

Chapter 4: Environmental Consequences

Introduction

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

The analysis presented here assumes that the alternatives would be implemented as described, including all mitigation measures identified in Appendix A of this EA. The following impact analyses and conclusions were informed by a review of existing literature and park studies, information provided by subject matter experts within the park and other agencies, consultation with the Department of Archaeology and Historic Preservation and interested local tribes, professional expertise, knowledge of park staff, and public input. This chapter is organized as follows:

- **Methodology for Impact Assessment**
- **Physical Environment**
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- **Experiential Environment**
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- **Relationship of Short-Term Uses and Long-Term Productivity**
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Methodology for Impact Assessment

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

Type: Impacts can be beneficial or adverse.

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

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

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

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

Cumulative impacts: The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR §1508.7).

Past, present, and reasonably foreseeable future actions, are listed in appendix C. 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)

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 will provide an accessible trail for hikers, bicyclists, stock users, wheelchairs, and strollers when complete.

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.

Table 4.1 TOTAL CONSTRUCTION RELATED IMPACTS TO GEOLOGICAL RESOURCES BY ALTERNATIVE				
	ALT 1	ALT 2	ALT 3	ALT 4
length of trail (miles)	3.7	5.7	6.4	6.1
volume of excavation/cut required (CY)	0	3515	25039	45539
volume of fill required (CY)	0	5024	13335	18694
volume of base material placed (CY)	0	1671	10109	3814
volume of asphalt placed (CY)	0	142	1649	1727
total paved surface area (acres)	0.0	0.5	5.0	5.9
total disturbed area (acres)	0.0	6.6	11.0	14.4

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 4.2: Geologic Features and Soils Impact and Intensity.

Impact and 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.

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 NPS Action Alternatives

Direct and Indirect Impacts of the Alternatives.

Under Alternatives 2, 3, and 4 a construction access ramp would be built from Camp David Junior Road (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.

Under Alternatives 2 and 3 the park would construct two paved, accessible parking spaces on 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, long-term to permanent, minor impacts associated with excavating, filling, and compacting soils in these locations.

Alternative 2 – Recreation Trail Emphasis

Direct and Indirect Impacts of the Alternative

Under Alternative 2 the park would construct 1.9 miles of new trail in the Sol Duc area of the park. The existing Spruce Railroad Trail (SRRT) would be widened and paved between Phase 1 of the ODT and the west (short) railroad tunnel. There would be limited improvement to the grade and surface of the remaining segments of the SRRT. The existing parking lot near the Lyre River would be expanded. 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 impacts associated with excavation, grading, placement of fill, and compaction of soils in the Lake Crescent area, and adverse, local, long-term to permanent, moderate impacts associated with the excavation, grading, placement of fill, and compaction of soils in the Sol Duc area.

Alternative 3 – NPS Preferred

Direct and Indirect Impacts of the Alternative

Under Alternative 3 the park would construct two miles of new trail in the Sol Duc area of the park. The existing Spruce Railroad Trail (SRRT) would be widened and paved between Phase 1 of the ODT and the current Lyre River parking lot. Both railroad tunnels would be cleared and developed for trail use. The existing parking lot near the Lyre River would be expanded and paved, as would the road between the Lyre River Bridge and the parking lot. The 0.2 miles of the Water Line Road within the park boundary would also be paved. The existing North Shore Picnic Area parking lot and new accessible parking area on CDJR would also be graded and paved. 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, moderate to major impacts associated with excavation, grading, placement of fill, and compaction of soils in both the Lake Crescent and Sol Duc areas.

Alternative 4 – County Proposal

Direct and Indirect Impacts of the Alternative

Under Alternative 4 Clallam County would construct 1.5 miles of new trail in the Sol Duc area of the park. The existing Spruce Railroad Trail (SRRT) would be widened and paved between Phase 1 of the ODT and the current Lyre River parking lot. A new trail alignment would be developed between the current Lyre River parking lot and Segment C of the SRRT. Additionally, new trail would be built between the current Lyre River parking lot and the park boundary east of the Lyre River on the Water Line Road. Both historic railroad tunnels would be cleared and developed for trail use. Best management practices would be implemented to avoid or minimize erosion and transport of sediment during construction.

Alternative 4 would result in adverse, local, long-term to permanent, major impacts associated with excavation, grading, placement of fill, and compaction of soils in both the Lake Crescent and Sol Duc areas. The area where the greatest new disturbance is proposed is along Segment D-ADA, which would require a large area of a steep hill slope to be cleared and graded to achieve an accessible grade.

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 to moderate 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 4.3: 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 NPS Action Alternatives

Direct and Indirect Impacts of the Alternatives.

Under Alternatives 2, 3, and 4 a construction access ramp would be built from Camp David Junior Road (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.

Under Alternatives 2 and 3 the park would construct two paved, accessible parking spaces on CDJR adjacent to the existing North Shore Picnic Area parking lot. The park would also construct a five 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. Best management practices would be implemented to avoid or minimize the transport of sediment during construction.

Constructing and paving the parking spaces and universally accessible trail between CDJR and Phase 1 of the ODT would result in adverse, site-specific, permanent, negligible impacts to surface hydrology and water quality.

Alternative 2 – Recreation Trail Emphasis

Direct and Indirect Impacts of the Alternative

Under Alternative 2 the park would construct 1.9 miles of new, unpaved trail in the Sol Duc area of the park. The existing Spruce Railroad Trail (SRRT) would be widened and paved between Phase 1 of the ODT and the west (short) railroad tunnel. There would be limited improvement to the grade and surface of the remaining segments of the SRRT. The existing parking lot near the Lyre River would be expanded, but not paved. 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 armoring would be placed in areas along the lake where it is necessary to support trail development and maintenance, primarily in Segment A where five failures occur over a total of 0.12 miles. A total of 1,450 cubic yards rip rap would be used to stabilize these bank failures.

