct Alternative 3 as proposed is \$4,655,778. The estimated cost of maintaining the trail over a 50 year period is \$1,350,000 for a combined cost of \$6,005,778. Funding is not currently available, but would be sought from NPS and other potential funding sources. Expenditure of these funds to improve and expand the SRRT would provide socioeconomic benefits to the local and regional area, as would the increased visitation and use of the area. This would result in beneficial, local to regional, short to long-term construction related, minor impacts. Increased use and visitation would result in beneficial, local to regional, long-term to permanent, minor to moderate impacts.

Alternative 4 – Ten foot wide non-asphalt trail

Direct and Indirect Impacts of the Alternative

The estimated cost to construct Alternative 4 as proposed is \$3,859,408. The estimated cost of maintaining the trail over a 50 year period is \$1,600,000 for a combined cost of \$5,449,408. Funding is not currently available, but would be sought from NPS and other potential funding sources. Expenditure of these funds to improve and expand the SRRT would provide socioeconomic benefits to the local and regional area, as would the increased visitation and use of the area. This would result in beneficial, local to regional, short to long-term construction related, minor impacts. Increased use and visitation would result in beneficial, local to regional, long-term to permanent, minor to moderate impacts.

Alternative 5 – Eight foot wide asphalt trail with three foot wide gravel shoulder

The estimated cost to construct Alternative 5 as proposed is \$4,079,919. The estimated cost of maintaining the trail over a 50 year period is \$1,600,000 for a combined cost of \$5,679,919. Funding is not currently available, but would be sought from NPS and other potential funding sources. Expenditure of these funds to improve and expand the SRRT would provide socioeconomic benefits to the local and regional area, as would the increased visitation and use of the area. This would result in beneficial, local to regional, short to long-term construction related, minor impacts. Increased use and visitation would result in beneficial, local to regional, long-term to permanent, minor to moderate impacts.

Cumulative Impacts (all alternatives)

Implementation of this project would cumulatively generate additional socioeconomic activity in the project area and local communities that serve the construction, maintenance, and use of the expanded trail system. This would be beneficial, site-specific to regional, long-term to permanent, and negligible to minor in the context of the north Olympic Peninsula's regional economy.

Unavoidable Adverse Impacts

Implementation of any of the action alternatives considered in this plan would result in temporary, construction-related impacts due to closures to visitor use and traffic delays during project implementation. Noise and visual disturbance impacts related to the use of heavy equipment and vehicles would also be unavoidable. Removal of numerous mature trees would be required to widen and extend the existing Spruce Railroad Trail. Ground disturbance would be required, including the potential to affect the historic railroad grade and prehistoric and historic archeological materials. Construction would result in short-term adverse effects on wildlife residing in the project area, and on any visitors recreating in park areas adjacent to the project area. Construction would also result in unavoidable adverse effects to local residents who own property adjacent to the proposed construction areas. Best management practices as described in Appendix A would be implemented to avoid and minimize adverse effects to the greatest extent possible, but some adverse effects would still occur as previously described in Chapter 4.

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 historic Spruce Railroad grade, including the existing Spruce Railroad Trail. Improvements would include the rehabilitation of elements of the historic rail grade, increased accessibility, the

long-term restoration of native vegetation near the Lake Crescent shoreline between the lake and the parking lot, and improved visitor experience following construction activities.

Implementation of any of the action alternatives would result in improved long-term productivity in terms of recreational and socioeconomic use of the area, although many short-term impacts would occur. The long-term integrity of park resources and values would not be adversely affected as a result of these short-term uses.

Irreversible and Irretrievable Commitments of Resources

Conversion of forested areas to new trail development would be effectively irreversible. Loss of historic materials that may be affected by the rehabilitation of the historic Spruce Railroad would be irreversible, although the NPS would develop and implement a treatment plan to avoid, to the greatest extent possible, the potential for adverse effects to historic properties. 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.

Chapter 5: Consultation and Coordination

Olympic National Park conducted public scoping for the Spruce Railroad Trail Expansion and Improvement project from July 2, 2010 to August 6, 2010. An environmental assessment was prepared and released for public review and comment between September 21 and October 21, 2011. A public meeting to present the alternatives and answer questions was held in Port Angeles at the Vern Burton Community Center on September 21, 2011. Many questions and concerns were voiced, particularly related to accessibility for people with disabilities and trail design standards and guidelines. These issues were further emphasized by people who provided written comment on the NPS Preferred Alternative described in the 2011 SRRT EA. In response, the NPS revised the range of alternatives and prepared an updated 2012 SRRT EA.

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 individuals, interest groups, government agencies, and area tribes on the park's planning mailing list.

Scoping

Scoping is an effort to involve American Indian Tribes; federal, state and local agencies; adjacent landowners and the general public in identifying issues to be analyzed in depth in the environmental assessment (EA). Scoping is also used to identify and eliminate from detailed study the issues that are not significant or which have been covered by prior environmental review, to allocate assignments for preparation of the EA, and to identify other environmental review and consultation requirements related to the EA which should be prepared concurrently with, and integrated with, the EA.

NPS staff began conducting internal scoping for the project in 2009 in response to a proposal for trail development that was submitted by Clallam County. 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.

A 30-day public scoping for the Spruce Railroad Trail EA was initiated July 2, 2010. 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 July 8, 2010 Peninsula Daily News. Respondents had the opportunity to provide written comments, fax comments, or input comments into the NPS Planning, Environment, and Public Comment (PEPC) website.

A public scoping meeting was held on July 20, 2010 at the Clallam County Courthouse in the Commissioners' Meeting Room. Public comments were taken during the workshop.

A public site visit was conducted on July 24, 2010 at the existing Spruce Railroad Trail. Park staff was on site to meet with park visitors to discuss the proposed trail development and answer questions.

The formal public scoping period ended on August 6, 2010. The park received over 140 responses from individuals, representatives of recreation organizations, and local agencies. Comments received during the scoping period are available for review on the park's Planning, Environment, and Public Comment (PEPC) website at <http://parkplanning.nps.gov/olym>.

An additional public meeting was held on October 4, 2010 to present the range of preliminary alternatives that were developed in response to feedback provided during public scoping. Park staff shared key details of each alternative, including proposed trail alignment, width, surface materials, access points, and associated visitor services. All comments were considered in the development of this environmental assessment.

As previously mentioned, the 2011 SRRT EA was made available for public review and comment between September 21 and October 21, 2011. A public meeting to present the alternatives and answer questions was held in Port Angeles at the Vern Burton Community Center on September 21, 2011. Many questions and concerns were voiced, particularly related to accessibility for people with disabilities and trail design standards and guidelines.

