Olympic

National Park Service
U.S. Department of the Interior

Olympic National Park

Olympic Hot Springs (Elwha) Road Access Environmental Assessment

October 2019

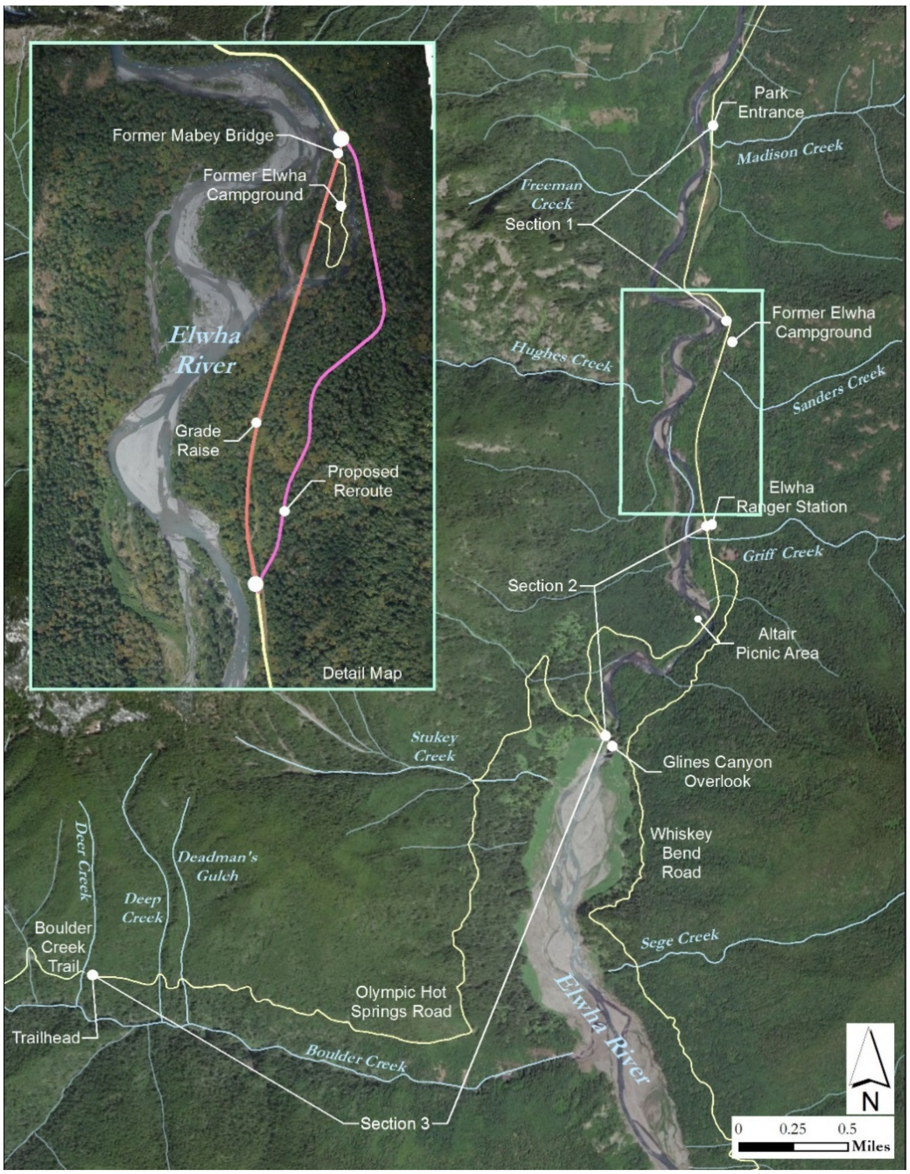

Figure 1: Project Area Location Map

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Chapter 1: Purpose of and Need for Action

A. Purpose

The purpose of the project is to rehabilitate the 8.2 mile Olympic Hot Springs (Elwha Valley) Road within Olympic National Park and to restore public and administrative road access to visitor and administrative use areas that are currently inaccessible due to washouts on the road. The washouts have resulted from the return of the Elwha River to its natural channel migration following dam removal. The rehabilitated roadway would provide year-round, vehicular access to the Elwha Ranger Station and Glines Canyon Spillway Overlook, and seasonal access to the Whiskey Bend Road and upper Olympic Hot Springs Road.

Public and administrative road access would restore travel to several popular trailheads, the Altair picnic area, a boat launch, Glines Canyon Spillway Overlook, and private lands (Figure 1: Project Area Location Map). The road would be used to maintain trails and other facilities, operate the Elwha Ranger Station, and access the pack stock operations area, seasonal housing, park maintenance area, and Elwha Ranger Station Historic District. Park and cooperating staff also need access to continue work associated with monitoring and furthering the restoration of the Elwha River. The park's 2008 General Management Plan (GMP) and the 2005 Elwha River Ecosystem Restoration Implementation Supplemental Environmental Impact Statement (SEIS) call for continued road access to this area.

Creating a safe, sustainable, more easily maintained roadway with improved public safety, while minimizing wildlife habitat impacts, is key to the success of this proposal. The proposal would include raising and/or relocating approximately one mile of roadway between the Elwha Boneyard (maintenance staging area) and the Elwha Ranger Station, where severe flooding and flood damage have damaged the existing road. This damage cut off access to important visitor destinations such as the Glines Canyon Spillway Overlook and popular trailheads.

In the rehabilitation sections of road between the entrance and the washouts and between the Ranger Station and the Boulder Creek (Olympic Hot Springs) Trailhead, improvements would maximize environmental sustainability while reducing impacts to park resources, including the Elwha River floodplain and associated rare, threatened, and endangered species habitat. The undamaged sections of roadway would be returned to functional or structural adequacy through resurfacing, subgrade stabilization, retaining wall repair, improving culverts, and other necessary work. These repairs would also reduce the need for unscheduled maintenance.

North of the Elwha Ranger Station, the project would provide continued long-term access while minimizing effects on the floodplain. The overall intent is to cost-effectively restore the roadway to good condition, by avoiding the damaging effects of the Elwha River's channel migration. Under the alternatives, portions of the roadway that remained within the floodplain would continue to be subject to future flood damage; however, flood damage would be less frequent and/or less likely to result in long-term closures.

B. Need

Sections Subject to Flood Damage: The first three miles of the roadway are adjacent to the Elwha River, and the first two miles are routinely subjected to flooding during high flows. Although the Record of Decision (ROD) for the Elwha restoration environmental impact statement (EIS) called for raising this section by 1-1.5 feet, this did not occur as part of the dam removal project and would not have prevented flood damage if it had. This portion of roadway is typically two lanes and 20-22 feet wide. Currently, near the east channel of the Elwha River (the historical Sanders Creek) the road briefly narrows to a few hundred feet of a single lane (14-feet wide). Although the road is mostly paved, flood damage has removed some pavement.

Because of the 2014 removal of Glines Canyon Dam, the river is expected to continue to migrate within the river valley (channel migration zone) for the foreseeable future. Although downstream movement of sediment formerly trapped behind the dam has stabilized, the river is continuing to adapt to its natural sediment regime. The river is also still recruiting and transporting large wood, resulting in sudden channel movements as log jams form.

With the return of the natural river processes following dam removal, the Elwha River became more dynamic, resulting in the river occupying a former channel that matches the road alignment near the Elwha Campground. This resulted in extensive damage to a portion of the road between the boneyard and the ranger station during storm events since the removal of Glines Canyon Dam (2014).

In 2015, two temporary bridges were installed over the newly occupied east channel, first a twenty-foot I-beam bridge and later a temporary modular Mabey Bridge. Flooding also resulted in catastrophic damage to the Elwha and Altair campgrounds, which were subsequently closed. Flooding in 2017 required the installation of two more temporary bridges over new washouts south of the Mabey Bridge. The severity and frequency of flood damage to the road made it necessary to restrict access to only administrative use in the summer 2018, preventing public road access to the Glines Canyon Spillway Overlook and other public use areas in the Elwha Valley on the Olympic Hot Springs and Whiskey Bend roads.

Although the roadway was temporarily passable for administrative use with the installation of three one-lane bridges, the bridges were removed in autumn 2018 to prevent their loss due to high flood flows during the following winter.

Within the first three miles from the entrance, there are several locations where the road is showing signs of distress and aging. These signs include alligator cracking, separation/loss of the most recent pavement preservation treatment, and isolated areas where the road has sunk and was repaired. During large flow events, minor flooding overtops the segment of road that runs through Sweets Field just south of Madison Falls. Future flooding during extreme flow events may allow the Elwha River to move across its floodplain and erode a new channel in this area, across the road and through Sweets Field. The potential for this channel migration is lower than for washouts near Sanders Creek because this area is farther from the Elwha River and has a flatter slope.

On the east side of the road south of the Elwha Ranger Station, there are several hundred linear feet of wetland. Some appear to have been created by the construction of the roadway, while others are associated with a wetland complex that extends to the east. Several poorly functioning culverts may be partly responsible for some of the wetlands. The roadway in this segment is in poor condition and shows signs of fatigue and subsurface failure. Surrounding ditches have standing water that appears to be infiltrating the pavement structure.

Upper Olympic Hot Springs Road: On this section of the road, the pavement surface is deteriorated and has reached the practical end of its service life.

This section (the six miles from Soldiers (Altair) Bridge to the Boulder Creek [Olympic Hot Springs] Trailhead), ascends 1,800 feet from the canyon floor to the trailhead. This upper segment is narrow (approximately 16-18 feet) with benched road construction characterized by steep cuts and fills. It includes numerous areas of road settlement and shoulder failures. Most of the road is asphalt, but there are multiple segments from 50 to several hundred feet in length where the asphalt has been removed and the road is maintained with an aggregate surface. Numerous sections of the roadway have subsurface stability issues, where the road surface is lower than adjacent areas. In several locations, the road is failing where log crib walls have exceeded their design life and are no longer functioning effectively.

Field reconnaissance yielded 45 sites displaying instability within the upper five miles of roadway. The Federal Highway Administration (FHWA) Western Federal Lands Division (WFLD) categorized each site for hazard severity/risk (FHWA 2015). A few sites are associated with active landslides which, if repaired, would require large-scale retaining structures to reduce chronic movement. Risks from these slides would likely occur during the off-season when the road is closed by snow accumulation. Therefore, proposed repairs would stabilize but not reconstruct these areas. The other areas of instability are generally related to settlement of fill beneath the downhill lane.

C. Background

The Olympic Hot Springs Road within Olympic National Park is 8.2 miles long and appeared on maps between 1892 and 1913. By 1919 there was a road as far as the McDonald Canyon Bridge, but beyond that on the east side of the valley, it was still a trail. In 1924, the Sixth Army Engineers built a bridge near Altair to access the Glines Canyon Dam site. By 1927, the road was improved as part of the dam construction and was extended to Boulder Hot Springs around 1930 (R. Hoffman pers. comm. 5-10-19). It is the only route to access the Whiskey Bend Road and associated trailheads, the Elwha Ranger Station Historic District, Elwha Maintenance Facility, park stock facilities, Glines Canyon Spillway Overlook, and Boulder Creek (Olympic Hot Springs) Trailhead. The road also provides access to 15 private parcels of land.

The road was reconstructed most recently c. 1982. Since that time, roadway maintenance has included replacement of at least one large culvert (Griff Creek in 2011) as well as a series of emergency repairs. Just prior to dam removal, a repair/bank stabilization project at “Fisherman’s Corner” included reconstruction of the road base. The portion of the road above Glines Canyon Spillway Overlook was closed between 2010 and 2015, during dam removal.

The section of Olympic Hot Springs Road below the former dam received heavy seasonal visitor use (highs of about 900 vehicles per day have been measured). Use has been primarily associated with casual hikers, bicyclists, and people observing the reservoir below the steep-walled gorge that held Glines Canyon Dam. This high use continued during dam removal and subsequent restoration of Elwha River flows. The upper section of the roadway is typically seasonal (it opens once snow melt occurs). Because most visitors turn around at the Glines Canyon Spillway Overlook, this part of the road provides lower volume access to trailheads and viewpoints. Hazards include road slumping and landslides that primarily occur when the road is closed to recreational use in winter, minimizing potential hazards to visitors.

In 2018, in preparation for what could be an extended closure of the Olympic Hot Springs Road, during the planning for this Environmental Assessment (EA), the park's maintenance crews performed a range of rehabilitation actions and secured administrative facilities, including the Elwha Ranger Station Historic District and roadways. This work was to minimize the need for motor vehicle-assisted work in the area in the interim period between removal of the temporary bridges and the decision-making associated with this EA.

D. Relationship to Elwha Restoration EIS/ROD

This EA is tiered to the Elwha Restoration EIS/ROD. Removal of the two Elwha River dams was intended to fulfill the requirements of the Elwha River Ecosystem Restoration Act (P.L. 102-495), including full recovery of the river's native anadromous fish populations.

According to the Elwha River Ecosystem Restoration DEIS,

> ". . . the Elwha River ecosystem would all benefit from the removal of the dams, including river morphology, nutrient transport, terrestrial wildlife, the marine ecology at the mouth of the river, vegetation, and threatened or endangered biota. Because animals need a year-round food source, the reintroduction of 10 runs of salmon and trout throughout the river's length would benefit wildlife in the area. Draining and revegetating the reservoir lands with native plants would provide additional habitat for wildlife. Threatened or endangered animals such as Stellar [sic] sea lions and bald eagles would benefit directly from an increase in available prey, and others from the creation of additional habitat. The river itself would return to its dynamic, free-flowing state, able to transport sand, gravel and nutrients all the way to the ocean. Water temperature, which currently runs 2° to 4° C. higher in the middle and lower river than before the dams were built, would drop to normal levels" (NPS 1994: ii)

The Elwha restoration ROD included a U.S. Army Corps of Engineers (ACOE) recommended mitigation measure of raising about one mile of low-elevation section of the road in the park and 1/3 – 2/3 mile of road outside the park by 1-2.5 feet. It also recommended that riprap be installed in 'select sections of road.' The EIS cited a 2003 Army Corps of Engineers report that recommended monitoring to assess when or if a road segment needs to be raised[1]" (NPS 2005:10). Bridges would include added debris deflectors for the in-water piers (NPS 2005:215).

Regarding the Altair and Elwha campgrounds, the EIS stated that the park would "Take no active flood protection measures because visitor use is seasonal and outside flood periods (campground closed from late summer/early fall to late spring/early summer); flood warnings are provided and the Elwha subdistrict is closed during floods; and the campground has minimal development[2]." Under a table labelled "Structural Mitigation for Flooding Impacts," measures stated "close campground during high flows or relocate campground if suitable areas outside the floodplain area available" for both the Altair and Elwha campgrounds (NPS 2005: 215).

[1] These recommendations were in Table 1: Mitigation for Structures Subject to Flooding.
[2] Altair campground language. Elwha language was similar.

Proposed actions for the Elwha Ranger Station (including structures, septic system, roads, and utilities) in the ROD included "Monitor/evaluate bank erosion threat and take corrective action (e.g. bank stabilization, engineered logjams) as needed[3]." (NPS 2005:10).

E. Issues and Impact Topics from NPS, Tribal, and Public Scoping

Issues and impact topics are the resources of concern that may be affected by the range of alternatives considered in this EA. Impact topics are used to analyze changes from the current conditions within the project area in *Chapter 4: Environmental Consequences*.

1. Issues and Impact Topics Considered

Impact topics were retained if they are directly related to the proposal; if analysis of environmental impacts is important to make a choice between the alternatives; if the environmental impacts were raised as a concern by the public and/or other agencies; or if there are potentially significant impacts associated with the issue.

Considered topics include: geologic hazards, soils, hydrology and floodplains, water quality, wetlands, vegetation, fish and wildlife, including special status wildlife and essential fish habitat, cultural resources (including archeological resources, historic structures, and cultural landscapes), and visitor experience.

2. Issues and Impact Topics Considered but Dismissed

Issues and impact topics are dismissed from further evaluation if: they do not exist in the analysis area, or; they would not be affected by the proposal, or the likelihood of impacts are not reasonably expected; or through the application of mitigation measures, there would be no measurable effects from the proposal.

Considered but dismissed topics include: air quality, water quantity, wilderness, socioeconomics, wild and scenic rivers, Indian trust resources, and environmental justice.

F. Decision to be Made

This EA evaluates impacts of the proposed project on park resources. It will guide the Regional Director, National Park Service (NPS), Interior Regions 8, 9, 10, 12, to make a decision, based on a recommendation by the Superintendent of Olympic National Park, about whether and how to rehabilitate the Olympic Hot Springs Road. The Regional Director's decision will be documented in a Finding of No Significant Impact (FONSI) for this EA. If the EA reveals significant impacts on park resources from the project, an Environmental Impact Statement and Record of Decision would be prepared.

G. Summary of Public and Tribal Civic Engagement

During a public and tribal civic engagement comment process between December 3, 2018 and March 13, 2019, including two extensions, 110 comment letters were received via hard copy form submitted at the December 13, 2018 civic engagement public meeting, Planning, Environment, and Public Comment (PEPC) website, or via hand or USPS delivery to Olympic

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[3] These recommendations were in Table 1: Mitigation for Structures Subject to Flooding.

National Park headquarters in Port Angeles, Washington. All of the comments came from respondents within the state. These comment letters were analyzed and divided into 29 categories, from which 68 concern statements were identified. Some comments called for modifications to the preliminary alternatives, while others identified impacts that would occur if the preliminary alternatives were implemented. Most (78%) of the respondents identified a preliminary alternative preference, with that preference falling heavily toward opening the road and/or rerouting the road. Only a small number (7) of respondents preferred the grade raise.

Numerous comments suggested broadening the scope of the EA; however, many of these additional actions would be dependent on answering the access question first – that is, determining whether to reconstruct or reroute the roadway. Therefore, this EA focuses only on whether or not road access would continue to be provided.

Within the scope of the comment analysis, were numerous comments calling for a reduction in proposed reroute width, other modifications to the grade raise, and/or to consider removing the road. The NPS and FHWA planning team has worked diligently to consider the whole range of public comments and to modify the alternatives to incorporate suggested changes. FHWA engineers have done their best to balance public safety, resource impacts, costs, and long-term maintenance needs in crafting the grade raise and the reroute alternatives.

Several stakeholder meetings, including a public meeting, walk-through of the project area with non-governmental organizations as well as with regulatory agencies, government-to-government consultation with the Lower Elwha Klallam Tribe (LEKT), and an Elwha inholders meeting were held to further identify concerns (see *Chapter 5: Consultation and Coordination*).

H. Federal, State, Local Permits and Consultation Requirements

The proposed action to realign and rehabilitate the roadway would require the following agency consultation and permits:

- Army Corps of Engineers 404 Permit
- Environmental Protection Agency (EPA) Water Quality 401 Permit
- Non-Point Discharge Elimination System Permit (NPDES)
- Formal Consultation with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) regarding effects on listed species.

Chapter 2: Alternatives, Including the Proposed Action

There are three alternatives. The no action alternative describes existing conditions and the actions the NPS would take if road access were not restored. 2)

A. Description of the Alternatives

1. Alternative 1: No Action (Continue Current Management Direction)

Management of Roadway: Existing management of the Olympic Hot Springs Road would continue. Public access beyond the gate at Madison Falls would be unavailable, due to the lack of parking and turnaround locations past the gate. (Other areas suitable for parking are within the Elwha River channel migration zone.) The section of roadway between the entrance and the Elwha Boneyard would continue to be maintained to accommodate administrative use. The section of road between the boneyard and the Mabey Bridge abutments would not be maintained. No vehicular traffic past the boneyard turnoff would be possible. Administrative vehicle access would continue to be available to the Elwha Boneyard beyond Sweets Field.

In the short-term, the NPS would remove a portion of the road where it is adversely affecting the ability of the Elwha River to migrate within its lower floodplain. The NPS would also manage the area to allow for non-motorized public access, which would continue to be limited to the non-motorized hiking/equestrian trail that bypasses the washed out roadway. The trail would provide access to the upper Elwha Valley for hikers, bicyclists walking their bikes, and equestrians. Over time, the trail would be maintained as needed to accommodate these user groups but would not be substantially modified to become a formal multiuse trail.

In the long-term the NPS would develop a plan to address withdrawal from the upper Olympic Hot Springs and Whiskey Bend roads and to remove other non-historic facilities from the area. Historic facilities would also be addressed in this future plan.

Upper Roadway (above Glines Canyon Overlook): Areas of road settlement and shoulder failures along the upper road would not be repaired. Stability issues beneath the variable aggregate and paved sections would continue. Failing log crib walls would further deteriorate.

Lower Roadway (below Glines Canyon Spillway Overlook): On the lower road, increased severity and frequency of flooding would likely continue. The road and ditches would not be maintained and failures would be minimally repaired to maintain access. The removal of the Glines Canyon Dam resulted in the Elwha River creating new channels, some of which continue to affect the roadway. For instance, the Elwha River is currently flowing along the east bank obscuring one of its tributary channels (Sanders Creek).

Whiskey Bend Road: Depending on the plans for withdrawal from the area, lack of maintenance on this road would also cause the road to begin to deteriorate.

Park Facilities: The vault toilet at the Madison Falls parking area would continue to be available. The vault toilets at the Glines Canyon Spillway Overlook, ranger station and the Boulder Creek

(Olympic Hot Springs) and Whiskey Bend trailheads would continue to be locked and unavailable. Other facilities, such as the ranger station, would remain closed.

Public Access: The park would maintain trail access from the entrance, through the boneyard to Olympic Hot Springs Road beyond the washouts. As described above, the bypass trail (about one mile) would continue to be open to foot and equestrian use and bicycles could be walked or hand carried. From the entrance it is 8.2 miles to the Boulder Creek Trailhead via the road. The parking area at the end of Whiskey Bend Road is 4.5 miles from its intersection with the Olympic Hot Springs Road, or 6.5 miles from the entrance.

Road and trail closures are likely during and after floods. Depending on their extent, closures could last for days, weeks, or months. Although the West Elwha Trail provides access to Altair Picnic Area (3.2 miles), the trailhead has very little parking and accesses the park through private land via an easement. Based on current conditions, there is neither space nor private landowner interest in expanding public parking.

Private Property Access: Approximately 0.25 miles north of the ranger station is a gate providing access to 15 parcels with approximately 11 different owners. The NPS is legally required to provide access to private property owners although access does not have to be motorized. Under alternative 1 property owners could use the existing road/bypass trail to reach their lands.

Elements Common to the Action Alternatives (ECAA)

The following actions are common to both action alternatives (2 and 3):

Madison Falls Emergency Bank Stabilization: Previous emergency work implemented at the park entrance is included. Winter storms eroded 200 feet of the Elwha River riverbank adjacent to the road. In an emergency repair, the park placed approximately 700 cubic yards of riprap along the east bank of the Elwha River along the eroded riverbank below the ordinary high water mark (OHWM) close to the park entrance sign. Winter storms caused the loss of several trees in late November 2018. The riverbank at this location was 2-10 feet (horizontally) from the edge of the road. The project required temporary road closure, including approximately 200 feet of the county road outside the park entrance. It also required monitoring by fisheries and cultural resources staff, and emergency consultation with the USFWS, NMFS, ACOE, State Historic Preservation Officer (SHPO) and the LEKT prior to taking action.

Between the park entrance and the northernmost washout, additional bank stabilization repairs would also occur where the Elwha River has made incursions into the bank close to the road. This area is near the Madison Falls parking area. Repairs would largely consist of placing additional woody debris and rock to protect and stabilize the bank.

Parking Area and Infrastructure Improvements

The following actions are included in the road rehabilitation:

Madison Falls Parking Area: This area would be modified by formalizing parking stalls and improving delineation of the parking lot within the existing disturbed areas to improve parking, including some additional paving. Parking at Madison Falls may also be expanded later. Minor upgrades planned for the Madison Falls parking area include picnic table accessibility.

Glines Canyon Spillway Overlook Parking: The Glines Canyon Spillway Overlook parking area would be modified to add a “hammerhead” turnaround for safer traffic flows.

Boulder Creek (Olympic Hot Springs) Trailhead: The parking area at the end of Olympic Hot Springs Road would be modified to maximize capacity within the existing footprint, including paving. This would reduce the need for visitor parking on road shoulders.

Soldiers Bridge: Minor preventative maintenance, such as bridge rail work and deck sealing would be included.

Powerlines: Powerlines along Olympic Hot Springs Road would be relocated to follow the new alignment (reroute or grade raise). For the grade raise, they would be hung on the bridge and then would continue underground to the corrals, while for the reroute they would be placed underground within the road shoulder. Remaining powerlines would be buried in the road shoulder within the road prism from the reroute/grade raise south to the Ranger Station and to the Whiskey Bend junction.

<u>Sign Replacement/Installation:</u> All regulatory signs needing replacement would be reinstalled as part of the project. In addition, park information signs on the roadway would also be replaced. And, there would be a new entrance sign at Madison Falls. An estimated 25 regulatory and 30 informational signs line the roadway.