Approximately 10% of this volume (145 cubic yards) would be placed below the ordinary high water level of Lake Crescent.

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. After construction, Alternative 2 would result in adverse, site-specific and local, permanent, minor impacts to surface hydrology and water quality associated with the increase in developed area and hardened surfaces, including the placement of bank armoring described above.

Alternative 3 – NPS Preferred

Direct and Indirect Impacts of the Alternative

Under Alternative 3 the park would construct two miles of new, paved trail in the Sol Duc area of the park. The existing Spruce Railroad Trail (SRRT) would be widened and paved between Phase 1 of the ODT and current Lyre River trailhead parking lot. The existing parking lot near the Lyre River would be expanded and paved. The existing road between the Lyre River Bridge and the parking lot would be paved, as would the 0.2 miles of Water Line Road within the park. The North Shore picnic area parking lot would also be paved. 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 armoring would be placed in areas along the lake where it is necessary to support trail development and maintenance. In addition to the five bank failures in Segment A described above, an additional nine bank failure areas in Segment B would 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.

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. After construction, Alternative 3 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 bank armoring described above.

Alternative 4 – County Proposal

Direct and Indirect Impacts of the Alternative

Under Alternative 4, Clallam County would construct 1.5 miles of new, paved trail in the Sol Duc area of the park. The existing Spruce Railroad Trail (SRRT) would be widened and paved between Phase 1 of the ODT and the existing parking lot near the Lyre River, including a new trail alignment between the historic railroad grade and the Lyre River parking lot. The Lyre River and North Shore picnic area parking lots would not be expanded or paved. New trail between the parking lot and the park boundary east of the Lyre River on Water Line road would be developed and paved. 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 armoring would be placed in areas along the lake where it is necessary to support trail development and maintenance. This includes placement of rip rap below the ordinary high water level of Lake Crescent as described for Alternative 3 above. 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. After construction, Alternative 4 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 bank armoring described above.

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 4.4: 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, and 4

Direct and Indirect Impacts of the Alternatives

All action alternatives would result in adverse, site-specific and local, short-term, negligible to minor impact 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 4.51: 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" in diameter (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 $\geq 11"$ dbh. No trees $\geq 24"$ 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 4.6 VEGETATION CLEARING & TREE REMOVAL BY ALTERNATIVE

	Alt 1	Alt 2	Alt 3	Alt 4
SRRT number of trees 11 - 23" dbh	0	60	112	394
SRRT number of trees 24 - 35" dbh	0	4	11	56
SRRT number of trees ≥ 36" dbh	0	0	0	1
Sol Duc: number of trees ≥ 11" dbh	0	54	135	192
TOTAL number of trees ≥ 11" dbh	0	118	258	630
total construction/cleared area (acres)	0	6.6	11.0	14.4
Total number of trees ≥ 11" dbh per acre	0	18	23	44

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 lot 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 – Recreation Trail Emphasis

Direct and Indirect Impacts of the Alternative

Under Alternative 2, 1.9 miles of new trail would be constructed in the Sol Duc area. The existing Spruce Railroad Trail would be widened between Phase 1 of the ODT and the west (short) railroad tunnel. The existing Lyre River parking lot would also be expanded. This would require clearing of vegetated lands and conversion to developed area within the park resulting in a total construction footprint of 6.6 acres. This clearing would include removal vegetation, including a maximum of 118 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, although 5 trees are 24" diameter at breast height (dbh), and the four largest trees are 26" dbh. These trees are mature second growth fir 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 2 would result in adverse, site-specific and local, long-term to permanent, minor to moderate impacts to vegetation.

Alternative 3 – NPS Preferred

Direct and Indirect Impacts of the Alternative

Under Alternative 3, two miles of new trail would be constructed in the Sol Duc area. The existing Spruce Railroad Trail would be widened between Phase 1 of the ODT and the existing Lyre River parking lot, which would be expanded and paved. This would require clearing of vegetated lands and conversion to developed area within the park resulting in a total construction footprint of 11 acres. This clearing would include removal of 258 trees \geq 11" dbh. Tree species removed would include cedar, fir, alder, maple and hemlock. None of the trees proposed for removal are old growth, although 17 trees are 24" dbh, 7 trees are 26" dbh, and the two largest trees are 30" dbh. These trees are mature second growth fir, hemlock, and cedar. 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 to major impacts to vegetation.

Alternative 4 – County Alternative

Direct and Indirect Impacts of the Alternative

Under Alternative 4, approximately 1.5 miles of new trail would be constructed in the Sol Duc area. The existing Spruce Railroad Trail would be widened between Phase 1 of the ODT and the existing Lyre River parking lot. New trail would also be developed between the current Lyre River parking lot and the park boundary east of the Lyre River on Water Line road. This would require clearing of vegetated lands and conversion to developed area within the park resulting in a total construction footprint of 14.4 acres. This clearing would include removal of 632 trees \geq 11" dbh, including trees greater than 36" dbh. Tree species removed would include cedar, fir, alder, maple, and hemlock. None of the trees proposed for removal are old growth, although 59 trees are 24" dbh or greater. The largest trees proposed for removal are a 40" dbh cedar, a 34" dbh fir, and seven trees that are 30" dbh. 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, particularly in the area upslope of the existing Lyre River parking lot where a new trail alignment with cleared areas up to 50' wide would be constructed. Increased sediment in areas containing water lobelia may occur as a result of construction upslope from the lobelia habitat, although development and implementation of a stormwater pollution prevention plan is expected to minimize this effect. Alternative 4 would result in adverse, site-specific and local, long-term to permanent, 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 4.7: 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 and 3

Direct and Indirect Impacts of the Alternatives

Under Alternatives 2 and 3 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 and the site assessed to determine if wetlands are present. Planned expansion of the parking lot would avoid filling any identified wetland areas. The area between the expanded parking lot and Lake Crescent would be restored to natural conditions.