National Park Service (NPS) policy for implementing the National Environmental Policy Act (NEPA) provides the following guidance related to the analysis of public comment on an environmental assessment (EA): screen EA comments for:

- **Important new issues**

For the 2011 SRRT EA public comments, the primary issues of concern were:

- Universal accessibility (applicable laws, design standards, visitor opportunities, personal values)
- Safety (adherence to established design standards, safe access (Hwy 101, East Beach Road, Fairholme Hill, Sol Duc), conflicts among users (passing widths, safe/unsafe speeds, surface (impacts to hikers, walkers, runners from asphalt))
- Visitor Experience (people expressed a wide range of preferences associated with the SRRT, ranging from those who would prefer the park make no changes to those who would prefer even more development than what was considered in the SRRT EA).

- **Reasonable alternatives**

For the SRRT EA new alternatives brought up in public comments included:

- Consideration of a revised proposal by Clallam County (as compared to Alternative 4 included in the 2011 SRRT EA)
- Consideration of an alternative that would provide accessibility to the historic railroad grade by making improvements to the current railroad tunnel bypass trails (while retaining the same trail surface and general design)
- Alternatives that provide for variations of the paved and unpaved trail widths to better accommodate various user groups, including:

- 10 – 12 feet of paved trail width to meet AASHTO guidelines w/o exception to 8 feet minimum as considered in Alternative 4
 - Six feet asphalt with six feet of adjacent natural tread trail to provide passing width for horses, runners and mountain bikers the same as proposed for wheelchairs, pedestrians and road bicyclists.
 - Trail alignment as proposed in Alternative 3, but with asphalt width reduced to 36” as proposed in Alternative 2.
 - 8 feet asphalt with only 2 feet gravel for equestrian use, or eliminate equestrian use.
- Improve East Beach road to provide a safe bypass for cyclists around Lake Crescent for people arriving on Highway 101 corridor, not just for people arriving via Highway 112 via Water Line Road.
 - Work with adjacent landowners to acquire access on historic railroad grade to avoid steep sections of trail (Segment D and Sol Duc)
 - Develop a trail underpass to Highway 101 to avoid at-grade crossing proposed by Clallam County.
 - Designate tunnel bypass trails for use by pedestrians only to provide an opportunity for people to experience the SRRT without asphalt and in the absence of potentially conflicting trail uses (bicycles, stock use).
 - Develop alternative to rip rap for downslope bank stabilization along Lake Crescent shoreline to mitigate impacts to aquatic habitat, such as those developed in other areas of the park that incorporate large woody debris.

- **Mitigation measures**

In addition to alternatives/actions described above, there were comments related to trail surface that requested the park consider permeable alternatives to asphalt for the parking lot and trail surface to reduce impacts to trail runners, walkers, and hikers associated with asphalt paving.

- **Corrections or additions of information related to impact analysis and determination of significant impact**

- Several people provided information about trail design standards, primarily related to compliance with AASHTO guidelines to support safety for multiple use (shared use) trails.
- Multiple people commented about concerns related to visitor safety associated with trail width, trail grade, crossing of Highway 101 at Fairholme, presence of fast-moving bicycles on the trail with other users, trail surface, and trail access along East Beach Road.
- There were requests for additional information about current use of the SRRT, and also for more detailed information about the trail alignment on the east end (Lyre River/Segment D).
- There were several statements and questions regarding how the trail proposals are influenced by the features of the historic Spruce Railroad.
- Information was provided by some regarding the design standards of other segments of the Olympic Discovery Trail (ODT) outside of the park that are

different from what was considered in the SRRT EA (specifically related to the use on non-asphalt surface materials and variable trail widths and user groups).

After considering public comments the NPS decided to revise and reissue the SRRT EA. The 2012 SRRT EA considers alternatives that were modified in response to public comments described above. The 2012 SRRT EA also describes why some actions proposed during the public review period were considered, but dismissed. This is described in greater detail in Chapter 2.

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:

U.S. Congressman Norm Dicks
U.S. Senator James Hargrove
U.S. Senator Patty Murray
U.S. Senator Tim Sheldon

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
 Nisqually National Wildlife Refuge
 National Park Service
 Seattle Office
 Office of Public Affairs
Depart 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
Department of Natural Resources

Department of Parks and Recreation

Local Agencies

City of Forks
City of Port Angeles
Clallam Bay and Sekiu Chamber of Commerce
Clallam County Commissioners
Clallam County Economic Development Council
Forks Chamber of Commerce
Jefferson County Commissioners
Kitsap County Commissioners
Olympic Region Clean Air Agency
Port Angeles Chamber of Commerce
Port Angeles Department of Community Development
Port Angeles, Victoria Visitor Bureau
Port of Port Angeles
Port Townsend City Council
Seattle Parks and Recreation
Sequim Chamber of Commerce

American Indian Tribes

Jamestown S'Klallam Tribe
Lower Elwha Klallam Tribe
Port Gamble S'Klallam Tribe
Quileute Indian Nation
Olympic Peninsula Intertribal Cultural Advisory Committee

Organizations and Businesses

Adventure Cycling Association
Adventure Treks, Inc.
All Points Charters and Tours
Americas Adventure, Inc.
Apogee Outdoor Adventures
ARAMARK Parks and Destinations
Backcountry Horseman of Washington, Peninsula Chapter
Bicycle Alliance of Washington
Camp Tawonga
Camp Thunderbird
Cascade Bicycle Club
Clallam County Economic Development Council
Clallam County Historical Society
Clallam Transit System
Country Walkers, Inc.
Conservation Northwest
Evergreen Escapes
Fairholme Store

Forks Forum
Friends of Lake Crescent

Organizations and Businesses, cont.

Friends of Miller Peninsula State Park
Friends of Olympic National Park
Friends of Port Townsend Trails
Gray Wolf Outfitters
Green Crow Timber LLC
Hurricane Ridge Winter Sports Club
Institute for Policy Research
Integrative Health Systems
Klahhane Club
Live Productions
KNOP Radio
Log Cabin Resort
Mike's Bikes
Monday Hikers
Mountain Hiking Holidays
National Audubon Society
National Coast Trail Association
National Parks Conservation Association
National Wildlife Federation
New England Hiking Holidays
North Olympic Peninsula Visitor and Convention Bureau
Off the Beaten Path
Olympians Hiking Club
Olympic Forest Coalition
Olympic Park Associates & North Cascades Conservation Council
Olympic Park Institute
Olympic Peninsula Audubon Society
Olympic Peninsula Explorers
Olympic Raft and Kayak
Olympic Region Clean Air Agency
Overland Travel, Inc.
Pacific Coast Treks
Pacific Northwest Trail Association
Passages Northwest
Peninsula Daily News
Peninsula News Network
Peninsula Trails Coalition
Peninsula Wilderness Club
Port Townsend Leader
Protect the Peninsula's Future
Quilcene Conservation District
Rainier Evergreen, Inc.