<u>Road Rehabilitation</u>: To improve the overall roadway condition, there are two project components proposed under this EA: 1) road rehabilitation, and 2) rerouting or reconstruction of the one-mile section of roadway subjected to the flooding washouts (see alternatives 2 and 3 description). The proposed road rehabilitation portion of the project is common to alternatives 2 and 3 and is a mix of rehabilitation, reconstruction, restoration, and resurfacing. It includes resurfacing and other work necessary to return the roadway; including the road shoulder, culverts, bridges, and other parts to a condition of functional and/or structural adequacy. The proposed rehabilitation would occur over 7.2 miles of the Olympic Hot Springs Road, a two lane asphalt concrete roadway, with some gravel sections. Rehabilitation would include repair of the road base and subgrade where necessary.

The rehabilitation portion of the project would also include:

- Minor alignment shifts within the existing prism;
- Some subsurface repairs within the roadway (below the existing driving surface);
- Repair/replacement of existing walls;
- Culvert repair or replacement – including adding fish passable pipes where needed;
- Ditch cleaning;
- Slope stabilization/erosion protection;
- Guardrail replacement;
- Limited tree removal (as needed to repair the roadway);
- New asphalt pavement surfacing or aggregate surfacing; and striping

Road rehabilitation would involve work in three distinct sections: from the park boundary to the northernmost washout at the east channel (section 1); from the Elwha Ranger Station to the Glines Canyon Spillway Overlook (section 2); from the Glines Canyon Spillway Overlook to the Boulder Creek (Olympic Hot Springs) Trailhead (section 3).

Section 1 and Section 2: Approximately 2.2 miles in length, these sections would be rehabilitated with subgrade stabilization, ditch cleaning, new culverts where needed, new pavement, and minor roadway shifts to provide better separation between the river and roadway. Minor road profile changes would better accommodate high river flows in the lowland areas (i.e. near Sweets Field and a short segment of road just south of the Whiskey Bend Road turnoff that traverses a wetland). To address the flooding and possible Elwha River migration across the road through Sweets Field, the road grade through this segment would be raised slightly and reconstructed with a hardened subgrade. This section of grade raise would not eliminate, but would reduce the potential for and frequency of flooding over the roadway. The hardened subgrade would reduce the likelihood that a future full washout of the roadway in this area would occur during larger floods. It would also prevent a new side channel of the Elwha River from forming across the road through Sweets Field.

Road width would be consistent, with most work falling within previously disturbed clearing limits; however, some vegetation removal would be necessary. Minor repairs would be made to existing walls and new walls would also be constructed to help stabilize the existing roadway.

Section 3: This approximately 5-mile-long section would be repaved, with new culverts and subsurface repairs as needed. The roadway profile and horizontal alignment would be the same. Work in this segment would fall entirely within the road prism (previously disturbed limits) and would include limited disturbance outside of the current road prism. Of the three segments, this portion has the lowest use and the roadway is in the poorest condition. Several locations require either wall repair or a new wall. Other locations with slope stability issues would not be included in the proposed project due to their low cost-benefit and limited immediate risk.

Preliminary plans show a range of culvert sizes (24-, 36-, and 60-inch), including approximately 40 culverts that would be cleaned in place. About five drainage structures would be repaired and there would be approximately 43,400 linear feet of ditch reconditioning (cleaning and reshaping). Approximately 250 linear feet of guardrail would be removed and 3,750 linear feet installed in six different locations. Approximately three rockery walls would be constructed, with lengths of approximately 100 feet between Deep Creek and Deadman's Gulch and 200 feet (at an unnamed location between stations 470 +80 and 472 +85).

<u>Private Property Access</u>: Private property access via road would be maintained, although this would require keeping a section of the existing roadway in the floodplain.

<u>Mabey Bridge Abutments</u>: The abutments associated with the Mabey Bridge would be removed and the area restored. However, prior to that, during construction of the reroute or grade raise, the park would temporarily replace the Mabey Bridge. The bridge would be used for access to the project area and to remove the pre-cast well house building via a crane. It could also be used to salvage the kitchen shelter, if it's safe and practical, and pending the completion of SHPO consultation. The bridge would also be used to access the existing roadway to remove pavement, recontour the existing grade, and to plant/reseed.

<u>Restoration</u>: Restoration actions would include removing the Elwha Campground pump house, and the Mabey Bridge abutments.

Wetlands Mitigation: Wetland mitigation for unavoidable impacts associated with road fill, ditch reconditioning and culvert repairs/replacements is required under the ACOE permitting process. Section 404 of the Clean Water Act and NPS policy require that construction that adversely impacts wetlands must be compensated by restoring, creating, or enhancing other wetlands at a 1:1 ratio. The mitigation wetlands must also replace the functions and values of the impacted wetlands. Accordingly NPS and FHWA propose to restore and/or enhance low functioning wetlands within and adjacent to the project area, the size of which would be determined during the Section 404 permitting process. The mitigation will be considered successful when hydrology and vegetation meet criteria specified in the 1987 ACOE Delineation Manual by the end of the monitoring period set during permitting (likely 3-5 years).

2. Alternative 2 Realignment

This alternative calls for obliterating one mile of the lower Olympic Hot Springs Road through the floodplain, constructing a reroute (realignment) above the floodplain, and rehabilitating other parts of the existing road.

Actions would be the same as described in ECAA. In addition, a one-mile portion of the road would be realigned. The realignment would reconnect with the existing rehabilitated road north of the Elwha Ranger Station and south of the private property, so vehicles would need to turn north on a section of remaining roadway to access the private property. This reconstruction portion of the project is intended to improve the roadway so that flooding and flood damage would be less frequent and would not be expected to damage the realigned road.

Geotechnical Analysis Phase II: Geotechnical Analysis Phase II: Additional geotechnical drilling is necessary to confirm the initial findings of geotechnical drilling. This could include helicopter-assisted drilling off the proposed roadway to clarify slope stability issues and to inform actions needed to improve slope stability. Additional investigation is also needed to design the footings for any structural elements such as walls or large culverts.

Realignment: The road would be rerouted upslope from the east channel crossing on the north end to near the Elwha Ranger Station on the south end (a distance of approximately one mile). Although the road would be located higher on the slope it would continue to be outside of wilderness. To stabilize the road on the slope above the Elwha River floodplain, road construction would affect the east channel (currently occupied by a portion of the Elwha River).

Following construction of the realignment, the existing one mile portion of the roadway within the floodplain would be removed and restored. Depending on recommendations, there would be grading to remove the dike-like effects of the road subgrade, asphalt and concrete curb removal. Native riparian vegetation would also be added. Relocation of the road, and removal of the existing road, would remove most human impediments to the recovery of federally-listed fish, including Chinook salmon, steelhead, and bull trout in the area and improve essential fish habitat for pink, chum and coho salmon, continuing to implement the Elwha restoration EIS.

With a paved width of 20-22 feet and 1-2 foot unpaved shoulders, the realignment would be similar in character to the adjacent roadway. Cut and fill walls would be built where necessary to stabilize the road on the hillside. The road would have new culverts, short bridges, and drainage features that allow for tributary crossings, and it would be striped for two-way traffic.

Overall, earthwork would comprise approximately 50,000 cubic yards. Cuts and fills would be balanced to the extent practical, and would affect much of the realignment area because it is located on a slope. Where possible, the realignment would follow the route that was used for geotechnical drilling. After construction, disturbed areas would be revegetated with native plants and seeds. Over time, the roadway would have characteristics similar to other parts of the Olympic Hot Springs and Whiskey Bend roads.

Walls would be used where appropriate to minimize impacts on natural and cultural resources, whereas cut and fill would be used to minimize costs. Additional design features and mitigation would include channel roughening elements such as rock, root wads, and logs that would improve fish habitat and protect the roadway embankment. This would create a bank with uneven edges and channel complexity and the slower velocity would provide more opportunities for spawning locations to develop.

The realignment would require removal of approximately 42-52 Douglas-fir, bigleaf maple, western hemlock, and western red cedar trees measuring more than 12 inches at 4.5 feet above the ground. Up to 10 walls, mostly toward the north end of the project, would be built, totaling to 1,000 linear feet and 12,000 square feet. These would be either rockery type (cut walls) or mechanically stabilized earth (MSE) walls. At the north end of the project area, approximately 8,500 cubic yards of riprap, root wads and large logs would be placed to stabilize the slope beneath the road.

Overall the upslope alignment would place the road in a location where cross drainages are in defined channels; and surface soils are granular rather than fine-grained, thereby resulting in a reduced risk of road failure due to perched groundwater close to the surface. This alignment would have more wetland but fewer floodplain impacts than alternative 3. Developing the final design would include more opportunity to "thread" the road to avoid some very large trees.

<u>Private Property Access</u>: Access to private land would require a U-turn from the reroute because the access road is approximately 1,200 feet north of where the new reroute would end. This remaining portion of the former Olympic Hot Springs Road would be maintained as an unpaved road. A new gate would be installed at the junction of the private access road.

<u>Restoration</u>: In addition to ECAA restoration actions, asphalt from the former roadbed would be removed and the area re-contoured from the new east channel crossing to the private property access road. The decommissioned roadway sections would also be revegetated. A logjam or other structural deflection would be installed to allow the former roadbed to be restored by deterring water from flowing down it.

3. Alternative 3 Grade Raise

This alternative calls for improving the lower Olympic Hot Springs Road through the floodplain, and rehabilitating other parts of the existing road.

This alternative would be the same as alternative 2 between the park boundary on the north to the boneyard, and then again from the Elwha Ranger Station and beyond. The bridge to elevate the road above a portion of the floodplain would begin after the boneyard. As in alternative 2, the bridge and grade raise would reconnect with the existing road north of the Elwha Ranger

Station. With the grade raise/bridge, flood damage would be less frequent and/or less likely to damage the new section of road.

Grade Raise: The existing alignment of the road would be maintained and the grade raised an average of 15 feet through the one-mile section subject to frequent flooding between the east channel crossing and the Elwha Ranger Station. To elevate a portion of the road outside of the Elwha River channel, a concrete span bridge (approximately 1,400 feet long) would be constructed between stations 75+65 and 89+55 to span the Elwha River and adjacent floodplain near the east channel. The bridge would have approximately eight piers that would be protected at their base using a combination of riprap and large woody debris (LWD). The road would also include guardrail, placed at the edge of the pavement shoulder on both sides of the bridge as well as at the wall locations. Trees and other vegetation would be removed to create the steeper roadside embankment on either end of the bridge. Other roadway sections susceptible to repeated flooding would also be reinforced to withstand periodic inundation. In addition to the walls on either side of the bridge, there would be two new walls, one of approximately 130 linear feet at station 94+15, and one of 800 linear feet at station 97+29. The completed road would be about 22 feet wide, with paved shoulders.

Remaining pavement within the floodplain would be removed and the area restored. Much of the restoration, however, would be beneath the new bridge and fill would be placed in the floodplain, including the piers and the materials used to support them.

Private Property Access: The intersection for the junction of the private access road would be very similar to existing conditions. Depending on need, the transition from the new (higher elevation) road to the existing private road may be tapered downward toward the river to maintain an appropriate approach grade. A new gate would be installed at the junction with the private access road.

Restoration: In addition to ECAA restoration, removing asphalt and re-contouring the former roadbed from the north end of the new bridge to the private property access road; and revegetating the decommissioned roadway underneath the grade raise would occur.

B. Impact Avoidance, Minimization and Mitigation Measures

The action alternatives would include a range of best management practices (BMPs), and impact avoidance, minimization and mitigation measures as described in Appendix 5.

C. Alternatives Considered but Eliminated from Detailed Study

These are described in Appendix 2:

D. List of Actions Outside the Scope of This EA

These are described in Appendix 2.

Chapter 3: Affected Environment

Information in this section is derived from a comprehensive review of existing information pertaining to the project area.

A. Geologic Hazards

Geologic hazards including landslides, flooding, and avalanches have affected the project area. Since removal of the Glines Canyon Dam in 2014, the Elwha River has fluctuated and has caused damage to the Olympic Hot Springs Road within the park due to frequent overtopping of the roadway and resultant embankment erosion and/or slope failures. The profile of the road is closer to the river in three general areas: 1) near the Elwha Ranger Station; 2) at the east channel; and 3) near the Madison Falls Trailhead. Since removal of the dam, these areas have been subject to more flood damage (FHWA [Morehouse] 2017:2). Travel through each of these areas would be improved under alternatives 2 and 3.

Based on geologic mapping (Polenz et al. 2004), most of the area above the proposed road alignment in alternative 2, is a mapped landslide. FHWA observations during field reconnaissance indicated it is an ancient landslide that is currently stable, but that it experiences some movement at its toe from bank erosion.

A debris fan is mapped near the ranger station and numerous older debris fans are mapped above the proposed alignments on the valley wall to the east. These debris fans are representative of the potential for rapid, high energy deposition, from steep valley side channels that become less constrained at the valley bottom (FHWA [Morehouse] 2017:4).

The FHWA geotechnical report (FHWA [Morehouse] 2017) describes the geological hazards associated with the roadway. Proposed road alignments were refined to avoid these specific geologic hazards in consideration of the dynamic nature of the Elwha River within its floodplain. The FHWA geotechnical investigation also analyzed seismic hazards.

B. Soils

Although a soil survey specific to the proposed action area is not available, soil information is based on the soil survey for Olympic National Forest (NRCS 2017) where soils have developed in a similar climate and landscape, and a Washington State Department of Natural Resources geologic map (WDNR 2005).

Sediments in the Elwha River drainage basin are dominated by glacial deposits and recent alluvium, ranging in size from clay to boulders. Recent alluvium is stored primarily in terraces with the floodplain and at the river mouth (NPS 2005).

C. Water Resources

1. Hydrology and Floodplains

The Elwha River basin is a large watershed on the Olympic Peninsula, covering 321 square miles and encompassing 70 miles of river and tributaries. Most (83%) of the watershed is within the park.

Glines Canyon Dam (removed in 2014) was located approximately 3.5 miles from the park entrance (river mile 13.5). The Elwha Dam (removed in 2012) was located 8.5 miles downstream, outside the park boundary (river mile 4.9) closer to Port Angeles. Construction of the dams disrupted natural river processes, and created the former Lake Mills and Lake Aldwell, respectively. Dam construction and removal has restored natural river processes with resultant dramatic effects to the Elwha River channel and floodplain.

The Elwha River follows a steep slope down the valley. This is most apparent at the headwaters where the gradient is an average of 16%. That gradient generally decreases farther downstream after it flows through several steep, narrow, bedrock canyons. Between these canyons, the channel is less steep and has wider reaches within broad floodplains. At the outlet of the canyons, there are terraces where the channel widens, streamflow slows, and deposits are left behind by the river in these wider areas. In the floodplain, the river meanders, occasionally undercutting alluvial terrace and valley wall deposits (NPS 2005). The floodplain below the Glines Canyon Spillway Overlook is a largely undeveloped, relatively narrow valley confined by steep, forested hillsides where the river gradient is much lower (0.75%).

From north to south, the following tributaries drain into the Elwha River: Madison Creek (from the east), Freeman Creek and Hughes Creek (from the west), Griff Creek (from the east), an unnamed creek from the east, Stukey Creek (from the west), Sege Creek (from the east), and Boulder Creek (from the west). After the road turns west to parallel Boulder Creek, Deer Creek, Deep Creek and Deadman's Gulch cross the roadway from the north (Figure 1). Only Freeman Creek, Hughes Creek, and Boulder Creek do not cross the road before entering the river.

From the park entrance, the Olympic Hot Springs Road parallels the east side of the river channel. The former Elwha Campground was also on the east side of the river, and along with most of the Altair Campground on the west side, was also within the 100-year floodplain. Some of the Elwha Ranger Station Historic District facilities, such as the maintenance building, were documented to be approximately one-foot above the 100-year floodplain, and are therefore potentially vulnerable to flooding.

Although most of the sediment has been eroded from the former Lake Mills Reservoir, some remains and continues to affect the Elwha River bed load during heavy runoff from storms. Channel migration limits are not yet predictable due to natural river fluctuation and the complicated interaction of stream flows, sediment erosion and transport, woody debris recruitment, and deposition. Large sediment releases during heavy rain and rain-on-snow events have altered the course of the river within its channel migration zone.

The Elwha SEIS described both the Olympic Hot Springs Road and the Elwha Ranger Station as vulnerable to loss through flooding and bank erosion following dam removal (NPS 2005). Although the Elwha Restoration Plan recommended monitoring bank erosion during dam removal, protecting the riverbank with large angular rock, engineered log jams, or a combination of the two, this would have been insufficient to prevent the major flood damage that occurred in November 2015 and in November-December 2016.

<u>East Channel</u>: This east channel flows from west to east within the project area and then onto the terrace of the floodplain, where it enters an oxbow channel along the east valley wall. In 2015, this oxbow channel captured approximately half the river's flow (NMFS 2016: 36).

Compared to its historic extent, the Elwha River is now relatively confined,. During 2017 widths in the main channel were 70-140 feet at 1,000 cfs. The east channel is deeper, with a steeper gradient and higher velocities than the river (NMFS 2016:36). The Mabey Bridge abutments at the downstream end confine flow.

Since dam removal, the Elwha River has accumulated more large woody debris that has blocked old braids in the main river channel. During flooding, the river has been forced around deposits of large wood into areas within the broader river valley, including the roadway and the east bank in the east channel.

Over the past 6 years, the Elwha River has experienced three instances of flooding beyond the typical expected annual maximums. This has included two 5-year floods and a 25-year flood. Flooding in the vicinity of the existing roadway has been more severe than in past years due to the release of the huge sediment and large woody debris loads stored behind the Glines Canyon Dam. This has resulted in major channel shifts in the river floodplain.

2. Water Quality

The groundwater in the Elwha River watershed is of excellent quality, and the entire headwaters area within the park is protected.

The Elwha River within the project area is listed as a 303(d) impaired waterbody with a Total Maximum Daily Load (TMDL) for temperature since 2008 but does not have improvement projects in the EPA database. It is possible that this impairment has been mitigated by removing the Glines Canyon Dam.

Groundwater withdrawals by the Dry Creek Water Association (DCWA) and the Elwha Place Homeowners' Association (EPHA) are periodically tested for several contaminants, as required by the Washington State Department of Health. Well water that was tested for a variety of pollutants, including turbidity, coliform bacteria, inorganic chemicals, trihalomethane, volatile organic compounds, and pesticides, was found to be of very high quality. Volatile organic compounds were not detected in any samples. Inorganic maximum contaminant levels were not exceeded in any sample taken from the DCWA wells (2003-04) or the EPHA wells (1985–93) (NPS 2005:67). Similarly, the U.S. Geological Survey (USGS) tested water resources at the LEKT Reservation in 1977 and found them to be of excellent chemical quality. The LEKT has sampled two of their community wells for complete inorganic and organic analysis. All parameters tested were lower than state maximum contaminant levels (NPS 2005:67).

3. Water Resources: Wetlands

A wetlands study in 2015 (David Evans and Associates) was made of the entire length of the Olympic Hot Springs Road. Eighteen 'natural' (non-ditch) wetlands were identified. Many of these extend outside the project area. Except for two, they would likely meet ACOE jurisdictional standards because they are connected to the Elwha River and/or its tributaries by surface water flows. This wetlands report was reviewed and ground-truthed by AECOM in 2019 and was determined to be valid and accurate.

Wetlands were characterized according to the ACOE definition. In this classification system, wetlands are distinguished by a combination of three factors, including the presence of water-dependent vegetation, anaerobically altered (mottled) soils, and/or the presence of water.

(Under the Cowardin classification system typically used by the NPS, only one of these characteristics must be present to classify an area as a wetland; however, wetlands often have two or more of these characteristics.)

A second wetland and stream delineation was conducted (July 2017) for the reroute/grade raise to document wetlands and other potentially jurisdictional waters, including streams, seeps, and ditches (AECOM 2017). It was also conducted according to ACOE and Cowardin classification methods. Due to site and design changes between 2017 and 2019, this area was re-delineated in 2019 (AECOM 2019) and the 2019 report supersedes the 2017 report.

2015 Report: This study found 30 stream-associated wetlands, 13 ditch-associated wetlands and 18 natural wetlands (Tables 1-6, Appendix 3). Only W-13 and D-7, which are isolated from other waters, were considered non-jurisdictional. Three isolated wetlands, (W-18, D-10, and D-12) drain to uplands and are considered jurisdictional only by the state.

All of the ditch-associated wetlands except D-7 were classified as palustrine emergent (PEM). D-7 has permanent water, but no wetland vegetation. Many of the non-ditch associated natural wetlands were also classified as palustrine emergent (PEM), including W-2, 3, 4 (also palustrine scrub-shrub - PSS), 5, W-6 and 7 and 8 (also PSS and palustrine forested - PFO), 9 (also PSS), 10 (also palustrine emergent scrub-shrub Cowardin), W-12, W-13 and 14 (also PFO), 15, 16.

In addition to those classified above as PEM, other single classification mixed palustrine scrub-shrub Cowardin (PSSC) wetlands were W-11, and 17.

For the ditch wetlands:

> "Within the bottom of the ditch, as shown in the paired plots throughout the study area, the presence of horsetail, coltsfoot, and salmonberry indicated the wetland boundary, whereas the rapid transition to upland (due to the well-drained soils) was characterized by a transition to swordfern, trailing blackberry, and other upland species."

Four streams (S-9, 16, 21, and 23) are considered "built" because they drain ditched wetlands. All of the other streams enter the area from upslope. Four of the streams are named: S-1 (Madison Creek), S-3 (Sanders Creek), S-5 (Griff Creek), and S-8 (Elwha River).

2019 Report: This study found 4 stream-associated wetlands (S-A, B, C, D), 2 ditch-associated wetlands (D-A, B) on the east side of the road, and 9 natural wetlands (W-A, B, C, D, E, F, G, H, and M)(Tables 2 and 3: Streams in Rehabilitation Area, Appendix 3).

S-A, B and C are tributaries to the East Channel (Sanders Creek). S-D drains a wetland (W-E). W-A and D are classified as PEM and PSS. Wetland B is PSS. Wetland C, E, F, and H are PEM, and Wetlands G and M are classified as PEM and PFO.

No wetlands are mapped by the National Wetlands Inventory within the project area (David Evans and Associates 2015), although in places the Elwha River, which is mapped as riverine, upper perennial, unconsolidated bottom, permanently flooded (R3UBH), is either part of the project area or close to it.

The OHWM on the east channel was established by locating where the fluctuations of water in the stream have created a clear, natural line on the bank indicated by changes in the soil/substrate and vegetation. OHWM demarcation was based on ACOE (Mersel and Lichvar 2014) and Washington State Department of Ecology (Anderson et al. 2016).

Fish-bearing streams include: (Madison Creek), S-1 (Stukey Creek), S-3 (Sanders Creek), S-5 (Griff Creek), S-6 (an unnamed creek) and S-8 (Elwha River). The lower reaches of Freeman Creek are also fish-bearing.

D. Vegetation, including Special Status Plants

Vegetation in the project area consists mainly of riparian and upland mature forests. Upland areas are dominated by mature and old-growth coniferous forest. Common trees include Douglas-fir (*Pseudotsuga menziesii),* grand fir *(Abies grandis),* western hemlock *(Tsuga heterophylla*), western red cedar (*Thuja plicata),* Sitka spruce (*Picea sitchensis*), and bigleaf maple (*Acer macrophyllum*) (AECOM 2017). The understory vegetation is typically sword fern (*Polystichum munitum*), and herbaceous species such as vanilla leaf (*Achlys triphylla*), pathfinder (*Adenocaulon bicolor*), wild ginger (*Asarum caudatum*), three-leaf foamflower (*Tiarella trifoliata*), enchanter's-nightshade (*Circaea alpina*), and oak fern (*Gymnocarpium disjunctum*) (AECOM 2017). Low Oregongrape (*Mahonia nervosa*), salal (*Gaultheria shallon*), bald-hip rose (*Rosa gymnocarpa*), oceanspray (*Holodiscus discolor*), osoberry (*Oemleria cerasiformis*), western serviceberry (*Amelanchier alnifolia*), and trailing blackberry (*Rubus ursinus*) are common understory shrubs.

Upland and riparian forests with restrictive drainage primarily consist of bigleaf maple and red alder (*Alnus rubra*) (AECOM 2017). Understory vegetation in these areas includes vine maple (*Acer circinatum*), salmonberry (*Rubus spectabilis*), common snowberry (*Symphoricarpos albus*), thimbleberry (*Rubus parviflorus*), and spreading gooseberry (*Ribes divaricatum*). The herbaceous layer is comprised of lady fern (*Athyrium filix-femina*), giant horsetail (*Equisetum telmateia*), stinging nettle (*Urtica dioica*), piggyback plant (*Tolmiea menziesii*), Arctic sweet-coltsfoot (*Petasites frigidus*), and coastal hedge-nettle (*Stachys chamissonis*) (AECOM 2017).