A preliminary wetland assessment found no wetlands in the area proposed for new trail development in the Sol Duc area. Additional survey would occur prior to construction to confirm that no wetlands are present. If wetlands are found, the trail alignment would be modified to avoid adverse effect to wetlands.

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.

Alternative 4

Direct and Indirect Impacts of the Alternatives

Under Alternative 4 the existing Spruce Railroad Trail would be re-aligned above the current Lyre River parking lot to avoid wetland areas. New trail development in the Sol Duc area would occur only in areas that have been surveyed to determine if wetlands are present. If wetlands are found, the trail alignment would be modified to avoid adverse effect to wetlands. New adverse impacts to known wetlands would be avoided. Adverse impacts associated with the No Action Alternative would continue.

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 4.8: 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 expanded trail system. Work would be completed in stages, most likely over the course of multiple construction seasons or years as funding becomes available. Best management practices would be implemented to avoid or minimize disturbance to wildlife during construction and maintenance of the expanded trail. However, all action alternatives would result in adverse, site-specific to regional, short-term moderate to major impacts associated with construction related-disturbance and site-specific to regional, long-term to permanent, negligible to moderate impact associated with ongoing use and maintenance.

Alternative 2 – Recreation Trail Alternative

Direct and Indirect Impacts of the Alternative

In addition to impacts described above, Alternative 2 would result in conversion of habitat to developed area where new trail is developed in the Sol Duc area, and where widening of the existing Spruce Railroad Trail is proposed between Phase 1 of the ODT and the west (short) railroad tunnel. 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. This would result in adverse, site-specific and local, long-term to permanent minor to moderate impacts.

Alternative 3 – NPS Preferred

Direct and Indirect Impacts of the Alternative

In addition to impacts described above, Alternative 3 would result in conversion of habitat to developed area where new trail is developed in the Sol Duc area, where widening of the existing Spruce Railroad Trail is proposed between Phase 1 of the ODT and the existing Lyre River parking lot, and where paving is proposed from the Lyre River parking lot to the Lyre River Bridge and on the Water Line Road. 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. This would result in adverse, site-specific and local, long-term to permanent, moderate impacts.

Alternative 4 – County Proposal

Direct and Indirect Impacts of the Alternative

In addition to impacts described above, Alternative 4 would result in conversion of habitat to developed area where new trail is constructed in the Sol Duc area, and where widening of the existing Spruce Railroad Trail is proposed between Phase 1 of the ODT and the existing Lyre River parking lot, and where new trail is built between the Lyre River parking lot and the park boundary east of the Lyre River on the Water Line road. Removal of vegetation may occur during anytime of the year where suitable habitat for Threatened and Endangered species is not present. Trees and snags that would otherwise provide nesting, roosting, or shelter for wildlife would be removed within the construction area, including during summer months when many species are nesting or rearing young. This would result in adverse, site-specific and local, long-term to permanent minor to major 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 4.9 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.

Alternative 2 – Recreation Trail Emphasis

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 west (short) railroad tunnel. There would be limited improvement to the grade and surface of the remaining segments of the SRRT. The existing

parking lot near the Lyre River would be expanded, but not paved. 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 armoring would be placed in areas along the lake where it is necessary to support trail development and maintenance. This includes placement of bank armoring (1450 cubic yards of rip rap) at five locations in Segment A. Approximately 10% of this would be placed below the ordinary high water level Lake Crescent. An estimated 0.12 miles of shoreline would be affected.

After the parking lot at the Lyre River has been expanded the remaining area between the parking lot and the lake would be rehabilitated to natural conditions. During construction, Alternative 2 would result in adverse, site-specific and local, short-term, negligible to moderate impacts to fish habitat associated with water quality impacts during excavation and grading. After construction, Alternative 2 would result in adverse, site-specific and local, permanent, negligible to minor impacts to fish habitat associated with bank armoring and the increased sediment transport into Lake Crescent from developed areas.

Alternative 3 – NPS Preferred

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 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 armoring would be placed in areas along the lake where it is necessary to support trail development and maintenance. This includes placement of 1,450 cubic yards of rip rap at five locations in Segment A and 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 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.

During construction, Alternative 3 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, Alternative 3 would result in adverse, site-specific and local, permanent, negligible to minor impacts to fish habitat associated with bank armoring 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 – County Proposal

Direct and Indirect Impacts of the Alternative

Under Alternative 4, Clallam County would construct approximately 1.5 miles of new paved trail in the Sol Duc area of the park. The existing Spruce Railroad Trail (SRRT) would be widened and paved between Phase 1 of the ODT and the existing parking lot near the Lyre River, including a new trail alignment between the historic railroad grade and the Lyre River parking lot. The Lyre River and North Shore picnic area parking lots would not be expanded or paved. New trail between the parking lot and the park boundary east of the Lyre River on Water Line road would be developed and paved. 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 armoring would be placed in areas along the lake where it is necessary to support trail development and maintenance as described for Alternative 3. This includes placement of rip rap below the ordinary high water level Lake Crescent as described above.

During construction, Alternative 4 would result in adverse, site-specific and local, short-term, negligible to moderate impacts to fish habitat and water quality associated with excavation and grading. After construction, Alternative 4 would result in adverse, site-specific and local, permanent, negligible to moderate impacts to fish habitat associated with bank armoring and the increase in sediment transport into Lake Crescent from developed areas.

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 armoring. 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 4.10 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 associated with the presence of work crews during project implementation and ongoing use and maintenance of the expanded trail system. Best management practices would be implemented to avoid or minimize disturbance to wildlife during construction and maintenance of the expanded trail. However, all action alternatives would result in adverse, site-specific to regional, long-term to permanent, negligible to moderate impacts associated with ongoing use and maintenance of the expanded trail system.