Rainshadow Natural Science
Recreational Equipment, Inc. (REI) Travel and Trip Planning
Seattle Post Intelligencer
Sequim Gazette
Sierra Club, Cascade Chapter
Sol Duc Hot Springs
Sol Duc Valley Packers
Soroptomist International of Port Townsend
Squeaky Wheels
Sunnydell Shooting Grounds
Survivor's Outdoor Experience
The Evergreen State College
The Wilderness Society
The World Outdoors
Timberline Adventures
University of Washington, Olympic Natural Resource Center
Victoria Express
Washington Environmental Council
Washington's National Park Fund
Washington Trails Association
Wilderness Inquiry Inc.
Wilderness Watch
Wirta Hospitality Worldwide

Area Libraries

Everett Public Library
Holland Library
King County Library System
Kitsap Regional Library
North Olympic Library System
Port Townsend Public Library
Renton Public Library
Seattle Public Library
Tacoma Public Library
University of Washington Libraries

List of Preparers

Olympic National Park

Karen Gustin, Superintendent (retired)
Todd Sues, Deputy Superintendent (Acting Superintendent)
Teri Tucker, Environmental Protection Specialist
Roger Hoffman, Geographic Information System Specialist
Jennifer Chenoweth, Wilderness Planner, Wetland Delineation Specialist
Paul Gleeson, Chief of Cultural Resources (retired)
Dave Conca, Chief of Cultural Resources, archeologist
Jacilee Wray, Cultural Anthropologist, Assistant Planner
Kim Kwarsick, Archeologist
Reed Robinson, Chief of Maintenance
Carl Elleard, Civil Engineer
Jack Galloway, Landscape Architect
Ellen Gage, Historic Architect, ONP Accessibility Coordinator
Larry Lack, Trails Foreman
Louise Johnson, Chief of Natural Resources
Pat Crain, Fisheries Biologist
Sam Brenkman, Fisheries Biologist
Patti Happe, Wildlife Biologist
Scott Gremel, Wildlife Biologist
Steve Fradkin, Coastal Ecologist
Bill Baccus, Natural Resources Specialist Steve Acker, Botanist
Ruth Scott, Wilderness Specialist
Colin Smith, Chief Ranger
Mark O'Neill, District Ranger, Lake Crescent
Chris Eckard, East District Interpretive Ranger
David Fuller, Administrative Officer
Rod Roberson, Contract Officer

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Appendices

Appendix A: Mitigation Measures Common to All Action Alternatives

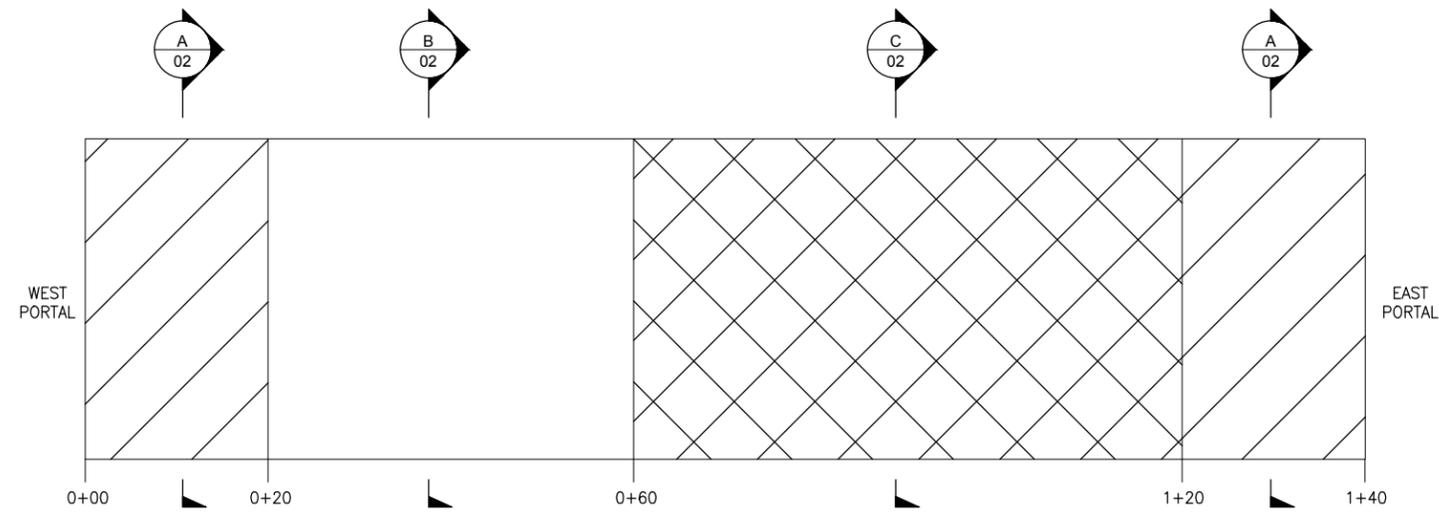
Resource Area	Mitigation
General Considerations	<p>The Spruce Railroad #1 is eligible to the National Register of Historic. Before the beginning of construction, all known contributing features of the historic railroad would be identified and construction methodology will follow the Cultural Resources Treatment Plan.</p> <p>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. A stormwater pollution prevention plan would be developed and implemented.</p> <p>Construction vehicle engines would not be allowed to idle for extended periods of time.</p> <p>All construction debris 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>Sediment control measures would be implemented to avoid potential impact to water lobelia from construction activities.</p> <p>A revegetation plan would be developed to restore disturbed areas along the trail, any former trail segments, parking lot parameters, and construction access areas.</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 an effort to avoid introduction of non-native / noxious plant species, no imported</p>

	<p>hay/straw bales would be used during construction or 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>All construction vehicles will be pressured washed prior to entering the park for the first time; subsequent 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>All tools and clothing will be free of seeds or other parts of exotic plants before being used at the construction site.</p> <p>All haul trucks bringing fill materials from outside the Park would be covered 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.</p> <p>The NPS would develop a plan to maintain vegetation in areas surrounding railroad features (bridges, tunnels, and sidings) to prevent vegetation encroachment.</p> <p>To prevent upslope rock failures and downslope bank failures, the NPS would routinely maintain culverts and remove vegetation surrounding railroad features (sidings, bridge and tunnel approaches).</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 the lake and 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 the lake and any flowing water bodies.</p> <p>If weather conditions during project operations generate and transport sediment to the lake or 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.</p> <p>In areas where drainages cross the trail, a drainage system will be established that supports the natural drainage pattern and the efficient removal of flowing water from the trail alignment.</p> <p>A storm water pollution prevention plan would be developed and implemented prior to commencing any near-water activities.</p>