Scrub-shrub wetland vegetation predominately consists of salmonberry and vine maple, along with herbaceous species including giant horsetail, lady fern, piggyback plant, water parsley (*Oenanthe sarmentosa*), stinging nettle, Siberian springbeauty (*Claytonia sibirica*), and tall mannagrass (*Glyceria elata*) (AECOM 2017). Emergent wetland vegetation includes American brooklime (*Veronica americana*), tall mannagrass, skunk cabbage (*Lysichiton americanus*), Arctic sweet-coltsfoot, yellow monkeyflower (*Mimulus guttatus*), creeping buttercup (*Ranunculus repens*), coastal hedge-nettle, big-leaf sedge (*Carex amplifolia*), short-scale sedge (*Carex leptopoda*), piggyback plant, and water parsley (AECOM 2017). Forested wetlands are dominated by bigleaf maple and red alder, with similar understory species as the scrub-shrub wetlands (AECOM 2017).

Based on information provided by the USFWS, there are no federally listed, proposed, or candidate plant species likely to occur within the project area. No rare plants were identified during the wetland and stream delineation. Two rare plants – branching montia *(Montia diffusa)* and tall bugbane (*Cimicifuga elata)* – could occur in the project area based on Washington Natural Heritage Program's Rare Plants and High Quality Ecosystem Dataset (WNHP 2017).

E. Fish and Wildlife, including Special Status Wildlife and EFH

1. Wildlife

Wildlife are abundant throughout the low-lying riparian, wetland, and upland habitats in the in the park (Table 7, Appendix 3) and Elwha River watershed. Small mammals common to the proposed project area include Townsend chipmunks, bushy-tailed wood rats, mountain beavers, and snowshoe hares. Predators include black bear, coyote, mink, weasel, and mountain lion. The area supports Columbian black-tailed deer, Roosevelt elk, beaver, and river otter. Bats include little brown myotis, silvery-haired bat, hoary bat, and big brown bat. Songbirds and raptors include red-tailed hawk, pileated woodpecker, great blue heron, black-capped chickadee, and winter wren. Seasonally ponded areas amphibian habitat for the northern red-legged frog, rough-skinned newt, and Pacific treefrog.

2. Fish

Before construction of the Elwha and Glines Canyon dams, native fish used the river and its diverse habitats for spawning. Since the removal of the dams, all 10 native anadromous fish runs have shown some (or a great deal) of recovery. This also includes winter and summer-run steelhead, and sea-run cutthroat trout. Sediment formerly caught behind the dams, has washed down river to a large degree, opening up spawning grounds in the main river and its tributaries that had been unavailable for over 100 years.

The mainstem and east channel include adult coho salmon (*Oncorhynchus kisutch),* Pacific lamprey (*Lampetra tridentata),* as well as nonnative brook trout (*Salvelinus fontinalis*), along with juvenile coho salmon, Chinook salmon (*O. tshawytscha),* Rainbow trout/Steelhead (*O. mykiss*), and bull trout (*S. confluentus*). Sockeye (*O. nerka*), Chinook, pink (*O. gorbuscha*), coho, and chum (*O. keta*) salmon, steelhead, and bull trout also use both areas (WDFW 2017b in AECOM 2019: 11).

3. Special Status Species

The project area contains abundant suitable habitat for the federally threatened marbled murrelet and northern spotted owl. The Elwha River is designated critical habitat for the federally threatened bull trout, and Puget Sound steelhead trout. Although it is not designated critical habitat for Chinook salmon, it meets the requirements for critical habitat and critical habitat is designated downstream in the mainstem Elwha River. It is also designated Essential Fish Habitat (EFH) for Puget Sound Chinook, coho, and pink salmon. Access to the area is critical to park fisheries biologists and other research scientists involved in monitoring activities to meet and fulfill requirements under the National Oceanic and Atmospheric Administration (NOAA) and USFWS Biological Opinions for dam removal.

Northern Spotted Owl: Northern spotted owls, listed as threatened by the USFWS and endangered by the State of Washington, occur in coniferous habitats in the park at elevations below 3,500 feet.

The current distribution and range of the spotted owl extends along the coast from southern California to southern British Columbia. Northern spotted owls generally require large areas of land containing semi-continuous expanses of old-growth forest to meet their biological needs for nesting, roosting, foraging, and dispersal. Nesting and roosting habitat typically includes a multi-layered, multi-species, moderate to high closure canopy with large trees.

No critical habitat for northern spotted owls has been formally designated within Olympic National Park, although much of the park contains high quality habitat that is considered important for the recovery of the species. Critical habitat was not designated because habitat in the park does not require special management consideration or protection by virtue of its national park status. The interior of the park has approximately 494,000 acres of forested areas considered potential northern spotted owl habitat. This represents the largest continuous block of suitable nesting habitat remaining within the range of northern spotted owls. The most comprehensive inventory and survey, covering over 72,600 acres or about 10% of the forested acreage in the park, were from February 1992 - September 1995. These surveys determined that northern spotted owls are seldom found above 3,000 feet elevation on the west side of the park or above 4,000 feet elevation on the east side of the park.

Northern spotted owl survey data collected in the park has been incorporated in a range-wide data analysis every five years. The most recent analysis (Dugger et al. 2016) estimated that northern spotted owl populations across the range of the species had declined 3.8% annually between 1995 and 2013.In the Olympic study area, including sites on the park and national forest, rates of territory occupancy declined from 81% in 1995 to 21% in 2013. Observational evidence suggests that barred owl presence decreased spotted owl territory colonization rates and increased spotted owl territory extinction rates.

In 2018, field crews located just six territorial spotted owls at 54 monitored sites in Olympic NP, two pairs and 2 single males (Gremel, pers. comm.).

Northern spotted owl monitoring data collected since the early 1990s has shown a steady decline in the proportion of sites with detections of spotted owls (Gremel 2017). Competition with the barred owl (*Strix varia*) appears to be the primary threat to conservation of northern spotted owls in protected areas (Gremel 2014; Dugger et al. 2016). Barred owls, once occurring only in the eastern U.S. have expanded their range to the west.

Although structurally suitable habitat for northern spotted owls occurs in the immediate proximity of the project, park surveys have not detected spotted owl use within 1 km of the proposed reroute since formal surveys began in 1992. Three documented spotted owl territories in the general vicinity of the project were part of the park's long-term monitoring program. Each territory was visited an average of four times a year between 1992 and 2018. Two core areas are within roughly 2 km of the project area; however, spotted owls have not been detected in over 20 years. The third site is roughly 2.2 km from the project area, was last occupied by a pair of spotted owls in 2012, and by a single spotted owl in 2015.This spotted owl was over 3 km and 3000-feet in elevation from the project area.

Between 2009 and 2018, barred owls were recorded at each of the three spotted owl sites in 50% of years, and many of these detections were in, or very close to, the planned reroute.

The status of spotted owls along the road in the rehabilitation section is similar. The most recent spotted owl sighting at the Madison Creek monitoring location was documented in the 1990s (Gremel pers. comm. 2018). Nesting spotted owls were documented near the Boulder Hot Springs trailhead in the early 1990s. In recent years, however, all spotted owl detections have been far from the road. A pair was found 800 meters from the road in 2006 near Stukey Creek, but since then only barred owls have been found in that drainage. Two sites near the trailhead have had no spotted owl responses within 1 km of the road in more than 20 years.

Marbled Murrelet: Marbled murrelets occur at low densities within all major drainages in the park. Suitable habitat for murrelet occupation includes coniferous forests to 3,500 feet on the east side, and 4,000 feet on the west side of the park. The forests in the project area contain a mix of deciduous and coniferous trees, and some nearby habitat may be suitable for murrelets.

The marbled murrelet is listed as state and federally threatened. Marbled murrelets may fly 50 or more miles inland to nest, generally in older coniferous forests with a high canopy closure. Marbled murrelets are more commonly found inland during the summer breeding season, but fly to the ocean to forage. Inland murrelet detections begin in the spring and peak in midsummer before decreasing rapidly after midsummer (USFWS 1997).

Olympic National Park contains the largest continuous block of suitable nesting habitat in the lower 48 states within the range of marbled murrelets – approximately 453,000 acres of forest. The park is located in two marbled murrelet recovery zones: Puget Sound (Zone 1) and Western Washington Coast Range (Zone 2) with the line between the two zones bisecting the park from northwest to southwest (NPS 2008). Marbled murrelet nesting season in Washington is from April 1 through September 23.

No critical habitat has been formally designated within Olympic National Park for marbled murrelets, although much of the park contains high quality habitat that is considered important for the recovery of the species.

Marbled murrelet habitat occurs within the action area and overlaps with potential habitat for northern spotted owls. Audio-visual surveys have found nesting marbled murrelets occupying stands up to about 3,800 feet in elevation on the east side of the Olympic Peninsula and about 3,500 feet on the west side (USFWS 2009). Reconnaissance-level surveys conducted in 1990 indicate that the Elwha Valley (between Krause Bottom and the delta) serves as a flight corridor between nest stands and the marine environment, including along the upper reaches of the Elwha River Valley or its tributaries, where an estimated 15 pairs of marbled murrelets bred during the 1990 season (NPS 1996).

Bull Trout: Bull trout inhabit the Elwha River from the river mouth upstream to the headwaters, including a number of the Elwha's tributaries. Elwha bull trout exhibit fluvial and anadromous life history strategies and migrate upriver during summer months. Bull trout require colder water temperature than most salmonids and the cleanest stream substrates for spawning and rearing. They need complex habitats, including streams with riffles and deep pools, undercut banks and lots of large logs; and they also rely on river, lake, and ocean habitats that connect to headwater streams for annual spawning and feeding migrations. The onset of bull trout spawning typically coincides with stream temperatures dropping below 48 degrees during the fall.

The Elwha River has been designated as critical habitat for bull trout. A total of 71.45 miles, including the mainstem Elwha River and accessible tributaries, have been identified within the Elwha River critical habitat subunit. Madison, Hughes, Griff, and Boulder creeks may provide feeding opportunities and limited spawning habitat. Smaller tributaries, such as Freeman, Sanders, Stukey, and Sege creeks, or any of the unnamed tributaries are unlikely to provide habitat for either feeding or spawning due to size and temperature. Further, tributaries to Boulder Creek (Deadman's Gulch, and Deep, Deer, and Cougar creeks) are located above an impassible falls and do not support bull trout.

Puget Sound Chinook: Chinook salmon are described by the season in which they enter their natal streams to spawn. Spring Chinook enter fresh water several months earlier than summer / fall Chinook. Adults require cool water and medium-size spawning gravel, usually laying eggs in the main channel, as well as larger side-channels and tributaries of the river. The Endangered Species Act (ESA) listed Chinook salmon population in the Elwha River Basin is comprised of hatchery and naturally spawning components. Although Chinook may spawn in a relatively wide range of conditions (Raleigh et al. 1986 NMFS BO 2016), they generally prefer water depths of 1 to 3 feet (Vincent-Lang et al. 1983; Moyle 2002 NMFS BO 2016) and velocities of 1-3 feet/sec (Moyle 2002; Vogel and Marine 1991; Allen and Hassler 1986 NMFS BO 2016). Chinook salmon currently spawn in the Elwha River from near the river mouth to near the river's headwaters. The peak of spawning occurs in September each year. Recent surveys revealed that approximately 80-90% of Chinook spawning between the former dam sites is in the mainstem river and its side-channels, while limited spawning (10-20%) is observed in available tributaries (McHenry et al. 2019).

No critical habitat has been designated or proposed for Puget Sound Chinook salmon in the project area. Critical habitat for Puget Sound Chinook salmon was defined prior to the Elwha and Glines Canyon Dam removal projects. The mainstem Elwha from the river mouth to the former Elwha Dam site was designated as critical habitat for Chinook. Although the Elwha River within the project area is not designated critical habitat for Chinook, it meets the essential features necessary to support one or more life stages of Puget Sound Chinook salmon.

Puget Sound Steelhead Trout: Puget Sound steelhead trout have two distinct life history strategies: winter-run migrations where steelhead spawn soon after entering freshwater and summer-run migrations where steelhead return to freshwater and typically spawn the following spring (NOAA 2013). Puget Sound winter-run and summer-run steelhead trout both inhabit the Elwha River and the ESA-listed population is comprised of both hatchery and naturally spawning components. In the Elwha River, steelhead have been observed using habitat similar to Chinook, but may use slightly smaller tributaries and faster water. Steelhead spawn where the water is 4-48 inches deep (Stolz and Schnell 1991 *in* NMFS BO 2016), and velocities are 1.5-2.0 feet/sec (USFWS 1995 *in* NMFS 2016).

Elwha winter-run steelhead typically spawn in the mainstem Elwha River and tributaries from late March to June. Additionally, spawning recently has been observed in a number of tributaries, including Little, Indian, Hughes, Boulder, Cat, and Madison creeks. Summer steelhead have been observed in every year from 2016-2019. Spawn timing for these summer-run fish is unknown, but presumably occurs in the winter or early-spring, similar to other summer-run populations in Puget Sound.

The Elwha River, including the mainstem and tributaries below anadromous barriers, is designated critical habitat for Puget Sound steelhead. Physical or biological features essential to the conservation of the species have been identified in the Elwha River. Essential features include sites necessary to support one or more life stages of the distinct population segment, such as spawning gravels, side channels, forage species, and water quantity and quality. The Elwha watershed is also important to a range of other sensitive species that may use the area (Table 8: Other Sensitive Species that May Occur in the Project Area, Appendix 3).

4. Essential Fish Habitat

Essential Fish Habitat was defined by the U.S. Congress in the 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act, as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity."[4] The Elwha River is designated EFH for Puget Sound Chinook, Pink, and Coho salmon.

F. Cultural Resources

This section includes the following topics: Archeological Resources, Historic Structures/Cultural Landscapes, and Traditional Cultural Resources.

Archeological Resources:

In the area of potential effect (APE), archeological surveys were conducted in 1995 and 2017. Field surveys and data were retrieved through correspondence with the LEKT Archeologist, park archeologist, the Department of Archeology and Historic Preservation's Washington Information System for Architectural and Archeological Records Data, and geologic data and maps from the Washington Department of Natural Resources and Washington Geological Survey. Prior to the 2017 survey, excavations and surveys documented cultural resources in and near the project area.

Sixteen archeological sites are recorded within ½ mile of the project APE (Table 9, Appendix 3). Currently there are only two sites that could be impacted by an alternative (the reroute).The rest are either outside of the APE or are outside of the physical working limits of the project and thus would not be affected by the project. Archeological monitoring is included as a requirement of project implementation.

The road crosses non-depositional geomorphic environments (landslide, mass wasting, and bedrock) greatly reducing or eliminating the potential for deeply buried archeological materials. Nonetheless, there is potential for near surface prehistoric and historic materials in the APE (Gough 2017:5). Alluvial river terraces or floodplains were some of the most used landscape elements. Site preservation is dependent on stream competence[5] and other factors and is uncertain even in a depositional sedimentary environment (Gough 2017: 6).

Although the initial archeological inventory for the geotechnical drilling did not identify archeological resources, during work a prehistoric artifact was found. During civic engagement new information suggested the presence of two additional sites within the APE. These circumstances prompted supplemental fieldwork to verify and evaluate the three potential historic properties. Park cultural resource staff conducted surface and subsurface investigations and determined that the precontact artifact, a piece of flaked stone, is likely an isolated artifact and not part of a larger archeological deposit. This site would be ineligible for the NRHP and is

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[4] [1]

[5] A measure of the maximum size of particles a stream can transport.

therefore not a historic property and is thus removed from further discussion other than archeological monitoring at this location during construction.

This work also confirmed the existence of two previously unrecorded historic period sites. One is the remains of a recreational cabin built a few hundred feet uphill from the former Elwha Campground. This cabin was constructed about 1920, a few years before the road, by Herb Crissler and Vern Samuelson. Herb Crissler was the filmmaker who recorded the Seattle Mountaineers on an ascent of Mt. Olympus in 1939. This was the first film made for the newly established Olympic National Park. In later years Herb and his wife Lois gained notoriety as wildlife photographers while residing at the Humes Ranch further upriver (Dalton 2019). The site includes the stone and mortar remains of a fireplace, a surface artifact scatter, and at least two features that are likely old privy pits or trash dumps—both of which are data rich. There has been little disturbance to the site since the building burned sometime after the park was established in 1938. Consequently, it remains an intact archeological site with data potential and a clear association with persons important in local and regional history. The site will likely be determined eligible as an historic property.

The second site is comprised of several large Douglas-fir trees that have been marked with blazes chopped into their thick bark. Historical and anecdotal information suggest some of these blazes may be associated with the 1890 Press Expedition. These trees along with others located upriver and outside the APE will be recorded as a linear site. During documentation efforts, park cultural resource staff noted two concerns about the potential press blazes within the proposed reroute. One is that they are not as linear as one would expect—in one case there are three blazed trees within a few meters of each other and they are clustered more than expected for a linear feature. The second is their location along a well-used nature trail leading out of the now abandoned campground raises concerns about their historical integrity. Multiple chop marks were observed on individual trees in the area that probably resulted from camper activity in the area over the years. Therefore, while the site is likely eligible for the NRHP, the trees located within the APE would be considered non-contributing elements to the site based on significant doubt regarding their origin.

Historic Structures: Five historic properties, including a historic district, two campgrounds and two Civilian Conservation Corps era kitchen shelters occur within or near the APE. These include the Elwha and Altair Campgrounds, both determined no longer eligible due to loss of integrity from river erosion; the Elwha Historic District (a listed property with multiple contributing elements), the Elwha Campground Community Kitchen (45CA540) (listed on the NRHP but damaged by the river), Elwha Campground Comfort Station (671762) (not eligible for listing), and the Elwha Campground Cultural Landscape (not eligible for listing).

Traditional Cultural Resources: The proposed action area is within the traditional territory of the Lower Elwha Klallam Tribe (Suttles 1990). One documented Historic Property of Religious or Cultural Significance is located within 2-3 miles of the project area. There will be no impact to this resource as a result of this project.

G. Visitor Experience

The Olympic Hot Springs Road provides access to trailheads that access the park's more than 876,447 acres of designated wilderness. The road also provides the only park access to observe the former dam and lake site associated with the nation's largest dam removal project to date.

The area has overlooks and interpretive exhibits for visitors. Prior to dam removal, this road averaged 70,000 visitors annually. In the summer after dam removal, there were more than 30,000 visitors in one month (July 2014). Although that number has tapered off, largely due to impaired vehicle access, there continues to be a great deal of public interest in watching area recovery. In 2015, the Elwha Valley had 130,985 annual visitor days.

Prior to the most recent road washouts in November 2017, the Olympic Hot Springs Road provided vehicle access to the Glines Canyon Spillway Overlook and popular trailheads. Average daily traffic (ADT) on the roadway was measured as approximately 350 vehicles, with seasonal volume increasing to approximately 915. One of the most popular activities was viewing the Glines Canyon gorge from the Glines Canyon Spillway Overlook or from the East/Whiskey Bend Overlook, approximately one mile up the Whiskey Bend Road. The Elwha area has nine trailheads that provide access to about 20 hiking trails (NPS 1994:3-64). In addition, rafting companies would use the former dam powerhouse site as a put-in for Elwha River trips. Camping in Altair and Elwha campgrounds was also a popular activity, with an estimated 5,000 – 8,000 participants annually (NPS 1994:3-83). Visitors also enjoyed boating and recreational fishing from below the dam.

When the road was in full operation it also provided vehicle access to the former Elwha and Altair campgrounds. Prior to dam removal Altair Campground had 31 campsites, parking pads, and other features, while the Elwha Campground had 41 campsites. Paved roads in the campgrounds comprised 1,426 linear, 17,107 square feet in Elwha and 2,640 linear, 31,680 square feet in Altair).

Currently, the Olympic Hot Springs Road south of the Madison Falls parking lot is accessible to the public by foot, stock, and bicycle. The bypass trail provides access around the road washouts to the trailheads and Glines Canyon Spillway Overlook. With the road closed, visitors currently engage in a variety of recreational opportunities, including sightseeing, picnicking, hiking, backpacking, fishing, horseback riding, and kayaking/rafting. Visitors also use the bypass trail to hike, horseback ride, or carry their bikes around the closed roadway en route to upper roadway or trail hiking or riding.

Within the park and upstream of the project area, the Elwha River is in pristine condition and is considered eligible for designation as a wild and scenic river. Water quality, fish habitat, riparian habitat, and scenic and esthetic values have been cited as values for the potential wild and scenic designation (NPS 1994: 3-65).

Access to the Elwha Valley for park staff, utility providers, and contractors is essential and time critical to maintain park operations, emergency services, employee housing, and maintenance facilities. Currently, there is no commercial power to the Elwha Valley and park facilities are vulnerable to mold impacts and damage without heat. Facilities include housing, ranger station, maintenance area, and stock operations area. Most structures in this area are part of the Elwha Ranger Station Historic District. Pack stock support maintenance and search and rescue efforts on the stock accessible portions of the park's approximately 620 miles of trails. They are also important to backcountry resource management, science and historic structure maintenance. Public access is important due to the high visibility of the Elwha restoration and fish passage project and abundance of educational opportunities. Access is also important for private property owners that have in-holdings within the Elwha Valley.

Chapter 4: Environmental Consequences

This chapter analyzes the potential environmental consequences (impacts or effects) that would occur from implementing the alternatives.

A. Cumulative Impacts Projects

Cumulative effects are "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). The following projects are described in Appendix 4.

1. Past Projects

- Elwha River Ecosystem and Fisheries Restoration Plan/DEIS, FEIS, SEIS, ROD
- Whiskey Bend Road Repair
- Glines Canyon Spillway Overlook East and West Side Parking and West Side Trail Development (2014)
- Emergency action for bank stabilization at park entrance (2015) and road washout at Sanders Creek (east channel) (2016)
- Long-term bank stabilization at park entrance (2015) and road washout at Sanders Creek (east channel) (2016)
- Decommissioning of Altair Campground
- Decommissioning of Elwha Campground
- Continued Existence and Routine Maintenance of Infrastructure
- Sweets Field Temporary Corral
- Subgrade Boring within Olympic Hot Springs Road
- Olympic Hot Springs Road Temporary Administrative Vehicle Access

2. Current Projects

- US Highway 101 Elwha River Bridge Reconstruction/EA
- Fire Management Plan/EA
- Lake Mills Trail
- Sweets Field Helicopter Staging Area
- Mountain Goat Management Plan/EIS
- Olympic National Park Final General Management Plan (GMP) and EIS (2008)

3. Future Projects

- Pacific Northwest National Scenic Trail Comprehensive Trail Management Plan/EA
- Wilderness Stewardship Plan/EIS
- WDFW Wolf Translocation and Reintroduction EIS

B. Environmental Impact Analysis

1. Geologic Hazards

Impacts from Alternative 1

Impacts to infrastructure from geologic hazards (flooding, avalanches, and landslides) would continue, particularly from flooding on the lower roadway and landslides / avalanches on the upper roadway. (See *Water Resources* section for impacts from flooding.)

Landslides/Avalanches: On the lower roadway, previous landslides in the vicinity of the Elwha Ranger Station Historic District have been stabilized. Elsewhere on the lower roadway, impacts from landslides or avalanches would continue to be unlikely.

Ongoing deterioration of the upper roadway would likely result in periodic damage to the adjacent environment. Short-term damage to the roadway and surrounding area could result from isolated landslides. Because road settlement and shoulder failures on the upper road would not be repaired, there would be increasing long-term stability issues. These would be particularly evident where previous failures have occurred. With persistent lack of maintenance and disuse, additional areas of deterioration would occur, including pavement and road subsidence and buckling, and failing log crib walls. Small and large landslides would eventually render the road impassable.

Impacts from ECAA
Except for the reroute or grade raise, impacts on the lower roadway would be the same as alternative 1. Rehabilitation of the upper roadway, including stabilizing failing crib walls, repairing the pavement subsurface , replacing culverts, and decreasing slope loading would reduce some potential risks. Areas would be prioritized for loading and downslope stability treatment based on their potential to reach the road and surrounding resources (i.e., drainages).

Despite repairs, some locations with slope stability issues would not be included due to their high cost compared to smaller benefits and limited immediate risks. Failure risk would be comparatively higher, but of less concern because areas in worse condition would have been fixed. As described in the alternatives, the project would focus on those areas most at risk from slides or other failures, reducing overall geologic hazards.

Impacts from Alternative 2
Locating the alignment above the floodplain would create new disturbance, including cuts and fills over the length of the reroute. There would also be the potential for increased rock fall and tree fall risk from the slopes above the road. Landslides could be generated from cutting slope toes and/or from continued movement of the Elwha River toward the embankment (FHWA 2017:8); however, the proposed reroute/realignment has been designed to avoid or to accommodate ancient, non-catastrophic landslides in the vicinity of the project area. Testing during geotechnical analysis found deep layers of clay intermixed with thin layers of fine sand. Although earth movement potential along the reroute would remain, overall risk would be small. Risks would be further mitigated by managing cut and fill slopes on the road, and by identifying and managing areas of potential instability found as design proceeds. Hazards may be addressed through structures, such as retaining walls and culverts. Retaining walls would also be used to avoid additional resource impacts.

