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:

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- **Physical Environment**
    - Geologic Features and Soils
    - Hydrology and Water Quality
    - Air Quality
- **Biological Environment**
    - Vegetation &Wetlands
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    - Unique or Important Fish or Fish Habitat
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- **Cultural Environment**
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- **Experiential Environment**
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    - 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 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. 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 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 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 ≥ 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 *no effect*.
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 *no adverse effect*.
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 *adverse effect*.
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 *adverse effect*.

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 **s**tabilized 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.