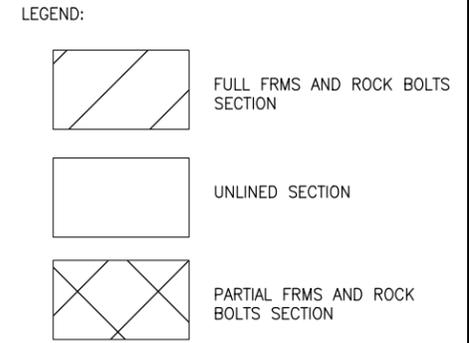
	<p>Regular site inspections would be conducted to endure that erosion-control measures are properly installed and functioning effectively.</p> <p>Prior to starting work each day, all machinery would be inspected for leaks (e.g., fuel, oil, and hydraulic fluid) and all necessary repairs would be made 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>
Wildlife and Fisheries	<p>NPS Wildlife and Fisheries Management staff would provide input during the development of final construction drawings and contract specifications to ensure that potential impacts to native wildlife species (including fish, bats, bald eagles, fisher, migratory birds, amphibians, etc.) are avoided or minimized to the greatest extent possible.</p>
Special Status Species	<p>No clearing of vegetation or major construction activity would occur within suitable habitat for northern spotted owl or marbled murrelet during the breeding season. Work in areas adjacent to suitable habitat would occur outside of the early breeding season to ensure that noise related disturbance is avoided or minimized.</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 that provide nesting habitat for marbled murrelet would be removed.</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</p>

	<p>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>
<p>Visitor Experience and Recreational Resources</p>	<p>Visitors would be informed in advance of construction activities.</p> <p>The project area would be closed to visitor use during construction activities.</p> <p>A traffic management plan would be developed and implemented to avoid or reduce impacts to local residents and park visitors using park roads during construction. Short-term closures may be required.</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>A Cultural Resource Treatment Plan would be developed to address how contributing features of the eligible National Register railroad will be restored or rehabilitated. Construction of the trail will be coordinated with the park Chief of Cultural Resources to insure that all work is done in compliance with this treatment plan.</p> <p>Should any significant 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. 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 archeological resources are uncovered during construction.</p> <p>Equipment and material staging areas would avoid known archeological resources.</p> <p>NPS archeologists would be on-site during all initial ground disturbing activities and when deemed necessary to protect specific historic features.</p> <p>Historic culverts constructed of log, timber, stone or concrete would be made serviceable and routinely maintained, as practicable.</p> <p>Historic culverts that are deemed ‘not serviceable’ would be inventoried and recorded as areas that may present future archeological and trail maintenance issues.</p>

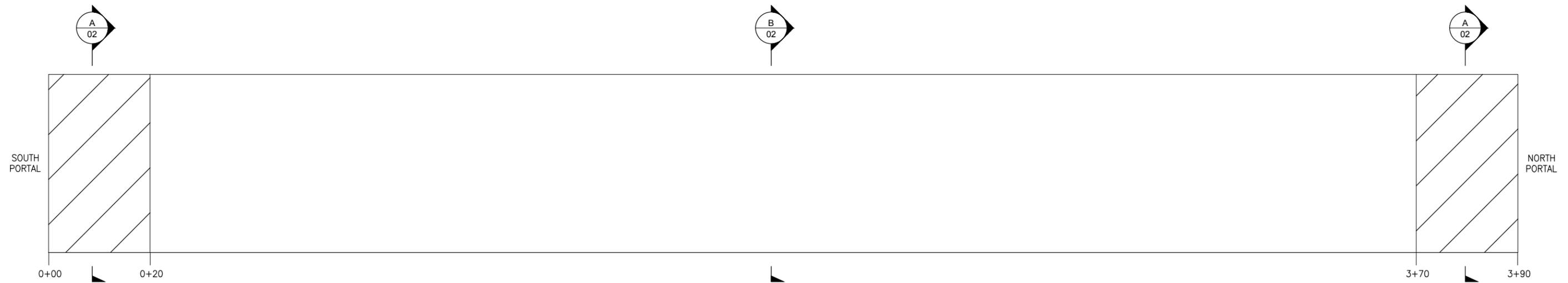
Appendix B: Long and Short Tunnel Profiles



NOTES:
 1. ALL DIMENSIONS ARE APPROXIMATE AND SHALL BE DETERMINED IN THE FIELD.



1 SHORT TUNNEL PROFILE
 SCALE: NTS



2 LONG TUNNEL PROFILE
 SCALE: NTS

No.	REVISION	BY	APP'D



JACOBS ASSOCIATES
 Engineers/Consultants



DESIGNED: CR	CHECKED:
DRAWN: PDC	APPROVED: GM
HORZ SCALE: AS NOTED	VERT SCALE: NA

CLALLAM COUNTY
SPRUCE TUNNEL
 REHABILITATION PROJECT
 LONG AND SHORT TUNNEL PROFILES

DATE: APRIL 29, 2011
JOB NO: 4352.0
DRAWING NO: 01
SHEET NO: 01 OF 03

TUNNEL REPAIR CROSS SECTIONS

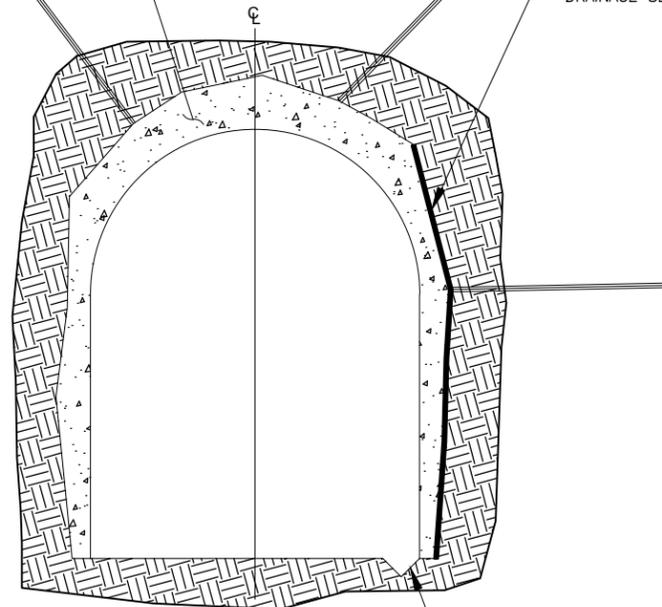
GENERAL NOTES:

1. SCALE ANY LOOSE ROCK THROUGH THE ENTIRE LENGTH OF THE TUNNEL AND AT PORTAL LOCATIONS.
2. REMOVE ALL ROCK ACCUMULATIONS AND TIMBER DEBRIS FROM WITHIN TUNNEL.
3. INSTALL ROCKBOLTS WHERE DIRECTED.
4. APPLY FRMS AT LOCATIONS SHOWN ON PROFILE (SHEET 01).