The road reroute would be located on the valley wall above the Elwha River, resulting in a slight potential for rock- or tree-fall onto the roadway. Stabilizing the slopes above and below the road would be part of the project, reducing not only rock- and tree-fall but also the potential for future instability if the Elwha River continues to cut into its eastern bank. The upslope alignment of the roadway would place it where cross drainages are in defined channels and surface soils are granular rather than fine-grained, reducing risks of failure from perched groundwater close to the surface.

Impacts from Alternative 3
Impacts from geologic hazards would generally be similar to those that were present before modifications to the roadway. Although there would be a grade raise before and after the proposed bridge, the remaining alignment would be similar. Potential hazards would come from rock- or tree-fall onto the bridge surface, a likelihood that would be reduced due to the distance of the bridge from the slope. Debris flow from the river could also damage piers in the channel during high flows.

Cumulative Effects: Regardless of past, present and future NPS and other actions, some potential adverse effects from geologic hazards would continue. Road development within the Elwha Valley exposes the roadway to geologic hazards. Although the alternatives would reduce the amount of roadway exposed to flooding, other infrastructure in the valley would remain and would continue to contribute small cumulative effects from geologic hazard risks for park infrastructure, staff, and visitors. Removal of most of the flood-affected roadway would reduce overall hazards, while some additional hazards could occur from relocating it to the east valley wall under alternative 2; however, alternative 2 would also remove most of the road from the floodplain/channel migration zone, reducing exposure to hazards from flooding (See also Water Resources: Hydrology and Floodplains). Alternatives 1-3 would therefore continue to contribute small cumulative adverse impacts.

Conclusion: Potential geologic hazards could affect Olympic Hot Springs Road under all alternatives. Except from flooding (see Water Resources: Hydrology and Floodplains), alternatives 1 and 3 would have similar risks, while alternative 2 would have fewer overall risks. Risks from geological hazards in the one-mile section would be avoided or minimized by roadway design for the reroute (alternative 2) or grade raise (alternative 3). Elsewhere risks would be reduced by rehabilitation.

2. Soils and Vegetation

Impacts from Alternative 1
There would be no new short-term impacts to soils and vegetation unless there is more deterioration of the road from flooding or failure. Routine, ongoing maintenance of the lower and upper road surfaces would be suspended until the area stabilizes and/or the park develops a future plan for the facilities. Suspended maintenance work would be pavement patching, mowing, shoulder work, and ditch clearing. These actions could continue on the first 0.5-mile (up to the boneyard turnoff) but, due to the need for heavy equipment use and access would not occur beyond that.

Because the park would be unable to conduct repairs of the upper roadway and the washout sections, minor problems could be exacerbated during an indefinite period of inattention. In the event of catastrophic road failure, depending on the location and severity, adverse impacts to soils and vegetation could range widely, from loss of a few cubic feet and a small area of grasses, forbs, shrubs, and trees, to loss of vegetation and soils in a much broader area. Erosion and sedimentation could affect areas downslope from the road, with resultant adverse effects. Depending on future plans, one or more of the temporary bridges could be reinstalled to allow more extensive work, resulting in additional effects on soils and vegetation to place the bridges.

Work to stabilize the park entrance, near Madison Falls, in December 2018 included excavation of approximately 1,000 cubic yards of native soil and placement of approximately 700 cubic yards of riprap and some excavated soil on the edge of the Elwha River. This impacted a large big-leaf maple and other vegetation along less than 200 linear feet of eroded riverbank.

Impacts from ECAA

General Impacts from Construction: Under alternatives 2-3, soils and vegetation would be affected at numerous sites along Olympic Hot Springs Road throughout the project, wherever excavation, fill, vegetation disturbance or removal, and/or hard surfaces are used. Equipment and workers in the construction zone (road prism from cut-slope to fill-slope) would undertake actions that would trample, remove, cover, and compact soils. Most work on the roadway would take place in areas previously disturbed by road-related maintenance and construction and visitor use activities. Actions associated with work on the upper road would not result in road widening or changes in its alignment. Instead, actions would include shoulder and culvert work, and work on the fill-slope at failing crib walls.

Loss of vegetation, including compaction from grading for gravel or asphalt surfacing, would change soil water infiltration. During excavation and grading, soils would be mixed, moved, and replaced with fill, causing a long-term change in soil profiles, loss of topsoil and vegetation, and decreasing soil productivity. Fine-grained soils in wet areas would be more likely to be compacted. This could decrease soil permeability, change soil moisture content, and lessen water storage capacity. Because of planned scarifying in exposed areas following construction, along shoulders and in turnouts, the long-term effects of construction-related compaction would be reduced in some areas.

Aggregate, asphalt, and soil fill materials would primarily come from commercial sources, therefore the park would ensure that fill is clean to prevent contamination of soils through weed seed or other unwelcome additives. Quarry areas and other materials sources proposed for use would be inspected for nonnative species to determine whether there may be noxious weed propagules. Determining weed-free status would be based on the time since materials were excavated and their storage time (if any) during or outside of the growing season. Although there is a higher risk of introducing nonnative species during construction, there would also continue to be a range of potential opportunities for this from day and overnight use by visitors from propagules attached inadvertently to boots, bicycles, vehicles, and equipment. As a result, ongoing monitoring of the area for new introduced species, as well as treatment of known infestations would continue.

Staging and Stockpile Areas: Materials, such as soil, gravel, rock, and logs would be stockpiled at the Elwha Boneyard, maintenance yard parking, Glines Canyon Spillway Overlook parking area, Boulder Creek Trailhead parking area, on the existing roadway, or in other pullouts along the route. Equipment would also be parked at these locations during the work. Storage may include fuel and removed asphalt. Water resources would be protected using silt fencing or other measures and covering stockpiles of loose materials would prevent contamination from weeds. Staging area use would occur throughout construction. Following disturbance, staging areas would be returned to previous conditions, including reseeding with a native mixture, where appropriate.

Lower Olympic Hot Springs Road
Several roadway sections susceptible to repeated flooding between the entrance and boneyard turnoff would be reinforced (raised and/or shifted slightly) to withstand periodic inundation. Approximately 26,000 cubic yards of fill material would be imported. Work would occur wholly within the road prism. Therefore, except for vegetation that has grown in the side ditches or road shoulders between maintenance actions, work would not be expected to cause additional vegetation disturbance.

Upper Olympic Hot Springs Road
Deep Patches: A small number of deep patches would be part of upper roadway rehabilitation. Deep patches include placing select borrow (rock) and geogrid/geotextile fabric underneath the roadway, which is then overlain with approximately 7 ½ inches of pavement. The area disturbed under the road is compacted fill material used in the original construction or subsequent repair of the roadway; however, some deep patches could affect deeper undisturbed native soils. Soils would be excavated, removed, and replaced with nonnative fill materials. Approximately 10,600 cubic yards of select borrow would be used. Excavation would be entirely within the roadway, including the road shoulders, and cause loss of small areas of native and exotic low-growing herbaceous plants on roadsides and side ditches.

MSE or Rockery Walls: Up to 10 MSE or rockery walls are planned for areas where the roadway edge is failing along a near vertical gradient (approximately 1,000 linear feet). These would be constructed in a similar manner to the deep patches; however, these would rise vertically adjacent to the roadway. In these areas, impacts to roadside soil and vegetation resources, such as large trees, could be minimized by excavating closer to/within the roadway, although native soils and vegetation would be removed. An estimated 10,000 cubic yards of soil would be replaced with fill, and adjacent areas would lose vegetation cover. Depending on the type of wall, construction would generally prevent the growth of trees within the wall. Other plants, such as small shrubs and forbs could become established.

Upper and Lower Olympic Hot Springs Road
Culvert Cleaning/Repair/Replacement: Replacing approximately 10 culverts of the same size and approximately 10 culverts with larger dimensions would improve fish passage and sediment delivery to the Elwha River, but would have a range of adverse effects on soils, including from excavation, fill, and removal.

An estimated 70-350 square feet would be affected at each location, depending on the size of the culvert and the need for adjacent rehabilitation work. Replacing culverts would cause an average of about 40 cubic yards of soil excavation for each one (about 12,000 cubic yards total). One culvert has a drop-inlet covers (grate) that screens large rock, while allowing the passage of sand and gravel to be part of water runoff. Culverts allow natural sediment discharge from higher elevations to reach the river, benefiting water and fish from natural erosion and nutrient enrichment.

Replacement of variably-sized ditch-relief and stream culverts (18, 24, 30, 36, and 48-inches) would have temporary adverse effects on soils (including adjacent areas from rerouting the flow of water, if needed, during replacement), including for installation of fish passage culverts, at 480+58 (S6) and 527+74 (S-D). These include replacing a 72-inch x 72- inch box culvert at S-6 Creek, and 108-inch culvert at Stream-D (Appendix 3).

Pavement rehabilitation: After roadway fixes, repaved in most areas would occur. Due to instability, some aggregate areas on the upper road could remain. Repaving would not extend the overall impacts on soils and vegetation beyond the shoulder. Paving turnouts, however, could affect nearby soils and vegetation from faster runoff and from excavation to layer a top course before the asphalt. During pavement rehabilitation, soils would be excavated, mixed and replaced with fill materials, including adding aggregate base to ensure a long-lasting surface. Paving would include asphalt milling and compaction, base and sub-base excavation (as needed), fill placement and compaction, and surfacing as appropriate to ensure a smooth, finished road surface. Except for the grade raise or reroute sections, this would occur in an area that was previously disturbed by the road. In rehabilitation areas, approximately 6-inches of road base (aggregate with a diameter of <1-inch) would be layered and covered with approximately 4-inches of asphalt concrete pavement. Paving would continue to alter the way runoff occurs and would affect the ability of soils to hold water.

Sign replacement/installation: Each of the regulatory and informational signs would require one or two post-holes to reinstall, causing a small amount of plant and soil disturbance, surrounding each signpost.

Nonnative Invasive Plant Treatment: Controlling nonnative species before, during, and after construction would preclude colonizing of renovated road shoulders and other open areas resulting from the project. Treatment would be consistent with the Programmatic Categorical Exclusion that documents the park's nonnative invasive plant management program.

Restoration: Following construction of the grade raise or realignment, the abandoned roadway within the floodplain would be excavated to remove the road subgrade, and re-contoured to match the surrounding terrain. This would be approximately 5-acres for the grade raise and 4.5-acres for the reroute.

Following construction, obliterated and disturbed areas would be hydromulched with a native grass and forb seed mix. These locally sourced seeds would be provided by the park. Although at first this would produce a look of wide grassy shoulders; later the area would be planted with a mixture of tree seedlings, native shrubs, and ferns to add to the native grasses and forbs. Native forest revegetation would assist recovery of the new cuts and fills (alternative 2) and/or obliterated roadway (alternatives 2 and 3).

The edges of the Olympic Hot Springs Road already contain nonnative and noxious weeds that would be treated with weed-free topsoil prior to seeding. This would improve these marginal habitats for a variety of native plants and small mammals. Seeding would result in restoration of approximately 5-acres disturbed by rehabilitation, as well as 11-acres disturbed by the new road alignment.

Impacts from Alternative 2

Reroute: Prior to reroute construction, sawyers would remove trees in the path of the reroute and on the hillslopes affected by proposed cuts and fills. Although two options were initially considered for the road realignment, beginning the reroute closer to Fisherman's Corner would affect far less forested area. Where possible, the largest trees would be avoided; however, approximately 18 acres of trees and other lowland forest vegetation would be removed. Tree removal would cause soil compaction as pioneer paths were created to remove them. These areas could also be used for more geotechnical drilling to confirm initial findings, and to inform foundation designs at wall locations. Helicopter-assisted drilling off the proposed roadway would improve slope stability design. Each new drill site would be approximately 2,500 square feet. This would affect a small area of vegetation which would be minimized to the extent possible.

Construction of the river diversions and access route that are needed to for bank hardening to hold the proposed reroute in place and to repair the previous entrance area bank stabilization would also affect soils and vegetation. To construct the reroute, approximately 50,000 cubic yards of soil and rock would be removed, moved and/or replaced. This is equal to approximately 2,500 20-ton dump truck loads. Because the proposed reroute section is located on a slope, there would be cuts and fills throughout the alignment. This work would affect primarily undisturbed native soils in, above, and below the alignment to create engineered slopes that would be stable during roadway use. To avoid excessive removal and importation of materials, cuts and fills would be balanced to the extent practical. This means that material excavated from a cut would be used to create a fill. Imported materials would be used for the road base and asphalt concrete pavement. Depending on the suitability of excavated materials for use in the project, there would be approximately 24,000 cubic yards of new material imported for the road, as well as an estimated 5,000 cubic yards of graded gravel road base and approximately 1,900 cubic yards of asphalt concrete pavement.

Equipment used in the road construction, such as excavators, bulldozers, backhoes, graders, vibrating compactors, pavers, and rollers, up and down the reroute corridor would be confined to the identified construction limits.

Road construction and improvements would include placement of fill materials on top of the soil profile and covering soil with impervious surface treatments. Surfacing would result in water running off rather than infiltrating, with potential resultant soil erosion from water concentrated off of impervious surfaces in ditches and culverts. Water runoff would also pick-up contaminants such as oil and gasoline residue and would enter the soil through adjacent unsurfaced shoulders and side ditches, resulting in potential localized adverse effects on vegetation and soils. Beneficial effects would occur from retaining topsoil during construction of new areas, such as pullouts, and pulling it back along the edges of the road to allow for restoration by seeding of native plants.

Overall, approximately 177 trees greater than 11 inches in diameter-at-breast-height (dbh) would be removed. Of these approximately 80 would be greater than 36 inches dbh, with an estimated 35 very large (50 to 70 inches dbh) trees removed. About 10 trees greater than 30 inches are just outside of the proposed clearing limits but could be affected. Most of the largest trees are Douglas-fir (Gremel December 2018) although, western red cedar and western hemlock trees could also be affected. The largest trees have potential marbled murrelet nesting habitat characteristics and are approximately 300 years old. Another set of large trees in this stand are approximately 150 years old (Gremel December 2018). Where possible, construction of the reroute would avoid the largest trees.

There would be a range of impacts on vegetation, from new disturbance for the rerouted roadway and to enable construction of the roadway within the clearing limits (4-acres for the road + 14-acres of cut and fill for a total of 18 acres). Some of the affected vegetation would also be riparian, especially along the east channel, where a series of walls would be constructed. Culvert installation on the nine tributary streams that cross the project area would also affect riparian vegetation.

The up to 10 walls would be primarily toward the north end of the project. These would be either rockery type (cut walls) or MSE walls and would comprise as much as 1,500 linear feet and total as much as 12,000 square feet of vertical area. Near the east channel, beginning slightly before the first wall and ending before the second wall, there would be approximately 8,500 cubic yards of riprap to stabilize the slope beneath the road, enhanced by engineered log jams and root wads.

Besides direct vegetation loss, indirect effects would include changes to the existing plant or wildlife community. These would occur in areas where, over time, the addition or loss of direct sunlight changes the local plant community type or favors early successional or nonnative species.

The reroute would provide the opportunity for weeds to be introduced to approximately one mile (18 acres) of currently forested lands, including both riparian and upland forest-types. This would result in the need for long-term monitoring during revegetation. Once weeds are introduced, they are very difficult to eradicate. A weed mitigation program would be needed for a minimum of five years although it could take longer to control or eradicate new weed species.

Impacts from Alternative 3

Grade Raise: Approximately 1,400 feet of the realignment would consist of a concrete span bridge. Walls of 800 feet and 130 feet would flank either end. In these areas, the roadway would be raised as much as 15 feet. Altogether there would be approximately 2,100-feet of roadway where the grade would be raised 10-15 feet, making it necessary to remove vegetation on both sides to allow the road to perch on its trapezoidal (inverted-V) base. Where it was the highest, this raised roadway would extend out approximately 20-feet on each side for a distance of about 3,880 feet and would therefore affect a range of vegetation from fill in that swath (1.5 acres).

Unlike alternative 2, there would be little flexibility in the road location through the floodplain because it would connect to the existing road at either end. Cut and fill impacts would not be balanced, resulting in the need for importation of most of the fill. Therefore the potential for bringing in contaminated fill would also be higher. Excavation of approximately 3,728 cubic yards would include removing duff and deteriorated pavement that would be of little use in the reconstruction of the road as a raised area.

Approximately 15 trees greater than 11-inches in diameter would be removed. Fewer large trees would be removed compared to alternative 2 and the trees removed would not be within old growth northern spotted owl/marbled murrelet habitat. Instead, tree removal would primarily occur within the riparian area and would be from the edges of the roadway where disturbance associated with opening the tree canopy has already occurred. In general, the area of vegetation removal for the raised roadway would be about three times as wide as it is now to allow for a stable edge to the roadway and additional resistance to flood damage. Revegetation could consist of plants that could live in the shadow of the bridge and taller stature vegetation on either side of the bridge.

Combined, this would result in loss of soil and vegetation over an area of 1.5 acres and a section of raised roadway that is 800-feet-long before the bridge and 130 feet-long after the bridge. Construction of the raised grade section would require importation of approximately 60,000 cubic yards of fill material, more than in alternative 2, because of the inability to balance cut and fill. Although the trees removed would not be as large as those in the proposed reroute alignment, they are located in considerably more sensitive habitats – wetland and riparian – and would impact more of these habitats.

Cumulative Effects: Habitat modification within and near Olympic National Park includes some areas where changes in vegetation characteristics have occurred due to fire suppression, visitor use, administrative, and private development. In addition, large areas surrounding the park are used for timber production. The park is surrounded by a range of successional forests. Loss of vegetation and impacts on soils have occurred where land has been developed for facilities, trails, and roads, and for private homes and businesses. Development, including roads, private property, and area administrative facilities in the park currently affects less than one percent of the land within the boundary. Combined, past actions have had localized, long-term adverse impacts on soils due to the increased impervious surfaces, decreased infiltration, soil compaction, loss of soil moisture, and loss of organic soil horizon when areas are converted to development. Elsewhere in the park, changes in river channel migration zones have affected soils and vegetation, especially in low elevation valleys. Within the project area, previous bank stabilization work has occurred near the entrance in several locations and at Fisherman's Corner. Work to place temporary bridges to allow administrative and some public access has also impacted soils and vegetation. With several roadways within the park proposed for rehabilitation in the next few years, including recent work on Highway 101 along Lake Crescent, there would continue to be a small range of impacts on soils and vegetation. Although most effects within the park in recent years are from actions like these – rehabilitation in previously disturbed areas – the park has also been engaged in a major river restoration project on the Elwha River. This led to the removal of two dams that had blocked the river for over 100 years and the downstream movement of sediment and LWD stored behind the dams and affected by the river as it changed from a sediment- and LWD-poor to a system rich in both.

When the actions in alternative 1 are added to past, present, and reasonably foreseeable future actions, there would continue to be a small contribution to cumulative effects. The action alternatives (2-3) would affect areas previously impacted by road construction as well as new areas affected by construction of either a reroute (alternative 2) or a grade raise/bridge (alternative 3). Although some placement of riprap would occur in both action alternatives (for reroute riverbank stabilization and for grade raise/bridge pier construction), much of the intent of the work is to remove roadway from the floodplain. When overall impacts are considered, relocating or raising the roadway above the floodplain would have fewer cumulative adverse effects on soils than retaining it in the floodplain. Cumulative adverse effects on vegetation would be greatest in alternative 2, followed by alternatives 3 and 1. Alternative 2 would mostly impact upland forest while alternative 3 would impact mostly riparian forest. The 18 acres of forest vegetation that would be removed in alternative 2 represent less than 3/100ths of 1% of Douglas-fir-hemlock forest type present in the Elwha River Valley (source: draft OLYM vegetation map). Riparian vegetation would be allowed to expand to the greatest extent under alternative 2, followed by alternative 1 and alternative 3. Riparian shrubs and trees are important for high quality aquatic habitats, including for shade, LWD inputs, insect production for food, sediment movement and deposition, and delivery of organic matter to the river, are all greatly diminished or lost when flooding is reduced or modified (Boyer et al. 2003, Florsheim et al. 2008, Segura and Booth 2010 in NMFS BO 2016:45).

Conclusion: Alternative 1 would retain both upland and riparian forested habitats and would improve both through removing road disturbance from the floodplain and eventually from the forest surrounding the upper roadway of both Olympic Hot Springs and Whiskey Bend roads. Because riparian forest habitat is more diminished than upland forest in the park, restoring more of this rich ecosystem and its ecosystem benefits to the Elwha Valley under alternative 2 would also further the goals of the Elwha River restoration that has been underway since 2012. Similarly, removing riparian instead of upland forest in alternative 3 would result the loss of fewer old growth trees (>30" dbh) but would adversely affect the more diverse community of plants and animals in the riparian and wetland areas.

3. Water Resources

a. Hydrology and Floodplains

Impacts from Alternative 1

Adverse and beneficial impacts from the Glines Canyon Dam removal on the Elwha River would persist. Post dam removal, the river is transforming from a wood/sediment poor to rich system. Flooding has caused loss of approximately 400 feet, in two different areas, of the Olympic Hot Springs Road. This loss is likely to continue and could expand under alternative 1.

Although the area between the entrance and the boneyard turnoff could continue to experience minor deposition from flooding, it would be maintained to accommodate administrative use of the boneyard, including the mule and horse corral in Sweets Field. Between Fisherman's Corner and the ranger station, increased effects from flooding would likely continue. Because the road and side ditches would not be maintained, and failures would be minimally repaired this section of roadway would continue to deteriorate. New channel formation in the Elwha River is anticipated to continue to affect the roadway.

Approximately 1,625 linear feet of the 22-foot wide road (1.5 acres) and the structures associated with it are in the 100-year floodplain. Other areas, such as the private property access road and the Elwha Ranger Station Historic District are barely one-foot above the 100-year floodplain. The presence of portions of the road and facilities within the floodplain would continue to adversely affect the natural hydrology of the Elwha River by creating barriers to water movement, limiting the use of historic side channels, and preventing the formation of new channels on the east side of the road (Figure 1). Road remnants and the Mabey Bridge abutments currently block access to the Elwha River floodplain near the former Elwha Campground and the oxbow. There, the road continues to adversely affect natural surface drainage by limiting infiltration. Effects occur during both regular flows and flood events.

During flooding, the road could continue to be overtopped and the river could use existing or new erosional channels through it. Although most changes related to dam removal have already occurred, flooding would continue to cause damage from the movement of sediment and LWD. Because of more frequent flooding, some channel changes are occurring even under typical bank-full, rather than flood, conditions. The most recent floods have been 5- and 25-year events.

As described by the USFWS, "The frequency, intensity, and location of interactions with road infrastructure will continue to change, and natural river migration and floodplain hydrology will [continue to] be impeded by road infrastructure" (NMFS BO 2016: 45). Where the road still exists in the floodplain, it blocks water flow and limits the formation of lower-velocity side channel aquatic habitats. Road infrastructure also limits the dispersion of water across the floodplain during high flows by restricting lateral movement and braiding of river flow toward the edges of its floodplain, except in the east channel, where braiding is evident. Lack of floodplain connectivity in other areas affects the "hydrological benefits provided by floods: benefits that are central to the productivity of aquatic, riparian, and floodplain ecosystems," such as the erosion and deposition of sediment (Cluer and Thorne 2013 *in* NMFS BO 2016: 45, see *Impacts on Fish and Wildlife, including Special Status Species*). These effects would be reduced or eliminated under alternative 1.

In the short-term, the NPS would remove some roadway where it is adversely affecting the ability of the Elwha River to migrate within its lower floodplain. Sections of the roadway remaining within the floodplain between the boneyard turnoff and the ranger station would be removed and the Elwha River would be able to expand more within its floodplain. In the long-term, there could be substantial indirect beneficial effects from developing a plan to determine how the park would continue to manage the Elwha Valley, if that plan called for removing more of the road and other non-historic infrastructure impeding river flow and channel migration in the floodplain.

Impacts from ECAA

Actions that disturb soil (excavating or placing fill, removing vegetation; concentrating runoff onto new, unstable surfaces, and changing surface permeability, such as new paving) would have short- and long-term adverse effects on area hydrology. Exposed soil can cause erosion during runoff, while concentrating runoff would minimize opportunities for water to infiltrate naturally in areas near the rehabilitated roadways. Road surfacing causes faster runoff, including transport of pollutants to surface waters.

Bank stabilization work at Madison Falls in December 2018 occurred after initial flood levels had subsided although, river levels were still higher than in summer. Therefore the river bottom was not visible. During operations, the park avoided in-water work, placing the base course of rock above river surface levels. No silt fence or settling pool was needed. Long-term repair of the bank stabilization work, including additional placement of LWD, would also use river diversion, if it was still adjacent to the bank, to allow work to proceed.