Alternative 2 – Recreation Trail Emphasis

Direct and Indirect Impacts of the Alternative

In addition to impacts described above, Alternative 2 would result in conversion of forest to developed area where new trail is proposed in the Sol Duc area, and where widening of the existing Spruce Railroad Trail is proposed between Phase 1 of the ODT and the west (short) railroad tunnel. Removal of vegetation within suitable habitat would occur outside of the breeding season for northern spotted owl and marbled murrelet (September 16 – February 28). 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” 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.

Alternative 3 – NPS Preferred

Direct and Indirect Impacts of the Alternative

In addition to impacts described above, Alternative 3 would result in conversion of forest to developed area where new trail is developed in the Sol Duc area, and where widening of the existing Spruce Railroad Trail is proposed between Phase 1 of the ODT and the existing Lyre River parking lot. Removal of vegetation within suitable habitat would occur outside of the breeding season for northern spotted owl and marbled murrelet (September 16 – February 28). 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. 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” 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.

Alternative 4 – County Proposal

Direct and Indirect Impacts of the Alternative

In addition to impacts described above, Alternative 4 would result in conversion of forest to developed area where new trail is constructed in the Sol Duc area, and where widening of the existing Spruce Railroad Trail is proposed between Phase 1 of the ODT and end of the historic Spruce Railroad grade along Lake Crescent, and development of trail along a new alignment between Lake Crescent and the existing Lyre River parking lot, and where new trail is built between the Lyre River parking lot and the park boundary east of the Lyre River on the Water Line road. Removal of vegetation would occur outside of the early breeding season in areas containing suitable habitat for Threatened and Endangered species. 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, likely to adversely affect,” due to the proposed removal of vegetation and other construction during the late breeding season in suitable habitat.

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 and expansion, the cumulative effects of this action in combination with other ongoing actions would be 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 4.11 Impact Intensity		Intensity Description
Negligible		The effects on cultural resources would be at the lowest levels of detection, barely measurable without any perceptible consequences, either beneficial or adverse to cultural landscape resources, historic structures, archeological resources, or traditional cultural properties. For the purpose of Section 106 of the National Historic Preservation Act, the determination of effect would be <i>no effect</i> .
Minor		The effects on cultural resources would be perceptible or measurable, but would be slight and localized within a relatively small area. The action would not affect the character or diminish the features of National Register (NRHP) eligible or listed cultural landscape, historic structures, archeological sites, or traditional cultural properties, and it would not have a permanent effect on the integrity of any such resources. For the purposes of Section 106, the cultural resources' NRHP eligibility would not be threatened; the determination of effect would be <i>no adverse effect</i> .
Moderate		The effects would be perceptible and measurable. The action would change one or more character-defining features of a cultural resource, but would not diminish the integrity of the resource to the extent that its National Register eligibility would be compromised. For the purposes of Section 106 of the National Historic Preservation Act, the cultural resources' NRHP eligibility would be threatened; the determination of effect would be <i>adverse effect</i> .
Major		The effects on cultural resources would be substantial, discernible, measurable, and permanent. For National Register eligible or listed cultural landscapes, historic structures or archeological sites, the action would change one or more character-defining features, and diminish the integrity of the resource to the extent that it would no longer be eligible for listing in the National Register. For purposes of Section 106, NRHP eligibility would be lost; the determination of effect would be <i>adverse effect</i> .

Environmental Consequences to Cultural Resources

Alternative 1 – No Action

Direct and Indirect Impacts of the Alternative

Under Alternative 1 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. 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 stabilization of historic revetments, drainage systems, wooden culverts, and shoring of historic tunnels (benign neglect).

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
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
	Timber half-bridge/cribbing (Segments A & B), rock	Adverse Effect	Local, long-term to permanent, moderate

	wall (Segment B), wooden culverts		
	Railroad artifacts	No Effect	Local, long-term to permanent, negligible
Railroad tunnels	Tunnels, portals, timber tunnel support beams	Adverse Effect	Local, long-term to permanent, moderate
SRRT Segment D	Anderson Homestead, heritage trees, structural remains, artifacts, prehistoric artifacts (potential), historic archeological resources	No Effect	Local, long-term to permanent, negligible
SRRT Lyre River parking lot and access road	Crescent siding, Crescent logging company camp	No Effect	Local, long-term to permanent, negligible
Sol Duc Area – railroad grade	Railroad grade, alignment and earthwork (cut, fill, gradient, profile, curvature, tangents, ditches, culverts)	No Effect	Local, long-term to permanent, negligible
	Railroad artifacts	No Effect	Local, long-term to permanent, negligible
	Sol Duc Station siding	No Effect	Local, long-term to permanent, negligible

Alternative 2 – Recreation Trail Emphasis

Direct and Indirect Impacts of the Alternative

Under Alternative 2 the park would construct 0.5 miles of new trail in the Sol Duc area of the park from the Sol Duc exhibit area and parking lot to the historic Spruce Railroad Grade southwest of Highway 101 and 1.4 miles of new trail on the historic grade (segment 12) adjacent to Sol Duc Hot Springs road. The existing Spruce Railroad Trail (SRRT) would be widened and paved between Phase 1 of the ODT and the west (short) railroad tunnel. There would be limited improvement to the grade and surface of the remaining segments of the SRRT. The existing parking lot near the Lyre River would be expanded. Best management practices would be implemented to avoid or minimize erosion and transport of sediment during construction.

Alternative 2 would result in local and regional, long-term minor to major adverse impacts due to expanding and paving road base and passing areas and not stabilizing the revetments. Wooden culverts would not be cleared, which would result in local and regional, long-term minor to major adverse impacts to this contributing element of the railroad. Installation of trail drainage features, such as low water crossings, would result in site-specific impacts to the railroad grade.