COMPLETELY LINE PORTAL ENTRY SIDES, QUARTER ARCHES, AND TOP WITH FRMS, EXTEND LINING 20 FEET INTO TUNNEL INTERIOR OR AS DIRECTED BY THE ENGINEER

ROCKBOLTS WHERE REQUIRED, TYP

INSTALL STRIP DRAIN WHERE NECESSARY TO CONTROL DRAINAGE SEEPS

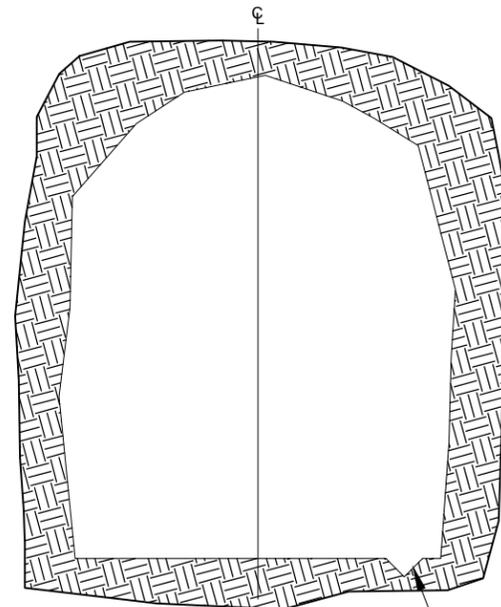


CONSTRUCT DRAINAGE DITCH ENTIRE LENGTH OF TUNNEL

A FULL FRMS AND ROCK BOLTS SECTION
SCALE: NTS

SHORT TUNNEL: STA 0+00 TO 0+20
STA 1+20 TO 1+40

LONG TUNNEL: STA 0+00 TO 0+20
STA 3+70 TO 3+90



CONSTRUCT DRAINAGE DITCH ENTIRE LENGTH OF TUNNEL

B UNLINED SECTION
SCALE: NTS

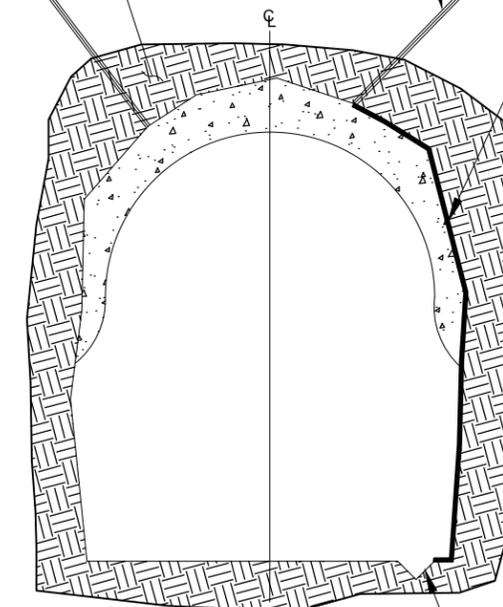
SHORT TUNNEL: STA 0+20 TO 0+60

LONG TUNNEL: STA 0+20 TO 3+70

LINE TUNNEL SIDES, QUARTER ARCHES, AND TOP WITH FRMS

ROCKBOLTS WHERE REQUIRED, TYP

INSTALL STRIP DRAIN WHERE NECESSARY TO CONTROL DRAINAGE SEEPS



CONSTRUCT DRAINAGE DITCH ENTIRE LENGTH OF TUNNEL

C PARTIAL FRMS AND ROCK BOLTS SECTION
SCALE: NTS

SHORT TUNNEL: STA 0+60 TO 1+20

No.	REVISION	BY	APP'D

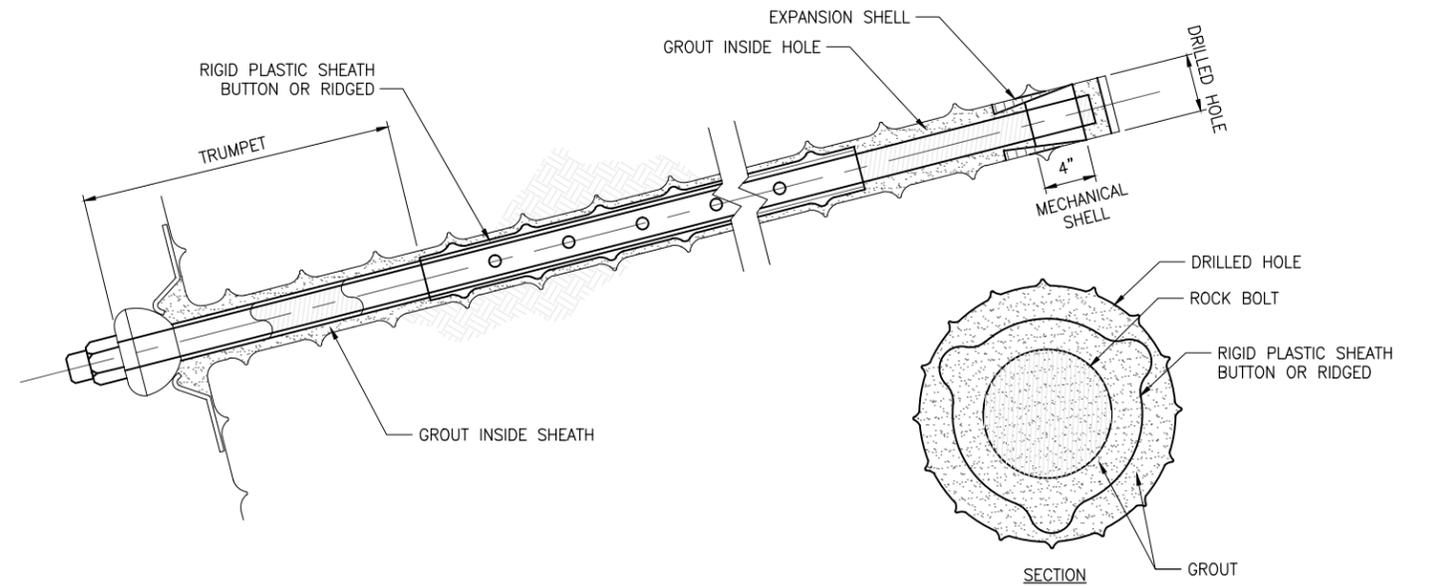


DESIGNED: CR	CHECKED:
DRAWN: PDC	APPROVED: GM
HORZ SCALE: AS NOTED	VERT SCALE: NA

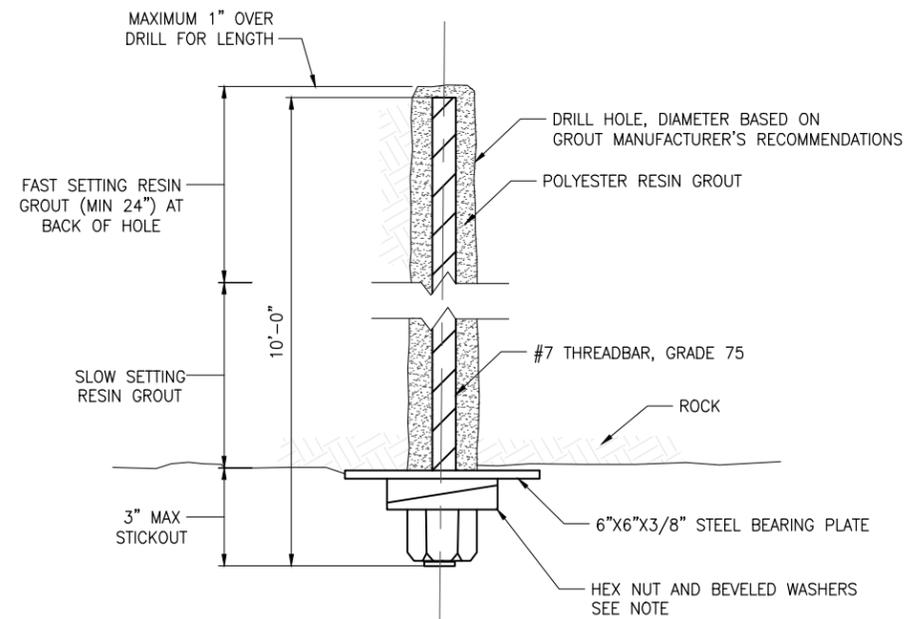
**CLALLAM COUNTY
SPRUCE TUNNEL**
REHABILITATION PROJECT

LONG AND SHORT TUNNEL SECTIONS

DATE: APRIL 29, 2011
JOB NO: 4352.0
DRAWING NO: 02
SHEET NO: OF 02 OF 03



1 - DETAIL - DOUBLE CORROSION PROTECTION ROCK BOLT (DCP)
SCALE: NTS



2 - DETAIL - RESIN GROUTED ROCK BOLT (RGRB)
SCALE: NTS

NOTE: CONTRACTOR MAY USE DOME ANCHOR NUTS AS A SUBSTITUTE TO HEX NUT AND BEVELED WASHERS. IF DOME NUTS ARE USED REPLACE 3/8" STEEL PLATE WITH 1/2" STEEL PLATE DISHED TO ACCEPT DOME NUT.

No.	REVISION	BY	APP'D



DESIGNED: CR	CHECKED:
DRAWN: PDC	APPROVED: GM
HORZ SCALE: AS NOTED	VERT SCALE: NA

**CLALLAM COUNTY
SPRUCE TUNNEL**
REHABILITATION PROJECT

DETAILS

DATE: APRIL 29, 2011
JOB NO: 4352.0
DRAWING NO: 03
SHEET NO: OF 03 OF 03

SRRT EA Cumulative Impact Summary

	Past Actions	Current Actions (Alt 1)	Reasonably Foreseeable Future Actions	Action Alternatives
PHYSICAL ENVIRONMENT				
Geologic Features and Soils	Construction of the Spruce Railroad and tunnels resulted in impacts to the geologic features and soils on the north shore of Lake Crescent, in the Sol Duc area, and outside of the park.	Railroad features are deteriorating, no new geological impacts other than background levels of erosion.	Railroad features are deteriorating, no new geological impacts other than background levels of erosion would continue.	There would be additional disturbance to geologic features and soils associated opening both historic railroad tunnels, widening of the SRRT and expanding of the Lyre River parking lot, and construction of an access trail on CDJR.
	Construction of Highway 101 on the south shore of Lake Crescent, East Beach Road, and Camp David Junior Road resulted in impacts to the geologic features and soils near Lake Crescent, and outside of the park.	Routine maintenance and repairs to adjacent roads results in minor impacts to geologic features and soils.	Routine maintenance and repairs to adjacent roads would continue to result in minor impacts to geologic features and soils.	Routine maintenance and repairs to adjacent roads, in addition to the new trail development proposed on the SRRT would continue to result in minor cumulative impacts to geologic features and soils.
	Construction of the park's existing 600 miles of hiking trails and additional system of roads resulted in impacts to the geologic features and soils throughout the park, including the project area.	Routine maintenance and repairs to the park's existing trail and road system results in impacts to geologic features and soils.	Routine maintenance and repairs to the park's existing trail and road system would result in continuing impacts to geologic features and soils.	In addition to the existing level of maintenance and repairs to the park's trail system, the widening of the SRRT would add slightly to the overall disturbance to geologic features and soils in the context of the broader system.