Approximately 40 ditch relief and 10 intermittent or perennial stream culverts would be replaced on the road. These would affect snowmelt, intermittent, and perennial streams to varying degrees, depending on the location and type of culvert. Culverts concentrate water rather than allowing for natural sheet flow across the ground surface. As a result, stormwater collects and may move faster toward other surface waters, thereby increasing the potential for erosion. This can be mitigated by the placement of rock at culvert outlets. With few exceptions (such as connection to side ditches), culverts in the project area flow to the Elwha River.

Culvert replacement requires use of sediment barriers, such as wattles, to minimize opportunities for soil from excavated areas to enter as a plume of sediment into flowing water. Although stream culverts would be replaced to the extent possible during the dry season, some perennial streams would need to be diverted during replacement, resulting in more opportunities for contaminants, including excess silt, to enter surface water. Several different means could be used to divert the streams, including diverting flow through an excavated channel, pumping, or another culvert. For those streams with fish, fish barriers would be placed and fish would be relocated from in-water work areas prior to dewatering.

A small range of new impacts on floodplains would be anticipated from rehabilitation work on the lower roadway between the entrance and the boneyard turnoff and north of the ranger station, where the road periodically floods. There would also be changes to hydrology from approximately 10 culverts that would carry tributary flows across the roadway throughout the project area. These culverts include culverts in the following sizes 24-inches (7), 9-foot (1), and 6 x 6-feet (1). Generally, rehabilitated culverts would be placed back in the same place as removed culverts. New culverts would either be installed in the dry, or tributaries would be briefly diverted for their placement.

The section of existing road within the 100-year floodplain near the entrance comprises 1.5 acres. Impacts would be from adding fill in two different areas to shift and elevate the roadway. Another area near the ranger station would be raised slightly to accommodate larger culverts where a wetland occurs on both sides of the roadway. These actions would result in excavation and fill (approximately 400 cubic yards over 1.3 acres) within the floodplain (below the OHWM). A floodplains statement of findings is included to comply with Executive Order 11988. Impacts from the slightly elevated roadway would be similar to the existing road, which is already slightly above the floodplain.

Rehabilitation work on the upper roadway (between Glines Canyon Spillway Overlook and Boulder Creek Trailhead would produce no additional impacts on floodplains. Replacement of approximately 10 culverts that cross the roadway between the overlook and the trailhead would affect approximately 360 cubic feet on either end.

Impacts from Alternative 2
Reroute: Realigning the road away from the river channel would restore floodplain, provide more reliable access and reduce roadway maintenance. The roadway and its infrastructure would be removed from the Elwha River channel migration zone, resulting in more unimpeded floodplain gain (approximately 5 acres).

Because part of the floodplain that would be affected by the new roadway is currently occupied by the Elwha River (the east channel), there would be short- and long-term adverse effects. To reconstruct the roadway above the channel, the Elwha River (if it remains against this east bank), would be relocated during bank hardening (similar to the work near the park entrance). This would adversely affect approximately 2.9 acres of floodplain, including direct effects from removing riparian vegetation along the bank (1.2 acres), constructing the new embankment (1.4 acres), and constructing multiple engineered logjams within the floodplain. To the degree that the river stayed adjacent to the east bank, it would flow along the riprapped toe of the slope, which would be excavated approximately 8-10 feet deep to catch the thalweg[6], riprap placed, and then reconstructed with large rock and engineered logjams to withstand future flow against

[6] the lowest line of subsurface flow

the cliff. These temporary impacts would comprise approximately 5.4 acres. Because stabilizing and hardening the bank would result in faster river flow, channel roughening measures would be incorporated in the design to reduce flow velocity and to improve fish habitat conditions (see *Fish and Wildlife, including Special Status Species and Essential Fish Habitat*).

Although approximately 1,353 linear feet of 22-foot wide (0.3 acres) of new roadway would remain within the floodplain, about 1,626 linear feet and 0.7 acres would be removed, resulting in a net benefit of 0.4 acres of roadway removed from the floodplain.

Temporary adverse effects on Elwha River hydrology and floodplains during construction would occur when the flow against the east bank is temporarily diverted. The diversion would be constructed using heavy equipment. The diversion would prevent water from entering approximately 1,160 feet of side channel and would remain diverted during construction for approximately one year. The diversion would be implemented and removed during a time that would minimize potential impacts on listed species. Approximately 500 cubic yards of floodplain sediments would be removed and temporarily stored during the diversion and then replaced where possible in the engineered bank.

Hardening the bank of the Elwha River at the edge of its floodplain could cause inadvertent effects downstream. Redirection and acceleration of erosional forces from hardened bank structures may create a chain reaction of erosion and stabilization responses that lead to additional bank hardening (Florsheim et al. 2008 *in* NMFS BO 2016:45). It can increase flow strength, which combined with reduced sediment supply, can lead to the channel deepening (Florsheim et al. 2008 *in* NMFS BO 2016:45). Conversely, when large woody debris is included in bank stabilization measures, the velocity and associated impacts of future flooding may be reduced.

Restoration: Recontouring and revegetating the abandoned roadway between the new east channel crossing and the private property access road would result in five acres of direct restoration, including removing asphalt.

Impacts from Alternative 3

Grade Raise: Because the channel migration of the Elwha River would continue to be dynamic and unpredictable, the road would follow its current alignment where possible, but would be raised to reduce its susceptibility to flooding. To avoid substantial impacts to the floodplain from reconstruction of the road, a 15-foot high, approximately 1,400-foot long bridge would be constructed. This would require raising the approaches to the bridge within the floodplain to meet the bridge elevation by constructing walls (on the north and south sides of the bridge of approximately 800 and 130-feet long).

While construction of the retaining walls to hold the roadway on either side of the bridge would primarily occur outside of the floodplain, bridge supports would require excavation within the floodplain. An estimated six piers would include excavation of approximately 10,000 cubic yards and placement of approximately 2,500 cubic yards of fill, including engineered logjams to support them. Each pier would be supported by an area of approximately 80 x 50 feet (4,000 square feet) of fill. The bridge abutments would be supported by approximately 5,000 square feet [100 x 50 feet] of fill. Altogether there would be 10,000 cubic yards of fill placed below the OHWM and 43,277 cubic yards above the OHWM. Placement of fill for the walls, bridge, and pier supports would affect water flow and impede the formation of off-channel habitat favored by fish for rearing and spawning. Compared to alternative 1, retaining the road in its current alignment by raising it above the floodplain in some areas would decrease its vulnerability to flood damage, while continuing adverse impacts on the Elwha River floodplain/channel migration zone. All of the fill associated with the alternative (approximately 53,277 cubic yards) would be placed within the floodplain, affecting approximately 1.3 acres of floodplain.

Restoration: Removing asphalt, recontouring and revegetating the floodplain beneath the bridge between the beginning of the bridge and the private property access road would result in 4.5 acres of direct restoration.

b. Water Quality

Impacts from Alternative 1

Ongoing maintenance and repair of portions of the Olympic Hot Springs Road located in the floodplain/channel migration zone, such as the entrance, would continue to have long-term adverse effects by altering the passage and quality of water flow. Areas within or close to the floodplain could further erode during flooding.

Small adverse effects on water quality would continue to be contributed by oil and other hydrocarbons released by vehicles on the roadway. Contaminants in stormwater runoff from hardened (surfaced/gravel) roads can affect water quality parameters such as the amount of dissolved oxygen in the water, turbidity, and pH. Changes in these can adversely affect fish and other aquatic resources. In the mainstem Elwha River, contaminants from the road would be diluted by the high volume of water in the river, particularly during high flow events. Currently, because travel is comprised only of administrative staff on the 0.5-mile section of roadway from the entrance to the boneyard turnoff, releases would likely be smaller than in the past.

Although unused in the short-term, unpaved road sections generate dust during dry periods and this dust often coats adjacent vegetation and washes into the surrounding area, including waterbodies, during storms. Localized impacts due to undersized, damaged, or clogged culverts and poor drainage conditions could also contribute to sedimentation. Poorly located, plugged or undersized culverts can cause rapid erosion of road fill during floods and contribute to road failure, adversely impacting water quality.

Eventually, there could be additional small temporary impacts to water quality from removal of the portions of the road within the floodplain. Removal during dry periods would limit effects. This removal would have long-term beneficial effects from eliminating impediments to water flow and the potential sources of contaminants from the floodplain/channel migration zone.

Placement of approximately 700 cubic yards of riprap to armor the bank of the Elwha River near the park entrance had impacts similar to, but not as extensive as, those identified in alternative 2 for the east channel wall because rock placement took place from the bank.

Impacts from ECAA

Many existing impacts to water quality would continue; however, culverts in poor condition, poorly located or functioning culverts would be replaced. Some culverts would be enlarged to better carry existing and anticipated stormwater flows. These changes would improve drainage off the road. Measures including silt fencing, fiber rolls, and other BMPs would be used to mitigate sediment releases associated with temporary construction impacts.

Most impacts to water quality would occur during the first rains following construction (from sediment transported offsite during uncontrolled stormwater runoff). Typically, the most contaminated stormwater also occurs with rain after long dry periods, when petroleum products and other vehicular discharges have had a chance to accumulate on the roadway. Other areas sensitive to erosion would include earth stockpiled during construction in staging areas. Still other potential impacts could occur from spills of fluids or petroleum products during refueling or maintenance operations within construction areas, although, mitigation measures would be used to prevent these.

Madison Falls: Although BMPs would be used for the entrance area bank stabilization work, potential adverse effects on water quality could occur if the Elwha Riverneeded to be diverted from the work area.

Road Rehabilitation: Short- and long-term localized adverse impacts on water quality could occur, depending on soil moisture, weather conditions, and the effectiveness of BMPs and mitigation measures.

Resurfacing: Where it is present or replaced, surfacing would continue to affect water quality by contributing faster runoff of dirt and oil and other roadway contaminants, generated from vehicle travel, into nearby water courses, causing small short-term adverse effects. Flushes of runoff during storms would also contribute to long-term effects to the extent that these pollutants persisted in streams or the Elwha River. Petroleum products and metals are deposited onto road and parking lot surfaces from vehicles and picked up during rain and snowmelt. Contaminants, may also indirectly affect water resources through infiltration into groundwater.

Culverts: Most culverts affected by the proposed project do not carry perennial or intermittent streams; rather, they are used to convey rain and snowmelt as "ditch relief" culverts.

Construction: Actions and impacts from construction, including excavation, grading, importing fill, loss of vegetation, and potential spills, would rehabilitation of the road . Despite required BMPs to prevent them, construction activities such as refueling and use of heavy equipment may result in spills of oil or fuel that could enter water sources during stormwater runoff. Accidental release of hydraulic fluid, diesel fuel, and other petroleum products during construction is also possible if mitigation measures fail.

Because most actions would also occur during the summer dry season in areas removed from the Elwha River, effects from road rehabilitation would likely be small. Coupled with work along the Elwha River, on other major creeks, and on intermittent drainages there would be work in-water to place new culverts, work on existing culverts and installation of new and replacement culverts that would have the potential to contribute sediment directly and indirectly to streams and the Elwha River. Adherence to the use of required BMPs would reduce or avoid short-term, localized effects on water quality.

Stockpiled earth and other materials in staging areas within the project area are also susceptible to erosion from stormwater. The Water Quality Certification will require the construction contractor to develop a water quality monitoring plan and measure turbidity. If turbidity reaches certain thresholds, stop work can be issued to prevent salmon mortality. The localized potential for sediment releases at all in-water work sites is high, but will be mitigated through BMPs and monitoring.

Proposed actions under the alternatives, including rehabilitation of 7.2 miles of roadway, may affect water quality. Impacts would occur from excavation (which would loosen soil materials); stockpiling of topsoil and other materials (which could be affected by runoff during seasonal rain or snowmelt); vegetation disturbance and modifications (removal, grubbing and flush-cutting, which would also open up new areas to erosive action by water once soil was disturbed); and drainage improvements such as installation of new culverts (which would affect wet soils and would loosen soil materials and temporarily subject them to erosion).

Combined, short-term effects on water quality would be small and localized in the area of improvements and would depend on weather conditions during construction. Although most construction areas on the roadway are sloped, the rehabilitation portion of the project, especially the upper road, is generally located some distance from the river and perennial streams, and most construction activities would occur after snowmelt. Project actions, including riparian restoration along the former roadway (reroute) or the bridge (grade raise) are not expected to raise the temperature in the river. Instead, adding more cover should reduce the temperature and help the river to meet regulatory requirements.

Impacts from Alternative 2

In addition to impacts associated with ECAA, there would be instream construction activities that could cause erosion and sediment releases, leading to possible elevated in-water levels of suspended sediments in the east channel and the mainstem Elwha River, including from diverting the river to reinforce the bank and to create a pioneer road for the reroute on the other side. Soil disturbance from construction activities within the floodplain, particularly when they occur within the channel or on the banks/margins of tributary streams, would have the potential for adding to or increasing sediment delivery, consequently elevating turbidity during initial rain events following construction activities.

Project actions that may discharge sediment include diverting the east channel into the mainstem river to allow the construction of a wall along the riverbank to support the road and to place riprap, including engineered logjams to support the road. Similarly the potential for sedimentation would be present in other tributaries and side channels from construction of culverts. Diversion and placement of silt, construction fencing, or other flow mitigation devices would minimize impacts on water quality. Impacts would also occur from removal of the bridge abutments and from removal of roadway within the floodplain.

Even using BMPs to control sediment, there could be episodes of increased sediment/turbidity, particularly when it is necessary for heavy equipment to cross the river or stream channel or to place materials below the OHWM. The potential for suspended sediment (i.e. turbidity) levels and subsequent deposition would be highest where in-water construction activities are proposed. Elevated levels of suspended sediment may also occur in the mainstem Elwha River and downstream of its confluence with the new side channel and with the east channel terrace as road removal from within the floodplain continues.

Impacts from Alternative 3

In addition to impacts from ECAA, there would be a range of adverse impacts on water quality, similar to alternative 2. Besides construction impacts, there would be in-water work associated with construction of the 1,400-foot long bridge, including the drilling and setting of approximately six piers, around which riprap and LWD would be placed to deflect river flow and floods. In addition to the bridge, a 242-foot segment of roadway would be reconstructed within the floodplain. The continued presence of these impediments in the floodplain would also affect the velocity of water flow and sediment releases and, in turn, water quality. Armoring the road banks could affect the ability to stabilize sediment during construction. Heavily armored areas would be more difficult to revegetate because they would have fewer areas available for plant growth. Ongoing maintenance of vegetation in the armored areas would also be necessary, resulting in the potential for very small long-term adverse effects on water quality. Even with the use of BMPs to control sediment, there could be episodes of increased sediment/turbidity, particularly during stream or river channel crossings, as well as during placement of riprap or revetment on road shoulders below the OHWM.

c. Wetlands

Impacts from Alternative 1

In the short-term, there would be no additional impacts on wetlands under alternative 1 (Appendix 3). There are approximately twelve 18-inch culverts, nine 24-inch culverts, one 34-inch culvert, two 36-inch culverts, and one each 48-inch, 60-inch, and 72 x 48-inch box (Madison Creek) culverts on Olympic Hot Springs Road. The Griff Creek box culvert is 26-feet. Six of these are considered fish-passable.

Existing impacts would continue. For instance, south of the Whiskey Bend Road turnoff, on both sides of the road, there are several hundred linear feet of wetland. Some was created by the roadway and some is associated with a wetland complex that extends to the east (WFLHD 2017). Ongoing ditch maintenance has adversely affected these wetlands from sedimentation and from flow diversion. Standing water in the area has also infiltrated the pavement structure. The roadway over the top of this area has subsided and cracked and been patched repeatedly (WFLHD 2017).

Near the wetland, there are also several poorly functioning culverts that may also be partially responsible for the wetland. Water flow has been directed into culverts at each end but continues to flow, particularly on the east side of the road between the culverts. One of two perennial fish-bearing streams has an inadequately sized and/or plugged culvert (60-inches). During initial surveys for roadway rehabilitation, this culvert was about ¾ full of sediment that likely came from Whiskey Bend Road.

Small adverse effects on wetlands from culverts located along the main and upper roads would continue. Without rehabilitation of the upper roadway, however, impacts from existing culverts would be small. There would be long-term beneficial impacts on 0.01 acres of wetlands from removing one culvert and the road within the floodplain.

Impacts from ECAA

There would be a range of small impacts to wetlands tied to culvert replacement from rehabilitation of the road. Most of this would occur in the upper section; however, areas on either side of the reroute would include culvert replacement. Approximately 7 of 30 culverts would be replaced (about 6 of these with a larger pipe and one with the same size pipe), and another 18 would be cleaned, with one of these also repaired. Two of the fish passable streams (Sanders Creek and an unnamed stream near Griff Creek) would have more room for water passage. Additionally, a grade raise required to accommodate the 6’x6’ fish passage box culvert at stream S-6 will involve some fill in wetlands (W-7/8).

Excavating soils in wetlands to replace culverts along the road could impact approximately 1.3 acres of wetlands to replace or upgrade ditch relief, intermittent, and/or perennial stream culverts. These impacts would occur at the culvert ends and would affect a small degree of soils and vegetation from excavation (approximately 60 square feet at each end for an 18-inch culvert, with more excavation for larger culverts). These disturbed ends would be restored following culvert replacement. With replacement during dry periods, most culvert replacement would have short-term adverse effects. Replacement of larger culverts on perennial streams, however, would take longer and have more potential for adverse impacts.

Impacts from Alternative 2

Impacts associated with constructing the reroute would include 15 new ditch relief and five perennial/intermittent stream culverts. These would range in size from 24 - 108 inches. Combined, there would be a total of 9,300 square feet (0.21 acres) of direct and 950 square feet (0.2 acres) of indirect impacts in four wetlands (Table 11: Wetland Impacts, Appendix 3). Combined, there would be a total of 1,465 square feet (0.13 acres) of direct and 345 square feet (0.03 acres) below the OHWM in four streams. In the Elwha River, there would be 5,000 square feet (0.12 acres) of direct impacts (Table 12: Stream-Associated Wetland Impacts, Appendix 3). In the east channel, there would be approximately 1,000 linear feet of channel disturbance (2.92 acres) of direct impacts.

Under alternative 2, impacts to the Griff Creek wetlands would be minimized by adding and improving culverts, side ditches, and other drainage features. The new culvert would be a fish-passable culvert for a perennial stream (72-inch box culvert), while the 24-inch culvert at station 474+27 (S-7) would be replaced in-kind.

Impacts from Alternative 3

A range of impacts on wetlands would result, including ongoing, but slight improvement in adverse effects from alternative 1. Because the road would continue to be located in the floodplain, the Elwha River could continue to flow alongside the riprapped raised roadbed, affecting flow velocity and aiding or impeding creation of riverine wetlands. Compared to alternative 2, there would be fewer effects on wetlands (0.41 acres) because there would be no need to relocate the river from the east channel.

Cumulative Effects (Hydrology and Floodplains, Water Quality and Wetlands):

Hydrology and Floodplains: The release of nearly 14 million cubic yards of sediment and associated wood from Lake Mills, combined with the restoration of natural sediment and wood recruitment, has led to a highly dynamic system.

Dam removal restored the sediment/wood load that had been absent from the Elwha River for 100 years, making the channel more dynamic. This resulted in a more sinuous river that is both eroding and depositing sediment as it migrates across the floodplain. The area is continuing to undergo large-scale ecosystem recovery, including “hydrologic and geomorphic changes, particularly increased flows, increased channel braiding with greater flow in floodplain off channels, and changing sediment deposition rates and bed sediment grain size within the Elwha River" (East et al. 2015 *in* NMFS BO 2016: 45). This has resulted in profound changes in the developed infrastructure in the Elwha Valley, particularly the Olympic Hot Springs Road. Because of the interplay between live trees eroded into the channel, existing wood in the channel, and sediment recruited from local erosion and still moving through the system from dam removal, the river response is difficult to predict (NMFS BO 2016).

Sediment modeling also showed that park infrastructure in the floodplain would be vulnerable to future flooding; however, it could have occured soon after removal or at some distant point. Because raising the roadway could not be considered mitigation and could have unforeseen consequences, regulatory agencies were concerned. Consequently the decision to monitor and react when needed was made. Under current planning, the original mitigation of raising the roadway was dismissed because it would not meet the purpose and need (see Alternatives and Actions Considered but Dismissed). In hindsight, had this proposal been implemented, it would not have been adequate to solve the problems caused by recent flood events.

When the effects of past, present, and future actions are added to the alternatives, including the goal of restoring a free-flowing Elwha River, alternatives 2-3 would continue the significant beneficial effects of dam removal and avoid damaging effects on the Elwha River and its floodplain by either raising the roadway or rerouting the road. Fewer long-term adverse effects on the floodplain occur under alternative 2 than under alternative 3. Alternative 1 could also benefit hydrology by eventually removing some infrastructure in the floodplain.

Following flooding impacts and campground closure, direct and indirect restoration of floodplains occurred from removal of infrastructure. Approximately 7.6 acres of direct and indirect restoration resulted from removing infrastructure, including 14,880 square feet[7] from the former Altair Campground and 19,680 square feet associated with the former Elwha Campground. Paved roads in the campgrounds were restored to natural conditions (1,426 linear/17,107 square feet in Elwha and 2,640 linear/31,680 square feet in Altair). Some indirect restoration included areas within the campgrounds that had long-been cut-off by the presence of the road in the floodplain.

<u>Water Quality</u>: Past, present, and future actions have affected, or will affect, water quality in the Elwha River and Olympic National Park (for example, construction of roads and other visitor facilities, and the subsequent maintenance to retain/reconstruct them). Dramatic adverse effects on water quality occurred during dam removal from the amount of sediment released, including from the loss of vegetation which may have contributed to potential localized increases in temperature and the inability to meet the TMDL. Flooding has washed away segments of the road and resulted in unknown impacts from turbidity. Since most of the road fill is coarse-grained, it is deposited quickly and has small, temporary effects on water clarity or quality. Because the river already carries a high volume of sediment during floods, the increase has been incremental due to the amount of material washed into the river compared to the size of the watershed and the volume of water and sediment it produces. Most of the sediment in the river

[7] For this calculation, 480 square feet was used for parking pads and 625 square feet for hardened area associated with campsites

channel is being produced naturally by bank erosion, including upstream avalanches, during flood events and is not a direct result of past or present human activity.

Other visitor uses and facilities in the park, including within the project area also have contributed to sediment and pollutants, including from litter, oil, and other contaminants that enter drainages and affect water quality. For example, septic systems may affect water quality. The combination of planned restoration and visitor facilities would contribute a mix of beneficial and adverse impacts to water quality. Overall impacts are primarily short-term and localized.

When the impacts of past, present, and reasonably foreseeable future actions are combined with the alternatives, they would be coupled with temporary adverse effects from construction of either the reroute (alternative 2) or the grade raise (alternative 3) and a small degree of cumulative adverse and beneficial impacts from removing facilities from the floodplain.

Wetlands: Within the Elwha Valley, there are 7.6 acres of riparian areas affected by development. This development in riparian areas (riverine wetlands) includes roads, former campgrounds, trails, administrative facilities, and private property. Actions in the alternatives would contribute localized long-term beneficial effects from removing the road from the floodplain. Adverse effects would occur in all alternatives, including from removal of the road within the floodplain and from construction of the reroute support structure along the east channel in alternative 2. The most long-term adverse effects, however, would occur in alternative 3 from in-water work to install bridge piers and from the retention of these within a wetland. Beneficial effects would be contributed by the construction of engineered logjams in alternative 2 and from incorporating LWD into the bridge pier protection structures in alternative 3. The contribution to cumulative impacts on wetlands would be small in comparison to the number of acres where development currently affects riverine wetlands/ riparian areas in the park.

Conclusion (Hydrology and Floodplains, Water Quality and Wetlands):
Hydrology and Floodplains and Water Quality: Removing the road from nearly all (alternatives 1 and 2) or part (alternative 3) of the floodplain would have long-term beneficial effects on hydrology, floodplains, and water quality. Surfacing would also create both adverse and beneficial effects, with more new surfacing in alternative 2, but more roadway in the floodplain in alternative 3.

Wetlands: Overall, impacts from rehabilitation of old and installation of new culverts would be similar in alternatives 2 and 3, with most impacts being short term, localized, and related to construction. In alternative 3, there would be less potential for creation and nourishment of wetlands from floodwaters reoccupying the floodplain and the river cutting new channels. In contrast, Alternatives 1-2 would allow for expansion of wetland areas as the river continues to migrate within its floodplain in areas where the road was rerouted or removed.

4. Fish and Wildlife

Impacts from Alternative 1

No additional impacts to fish and wildlife species or habitat would result from the implementation of alternative 1. Existing impacts, including from the continued presence of most of the Olympic Hot Springs Road would continue. Adjacent to the road corridor, wildlife is likely habituated to human activity from decades of attendant human activity, vehicles, and noise.