Alternative 2 would result in local and regional, long-term minor to major beneficial impacts due to maintaining the historic Spruce Railroad trail alignment and tie ballast to improve drainage and stabilize embankments.

Alternative 2: Recreation Trail Emphasis			
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
SRRT Segment A	Railroad grade, alignment and earthwork (cut, fill, gradient, profile, curvature, tangents, ditches)	No Adverse Effect	Local, long-term to permanent, minor
	Timber half-bridge/cribbing (Segments A & B), rock wall (Segment B), wooden culverts	Adverse Effect	Local, long-term to permanent, major
	Railroad artifacts	No Adverse Effect	Local, long-term to permanent, minor
SRRT Segments B & C	Railroad grade, alignment and earthwork (cut, fill, profile, curvature, tangents, ditches)	No Adverse Effect	Local, long-term to permanent, minor
	Railroad grade (gradient)	Adverse effect (low-water crossings)	Local, long-term to permanent, major
	Timber half-bridge/cribbing (Segments A & B), rock wall (Segment B), wooden culverts	Adverse Effect	Local, long-term to permanent, major
	Railroad artifacts	No Adverse Effect	Local, long-term to permanent, minor
Railroad tunnels	Tunnels, portals, timber tunnel support beams	Adverse Effect	Local, long-term to permanent, moderate
SRRT Segment D	Anderson Homestead, heritage trees, structural remains, artifacts, prehistoric artifacts (potential), historic archeological resources	No Adverse Effect	Local, long-term to permanent, minor
SRRT Lyre River parking lot and access road	Crescent siding, Crescent logging company camp	No Adverse Effect	Local, long-term to permanent, minor
Sol Duc Area – railroad grade	Railroad grade, alignment and earthwork (cut, fill, gradient, profile, curvature, tangents, ditches, culverts)	No Adverse Effect	Local, long-term to permanent, minor
	Railroad artifacts	No Adverse Effect	Local, long-term to permanent, minor
	Sol Duc Station siding	No Adverse Effect	Local, long-term to permanent, minor

Alternative 3 – NPS Preferred

Direct and Indirect Impacts of the Alternative

Under Alternative 3 the park would construct two miles of new trail in the Sol Duc area of the park from the Sol Duc exhibit area and parking lot to the Historic Spruce Railroad Grade southwest of Highway 101 and 1.4 miles of new trail on the historic grade (segment 12) adjacent to Sol Duc Hot Springs road. The existing Spruce Railroad Trail (SRRT) would be widened and paved 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.

Alternative 3 would result in both beneficial and adverse impacts to cultural resources. This alternative 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.

Alternative 3 would result in beneficial regional, long-term minor to moderate impacts by maintaining the historic Spruce Railroad trail alignment and tie ballast and improving drainage to stabilize embankments. New base material would be placed on the historic railroad grade to rehabilitate the historic grade profile and ditches. Alternative 3 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 historic dry laid fieldstone revetment would be stabilized and if lateral realignment is not feasible, the slope will be stabilized with timber. Timber half-bridge will be rehabilitated and replaced in-kind. The base of the revetment would be rock to avoid placing timber supports below the lake level. Existing timbers would be preserved and stabilized and left in place where possible. Timber culverts would be cleaned and stabilized or restored in-kind. This Alternative would open and stabilize both historic tunnels. The following actions would also be implemented in consultation with the State Historic Preservation Officer (SHPO).

- *Formulate a plan to protect sites like the tunnels, Sol Duc Siding, 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)

Alternative 3: NPS Preferred Alternative			
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
SRRT Segments A & B	Railroad grade, alignment and earthwork (cut, fill, gradient, profile, curvature, tangents, ditches)	No Adverse Effect	Local, long-term to permanent, minor
	Timber half-bridge/cribbing (Segments A & B), rock wall (Segment B), wooden culverts	No Adverse Effect	Local, long-term to permanent, minor
	Railroad artifacts	No Adverse Effect	Local, long-term to permanent, minor
SRRT Segment C	Railroad grade, alignment and earthwork (cut, fill, profile, curvature, tangents, ditches)	No Adverse Effect	Local, long-term to permanent, minor
	Railroad grade (gradient)	Adverse effect (low-water crossings)	Local, long-term to permanent, moderate
	Timber half-bridge/cribbing (Segments A & B), rock wall (Segment B), wooden culverts	No Adverse Effect	Local, long-term to permanent, minor
	Railroad artifacts	No Adverse Effect	Local, long-term to permanent, minor
West Railroad Tunnel (short)	Tunnels, portals, timber tunnel support beams	Adverse Effect due to loss of historic timber support beams, loss of historic appearance due to absence of portal, use of rock bolts/shotcrete (may be mitigated?)	Local, long-term to permanent, major
McFee Railroad Tunnel (long)	Tunnels, portals, timber tunnel support beams	Adverse Effect due to loss of historic timber support beams, tunnel closed to public use)	Local, long-term to permanent, moderate
SRRT Segment D	Anderson Homestead, heritage trees, structural	No Adverse Effect	Local, long-term to permanent, minor

	remains, artifacts, prehistoric artifacts (potential), historic archeological resources		
SRRT Lyre River parking lot and access road	Crescent siding, Crescent logging company camp	No Adverse Effect	Local, long-term to permanent, minor
Sol Duc Area – railroad grade	Railroad grade, alignment and earthwork (cut, fill, gradient, profile, curvature, tangents, ditches, culverts)	No Adverse Effect	Local, long-term to permanent, minor
	Railroad artifacts	No Adverse Effect	Local, long-term to permanent, minor
	Sol Duc Station siding	No Adverse Effect	Local, long-term to permanent, minor

Alternative 4 – County Proposal

Direct and Indirect Impacts of the Alternative

Under Alternative 4, Clallam County would construct 1.5 miles of new trail in the Sol Duc area of the park including 1.4 miles of new trail on the historic grade (segment 12) adjacent to Sol Duc Hot Springs road and a short spur trail connecting with new trail planned on adjacent USFS lands. The existing Spruce Railroad Trail (SRRT) would be widened and paved between Phase 1 of the ODT and the existing parking lot near the Lyre River, including a new trail alignment between the historic railroad grade and the Lyre River parking lot. The Lyre River and North Shore picnic area parking lots would not be expanded or paved. New trail between the parking lot and the park boundary east of the Lyre River on Water Line road would be developed and paved.