	Construction of other sections of regional trail networks outside the park have impacted geologic features and soils.	Routine maintenance and repairs to the existing trail systems results in impacts to geologic features and soils.	In addition to routine maintenance and repairs, new sections of regional trail are currently under construction or planned for construction in the near future, particularly areas of the proposed Olympic Discovery Trail. This includes new trail on USFS lands adjacent to the park, among others.	-

Appendix C: Cumulative Impact Summary

<p>Hydrology and Water Quality</p>	<p>Visitor and Administrative use has resulted in increased sediment, nutrient, and contaminant loads in areas of development adjacent to surface waters. Construction along the shoreline and within riparian areas have also affected hydrology and water quality to varying extents.</p>	<p>Routine use, maintenance and repairs to existing infrastructure results in continuing impacts to water resources associated with altered hydrologic patterns and introduction of contaminants from developed areas, including Highway 101, other roads, and shoreline development. Despite the current use levels, water quality at Lake Crescent has remained exceptionally high.</p>	<p>Routine use, maintenance and repairs to existing infrastructure would continue to alter and affect water resources, both within and outside of the project area. New development on private lands adjacent to Lake Crescent would likely occur as property owners develop or maintain their lots.</p>	<p>In addition to the existing level of use, maintenance and repairs to existing infrastructure, the park would expand development as described by installing new bank armoring in several sections of the SRRT and widening the trail. This would add to the existing level of impact to water resources during construction, and also by adding to the extent of infrastructure with the potential to impact water resources. Impacts would be somewhat lessened due to the paving of access road and parking areas to minimize sediment transport that is occurring in these areas.</p>
<p>Air Quality</p>	<p>Vehicle emissions from visitor, administrative, residential, and industrial uses have affected regional air quality.</p>	<p>Routine use, maintenance, and repairs to road and trail infrastructure both within and outside of the park results in ongoing effects to air quality from vehicle emissions and use of motorized tools and equipment.</p>	<p>Air quality impacts are expected to be consistent with current use levels. No new developments with the potential to measurably affect air quality are currently planned in the area.</p>	<p>In addition to background levels of air quality impacts, there would be some additional use of motorized vehicles and equipment to construct and maintain new trail as described above. This increase would be noticeable during construction, but negligible in the context of local and regional air quality in the long term.</p>
<p>Vegetation</p>	<p>Extensive logging and vegetation removal has reduced the extent 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. Existing residential, recreational and industrial uses required removal of native vegetation throughout the region, including within the park.</p>	<p>Vegetation impacts are ongoing as a result of routine maintenance, repairs and use. This includes removal of hazard trees in developed areas and routine brushing to clear existing trail and road corridors and around buildings and utilities. Existing development in the Lake Crescent area threatens water lobelia when sediments from upslope use areas is deposited in shallow water habitats occupied by water lobelia.</p>	<p>Vegetation impacts would continue to occur from routine use and maintenance activities. Additional impacts would occur from new developments outside of the park associated with regional trail development, including construction of new trail on USFS lands adjacent to OLYM.</p>	<p>In addition to ongoing impacts, the proposed improvements to the SRRT would result in construction related disturbance to between 5.6 and 6.5 acres due to widening the SRRT and parking areas. This would result in the removal of up to 165 large trees (11" - 30" dbh). This would result in additional shoreline disturbance with the potential to affect water lobelia, but most development would occur away from known lobelia habitat and paving of parking areas and roads would minimize future sediment transport near the Lyre River.</p>