Routine and recurring maintenance on the roads, such as mowing, guardrail repair, crack sealing, culvert cleaning, ditch clearing, and other activities could cause periodic noise and human activity that would have short-term localized impacts on wildlife presence, disrupting animal movement and temporarily displacing species from areas of activity. Under alternative 1, activities would occur primarily on the first two miles of roadway and would be diminished compared to activity for over 100 years. Due to the low level of traffic (except near Madison Falls) vehicle-wildlife collisions would be unlikely.

The road would also continue to impede water and aquatic wildlife movement between the west and east banks of the river valley. Runoff could also continue to pick up pollutants and carry these toward the Elwha River, potentially causing localized effects on water quality and affecting fish (see *Water Resources*). If catastrophic flooding occurred again, the road could fail in other locations, wildlife habitat would be altered, and water quality could be degraded. Potential adverse effects on wildlife habitat from undersized or plugged culverts on Olympic Hot Springs Road would continue until they were repaired or removed.

Impacts from ECAA

The park would resume ongoing routine and recurring maintenance along Olympic Hot Springs and Whiskey Bend roads. In addition to the effects of noise and disturbance associated with construction, the following specific actions in staging areas, on the road, and in adjacent areas, could affect fish and wildlife:

- Above ambient noise, activity, and emissions associated with project implementation (such as from tree and vegetation removal, and asphalt grinding/placement)
- Soil removal, excavation, loss, and replacement with fill to construct walls, culverts, etc.
- Native and nonnative vegetation removal in preparation for specific actions along the roadway, such as deep patches, walls, guardrails, and staging areas
- Importation of fill materials
- Culvert maintenance, including cleaning, replacement, and installation
- Revegetation/restoration.

Impacts to wildlife would primarily consist of noise and disturbance from road rehabilitation activities, because activities common to both alternatives would occur in areas previously impacted by the road prism (cut-slope to fill-slope), although both alternatives would also have other impacts from new construction. Rehabilitation activities would have small adverse effects because roadsides generally provide low quality wildlife habitat.

Other impacts from construction that could affect wildlife include:

- Dust emanating from construction sites could affect the use of surrounding habitats
- Diversion of water flows during construction would result in unnatural drying or wetting of habitat in the vicinity
- Wildlife could be killed by traffic or machinery associated with construction
- Pits and trenches could entrap and potentially kill wildlife
- Inadvertent spills of fuel, oil, hydraulic fluid, antifreeze, and other toxic chemicals could affect wildlife, especially if spills uncontrolled by BMPs reach surface water

- Ineffective implementation of BMPs could also cause construction personnel, and area residents or visitors to provide a source of human food to wildlife, resulting in wildlife habituation and human/wildlife conflicts

Road Rehabilitation: Road rehabilitation would coincide with the visitor use season, when some of the heaviest traffic previously occurred in the project area. As a result, noise and activity could be similar to the previous level of noise and disruption in the project area. Depending on the work being accomplished, road construction could be concentrated in various locations and occur from March – November. Most work would be halted during the heaviest precipitation. In general, most wildlife would tend to avoid the construction areas during daylight hours when project work was occurring. In the evening and on weekends when work would usually cease, wildlife could return to the project areas. Some species, such as birds, deer, and squirrels might also be seen throughout the day.

Actions would likely result in some disturbance and elimination of small mammals and invertebrates not able to move quickly away from excavation. Medium-sized mammals could also be displaced during construction, forced as a result of human activity, to relocate outside the construction limits. This could increase their susceptibility to predation or competitive stress. Displacement could also result in a slight population depression adjacent to the construction area for some species, but following project completion and successful restoration, wildlife would again reoccupy restored portions of the project area (NPS 2004: 65).

Road rehabilitation would result in limited localized wildlife habitat modification and loss. Removing vegetation and soils would cause short- and long-term localized loss of food and shelter. Where trees and shrubs are removed, this would preclude a return to the former level of use by wildlife. For example, loss of trees removes ing areas birds formerly used to perch, forage, and nest. Similarly, loss of some trees and shrubs could locally reduce shelter for some mammals, such as voles and flying squirrels. Loss of cover along the roadway could reduce the incidence of some species, such as deer, which would be compounded by the loss of some desirable browse for this species. Incremental loss of vegetation could also cause short- and long-term localized impacts to a few species depending on where habitat changes occurred. For example, impacts in wetter or edge habitats, such as riparian areas would be likely to affect more species.

The entire project area, except for staging, is comprised of the road prism, from cut-bank to fill-slope, including the road, shoulders, side ditches and other drainage or protection (guardrail) features. Except for a short alignment shift within the rehabilitation sections, area not disturbed as part of the original construction of the road is unlikely to be affected. Another area in the vicinity of the proposed 6-foot x 6-foot box culvert (near the Whiskey Bend Road junction) would also be raised. The new road embankment would extend slightly beyond its original footprint to accommodate this fish-passage modification.

Culvert Replacement: Should BMPs fail, work occurring near water resources, such as culvert replacement, has the potential to cause sedimentation in adjacent or nearby aquatic habitat. Even with BMPs in place, some construction generated turbidity is likely to occur, but will be mitigated through BMPs, water quality monitoring and stop work authority. Turbidity could reduce dissolved oxygen for fish and amphibians within the project area and downstream.

Because mitigation measures would be expected to be effective and would remain in place until the potential for impacts ceases, potential impacts to fish and wildlife would be temporary.

Imported Materials: The importation of fill materials, particularly topsoil, has the potential to cause changes in the microbial composition of the soil, thereby potentially altering its utility or viability for organisms, such as invertebrates and amphibians. Most imported topsoil would come from the Olympic Peninsula; however, other sources could also be used. Because most materials imported for the project would be for subsurface replacement and because soils in key habitat areas would remain undisturbed, effects from importation would be small.

Public Use: Once the roadway is open again to public use wildlife-vehicle collisions are likely to resume. Collision potential would remain the same as before the road washed out. Nonetheless, this could result in a long-term, albeit a low level adverse effect on some wildlife species.

Impacts from Alternative 2

The road reroute would affect approximately one mile of mostly undisturbed habitat. Three acres of new road within the overall disturbance area (18 acres) is needed for construction, and would include the removal of vegetation/wildlife habitat. This would have a long-term localized adverse impact on wildlife. In addition to loss of vegetation along the road alignment and adjacent cut and fill areas, soil and rock would be removed and/or relocated within the construction area and structural and surfacing fill would be imported.

Adjacent forest would be lost where cuts and fills were constructed, resulting in fewer perches and nest sites for birds and less food and cover for mammals, as well as a change in the microclimate, with fewer trees contributing to shading and with more sunny openings, among other impacts. Small beneficial effects would result from the creation of edge habitat for wildlife, along the new section of roadway, which would also adversely affect wildlife by increasing the potential for vehicle-wildlife collisions.

Because the road reroute would remove vegetation and convert the area from a relatively undisturbed native forest to a developed landscape, effects from habitat loss in this narrow strip of forest would be long-term. With revegetation, over time many of the cut and fill areas would again serve as wildlife habitat, although the loss of old growth trees in this area, as well as the loss of the complex habitat associated with them would be permanent. Nonetheless, similar habitat would be available elsewhere in the vicinity and the habitat type, including the presence of large trees, is common in the area.

Impacts to upland habitat on the reroute would be offset to some degree by removal of one mile of road from the Elwha River floodplain. Since the valley (and watershed) contain far less riparian than upland habitat, this restoration of riparian habitat could be more valuable for some wildlife species.

Alongside the east channel, placement of riprap would not only result in the loss of vegetation, but would also preclude vegetation reestablishment due to the hardened bank and the need to maintain it. Part of the bank hardening would consist of several engineered logjams. Where possible, large conifers would be salvaged from project work, and used for this purpose, and to benefit fish by providing cover and vegetation reestablishment by providing a suitable base.

Fish would be temporarily adversely affected by the diversion of the east channel to construct the wall that would retain the beginning of the reroute, however measures would be taken to avoid fish stranding. Although the water velocity within the channel tends to be high, spawning of Chinook salmon, steelhead, and coho salmon has been observed. The area is used as rearing habitat for fish and other aquatic species. Therefore, the temporary diversion of the channel and then its reunification could adversely affect some species.

Following construction, restoring vegetation to approximately seven acres, including approximately four acres of cut- and fill-slopes with native species would improve wildlife habitat values in the reroute area.

Impacts from Alternative 3
The grade raise would affect approximately one mile close to the present road alignment. More disturbance would occur at either end of the bridge and in a 242-foot section in the floodplain where the road would be raised to make it better able to withstand future flood flows. In these areas, approximately 0.26 acres of trees and other vegetation would be removed to accommodate a wider road base. Although no large, intact habitat areas would be disturbed, roadside habitat, where large trees occur intermittently, would be affected.

In addition, above-ambient noise and activity would result from project implementation (with consideration for dawn and dusk exclusions during marbled murrelet nesting season – see special status species mitigation). Bridge construction would require blasting and pile driving, activities that would have temporary adverse effects on wildlife. Short- and long-term effects on aquatic habitat would result from installing the bridge piers. Construction of the raised roadway or bridge would reduce some riparian vegetation cover for fish. Nonetheless, construction impacts would be localized within an already highly modified road corridor, and a great deal of suitable wildlife habitat would continue to be present in the vicinity. No old growth trees would be removed. Therefore, impacts would be localized and short-term and would not be expected to result in direct changes in overall wildlife presence or loss.

Cumulative Effects/Conclusion: See *Special Status Fish and Wildlife*

5. Special Status Fish and Wildlife

Impacts from Alternative 1

Special Status Fish

Under alternative 1, initially there would continue to be reduced habitat quality and quantity in the vicinity of the former roadway. The Olympic Hot Springs Road in the floodplain/channel migration zone of the Elwha River would continue to prevent the Elwha River from occupying its eastern floodplain, acting like a dike as it forces the river away. Forcing the river channel to stay to one side inhibits the formation of side channels and braiding.[8] During and following dam removal, the river began to push toward its eastern bank, with floodwaters occupying the east

[8] Meandering rivers create slower moving off channel habitats, improving habitat for salmonids. Salmon typically use off channel habitats (alcoves or backwaters) to rear, feed, and produce young. Slower moving areas provide refugia from the higher flows in the main river, reduced competition for food and space, and productive feeding areas. They improve predator avoidance, and can improve growth and survival (see Martens and Connolly 2014 *in* NMFS Elwha BO 2016:36). Juvenile salmon use floodplain habitat more than the river itself for rearing (Pess et al. (2008) *in* NMFS Elwha BO 2016:36).

channel as often as every two years, while increasing in flow frequency and magnitude.[9] Currently, the swift channel flow prevents substantial spawning by special status fish. Eventually, with removal of the roadway from the floodplain, salmonids would not only pass through the channel, but the velocity in the channel could slow and provide better spawning and rearing habitat. Currently, because of the bridge abutments, accumulation of LWD, and road, the river is prevented from occupying nearby areas that might cause it to spread out and reduce velocity. This would eventually be possible in the east channel as well, if the river began to braid within its floodplain, unconstrained by the road.

Although BMPs would be used, removal of the Mabey Bridge supports and roadway within the floodplain could result in discharge of sediment to these areas, including the Elwha River and adjacent tributaries. Compared to past conditions, because only administrative vehicles would travel beyond the entrance, there would be greatly reduced opportunities for pollutants from motor vehicles to enter the Elwha River and surrounding area.

The dramatic increase in habitat availability for salmonids that has taken place since dam removal would continue and could expand under alternative 1, with removal of more of the flood-affected roadway. The recolonization of historically accessible habitats in the Elwha River by salmon is a key component of overall ecosystem recovery. These changes would continue to benefit fish community structure, allowing more fish to occur in the middle and upper reaches of the Elwha River and tributaries, in places where dams previously precluded upstream passage. Puget Sound Chinook salmon and steelhead spawning and rearing now occur within these reaches (Denton et al. 2014; Denton et al. 2015; McHenry et al. 2015; McMillan et al. 2015 *in* NMFS BO 2016:34) and could spread.

Under alternative 1, spawning habitat for Chinook or other salmon species would remain very limited in the fast-moving east channel. Unstable river areas in the washouts also do not provide high quality suitable spawning habitat. Currently, water depth in the channel is often deeper than they prefer and velocities are greater.

Chinook Salmon: Fish use is higher in the mainstem for Chinook. Compared to approximately 1,600 redds found in the Elwha River, there were seven found in the east channel in 2017. Although juvenile salmonids may rear in the channel, it is not considered high quality rearing habitat.

Steelhead Trout: Fish use of the channel has been observed, for example, five steelhead redds were found in the Elwha east channel in 2016. Steelhead spawn in the mainstem river (however no redds were found in 2016), Indian Creek, Little River, Hughes Creek, Cat Creek, and the lower reach of Griff Creek, but not in smaller tributaries.

[9] As the Elwha River eroded the floodplain to the west and moved toward the road, the river began to flow both within its floodplain and to combine with flow in the east (Sanders Creek) channel. Prior to dam removal, only rare (>10 year recurrence interval) floods would overtop the road and send water down the road surface or into the Sanders Creek channel.

Bull Trout: As with Chinook and steelhead, impacts would be similar for bull trout spawning, which is unlikely to take place in the deeper, fast moving waters of the east channel under alternative 1. Adult or juvenile bull trout may use the area as habitat and are likely present.

Pink Salmon: Pink salmon populations have recently crashed from loss of spawning habitat due to dam removal. Similar to other species, they prefer slower moving waters, located in broader flat channels for spawning, which could become more available when infrastructure preventing the river from slowing and spreading out within its floodplain is removed.

Coho Salmon: Although Puget Sound/ Strait of Georgia ESU coho salmon are not listed, they also declined precipitously when the dams were constructed and have since begun to recover due to dam removal and relocation programs. In 2016-17, they were found above Glines Canyon, spawning in Boulder and Hurricane Creeks. Similar to other species, eventual actions to remove additional infrastructure, including the road within the floodplain, would benefit them.

<u>Special Status Birds</u>
Northern Spotted Owl and Marbled Murrelet: No additional impacts would accrue to special status birds under alternative 1. Existing impacts, however, would continue. Northern spotted owl and marbled murrelet habitat would continue to be disturbed by ongoing road use and maintenance of Olympic Hot Springs Road (north of the washout sections). There would be no impacts from the use of the upper roadway or the Whiskey Bend Road. Because the roadside does not contain habitat trees, noise and disturbance would be the likely effects. New ground disturbance with the potential to impact individuals or suitable habitat for these species would be associated with removal of the portions of Olympic Hot Springs Road in the floodplain between the entrance and the Elwha Ranger Station Historic District. Because of the road closure beyond the Madison Falls parking area, disturbance associated with traffic (including noise and human activity from visitor use) would continue to be inconsequential. Routine use combined with routine and recurring maintenance may affect but would continue to be unlikely to adversely affect northern spotted owls and marbled murrelets. Nesting season restrictions would continue to be used to protect northern spotted owl and marbled murrelet habitat.

Noise and activity during roadway removal within the floodplain could disturb nearby northern spotted owls and marbled murrelets. Because no spotted owls have been observed in the area in many years, effects would be unlikely to occur. Murrelets are known to use the Elwha Valley and could be affected; however, nesting season noise and activity restrictions would be used to protect habitat from most impacts. Aside from road removal, there would be no new activities with the potential to impact individuals or suitable habitat for these species. However, long-term beneficial effects would result from removing the roadway and vehicles from the area beyond the ranger station, and from reducing human activity and corvid (crows and ravens) presence near the corrals and on the Whiskey Bend Road. Closure of the Elwha and Altair campgrounds would also reduce corvid populations. Although there would continue to be disturbance associated with noise and human activity from visitor use, compared to past conditions that included public use of two roads, two campgrounds, and more people, effects would be small.

Impacts from ECAA
Benefits associated with removal of floodplain affected sections of the Olympic Hot Springs Road would be the same as in alternative 1.

Special Status Fish: Ongoing road use in either the grade raise or reroute could allow for pollutants from motor vehicles to be discharged into nearby water bodies during runoff, potentially affecting fish habitat quality (Sandahl et al. 2007; McCarthy et al. 2008 *in* NMFS 2016). Pollutants from vehicles, including petroleum- and metal-based compounds may accumulate on impervious surfaces (roads, parking areas) and wash into waterways during rain events. High levels of suspended sediment or pollutants can cause fish to avoid or migrate out of areas with poor water quality (Svecevičius 2012 *in* NMFS 2016). Sediment can also fill the interstitial spaces of gravel in spawning areas, or elsewhere, adversely affecting the survival of benthic invertebrates (Birtwell 1999; Kemp et al. 2011 *in* NMFS 2016).

Due to the great volume of water during heavy rains or flooding, it is likely that contaminants would be diluted. Adults and larger fish could also avoid localized areas of concentrated contaminants. Although there would be short-term periods of runoff associated with heavy precipitation or flooding, contaminants may persist if they bind to the substrate. This could affect incubating eggs and young fish, potentially causing reduced growth and survival in areas closest to the road. Generally, there would be no observable effects on ecological habitat structure, productivity, abundance or diversity of species present from maintaining the road.

Road rehabilitation actions, including culvert replacement; removal of floodplain sections; and reconstruction of the roadway, as either part of the grade raise or reroute, would also have the potential to contribute sediment to the floodplain. As in alternative 1, actions would also include removal of the Mabey Bridge abutments, which could have short-term adverse effects on fish habitat. Suspended sediment is a potential pollutant that, in high concentrations, makes it difficult for fish to breathe by reducing water quality. With the use of BMPs to eliminate or reduce sediment discharges, there would be short-term impacts on water quality, followed by long-term beneficial effects from fixing other problems (poorly placed or plugged culverts, and reducing the amount of road within the floodplain). Actions would take place throughout the project area from near the park entrance to the Boulder Creek (Olympic Hot Springs) Trailhead.

Special Status Birds

Although there is no habitat on the roadway, most of the project area on both sides of the road comprises marbled murrelet habitat. Along the Olympic Hot Springs Road corridor, which is comprised of a linear corridor 8.2 miles long, road work would affect trees and other vegetation. None of the trees proposed for removal during rehabilitation is considered potential nesting habitat for marbled murrelets or northern spotted owls due to the small diameter of branches and other inadequate old growth tree characteristics for nesting marbled murrelets (lack of platforms or wrong species). No trees with nesting habitat characteristics would be removed in the rehabilitation areas. Some smaller diameter conifers, however, would be removed for road rehabilitation. In other rehabilitation areas, vegetation removal would be confined to deciduous trees (such as red alder, big leaf maple, and willow), seedling and young trees, and small shrubs, ferns, forbs, and grasses along the road shoulder.

Impacts from noise and activity during construction would occur in each of the construction years from approximately March-November. Within this period, impacts from particularly noisy activities would occur outside of the marbled murrelet nesting season (September 24-March 31). Other project work during the nesting season (April 1-September 23) would occur during the day beginning two hours after sunrise and could continue until two hours before sunset.

Work on the project would involve people using a variety of construction equipment. In some cases, work would occur in a number of locations within the project area simultaneously. In other cases, work would begin at one location and systematically proceed through the project area. Other work, such stream culvert replacement would occur during only the late summer/early fall to avoid impacts, such as on fish spawning. Generally, noise and activity from most work could occur in any given location within the project area during the construction season and could last for hours to days in the same location.

Much of the concentrated work in the project area during rehabilitation would contribute short-term noise from the use of excavators to remove soil and road fill as areas beneath the travel lanes were repaired. This would result in a much louder environment than is typical for ambient noise on either section of the roadway. Milling and application of asphalt would also result in noise that moved from one end of the project area to the other. Later, graders and paving equipment, including a mixer for the asphalt-concrete mixture and rollers, would be used. Due to the need to achieve a certain temperature for the paving operations, it is likely that paving would be conducted in the late summer or early fall. As a result, it would likely be conducted late in the nesting season, resulting in limited disturbance effects.

Because of ongoing human activity in marbled murrelet habitat, there would also be short-term, indirect, adverse impacts to marbled murrelets from the attraction of corvids, impacts that would be mitigated by BMPs to limit the availability of human food sources in the project area.

Based on the information presented above, sound and activity-related disturbance to nesting murrelets would occur along Olympic Hot Springs Road from early spring through early fall (respecting the nesting season and daytime restrictions). The project area in the rehabilitation sections of the road includes a small portion of the approximately 332,993 acres of marbled murrelet habitat in the park.

Since the early 1990s, no remaining spotted owl territories have been documented near the project area. Although structurally suitable habitat for the northern spotted owl is located in the vicinity of the action area, it is unlikely to be used for nesting or roosting by spotted owls due to competition with barred owls. However, the area includes potential habitat for northern spotted owls and could still be used for foraging and dispersal. Therefore, project activities may affect, but are not likely to adversely affect northern spotted owls.

Special Status Fish: A range of effects would occur from adding to/replacing the emergency bank stabilization near the park entrance with LWD and additional revetment. Beneficial and adverse effects from turbidity, displacement, and changes in substrate and flow adjacent to the bank could occur.

Impacts from Alternative 2

Special Status Fish: Under alternative 2, impacts may occur during construction of the east channel roadside revetment and placement of new culverts along the realignment. Because log jams would be placed within the riprap revetment along the road shoulder, habitat quality would be improved.

Approximately 15 new culverts would be installed. Placement would require excavation of approximately 360 cubic feet of soil on either end, followed by seating of a 24 to108-inch corrugated metal pipe (CMP) culvert. Where fish have been detected, fish-passable pipes would be installed. Recent recommendations for in-water work window in the Elwha River range from July 1 to August 15 (ACOE) to August 1 to August 15[10] (Washington Department of Fish and Wildlife). These recommendations are based on information available prior to dam removal, when salmon presence in the Elwha River was dominated by hatchery fish. With the intensive monitoring of salmon recovery following dam removal, new information is available regarding timing of wild Chinook salmon and steelhead runs. Specifically, the peak spawn period for steelhead is from March-May, with limited spawning occurring into June (McMillan et al. 2015). Similarly, more of the Chinook salmon run enters the river in June, with peak entry in mid-July (Denton et al. 2015). Therefore, there is essentially no time when listed fish would not be disturbed by in-water work. It is anticipated that the time of least impact would be prior to peak entry of Chinook salmon. To the degree possible, in-water activities would be conducted outside of peak spawning seasons for fish. Any time in-water work is conducted, mitigations would be in place to minimize impacts.

In the area of the revetment, the availability of overhead and instream cover for fish would be reduced by the proposed project. Direct effects would come from tree removal along the channel and from relocating LWD to remove the Mabey Bridge abutments as well as to construct bank protection. There would also be effects from constructing a logjam to reduce the possibility that the river would flow along the modified east channel bank. Along the bank, areas of riprap and to some extent, LWD would prevent the growth of riparian vegetation. Removal of flood debris above the OHWM in this vicinity would also imperceptibly reduce future woody debris recruitment in the Elwha River and the east channel. Placement of multiple engineered logjams along the east bank of the channel and in the forested floodplain would provide some habitat cover and long-term woody debris nutrient recruitment into this area. In addition, several engineered log jams would be placed within the floodplain to reestablish vegetation and to allow the natural systems to restore the channel and floodplain. There would continue to be opportunities for instream LWD to increase habitat complexity, reduce sediment transport, moderate flow, trap gravel for spawning, stabilize stream channels, provide food for aquatic invertebrates, and provide stream nutrients, thereby increasing overall stream productivity (Bisson et al. 1987; Shirvell 1990; Roni and Quinn 2001 in NMFS 2016: 59).

Over the long-term, revegetation of the western strip between the road and the riverbank and the east side of the rerouted roadway could provide some shade/cover along the east bank of the river. Some effects from lack of cover would also be localized to stream channels adjacent to the roadway, where culverts were installed. Long-term beneficial effects that may outweigh some of the short-term effects from potential sedimentation and long-term adverse effects of loss of cover would include reconnection of the road-separated sections of the floodplain, allowing for unrestricted movement of the Elwha River within its channel migration zone. This would contribute to providing more complex floodplain habitat for fish, with unimpeded connections between off-channel habitat and the mainstem river. These “unimpeded lateral connections between main channels, secondary channels, and floodplains” are essential for maintaining

[10] NPS will need to coordinate with USFWS, NMFS and WDFW to determine the appropriate window to ensure there is a construction period that is 1) long enough to complete the work and 2) does not conflict with the murrelet nesting window.

habitat dynamics and species responses, including fulfillment of anadromous salmonid lifecycle requirements (Bisson et al. 2009 *in* NMFS 2016:45).

Special Status Birds: Although there would be noise and disturbance similar to work in the rehabilitation sections of the roadway, it would be more consistent and louder in the same area over more time. The biggest impact, however, from alternative 2 would be from the loss of up to 50 old growth trees with marbled murrelet nesting habitat characteristics. These are trees characterized by large diameter branches with flattish tops that would allow the birds to lay their single egg within a slight depression on its open moss-covered span. These nest characteristics are often found in only the largest conifers. In addition, smaller, non-nest habitat characteristic trees surrounding these would also be removed, opening up the area to changes in microhabitat, including light penetration, air temperature, and others. Removal of up to 18 acres of trees in a swath of approximately one mile-long by variably 40-120 feet wide would alter the characteristics of this section of old growth lowland forest from habitat loss and degradation. Although this type of forest is common within the park, it has been greatly reduced on the Olympic Peninsula as a result of decades of logging activity that continues today.