Alternative 4 would result in local and regional, long-term minor to moderate adverse impacts by altering national register eligible segments of the historic 36-mile long Spruce Railroad trail alignment, and due to expanding and paving road base and passing areas, not stabilizing slope revetments, and not preserving locale of historic artifacts that contribute to the railroad's eligibility.

Alternative 4 would result in local, long-term minor to moderate beneficial impacts by opening up the two tunnels (subject to in-kind timber replacement) and clearing the historic wooden culverts (subject to shoring or replacing timbers in-kind).

Alternative 4: County Proposal			
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
SRRT Segments A, B, C	Railroad grade, alignment and earthwork (cut, fill, gradient, profile, curvature, tangents, ditches, culverts)	Adverse Effect (inconsistent ditch width)	Local, long-term to permanent, moderate

	tangents, ditches)		
	Timber half-bridge/cribbing (Segments A & B), rock wall (Segment B), wooden culverts, low water crossings	Adverse Effect	Local, long-term to permanent, major
	Railroad grade (gradient)	Adverse effect (low-water crossings)	Local, long-term to permanent, moderate
	Railroad artifacts	No Adverse Effect	Local, long-term to permanent, minor
Railroad Tunnels	Tunnels, portals, timber tunnel support beams	Adverse Effect due to loss of historic timber support beams, loss of historic appearance due to absence of portal, use of rock bolts/shotcrete (may be mitigated?)	Local, long-term to permanent, major
SRRT Segment D	Anderson Homestead, heritage trees, structural remains, artifacts, prehistoric artifacts (potential), historic archeological resources	No Adverse Effect	Local, long-term to permanent, minor
SRRT Lyre River parking lot and access road	Crescent siding, Crescent logging company camp	No Adverse Effect	Local, long-term to permanent, minor
Sol Duc Area – railroad grade	Railroad grade, alignment and earthwork (cut, fill, gradient, profile, curvature, tangents, ditches, culverts)	Adverse Effect (inconsistent ditch width)	Local, long-term to permanent, moderate
	Railroad artifacts	No Adverse Effect	Local, long-term to permanent, minor
	Sol Duc Station siding	No Adverse Effect	Local, long-term to permanent, minor

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 eligibility of the railroad for listing on the National Register of Historic Places (NRHP). Some segments, including those currently proposed for trail development with the Park, retain historic integrity and are eligible for listing 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 4.12: 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, 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 would not be improved to provide a more consistent experience for visitors traveling across the north Olympic Peninsula on the regional Olympic Discovery Trail (ODT) if it is completed in the future outside of the park. 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. 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.

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.

Alternative 2 – Recreation Trail Emphasis

Direct and Indirect Impacts of the Alternative

In addition to the effects described above, under Alternative 2 the NPS would construct or improve 4.9 miles of universally accessible trail. This would include Segment A of the existing

SRRT and 1.9 miles of new trail in the Sol Duc area of the park, resulting in a total of 11 miles of accessible trail when combined with the 6 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 and a second from the Sol Duc kiosk parking lot.

The existing trailhead parking lot near the Lyre River would be expanded to provide an additional 14 parking spaces. The parking lot would remain gravel. Adequate turnaround space for people in long vehicles or towing trailers would be developed.

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 permitted on the new trail proposed in the Sol Duc area. The bridge located at the Devil's Punchbowl would be repaired or replaced to restore use by people traveling with stock. Road bicyclists who are seeking an alternative to Highway 101 along Lake Crescent would continue to route their trip outside of Olympic National Park, 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 would not be improved to provide a more consistent experience for visitors traveling across the north Olympic Peninsula on the regional Olympic Discovery Trail (ODT) if it is completed in the future outside of the park. 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. The two partially collapsed historic railroad tunnels would remain closed.

This would result in ongoing, beneficial and adverse, local and regional, long-term to permanent, minor to major impacts.

Alternative 3 – NPS Preferred

Direct and Indirect Impacts of the Alternative

Under Alternative 3 the NPS would construct or improve 5.7 miles of universally accessible trail. This would include Segments A, B, and C of the existing SRRT and two miles of new trail in the Sol Duc area of the park, resulting in a total of 11.7 miles of accessible trail when combined with the 6 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 and a second from the Sol Duc kiosk parking lot.

The existing trailhead parking lot near the Lyre River would be expanded, paved, and striped to provide an additional 14 parking spaces. Adequate turnaround space for people in long vehicles or towing trailers would be developed.

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 permitted on 0.5 miles of the new trail proposed in the Sol Duc area, they would be permitted on the remaining 1.5 miles that would connect to trail outside of the park. 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.

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) if it is completed in the future outside of the park. 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, adjacent private lands, 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 – County Proposal

Direct and Indirect Impacts of the Alternative.

Under Alternative 4, Clallam County proposes to construct or improve 6.1 miles of universally accessible trail. This would include all of the existing SRRT, new trail east to the Lyre River Bridge, and 1.5 miles of new trail in the Sol Duc area of the park, resulting in a total of 12.1 miles of accessible trail when combined with the 6 miles constructed in 2009 as Phase 1 of the ODT. No universally accessible trail access points would be developed in the park.

The existing trailhead parking lot near the Lyre River would not be expanded. Adequate turnaround space for people in long vehicles or towing trailers would not be developed.