Appendix C: Cumulative Impact Summary

	Non-native plants have been introduced to the region, and the project site.	Ongoing use also provides opportunities for the introduction or spread of non-native plants, although best management practices are implemented to avoid or minimize this risk to the greatest extent possible.	Ongoing use also provides opportunities for the introduction or spread of non-native plants, although best management practices are implemented to avoid or minimize this risk to the greatest extent possible.	Ongoing use and development would continue to provide opportunities for the introduction or spread of non-native plants, although best management practices are implemented to avoid or minimize this risk to the greatest extent possible.
Wetlands	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. The existing Lyre River trailhead parking lot is adjacent to a potential wetland area, and portions of the existing SRRT cross seasonal drainages with nearby wet areas.	Ongoing use and maintenance of infrastructure both within and outside the project area is resulting in ongoing effects to wetlands.	A formal wetland delineation is being completed for the project area. The park plans to remove a vacant building near the current SRRT parking lot at the Lyre River. Any areas identified as wetland would be rehabilitated to natural conditions.	A formal wetland delineation is being completed for the project area. Any wetlands within the proposed project area would be avoided. Areas of wetland that are currently affected by development would be rehabilitated to the greatest extent possible. Some areas would be crossed by bridges or boardwalks to prevent impacts to the movement of water.
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 function.	Ongoing use and development continues to impact the quality and quantity of wildlife habitat both within and outside the park. Impacts in the park are primarily associated with front-country developed areas and with the use of aircraft and motorized tools in backcountry locations to maintain remote sections of the existing trail system.	In addition to ongoing levels of impact to wildlife and wildlife habitat, ongoing use and development would continue to occur both within and outside the park. Olympic National Park would continue to provide extensive intact habitat that provides alternate feeding, sheltering and breeding locations for many animals in the park and surrounding areas.	In addition to the ongoing and reasonably foreseeable impacts to wildlife and wildlife habitat, there would be additional loss of habitat due to new trail construction and some disturbance to surrounding habitat during construction and maintenance of the SRRT improvements. The park would continue to provide extensive habitat outside of the project area. Best management practices would be implemented to avoid or minimize disturbance due to construction and maintenance to the greatest extent possible.

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<p>Unique or Important Fish or Fish Habitat</p>	<p>Changes in human use patterns, including consumption of fish and alteration of fish habitat has reduced the distribution and abundance of native fish species. This includes the two endemic fish species present in Lake Crescent, although park management actions to reduce impacts to both species have been taken to protect both fish populations.</p>	<p>Ongoing use and development would continue to affect the quality and quantity of fish populations and fish habitat. Effects would be both positive and negative, since new development in some areas may be off-set by large restoration projects (such as the Elwha dam removal project) in others. NPS has an active monitoring and protection program in place at Lake Crescent to support the preservation of the two endemic fish species.</p>	<p>Current impacts, both positive and negative, would continue.</p>	<p>In addition to ongoing impacts, disturbance to approximately 5.6 to 6.5 acres to widen and improve the SRRT and parking areas and the installation of new bank armoring in Segments A and B of the SRRT would result in additional new construction and maintenance related impacts to the Lake Crescent aquatic habitat, although best management practices would be implemented to avoid or minimize impacts to the greatest extent possible.</p>
<p>Threatened and Endangered Species</p>	<p>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 and marbled murrelet. These changes affected the composition, structure, and function of species populations and habitat. Northern spotted owls are also being affected by increasing populations of barred owls, which displace spotted owls and have reduced available breeding habitat due to competition. A programmatic Biological Opinion was prepared during the preparation of the Olympic National Park General Management Plan.</p>	<p>Ongoing use and development both within and outside the park would continue to affect marbled murrelets and northern spotted owls. Barred owls are continuing to expand their range both within and outside the park. Conservation measures are implemented as part of ongoing park operations to avoid or minimize disturbance to T & E species to the greatest extent possible. Research and monitoring is ongoing.</p>	<p>The current level of disturbance to T & E species would continue, as would efforts to support recovery of listed species and efforts to avoid or minimize impacts to the greatest extent possible. There would be additional disturbance associated with new trail development outside the park, as well as from other land management practices outside the park, but within the local region.</p>	<p>The current level of disturbance would likely continue, as would conservation measures, but there would be some additional disturbance due to the construction of new trail and increased use and maintenance activities within or adjacent to suitable habitat for marbled murrelet and northern spotted owl. Best management practices would be implemented to avoid or minimize disturbance to the greatest extent possible. No loss of individual animals or nest trees would occur.</p>

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<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.</p>	<p>The existing level of adverse effect would continue under current conditions. However, new impacts would be avoided to the greatest extent possible through preservation maintenance of remaining historic properties, archeological monitoring and implementation of inadvertent discovery plans, and rehabilitation of some historic properties in areas where this would not unreasonably conflict with the preservation of natural resources.</p>	<p>Other effects to cultural resources that may occur in the reasonably foreseeable future include additional preservation maintenance and rehabilitation of historic properties in areas where this would not unreasonably conflict with the preservation of natural resources.</p>	<p>The historic Spruce Railroad would be affected as described below. Additionally, archeological monitoring and implementation of an inadvertent discovery plan would be implemented to avoid or minimize potential impacts to archeological resources associated with historic resort properties, historic logging camps, or prehistoric sites.</p>
<p>Historic Spruce Railroad</p>	<p>The Historic Spruce Railroad has been affected by the removal of track hardware, conversion of some sections to road, and other sections to trail. The two historic railroad tunnels have been closed through blasting that resulted in adverse effects. Benign neglect has allowed several features to deteriorate or be lost, including historic log cribbing, tunnel supports, dry laid rock wall, trestle bridges, and wooden culverts. Some sections of rail grade have been unmanaged for several years. Some sections of the historic Spruce Railroad retain integrity and were found to be eligible for the National Register of Historic Places. This historic property was determined to have national significance due to its association with World War I and the Spruce Division that supplied materials for airplanes.</p>	<p>Sections of the historic Spruce Railroad are being used as road, trail, or are unmanaged. Elements of the historic property are being lost due to benign neglects as historic fabric deteriorates. This includes the historic log cribbing, wood culverts, and wood tunnel supports. Areas of dry laid stone retaining wall are also failing.</p>		<p>The SRRT would be widened in Segments A, B and C. This would result in the rehabilitation of the railroad grade. The remaining log cribbing and dry-laid stone retaining wall would be rehabilitated as well. Interpretation of the historic railroad would be improved. Deterioration of wood culverts would continue and tunnel supports would be removed when the two historic railroad tunnels are reopened and stabilized to allow for visitor use.</p>