The loss of these trees would not only remove potential nesting trees, but the opened corridor would create opportunities for increased egg and nestling chick predation by corvids. It would also change habitat such as light and heating in the vicinity of the roadway, reducing overall habitat quality for murrelets and other species.

In addition to the habitat loss, activities that generate loud sounds in close proximity to nesting murrelets may cause disturbance responses, including flushing from the nest, aborted feeding, and postponed feedings (USFWS 2008: 102). Few studies, are available that document the murrelet's vulnerability to disturbance effects. Anecdotal research observations indicate that:

> "murrelets typically exhibit a limited, temporary behavioral response to noise disturbance at nest sites and are able to adapt to auditory stimuli (Singer et al. 1995 *in* McShane et al. 2005; Long and Ralph 1998; Golightly et al. 2002 *in* USFWS 2008: 102). In general, responses to auditory stimuli at nests sites have been modifications of posture and on-nest behaviors" (Long and Ralph 1998 *in* USFWS 2008: 102).

Studies of other alcids and seabirds have documented harm from disturbance to breeding success and the maintenance of viable populations (Cairns 1980; Pierce and Simons 1986; Piatt et al. 1990; Beale and Monaghan 2004 in USFWS 2008: 102).

Further, the biological opinion notes:

> "Based on the data presented by Nelson and Hamer (1995a), approximately 80 percent of the feedings occur during the 2 hours after sunrise and 2 hours before sunset. Approximately 20 percent of feedings occur during the day, when Park activities are not restricted, so there is a potential for some missed or postponed feedings during unrestricted hours" (USFWS 2008: 102).

Noisy activities and vegetation removal would also be timed to avoid marbled murrelet nesting season (during nest site selection and initial rearing) and to avoid daily feeding activities near sunrise and sunset. Adhering to timing restrictions, would be therefore unlikely to harm marbled murrelets, who receive and deliver most of their meals in the early morning and late evening.

For the rehabilitation and reroute, approximately 24 acres in the park would be subjected to noise disturbance along the roadway. Another 18 acres (4 acres for the road and 14 acres for the cut and fill-slopes, or 3/100ths of one percent of available Douglas-fir habitat in the Elwha Valley) would be subjected to noise, human activity, and habitat loss for the reroute. The noise disturbance associated with the rehabilitation would be in areas that formerly received high levels of human activity, including along the Olympic Hot Springs Roads and area trails, while the reroute impacts would be in new, relatively undisturbed old growth forest. This may affect, and would be likely to adversely affect marbled murrelets. Northern spotted owls would also lose potential habitat but since they are not currently using the area impacts would be unlikely. Although conservation measures would be employed, marbled murrelets and northern spotted owls (if they returned to the area) could be disrupted and displaced; however, there would continue to be many acres of similar old growth habitat in the vicinity of the project area.

Impacts from Alternative 3

Special Status Fish: Under alternative 3, actions that would have long-term adverse effects on fish include the road in the floodplain, especially before and after the bridge; the bridge support structure (piers and approaches) that would alter river flow; the inability to restore some parts of the floodplain; and temporary impacts that could cause sedimentation during construction.

The continued presence of the Olympic Hot Springs Road would limit the extent to which the Elwha River can access its floodplain. Although approximately 1,384-feet of the roadway would be removed and the area restored, there would continue to be up to 1,626-feet (1.3 acres) in the floodplain. Although the effect of this would be much less than previously occurred when the dams were present, leaving part of the road within the floodplain would continue to adversely affect fish habitat. Natural channel processes that have been constrained since the construction of the roadway and other infrastructure in the floodplain would continue to be affected.

Although the rate and extent of channel migration has diminished somewhat compared with the years immediately after dam removal, the Elwha River continues to respond to the elevated inputs of sediment and LWD. In addition, the river is anticipated to undergo additional channel activity when the Mabey Bridge abutments are removed, especially because of the removal of a large amount of LWD to access the area. Removal would contribute to long-term beneficial impacts on aquatic habitat, but it is unknown how the river would respond during the next flood event. (Impacts would be the same as in ECAA.)

In-water work to place the bridge supports could result in an adverse effect on juvenile and adult salmon and steelhead rearing as a result of temporary degradation of water quality. In-water work could also cause mortality of juvenile fish and destruction of redds. Suspended sediment loads immediately adjacent to the work area would be monitored, but even with BMPs could produce turbidity up- or downstream. Adult fish would be able to move a short distance up- or downstream to avoid impacted waters; however, juvenile fish could suffer adverse effects, such as stress, reduced feeding, and avoidance of the area. There could also be effects on their ability to locate predators, find prey, defend territories, and even a temporary reduction in gill function (NMFS 2016: 54). Suspended sediment that settles onto substrate in the river could harm or kill incubating eggs and alevins; however, their greatest susceptibility coincides with fall and winter storms, so this is unlikely. In addition to potential short term increases in turbidity, the use of riprap around the bridge piers would locally reduce habitat complexity and change water flow; however, fish would soon be accustomed to the bridge supports and, depending on their configuration and composition, they could also be used for cover. In general, adverse effects would be localized to stream channels adjacent to road infrastructure, especially where flows cross the road, close to the proposed bridge, and where in-water work or crossings occur.

Placement of approximately 500 cubic yards of riprap to protect each of six bridge piers below the OHWM and from placement of fill in the floodplain to support grade raises in each of two locations (0.26 acres) would contribute long-term adverse effects.

Special Status Birds: Impacts would be the same as ECAA. In addition, there would be concussive sounds associated with blasting and/or pile driving for the bridge piers. Compared to ECAA, the project would take longer and be louder.

Cumulative Effects for Fish and Wildlife and Special Status Fish and Wildlife: The effects of development in the park and in the surrounding area, coupled with the purposeful eradication of many predator species during the 1800s and early 1900s, have contributed to low level or extirpated wildlife populations of some key species in the park. In addition, extensive loss of habitat from logging on the Olympic Peninsula has changed wildlife presence and abundance, as has rural, urban and suburban development and road development.

Although there are no major development projects planned for the park that would result in additional cumulative effects to wildlife, the cumulative effects of existing development continue to take a toll on wildlife from the effects of collisions on the road as well as from occasional wildlife-human interactions. The existence and maintenance of the road and park developed areas would continue to contribute to long-term adverse effects on wildlife increasing the presence of some species while decreasing the presence of others.

Logging and development have had and would continue to have adverse impacts on wildlife, including special status species on the Olympic Peninsula. These adverse effects would include disturbance, displacement, indirect loss through loss of habitat and habitat fragmentation, and direct loss through hunting and vehicle-wildlife collisions. Many of these activities would continue to occur on other federal, state, and private lands. Development and logging increase forest fragmentation and direct removal of forest habitat used by the northern spotted owls and marbled murrelets and other special status species. For marbled murrelets, pollution, recreational and commercial boating, and near-shore development in the marine environment degrade such habitat and are expected to continue. Substantial influences of pollution, habitat loss, and direct losses to oil spills and net entanglements are affecting marbled murrelet populations within the marine environment (USFWS 2003b *in* NPS 2008).

Past, present, and reasonably foreseeable future actions, within and outside the park would continue to contribute short- and long-term adverse impacts on wildlife, combined with beneficial effects, when wildlife habitat linkages or native plant restoration are taken into consideration along with the developments. Among the biggest contributor to beneficial cumulative effects was removal of the Elwha dams blocking fish passage. Dam removal activities mobilized millions of yards of sediment stored in the former reservoirs (East et al. 2015 *in* McHenry et al. 2018: 6). Other projects in the park include reconstruction of the

Spruce Railroad Trail as a multiuse path, other road rehabilitation projects, such as Highway 101, new cabins at Log Cabin Resort, and ongoing fire and backcountry management actions. Outside the park, logging and development, as well as other habitat modifications would continue to occur as areas on the peninsula are converted to housing and shopping areas. The cumulative effects of these past, present, and reasonably foreseeable actions would continue to adverse impacts combined with some beneficial impacts on wildlife habitat, species composition and presence in the vicinity of the proposed project areas.

When the impacts from past, present, and reasonably foreseeable future actions are considered in combination with alternative 1, there would be no additional cumulative impacts on fish and wildlife in the short-term, although existing impacts would continue and in the long-term there would be cumulative beneficial effects from removing the portion of the roadway within the floodplain. Compared to the no action alternative, there would be more short- and long-term adverse, as well as cumulative adverse effects from implementation of alternative 2, especially from the removal of approximately 18 acres of primarily old-growth forested habitat. Similarly, under implementation of alternative 3, the contributions to cumulative impacts would primarily be from maintaining infrastructure within the floodplain of the Elwha River.

Conclusion: Alternative 1 may affect, but would be unlikely to adversely affect northern spotted owls and marbled murrelets. Actions under alternative 2 and 3 may affect but would be unlikely to adversely affect northern spotted owls. Project actions under alternatives 2 and 3 may affect and would be likely to adversely affect marbled murrelets, Chinook salmon, bull and steelhead trout. Temporary adverse effects on EFH would affect pink, coho and Chinook salmon.

6. Cultural Resources

This section includes the following topics: Archeological Resources, Historic Structures, Cultural Landscapes, and Traditional Cultural Resources.

Impacts from Alternative 1

Archeological Resources: No archeological resources, eligible for or listed on the NRHP, would be affected by actions under alternative 1. Although some additional ground disturbance is proposed over the long-term, the discovery potential for buried archeological resources would continue to involve mitigation measures. As a result, there would be no adverse effect on archeological resources.

Historic Structures and Cultural Landscapes: Although the Elwha and Altair campgrounds are no longer eligible for the NRHP due to loss of integrity from river erosion, effects could be exacerbated by future flooding. The Elwha Campground Community Kitchen (45CA540), listed on the NRHP but damaged by the river could also continue to be affected. The park is currently undergoing consultation with SHPO to determine its disposition. Although the Elwha Campground Comfort Station (671762) and the Elwha Campground Cultural Landscape could also be adversely affected, they are not eligible for listing on the NRHP. Without vehicle access, park facilities, rehabilitated to good condition before the temporary bridges were taken out, could deteriorate. At a minimum, because of such difficult access, repairs would be more expensive.

The Elwha Ranger Station Historic District, a historic property within the APE would be adversely affected by selection of alternative 1. The historic district is listed on the NRHP and has numerous contributing elements. Implementation of alternative 1 would result in the inability to effectively use the buildings for the purposes they now serve, making it more difficult to maintain them. Without use and regular preservation maintenance that results from that use, they could deteriorate. The future long-term plan for use of the Olympic Hot Springs area would address uses and preservation actions that would need to occur to maintain the historic district in the absence of current park administrative uses. This could include adaptive reuse or other actions. As a result of the potential adverse effects, the park would develop a Memorandum of Agreement (MOA) with the SHPO with optional involvement by the Advisory Council for Historic Preservation.

Traditional Cultural Resources: Because there are no documented historic properties of religious or cultural significance within or near the APE, there would be no effect on traditional cultural resources.

Impacts from ECAA

Archeological Resources: Modifications to the parking area at the Boulder Creek (Olympic Hot Springs) Trailhead would not disturb the known site in that vicinity. There would be no adverse effect on this resource from implementation of alternatives 2 or 3.

Historic Structures and Cultural Landscapes: The Elwha Campground Community Kitchen (45CA540) is listed on the NRHP. Although the road is near it, it would not be physically impacted by the proposed project. Discussions with SHPO would continue as to its disposition, since it has already been affected by flooding. The Elwha Campground Comfort Station (671762) also lies near, but outside of, the project area. Although the road would cross the Elwha Campground cultural landscape, neither it nor the comfort station are eligible for listing in the NRHP. Neither would be affected.

Because the road would be available under the action alternatives, existing uses and maintenance of the Elwha Ranger Station Historic District would continue, resulting in long-term beneficial effects (no adverse effect) on this historic resource.

Impacts from Alternative 2

Archeological Resources: Impacts would be the same as ECAA. . Although there are archeological resources within the APE, they are not within or adjacent to the construction limits for the rehabilitation or reroute.

Historic Structures and Cultural Landscapes: Impacts would be the same as ECAA. A recreational cabin constructed a few hundred feet uphill from the former Elwha Campground is located in the vicinity of the project area. The proposed reroute has been designed to avoid this site and vicinity and would have no adverse effect on it or its potential eligibility for the NRHP.

In addition, the cluster of three trees that were marked in the 1890 Press Expedition are considered contributing elements to the site. Because the linear feature and the trees blazed as part of the Press Expedition are eligible, there would be an adverse effect on contributing trees from the Press Expedition. Therefore, the project would require a MOA with SHPO.

Traditional Cultural Resources: As in alternative 1, there would be no effect on traditional cultural resources.

Impacts from Alternative 3
Archeological Resources: Impacts would be the same as ECAA. No eligible or listed archeological resources would be affected. Although there are archeological resources within the APE, they are not within or adjacent to the construction limits for the rehabilitation or grade raise/bridge.

Historic Structures and Cultural Landscapes: Impacts would be the same as ECAA.

Traditional Cultural Resources: As in alternative 1, there would be no effect on traditional cultural resources.

Cumulative Effects: Human use has occurred in the area comprising Olympic National Park for thousands of years. From prehistoric peoples to early resort owners to contemporary Native American tribes, each group has affected the area. Archeological resources present in the park have likely been adversely affected to varying degrees from past construction-related disturbances (prior to the advent of archeological resources protection laws); visitor impacts and vandalism; and erosion and other natural processes. Compared to past actions, the proposed actions considered in this plan would affect previously disturbed areas and would have no effect on known archeological resources, historic structures, or cultural landscapes. Nonetheless, actions proposed in the alternatives would avoid, minimize, or mitigate potential impacts to potential archeological resources, if these are later found in the project area.

There would be no contribution to cumulative effects on historic structures, because there would be no adverse effect from the implementation of alternatives 1-3 on resources eligible for or listed on the NRHP. Because mitigation measures would be employed to avoid or minimize impacts to potentially unidentified cultural resources in this and other park projects, it is likely that these measures would be successful. There would be no construction-related effects on affect known eligible resources and therefore no cumulative impacts from alternatives 1-3. Future proposed work could affect currently unidentified cultural resources. Because mitigation measures would be implemented, alternatives 1-3 would not be expected to contribute to cumulative effects on archeological resources, historic structures, or cultural landscapes.

Conclusion: Selected areas within the APE with elevated archeological potential have been or will be inventoried. No known archeological resources, cultural landscapes, or historic structures occur within the project area for either the grade raise or the reroute, therefore, implementation of alternatives (1-3) would not have adverse impacts on either known resources or character-defining elements. Because mitigation measures would be employed to detect previously unidentified historic properties, there would be *no adverse effect* on historic properties.

7. Visitor Experience

Impacts from Alternative 1
Although a small portion would remain open for administrative use, the Olympic Hot Springs Road after the parking facility at Madison Falls would continue to be unavailable for public vehicles. After dam removal, the road was open for about one year before the initial washouts and then for about two years before the second series of washouts. Over the last two years, the bypass trail has provided the most reliable access into the Elwha Valley for park visitors. The bypass trail starts near the Elwha Boneyard and continues for approximately one mile to the

road about 0.5 miles north of the Elwha Ranger Station Historic District. From there, visitors can hike up either the Olympic Hot Springs Road or the Whiskey Bend Road to access the Boulder Creek (Olympic Hot Springs) and Whiskey Bend trailheads. Although this trail would continue to be available and could be improved slightly, it would not be redesigned as an improved multiuse trail. Instead, bicyclists could continue to walk their bikes with the other trail users, including hikers and equestrians. Under both the short- and long-term, and depending on their perspective, visitors could continue to enjoy the opportunity of walking in the Elwha Valley and/or regret the loss of the drivable roadway (with accompanying beneficial or adverse effects).

Under alternative 1, there would continue to be a range of short- and long-term adverse impacts from lack of vehicle access to the Elwha Valley and its trailheads. The NPS would begin to determine the future of the area without the road. Short-term impacts would continue from the lack of parking at the Madison Falls area near the park entrance. Eventually, depending on the permanent location of the corral, additional parking could be added and the parking lot expanded beyond what is proposed as part of the road rehabilitation.

Removing the sections of the road within the floodplain could allow for new opportunities to experience the movement of the Elwha River in its floodplain and the recovery of the riparian zone along the Elwha River, without interference from vehicles. Although no specific opportunities to interpret this recovery have yet been identified, there would be numerous places where it could be seen.

Although the Elwha and Altair campgrounds have not been available for several years, it is likely that the loss of these continues to affect park visitors, diminishing the overall number of front country camping opportunities in the park, especially close to Port Angeles. The modifications to provide a picnic area at the Altair Campground have opportunities for visitors to use the remaining facilities.

A lack of toilet facilities in the Elwha area would continue to create adverse visitor experience effects. The vault toilet and a recently installed urine diversion “trial” toilet at Madison Falls are the only ones that would remain open. The lack of facilities and greater distance to trailheads would continue to affect the ability of many visitors, including some with young children or reduced hiking stamina, to access desired visitor experiences, such as higher elevation hiking trails and viewpoints. These characteristics may also result in displacement of some visitors to other areas/trailheads with better road access. Over time, the road and pavement is expected to continue to deteriorate and will eventually become similar in nature to a back country trail

Under alternative 1, there would be long-term adverse effects on private landowners within the Elwha Valley, who would lose road access to their properties. Nonetheless, they could continue to access their properties as do recreationists, via foot, bicycle, or stock.

Impacts from ECAA

Repairs near the park entrance in winter 2019 resulted in retention of the Olympic Hot Springs Road near the entrance to the park, allowing the parking area at Madison Falls to remain open. Temporary adverse effects on visitor use occurred during the several day period of construction. Retaining this public use area would continue to allow visitors from Port Angeles and elsewhere to enjoy the short Madison Falls Trail and give visitors with more time an opportunity to park and take the Bypass Trail or to walk up the roadway to experience the Elwha Valley and the Elwha River restoration.

The upper five miles of roadway have been damaged by slow-moving landslides that have affected pavement, the roadway profile, outer edge stability, and road width. Damaged areas present driving hazards in the form of narrow lanes, poor horizontal and vertical geometry, and sections where existing surfacing has been damaged or removed. Over time, the road would deteriorate, with the potential for landslides and winter downed material left on the roadway due to the inability to clear these with heavy equipment.

Whether the road is rerouted or a grade raise constructed, the visitor use opportunities formerly available via road access would continue. Visitors could continue to drive to the Elwha Ranger Station Historic District, Glines Canyon Spillway Overlook, and high elevation trailheads.

In addition, improvements at Madison Falls, Glines Canyon Spillway Overlook, and Boulder Creek (Olympic Hot Springs) Trailhead would have beneficial impacts from better delineation of parking and from improving protection of nearby resources from parking associated impacts. The parking improvements would also improve circulation. At Madison Falls, improved accessible picnicking opportunities would also be provided, benefitting some visitors.

Other roadway improvements, including minor repairs to Soldiers Bridge and the upper roadway would allow these areas to be used for many years to come, a long-term benefit to visitor experience. Prior to that, roadway improvements would result in longer-term road closures, causing inconvenience for visitors. Road rehabilitation would provide a smoother roadway, better signage, and improved turnouts.

During and immediately following construction, wildlife viewing opportunities would likely diminish in the project areas, a short-term adverse effect on visitor use opportunities. There would be fewer opportunities to encounter natural conditions in the construction areas. Over time, as construction activities subsided, these impacts would diminish and most wildlife would return to the areas and opportunities would return or even increase, because of the increase in edge habitat in some areas.

Impacts from Alternative 2

Construction of a road reroute would have long-term beneficial effects on visitor access and transportation from maintaining vehicle passage through this portion of the Elwha Valley. The portion of the Olympic Hot Springs Road that is closest to the Elwha River, which has been adversely affected by flooding, would be relocated and there would be access into the valley for the foreseeable future. With the rerouting of the road, powerlines adjacent to the current roadway would also be relocated and this would improve valley aesthetics, including scenic views of the river from the roadway. The reroute would also be much more resistant to impacts from flooding. Although a portion of it would be located close to the east valley wall, the engineered riverbank would be designed to withstand erosion, providing reliable access to area facilities, including wilderness trailheads.

Because the reroute alternative was designed (in its horizontal and vertical alignment) to feel similar to adjacent segments of the Olympic Hot Springs Road, overall driving conditions would be similar; because of tree removal, it would likely continue to seem like the floodplain roadway.

Later, vegetation, no longer repeatedly affected by flooding, would fill in and the area could develop a closed canopy again. If road damage occurred, it is likely that repairs could be undertaken by park maintenance crews without external assistance, making it likely that visitor access, if interrupted, would continue with small delays.

Since much of the current visitor use would occur well away from the proposed reroute, effects from noise and activity would be small; however, there would be temporary impacts from consistent noise and activity along Olympic Hot Springs Road within and outside the park from hauling materials and supplies, including some fill, asphalt-concrete paving, and riprap. When the road reopened, anticipated delays would diminish.

Provisions would be made in the design of the roadway to provide access to private landowners. A short-distance from the end of the reroute, landowners would turn north toward the access road.

Impacts from Alternative 3

Although this alternative would generally be constructed along the same alignment as the washed out roadway, its new features (the bridge and raised grade) would make it more resistant to flooding. Slightly more of the roadway would remain in the floodplain compared to alternative 2; however, visitor access would be as reliable as in alternative 2, resulting in similar long-term beneficial effects on visitor access and transportation.

Compared to alternative 2 and the former section of road, the aesthetics of the roadway would be different because a substantial portion of the road would be up to 15-feet higher than the ground surface. This would be true of the bridge approaches and the bridge. As a result, there would be guardrail or a concrete barrier on both sides, providing a somewhat confined travel route. Unlike alternative 2 because of the bridge, fixes if needed, would be expensive and would involve expertise beyond that of park maintenance crews.

As in alternative 2, provisions would be made in the design of the roadway to provide access to private landowners. A turnaround would be provided at the end of the raised roadway that would direct inholders toward their access road.

Cumulative Effects: Over time, visitors and residents have experienced short-term and cumulative adverse impacts on access and transportation from the periodic closures of the Olympic Hot Springs Road, after flood events.[11] These impacts have been cumulative because several other roadways in the park have been closed intermittently or permanently to vehicle access also due to flooding. Following flooding of the Elwha and Altair campgrounds, the park removed the asphalt in both areas.

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[11] In November 2017, high flows on the Elwha River damaged and washed out portions of the Olympic Hot Springs Road near the former Elwha Campground. Severe winter storms in November, December, and January 2015-2016 also created exceptionally high flows. Flooding undermined and washed out a 3-foot diameter reinforced concrete pipe and a 90-foot section of Olympic Hot Springs Road. Approximately 1,400-feet south of the washout, flooding also plugged an 18-foot CMP culvert, over-topping the road, heavily eroding the road shoulders, and undermining about 140-feet of asphalt on the east side of the road. Immediately north of the washout 290-feet of roadway fill slope was heavily eroded and destabilized by floodwater flowing in new channels produced during the flood events. Electrical power and phone to the valley were also lost.

The upper portion of the road, above the Glines Canyon Spillway Overlook, closed for the 5 years during the dam removal, and re-opened in the spring of 2015. Park visitors have also lost access to drive-in camping opportunities in the Elwha Valley with the closure of the Elwha and Altair campgrounds due to impacts from flooding. Some visitors have commented that they are no longer able to get to the places they used to go or want to take their families. Flooding has prevented vehicle access to the Elwha Ranger Station, park seasonal housing, permanent stock corral, Elwha Ranger Station Historic District, Glines Canyon Spillway Overlook, private property, and multiple trailheads.

Alternative 1 would continue to contribute adverse impacts to access and transportation because the NPS would not reconstruct the roadway in flooded areas, instead planning for withdrawal of facilities from the Elwha Valley. Under alternative 3, because more of the road would remain within the floodplain, there would continue to be a greater potential for floods to affect the roadway; large floods could erode road fill or wash out other sections of roadway. Alternative 2 would contribute cumulative beneficial rather than adverse effects.

Conclusion: Impacts from alternative 1 would initially be the same as now. Over the long-term there would be adverse effects on visitor experience, including access and transportation and visitor use opportunities. Alternatives 2-3 would have short-term adverse effects on visitor access and transportation during construction. Closure of the area under the reroute alternative would have more short-term adverse effects. Under the grade raise/bridge alternative, the bypass trail could remain open during construction, but would likely start from Madison Falls. There would be a range of long-term beneficial effects following road rehabilitation and reconstruction under alternatives 2 and 3, when visitors and residents would find an improved roadway, with vehicle access to wilderness trailheads.