Hikers, bicyclists, and people traveling with stock or on horseback would continue to use the existing Spruce Railroad Trail and the new trail proposed in the Sol Duc area. 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. Others would continue to ride on the south shore of Lake Crescent along Highway 101.

The trail would be improved to provide a consistent experience for visitors traveling across the north Olympic Peninsula on the regional Olympic Discovery Trail (ODT) if it is completed in the future outside of the park. People accessing the SRRT from the Adventure Route near the Lyre River would continue to connect unpaved trails outside of the park to the newly developed 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.

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. Development of the Spruce Railroad grade, including the existing SRRT, 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 4.13: 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. Noise would also be generated by maintenance activities. This would include removing downed trees using chainsaws and clearing of paved sections using motorized equipment to maintain an 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.

Alternative 2 – Recreation Trail Emphasis

Direct and Indirect Impacts of the Alternative

Although the cause of noise-related impacts is common to all alternatives, the extent of impacts varies according to the proposed extent and degree of development. Under Alternative 2, trail construction or rehabilitation would occur on 5.7 miles of trail in both the Sol Duc and Lake Crescent areas over a total of 6.6 acres. Construction activities would result in noise generated by heavy equipment, motorized tools, and construction vehicles resulting in adverse, site-specific and local, short-term, negligible to moderate impacts. Construction related noise would only occur during trail development.

Alternative 3 – NPS Preferred

Direct and Indirect Impacts of the Alternative

Although the cause of noise-related impacts is common to all alternatives, the extent of impacts varies according to the proposed extent and degree of development. Under Alternative 3, trail construction or rehabilitation would occur on 6.4 miles of trail in both the Sol Duc and Lake Crescent areas over a total of 11 acres. 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. Construction activities would result in noise generated by heavy equipment, motorized tools, and construction vehicles. Construction related noise would only occur during trail development. This would result in adverse, site-specific and local, short-term, minor to major impacts.

Alternative 4 – County Proposal

Direct and Indirect Impacts of the Alternative

Although the cause of noise-related impacts is common to all alternatives, the extent of impacts varies according to the proposed extent and degree of development. Under Alternative 4, trail construction or rehabilitation would occur on 6.1 miles of trail in both the Sol Duc and Lake Crescent areas over a total of 14.4 acres. 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. Construction activities would result in noise generated by heavy equipment, motorized tools, and construction vehicles. Construction related noise would only occur during trail development. This would result in adverse, site-specific and local, short-term, minor to major 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 4.14: 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 and Sol Duc areas would remain unchanged. There would be no additional clearing of forested areas 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 and Sol Duc areas would be affected by trail construction from the end of CDJR to the west (short) railroad tunnel. Clearing of vegetation in this area would range between 12 to 20 feet in width. This would include the placement of several areas of visible bank stabilization along Segment A of the SRRT. There would also be visible disturbance in the Sol Duc area where new trail is proposed under all alternatives. This would result in adverse, site-specific and local, short-term, minor to moderate impacts.

Alternative 2 – Recreation Trail Emphasis

Direct and Indirect Impacts of the Alternative

In addition to the effects described above, under Alternative 2, Segments B, C, and D of the existing SRRT would remain relatively unchanged, avoiding most visual disturbance in this area. Clearing would be minimized to a corridor not exceeding 10 feet in width. There would be some new disturbance at the Lyre River parking lot when the vacant building is removed; the parking lot would be expanded into the old building footprint, and native vegetation would be restored between the parking lot and lakeshore. This would result in adverse, site-specific and local, short-term to permanent, negligible to minor impacts.

Alternative 3 – NPS Preferred

Direct and Indirect Impacts of the Alternative

Under Alternative 3, Segments B, C, and D of the existing SRRT would be widened, resulting in some visual disturbance in this area. Visible bank stabilization would also be installed at multiple locations in Segment B of the SRRT. Clearing would be minimized to a corridor not exceeding 14 feet in width with minimal areas widened to allow for construction access, staging and turnaround, particularly near the railroad tunnels.

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 4 – County Proposal

Direct and Indirect Impacts of the Alternative

Under Alternative 4, Segments B and C of the existing SRRT would be widened, resulting in visual disturbance in this area. Visible bank stabilization would also be installed at multiple locations in Segment B of the SRRT. Clearing during construction would vary in width, but would typically result in a corridor that is 17 to 20 feet wide with additional areas widened to allow for construction access, staging, and turnaround, particularly near the railroad tunnels.

A new trail alignment would be developed in Segment D-ADA above and to the east of the existing Lyre River parking lot. To construct an accessible grade in the location would require

the clearing of vegetation in areas up to 50 feet wide to allow for excavation and grading. This would be highly noticeable to people who own land downslope and adjacent to the project area. This cleared width may also be visible from Lake Crescent and Highway 101. New trail is also proposed above the current road between the Lyre River Bridge and the existing parking lot.

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 major 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), the Sol Duc Road, 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 is considered, and also the Sol Duc kiosk parking area, interpretive exhibits and vault toilet.

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 4.15: 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.

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).

Alternative 2 – Recreation Trail Emphasis

Direct and Indirect Impacts of the Alternative

Under Alternative 2 the existing trail system would be improved and expanded. This would include the development of 1.9 miles of new gravel trail in the Sol Duc area, and the widening and paving of Segment A of the existing SRRT. The existing parking lot at the Lyre River would be expanded, and a new access trail would be developed from CDJR near the North Shore Picnic Area. Trail access would also be provided from the existing Sol Duc kiosk parking area.

Increased development and use would require additional maintenance, visitor education, ranger presence, resource monitoring and management, and administrative oversight. Use of construction equipment on the Sol Duc Road, CDJR, East Beach, and Joyce-Piedmont Road would result in additional wear and tear that may require limited repairs or rehabilitation. This would result in adverse, local and regional, long-term to permanent, minor impacts.