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<p>Visitor Use and Experience</p>	<p>Olympic National Park provides world-class opportunities for visitors to experience the outstanding natural and cultural resources within the park. The Lake Crescent and Sol Duc areas are among the most visited areas within the park, providing a wide range of overnight and day use. Past development has resulted in the creation of a trail system containing over 600 miles of trail within the park. Very few miles of trail are universally accessible. Extensive trail opportunities also exist outside the park, including many areas that are universally accessible.</p>	<p>The existing level of visitor use would continue and existing infrastructure to support visitor use would remain. The SRRT would continue to support use by hikers, bicyclists and equestrians. Phase 1 of the ODT would provide 6 miles of universally accessible trail in the Lake Crescent area. Trails outside the park would continue to provide additional opportunities for people to experience and enjoy the Olympic Peninsula.</p>	<p>In addition to existing visitor use opportunities, new trail would be built outside the park, including new sections of trail on USFS lands adjacent to the project area. This would expand the current regional trail network and provide increased opportunities for visitors to experience and enjoy the Olympic Peninsula.</p>	<p>The existing SRRT would be widened and made universally accessible in all areas except Segment D under Alt 3. The two historic railroad tunnels would be opened. Trail access and parking would be improved, and there would be increased opportunities for people to experience and enjoy the Olympic Peninsula.</p>
<p>Soundscapes</p>	<p>Use and development both within and outside the park has resulted in numerous activities that affect natural soundscapes. This includes roads, trail, housing, business and recreational developments. The construction of Highway 101 on the south shore of Lake Crescent has added traffic noise to the area.</p>	<p>Ongoing use and maintenance results in noise related impacts that affect biological as well as experiential conditions. Roads and trails require the use of motorized vehicles and tools to maintain surfaces and provide adequate clearance. Vehicle traffic on road and motorized boats on Lake crescent also add noise to the environment. Aircraft use also affects the region. Noise levels vary depending on the season and time of day, and despite the level of development, natural sounds are still present throughout the project area.</p>	<p>Ongoing noise related impacts would continue to occur. New development and use within the project area would also add some degree of additional noise on adjacent lands.</p>	<p>There would be short term noise increase due to widening of the existing SRRT, and also during the expansion of the SRRT parking lot near the Lyre River and the development of accessible parking and an access trail on CDJR and the paving of the Water Line Road and road between the Lyre River bridge and parking lot. There would be some additional noise associated with the ongoing use and maintenance of the expanded trail system. Including the delivery of new trail bridges by heavy life helicopter.</p>
<p>Scenery and Visual Resources</p>	<p>The Olympic Peninsula is renowned for its natural beauty and high quality visual resources. Some impacts have occurred due to development and land use practices, particularly in areas used for commercial activities and commodity production. Lake Crescent is a premier destination for those seeking scenic beauty. Shoreline development has occurred in the past on park and private lands, but a high overall visual quality remains.</p>	<p>The existing high level of scenic beauty and visual resources would continue to exist. There would be some ongoing impacts from adjacent land uses that adversely affect visual resources. There would be some short-term visual impacts associated with routine maintenance and repairs to existing infrastructure on park and private lands.</p>	<p>Future use and development may result in adverse visual impacts, particularly if forested lands that are visible from the Lake Crescent area are cleared or developed. Existing short-term impacts associated with routine use, maintenance and repairs would continue.</p>	<p>There would be greater short-term impacts associated with construction of new trail and the expansion of existing trail and parking lots. There would be no long-term adverse effects other than those associated with routine use, maintenance and repairs.</p>

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<p>Park Operations and Safety</p>	<p>Olympic National Park is managed to provide for employee and visitor safety in accordance with all applicable laws and policies. The park operation has grown over time as new infrastructure has been developed to support increased visitor use.</p>	<p>The existing park operations would continue, as would the NPS commitment to visitor and employee safety.</p>	<p>Park budgets are not expected to increase in the foreseeable future, and may decrease for some operations. The commitment to safety would remain. The general extent of park infrastructure would remain the same.</p>	<p>The existing SRRT and associated parking lots would be improved. The Water Line Road, SRRT parking lot and North Shore Picnic Area parking lot would also be paved. The two historic railroad tunnels would be opened and developed for trail use. This would result in increased operational demands to maintain the expanded infrastructure and provide for visitor and employee safety in a way that protects park resources and values. Support for new trail development on the SRRT may reduce the availability of park staff to maintain other areas. Additional work would be required to provide a firm and stable surface to meet outdoor accessibility guidelines.</p>
<p>Land Use</p>	<p>Olympic National Park was established in 1938, resulting in a change in land use within most of the park boundary. Some private lands have been acquired by the NPS within the park boundary. Some private lands remain within the park boundary. The existing SRRT was constructed on park lands, but resulted in a small amount of trail on the corner of one privately held parcel. A General Management Plan was developed for Olympic National Park that guides land use and expansion of the park boundary.</p>	<p>No changes in land use would occur under the No Action Alternative other than what is approved in the OLYM GMP.</p>	<p>Designation of wilderness may occur on the north shore of Lake Crescent, but outside of the SRRT project area. Other current land uses would continue.</p>	<p>Existing land uses would continue in accordance with the GMP, but the SRRT would be re-aligned to avoid the corner of private property.</p>
<p>Socioeconomics</p>	<p>The local economy includes numerous elements, including tourism, commodity production, provision of services, and retail operations. Government at the federal, state, and local levels also contribute to the local economy.</p>	<p>Under the No Action Alternative, the existing socioeconomic conditions would continue in relation to activities taken by the NPS. Tourism and the ongoing maintenance and operations of the park would continue to support socioeconomic values.</p>	<p>Improvements to park concession operations and the expansion of the visitor opportunities at Hurricane Ridge may result in benefits to local socioeconomic values. Implementation of the Elwha Dam removal project would also support the local and regional economy.</p>	<p>The existing socioeconomic values would be enhanced by the improved trail opportunities, including better connection to regional trail systems. There would be some short-term adverse effects due to closures and delays during trail construction. The estimated cost to implement the alternatives ranges between \$3.5 to \$4.6 million to construct, and between \$920,000 to \$1,600,000 to maintain over a 50 year period.</p>