Alternative 3 – NPS Preferred

Direct and Indirect Impacts of the Alternative

Under Alternative 3 the existing trail system would be improved and expanded. This would include the development of two miles of new asphalt paved trail in the Sol Duc area, the widening and paving of the existing SRRT, Lyre River and North Shore Picnic Area parking lots, paving 0.2 miles of Water Line Road in the park, and paving 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. Trail access would also be provided from the existing Sol Duc kiosk parking area. Both historic railroad tunnels would be opened and developed for trail use.

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 and determined suitable for use by wheelchairs or road bikes would require more frequent maintenance to ensure the trail surface is clear of obstacles. Use of construction and hauling equipment on the Sol Duc Road, CDJR, East Beach, and 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 4 – County Proposal

Direct and Indirect Impacts of the Alternative

Under Alternative 4 the existing trail system would be improved and expanded. This would include the development of 1.5 miles of new asphalt paved trail in the Sol Duc area, and the widening and paving of the existing SRRT, paving the 0.2 miles of Water Line Road in the park and developing and paving new trail between the Lyre River Bridge and the Lyre River parking lot. Both historic railroad tunnels would be opened and developed for trail use.

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 paved and determined suitable for use by wheelchairs or road bikes would require more frequent maintenance to ensure the trail surface is clear of obstacles. Use of construction and hauling equipment on the Sol Duc Road, CDJR, East Beach, and 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.

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 paved and determined suitable for use by wheelchairs or road bikes 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 4.16: 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 related impacts that are adverse, site-specific and local, short and long-term, and minor to major in intensity.

Alternative 2 – Recreation Trail Emphasis

Direct and Indirect Impacts of the Alternative

Under Alternative 2 the existing trail system would be improved and expanded. This would include the development of 1.9 miles of new gravel trail in the Sol Duc area, and the widening and paving of Segment A of the existing SRRT. The existing parking lot at the Lyre River would be expanded, and a new access trail would be developed from CDJR near the North Shore Picnic Area. Trail access would also be provided from the existing Sol Duc kiosk parking area.

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 impacts.

Alternative 3 – NPS Preferred

Direct and Indirect Impacts of the Alternative

Under Alternative 3 the existing trail system would be improved and expanded. This would include the development of two miles of new asphalt paved trail in the Sol Duc area, and the widening and paving of the existing SRRT, the Lyre River, and North Shore Picnic Area parking lots, paving the 0.2 miles of Water Line Road in the park and paving 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. Trail access would also be provided from the existing Sol Duc kiosk parking 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.

Alternative 4 – County Proposal

Direct and Indirect Impacts of the Alternative

Under Alternative 4 the existing trail system would be improved and expanded. This would include the development of 1.5 miles of new asphalt paved trail in the Sol Duc area, and the widening and paving of the existing SRRT, paving the 0.2 miles of Water Line Road in the park and developing and paving new trail between the Lyre River Bridge and the Lyre River parking lot. 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.

Development of an accessible trail grade in Segment D-ADA above the Lyre River parking lot would require clearing, excavation and development of a new section of trail on both NPS and privately owned lands. Use of private lands is proposed by Clallam County under this alternative. The NPS is not proposing to acquire right of way or ownership of privately owned lands to

support the development of Segment D-ADA as proposed by Clallam County. The trail alignment would also bring the main trail corridor to a lower elevation that is adjacent to other privately owned lands near the existing Lyre River parking lot. This would result in adverse, site-specific and local, long-term to permanent, minor to moderate 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 4.12: 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 and Sol Duc areas would be unaffected. Commercial use of the SRRT would be unaffected. Use of the SRRT by Olympic Park Institute would be unaffected. The area would continue to support 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 or Sol Duc areas 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.

Alternative 2 – Recreation Trail Emphasis

Direct and Indirect Impacts of the Alternative

Under Alternative 2 the existing trail system would be improved and expanded. This would include the development of 1.9 miles of new gravel trail in the Sol Duc area and the widening and paving of Segment A of the existing SRRT. The existing parking lot at the Lyre River would be expanded, and a new access trail would be developed from CDJR near the North Shore Picnic Area. Trail access would also be provided from the existing Sol Duc kiosk parking area.

The estimated cost to construct Alternative 2 as proposed is \$632,000. 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, negligible to minor impacts.

Alternative 3 – NPS Preferred

Direct and Indirect Impacts of the Alternative

Under Alternative 3 the existing trail system would be improved and expanded. This would include the development of two miles of new asphalt paved trail in the Sol Duc area and the widening and paving of the existing SRRT, the Lyre River and North Shore Picnic Area parking lots, paving the 0.2 miles of Water Line Road in the park and paving 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. Trail access would also be provided from the existing Sol Duc kiosk parking area. Both historic railroad tunnels would be opened and developed for trail use.

The estimated cost to construct Alternative 3 as proposed is \$4.5 million dollars. Funding is not currently available, but would be sought from NPS and other potential funding sources. If selected, it is likely that the project would be constructed in multiple phases as funding is acquired. 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, long-term construction related, minor to moderate impacts. Increased use and visitation would result in beneficial, local to regional, long-term to permanent, negligible to moderate impacts.

Alternative 4 – County Proposal

Direct and Indirect Impacts of the Alternative

Under Alternative 4 the existing trail system would be improved and expanded. This would include the development of 1.5 miles of new asphalt paved trail in the Sol Duc area and the widening and paving of the existing SRRT, paving the 0.2 miles of Water Line Road in the park and developing and paving new trail between the Lyre River Bridge and the Lyre River parking lot. Both historic railroad tunnels would be opened and developed for trail use.

The estimated cost to construct Alternative 4 as proposed is \$4.1 million dollars. Limited funding may be available, but additional funds would be sought from NPS and other potential funding sources. If selected, it is likely that the project would be constructed in multiple phases as funding is acquired. 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, long-term construction related, minor to moderate 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.