Chapter 5: Consultation and Coordination

A. Internal Scoping

The NPS used internal scoping to define the purpose and need for the project and the proposed project goals and objectives. An interdisciplinary team comprised of staff from the park and regional office was formed. This process continued with identifying potential actions to address the need, and determining what park resources could potentially be affected by the proposal. Internal scoping began when flooding initially washed out a section of the Olympic Hot Springs Road and Elwha Campground and continued through development of this EA in numerous meetings and site visits between the NPS and FHWA, including once the initial plans were developed. During the design phase, the proposed project areas were surveyed in detail and staked with station markers. As the designs developed, these were reviewed and analyzed for potential environmental impacts.

A variety of concerns were identified regarding what should be in the plan and what impacts should be included. The interdisciplinary team defined the purpose and need, identified ongoing and potential management actions, determined the likely issues and impact topics and provided related information about proposed improvements. The site visits were also conducted to evaluate proposed actions and to discuss impacts associated with these.

B. Public Involvement

Olympic National Park conducted civic engagement of the preliminary alternatives between December 3, 2018 and March 13, 2019. A public meeting was held in Port Angeles on December 13, 2018. Although a separate meeting was scheduled that afternoon for those who own property within the park boundary, landowner contact information was limited. Therefore another meeting was held with the landowners on August 7, 2019.

The park received 110 comment letters, all from Washington State, mostly from 27 cities or communities in Clallam and Grays Harbor counties. Most comments were from Port Angeles (40), Sequim (19), Seattle (14), Port Townsend (5) and Bainbridge Island (4).

Approximately 343 comments were identified from commenter letters or PEPC entries. About 251 of these contained some substantive portion. The rest (most were opinions about alternative preference) were non-substantive. The substantive comments were sorted into 29 comment categories and subsequently into 68 public concerns. These public concerns were used to adjust the preliminary alternatives into those considered in this EA.

C. Agency Consultation

1. U.S. Fish and Wildlife Service

In accordance with the Endangered Species Act, the NPS contacted the USFWS to determine which federally listed special status species should be included in the analysis. Based on subsequent analysis of the proposed action and its potential effects, the park has determined that the proposed action may affect, but would be not likely to adversely affect northern spotted owls (see impact analysis section). The project may affect, and is likely to adversely affect marbled murrelets and bull trout. During public review of this document, prior to preparing a

National Environmental Policy Act (NEPA) decision document, we will seek concurrence with this determination from the USFWS.

2. National Marine Fisheries Service

In accordance with the Endangered Species Act, the NPS contacted the NMFS to determine which federally listed special status species should be included in the analysis. Based on subsequent analysis of the proposed action and its potential effects, the park has determined that the project may affect, and is likely to adversely affect Chinook salmon and steelhead trout. During public review of this document, prior to preparing a NEPA decision document, we will seek concurrence with this determination from the USFWS.

3. Washington State Department of Archaeology and Historic Preservation

In accordance with Section 106 of the National Historic Preservation Act, the NPS has provided the SHPO of the Washington State Department of Archaeology and Historic Preservation an opportunity to comment on the effects of this project. The determination of effect associated with that consultation will be part of the decision document.

4. Native American Indian Consultation

Meetings are also held with the tribes to discuss issues of concern. Native American Indian tribes, including the Lower Elwha Klallam Tribe commented during project development. Tribal concerns were primarily that this project be consistent with the Elwha Act and protects Treaty Rights.

D. List of Preparers, Persons and Agencies Consulted

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Appendix 1: How to Comment on this EA

This Environmental Assessment is being made available to the public, federal, state and local agencies and organizations through press releases distributed to a wide variety of news media, direct mailing, and on park websites.

Copies of the document may be downloaded from the Planning, Environment, and Public Comment (PEPC) website:

Internet: http://parkplanning.nps.gov/olym (PEPC Project Number 84555)

In addition, written comments will be accepted on the PEPC website and at the following location:

Mail or hand delivery:
Olympic National Park 600 East Park Avenue, Port Angeles, Washington 98362-9798

Note to Reviewers: Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment –including your personal identifying information– may be made publicly available at any time. Although you can ask the National Park Service in your comment to withhold your personal identifying information from public review, the NPS cannot guarantee that it will be able to do so.

Comments submitted by phone or email will not be accepted. Comments submitted by individuals or organizations on behalf of other individuals or organizations also will not be accepted.

Responses to substantive comments on the EA will be addressed in the proposed Finding of No Significant Impact or will be used to prepare an Environmental Impact Statement (if warranted).

Note: For more information about specific agency and staff consultation, see *Chapter 5: Consultation and Coordination*.

Appendix 2: Alternatives Considered but Eliminated from Detailed Study

List of Alternatives Considered but Eliminated from Detailed Study

- *Variations of the Grade Raise and Realignment Alternatives*

Several iterations of the grade raise and realignment alternatives were evaluated as conceptual alternatives, including variations of the realignment alternative with all bridges, all walls, or all cuts and fills; and bridges of different lengths or multiple bridges for the grade raise alternative. Because these had more impacts than other alternatives and/or were less feasible, they were dismissed from further consideration.

- *Raise the Road 1-2.5 feet as Called for in the Elwha River Ecosystem and Fisheries Restoration Plan (Elwha) EIS (FEIS 1996, SEIS 2005)*

This alternative was considered but dismissed because a 1-2.5-feet grade raise would be costly and would not be sufficient to maintain consistent access. The grade raise would not be sufficient to prevent flooding from overtopping the roadway during a typical storm. It would also continue to limit the river's access to the channel migration zone.

- *Construct a Flood-Proof Roadway by Raising the Grade and Fortifying the Road Base*

Adding 10-15 feet of elevation to the roadway, combined with additional bridge structures would greatly increase the impacts on the floodplain by more than doubling the amount of fill required to construct the roadway and adversely affecting acres of special status fish habitat. This alternative was dismissed because it would have far more impacts than other alternatives considered, would not achieve truly flood-proof access, and would control the Elwha River's access to the east channel.

- *Prevent the River from Overtopping the Roadway by Controlling the River Channel*

Dredging or altering the river channel is against NPS policy and would adversely affect listed fish species. This alternative was rejected because it does not meet the NPS mission and would be unlikely to be permitted by agencies such as the USFWS and the ACOE.

- *Construct the Roadway Further Away (Upslope) from the Elwha River/Begin the Reroute Near the Elwha Boneyard (Maintenance Staging Area)*

This area was found to be too steep for road construction, based on the need to balance cut and fill slopes and avoid importation of extensive amounts of road fill. This alternative would have far greater costs and impacts than the proposed action. Based on the steepness of the terrain between the boneyard and the southern part of the reroute alignment, it is not considered feasible without extensive walls, cuts, and fills that would adversely affect more vegetation and wildlife habitat.

- *Construct a Single-Lane Reroute with Curve-widening or Turnouts*

This alternative was evaluated in response to public comments that called for the narrowest roadway with the least possible impacts. Based on FHWA analysis, constructing a single-lane roadway with either curve widening or turnouts would cost approximately 10-15 percent less, and would reduce impacts by about 10 percent. The narrower roadway would not provide sufficient area for anticipated traffic volumes and would not achieve worthwhile reductions in overall impacts on park resources.

- *Construct an Aerial Tram to Take Visitors to the Boulder Creek (Olympic Hot Springs) Trailhead and/or to the Top of Whiskey Bend Road*

This suggestion arose during public scoping for both the current project, as well as during scoping for the geotechnical investigation EA. Constructing an aerial tram and finding a concessioner to run it is outside the scope of the plan. This concept would require establishing parking in the channel migration zone that would have more impacts on old growth trees and the floodplain. In addition, it would add long-term adverse effects on air quality, noise, and could affect wilderness in the Elwha Valley. Routine operation of an aerial tram would adversely affect suitable habitat for northern spotted owls and marbled murrelets during their nesting seasons. Operation of an aerial tram would also be unlikely to be feasible as a concession operation, due to high construction and maintenance costs.

- *Construct a New Road Entrance from the West Side of the Elwha River*

The west side of the Elwha River valley between the end of Herrick Road and Altair Picnic Area is either private property or designated wilderness. Construction of a west access road is not feasible because it would require an Act of Congress to modify the wilderness boundary.

List of Actions Outside the Scope of this EA

These could be considered once the disposition of this EA is determined.

- *Remove or Relocate Park Facilities Subject to Flooding and/or Protect Entrance Station, Ranger Station and Other Park Assets from Flooding*

This alternative was considered but dismissed because most of the facilities that could be subject to later flooding are part of the Elwha Ranger Station Historic District and moving them would adversely affect the integrity of the district, altering their eligibility for the National Register of Historic Places. Until reliable road access is restored, considering relocation or removal of the facilities is premature.

- *Relocate Closed Campgrounds*

Although camping was a popular activity in the Elwha Valley, suitable locations for campgrounds are limited by the terrain and access to it. Until reliable road access is restored, considering new camping opportunities is premature.

- *Systematically Retreat from the Area Now Occupied by the Olympic Hot Springs and Whiskey Bend Roads*

This alternative would encompass removal of non-historic NPS facilities from the Elwha Valley, including the Olympic Hot Springs and Whiskey Bend roads and existing maintenance facilities.

It was dismissed from further consideration because it does not meet the purpose and need. Two previous environmental impact statements (the park GMP and the Elwha River Restoration), affirmed the park's desire to retain road access in the Elwha Valley. The Elwha River Restoration project has been of high public interest. Closing the road would greatly reduce the opportunity for visitors to view the recovery of this ecosystem. This alternative would have disproportionate short-term impacts on park resources from decommissioning 8.5

miles of the Olympic Hot Springs Road and 4.5 miles of Whiskey Bend Road, including removing very large culverts, asphalt pavement, gabion baskets, and vault toilets with heavy equipment that would have to cross the Elwha River where washouts have removed the roadway. The Elwha Ranger Station Historic District includes 13 historic buildings and structures. There are also six non-historic buildings and structures that would need to be removed and/or relocated, all actions that are outside the scope of this plan.

Appendix 3: Additional Tables

Table 1: Wetlands in Rehabilitation Area

Wetland Name	Approx. Station Number	Cowardin Class	HGM Class	Size in Study Area (acres)	Wetland Rating	Jurisdictional Status Assumption (Federal and/or State?)
W-1	53+00	PSSC	Riverine/ Slope	0.001	Category III	Both (connects to S-3)
W-2	60+00	PEM	Depressional	0.003	Category III	Both (assumed to connect to Elwha due to proximity)
W-3	65+50	PEM	Depressional	0.002	Category III	Both (assumed to connect to Elwha due to proximity)
W-4	99+00	PSS/PEM	Slope	0.009	Category IV	Both (connects to S-4)
W-5	109+00	PEM	Slope	0.006	Category III	Both (assumed to connect to Elwha due to proximity)
W-6	112+00	PFO/PSS/ PEM	Slope	0.031	Category III	Both (connects to S-6)
W-7	115+00	PFO/PSS/ PEM	Slope	0.141	Category III	Both (connects to W-8 and S-7, which connect to Elwha R.)
W-8	117+00	PFO/PSS/ PEM	Slope	0.052	Category III	Both (connects to W-8, which connects to Elwha R.)
W-9	160+00	PSS/PEM	Slope	0.008	Category IV	Both (assumed to connect to Elwha due to proximity)
W-10	161+00	PSSC/PEM	Slope	0.006	Category IV	Both (connects to S-9)
W-11	163+50	PSSC	Slope	0.007	Category IV	Both (connects to S-9)
W-12	179+00	PEM	Slope	0.017	Category IV	Both (connects to Elwha River)
W-13	198+00	PFO/PEM	Slope	0.114	Category IV	State only- isolated
W-14	203+00	PFO/PEM	Slope	0.110	Category IV	Both (connects to Elwha River)
W-15	244+00	PEM	Slope	0.025	Category IV	Both (connects to Elwha River)
W-16	249+00	PEM	Slope	0.005	Category IV	Both (connects to Elwha River)
W-17	254+00	PSSC	Slope	0.001	Category IV	Both (connects to Elwha River)
W-18	276+00	PEM	Slope	0.010	Category IV	Both (connects to Elwha River)

Table 2: Ditches in Rehabilitation Area

Ditch Name	Approx. Station Number	Cowardin Class	HGM Class	Size in Study Area (acres)	Wetland Rating	Jurisdictional Status Assumption (Federal and/or State?)
D-1	46+00	PEM	Slope	0.019	N/A	Both (connects to Elwha River)
D-2	52+00	PEM	Slope	0.005	N/A	Both (connects to Elwha River via S- 3)
D-3	99+00	PEM	Slope	0.004	N/A	Both (connects to S-4)
D-4	160+00	PEM	Slope	0.024	N/A	Both (connects to W-9)
D-5	173+00	PEM	Slope	0.006	N/A	Both (connects to Elwha River)
D-6	179+00	PEM	Slope	0.014	N/A	Both (connects to Elwha River)
D-7	206+00	-	-	0.030	N/A	Neither- No connection to upslope waters. See text.
D-8	250+00	PEM	Slope	0.010	N/A	Both (connects to Elwha River)
D-9	265+50	PEM	Slope	0.002	N/A	Both (connects to Elwha River)
D-10	277+00	PEM	Slope	0.011	N/A	State only- isolated
D-11	280+00	PEM	Slope	0.007	N/A	Both (connects to Elwha River)
D-12	297+00	PEM	Slope	0.004	N/A	State only- isolated
D-13	407+50	PEM	Slope	0.001	N/A	Both (connects to Elwha River)

Stream Name	Approx. Station Number	Size in Study Area (acre)	Jurisdictional Status Assumption (Federal and/or State?)	Natural or Built? Fish?	Notes and approximate OHWM width
S-1 (Madison Creek)	1+50	0.002	Both (connects to Elwha River)	Natural. Fish likely.	Madison Creek. 6 ft OHW. 1’ flowing water, perennial.. Boulder/cobble/pebble.
S-2	8+00	0.000	Both (connects to Elwha River)	Natural. See text.	2 ft OHW. Dry, intermittent. Cobble/silt. See text.
S-3	53+00	0.005	Both (connects to Elwha River)	Natural. Fish likely.	8 ft OHW, 6” flowing low gradient sand/silt bottom creek with adjacent wetland (W-1). Perennial.
S-4	100+00	0.001	Both (connects to Elwha River)	Natural. Fish unlikely-too steep.	2 ft OHW. 3” water, perennial. Boulder/ cobble/pebble.
S-5 (Griff Creek)	105+00	0.000	Both (connects to Elwha River)	Natural. Fish present.	Griff Creek. 15 ft OHW. 1’ flowing water, perennial. Boulder/cobble/sand. New arch-top culvert.
S-6	113+00	0.001	Both (connects to Elwha River)	Natural. Fish likely.	3 ft OHW. 2” flowing water, perennial. Gravel/pebble/silt.
S-7	120+00	0.001	Both (connects to Elwha River)	Natural. Fish likely.	2 ft OHW. 2” flowing water, perennial. Gravel/silt.
S-8 (Elwha R)	126+00	0.160	Elwha River	Natural. Fish present.	150’ OHW. Perennial.
S-9	161+00	0.001	Both (connects to Elwha River)	Built, fish unlikely.	1 ft OHW. 2” flowing water, perennial. Gravel/pebble/silt.
S-10	162+50	0.000	Both (connects to Elwha River)	Natural. Fish likely.	1 ft OHW. 3” flowing water, perennial. Gravel/pebble/silt.
S-11	165+00	0.001	Both (connects to Elwha River)	Natural. Fish may be present.	1.5 ft OHW. 1” flowing water, intermittent. Gravel/pebble/silt.
S-12	166+00	0.001	Both (connects to Elwha River)	Natural. Fish may be present.	1 ft OHW. 1” flowing water, perennial. Gravel/pebble/silt.
S-13	167+00	0.000	Both (connects to Elwha River)	Natural. Fish unlikely-too steep.	1.5 ft OHW. Dry, intermittent. Gravel/pebble.
S-14	172+00	0.000	Both (connects to Elwha River)	Natural. Fish likely.	5 ft OHW. 3” flowing water, perennial. Fish likely. Gravel/cobble/pebble.
S-15	178+00	0.001	Both (connects to Elwha River)	Natural. Fish unlikely-too steep.	1 ft OHW. 2” flowing water, perennial. Gravel/pebble/silt.
S-16	205+50	0.000	Both (connects to Elwha River)	Built. Fish unlikely-too steep.	1.5 ft OHW. 0.5” flowing water in flume, perennial. Appears to be ‘Built’ by placement of culvert.
S-17	248+50	0.000	Both (connects to Elwha River)	Natural. Fish likely.	3 ft OHW. 4” flowing water, perennial. Gravel/pebble/silt.

Table 3: Streams in Rehabilitation Area

Table 4: Streams in Rehabilitation Area Continued

Stream Name	Approx. Station Number	Size in Study Area (acre)	Jurisdictional Status Assumption (Federal and/or State?)	Natural or Built?/ Fish?	Notes and approximate OHWM width
S-18	254+00	0.001	Both (connects to Elwha River)	Natural. Fish likely.	5 ft OHW. 5” flowing water, perennial. Gravel/pebble/silt.
S-19	259+00	0.000	Both (connects to Elwha River)	Natural. Fish unlikely.	2 ft OHW. Dry, intermittent. Cobble/Gravel/pebble.
S-20	265+00	0.002	Both (connects to Elwha River)	Natural. Fish unlikely.	1.5 ft OHW. 0.5” flowing water in flume, perennial.
S-21	265+50	0.001	Both (connects to Elwha River)	Built. Fish unlikely.	1.5 ft OHW. 0.5” Very steep, perennial. Outfall from D-9.
S-22	271+00	0.001	Both (connects to Elwha River)	Natural. Fish unlikely.	1 ft OHW. Dry, intermittent. Cobble/Gravel/pebble.
S-23	280+00	0.001	Both (connects to Elwha River)	Built, Fish unlikely.	Built. 1 ft OHW. 0.5” Very steep, perennial. Outfall from D-11.
S-24	297+00	0.000	Both (connects to Elwha River)	Natural. Fish unlikely.	1.5 ft OHW. Dry, intermittent. Cobble/gravel. Erosion adjacent.
S-25	310+00	0.001	Both (connects to Elwha River)	Natural. Fish unlikely-too steep.	2 ft OHW. xx” flowing water, perennial. Cobble/gravel/silt.
S-26	352+50	0.001	Both (connects to Elwha River)	Natural. Fish unlikely.	2 ft OHW. Mostly subsurface, perennial. Boulder/cobble/pebble.
S-27	361+00	0.001	Both (connects to Elwha River)	Natural. Fish unlikely.	2 ft OHW. 2” flowing water, perennial. Boulder/cobble/pebble.
S-28	399+50	0.000	Both (connects to Elwha River)	Natural. Fish unlikely-too steep.	3 ft OHW. Dry, intermittent. Cobble/gravel.
S-29	407+50	0.000	Both (connects to Elwha River)	Natural. Fish unlikely.	2 ft OHW. 0.5” flowing water, perennial. Boulder/cobble/pebble.
S-30	409+00	0.001	Both (connects to Elwha River)	Natural. Fish unlikely.	3.5 ft OHW. 2” flowing water, perennial. Boulder/cobble/pebble/silt.
	Total	**0.184**			

Table 5: Wetlands in the Reroute Area

Wetland	Cowardin Class	HGM Class[12]	Hydrologically Isolated?	Wetland Size (acres)	Wetland Category	Rating Scores*
W-A	Scrub-shrub / Emergent	Riverine/Slope	No	0.85	II	5-7-8
W-B	Scrub-shrub	Slope	No	0.07	III	5-5-7
W-C	Emergent	Depressional	No	0.02	III	6-5-6
W-D	Scrub-shrub/ Emergent	Depressional / Slope	Yes	0.45	III	6-6-7
W-E	Emergent	Slope	Yes	0.10	IV	4-5-6
W-F	Emergent	Depressional	Yes	0.06	III	6-6-7
W-G	Forested / Emergent	Slope	Yes	0.27	III	4-5-8
W-H	Emergent	Slope	Yes	0.17	III	4-5-8

* Scores are for water quality, hydrology, and habitat functions (in that order) from *Washington State Wetland*

[12] HGM = hydrogeomorphic

Rating System for Western Washington (Hruby 2014).

Table 6: Streams and Ditches in the Reroute Area

Stream Name	Length in Study Area (LF)	Average Width at OHWM (feet)	Size in Study Area (acres)	Hydrologically Isolated?	Flow Regime	Fish Habitat?
Sanders Creek (East Channel) (S-3)	2,500	35	1.54	No	Perennial	Yes
Stream S-A	341	2	0.02	No	Intermittent	No
Stream S-B	294	2	0.01	No	Intermittent	No
Stream S-C	486	6	0.07	No	Intermittent	No
Stream S-D	233	3	0.02	Yes	Ephemeral	No
Ditch A	123	2	0.01	No	N/A	No
Ditch B	483	2	0.02	No	N/A	No

* Notes: LF = linear feet, N/A = Not Applicable; OHWM = Ordinary High Water Mark

Table 7: Wildlife in Olympic National Park

Species Type	Native	Nonnative
Birds	260	5
Mammals	66	6 (7th pending)
Amphibian	13	-
Freshwater Fish*	24	5 combined
Marine Fish	58	--
Anadromous Fish	13	--
Reptiles	4	-
Invertebrates	Unknown,	but likely very large (NPS 2008: 185)

* Three species of fish are considered endemic; genetic analysis is pending (Certified Species List: NPSpecies - The National Park Service Biodiversity Database (IRMA Portal Version) https://irma.nps.gov/App/Species/Search [certified species list - park status view; accessed September 2015])
Data Source: *Beirne pers. comm. 9-16-15 and NPSpecies database 9-14-15*

Table 8: Other Sensitive Species that May Occur in the Project Area

Species	Status	Breeding Season/Location	Notes
Black Oystercatcher	CC	Breeds Apr 15–Oct 31	
Black Turnstone	CC	Breeds elsewhere	
Clark's Grebe	CC	Breeds Jan 1–Dec 31	
Great Blue Heron	CC	Breeds Mar 15–Aug 15	
Lesser Yellowlegs	CC	Breeds elsewhere	
Long-billed Curlew	CC	Breeds elsewhere	
Marbled Godwit	CC	Breeds elsewhere	
Olive-sided Flycatcher	CC	Breeds May 20–Aug 31	
Red Knot	CC	Breeds elsewhere	

Species	Status	Breeding Season/Location	Notes
Red-throated Loon	CC	Breeds elsewhere	
Rock Sandpiper	CC	Breeds elsewhere	
Rufous Hummingbird	CC	Breeds Apr 15–Jul 15	
Semipalmated Sandpiper	CC	Breeds elsewhere	
Short-billed Dowitcher	CC	Breeds elsewhere	
Western Screech Owl	CC	Breeds Mar 1–Jun 30	
Whimbrel	CC	Breeds elsewhere	
Willet	CC	Breeds elsewhere	

Table 9: Cultural Resources in or Near Project Area

Site Name	Trinomial	Eligibility	Comments
Sweet's Resort	45-CA-451	Not Eligible	Loss of integrity from river erosion
Mint Cabin	45-CA-455	Probably eligible	Within APE but outside of the project's working limits--no project impacts
Bowman Homestead	45-CA457	Probably Eligible	Outside of APE
Waumilla Lodge	45-CA453	Probably Eligible	Within APE but outside of the project's working limits--no project impacts
Elwha Dump	45-CA-454	Probably Eligible	Within APE but outside of the project's working limits--no project impacts
Pit Features	45-CA-456	Not eligible	Outside of APE
Olson Dump	45-CA-452	Probably not eligible	Outside of APE, likely destroyed by river
East Glines Canyon Dam Site	45-CA-624	Probably eligible	Outside of APE
Hot Springs Road Lithic Scatter	45-CA-557	Probably eligible	Outside of APE
Altair Camp Overlook	45-CA556	Probably eligible	Outside of APE
Boulder Trailhead	45-CA-661	Determined eligible	Within APE but outside of the project's working limits--no project impacts
Glines Canyon Sawmill	45-CA-626		Outside of APE
West Glines Abutment Camp	45-CA-635	Determined Eligible	Within APE but outside of the project's working limits--no project impacts
Precontact Isolate	45-CA627	Probably not eligible	Outside of APE
Historic Debris Scatter	45-CA-628	Probably not eligible	Within APE but outside of the project's working limits--no project impacts

Table 10: Construction Equipment Noise (dBA) at 50 Feet

Construction Equipment	Noise Level Range
Compactors (rollers)[1]	72-88 dBA
Front Loaders[1]	72-98 dBA
Backhoes[1]	72-96 dBA
Scrapers, Graders[1]	76-96 dBA
Pavers[1]	82-94 dBA
Trucks[1]	70-96 dBA
Concrete Mixers[1]	72-91 dBA
Pumps[1]	70-80 dBA
Generators[1]	70-82 dBA
Compressors[1]	68-88 dBA
Jackhammers, Rock Drills[1]	76-98 dBA

Construction Equipment	Noise Level Range
Pile Drivers (Peak) [1]	89-106 dBA
Cold Asphalt Planer (asphalt milling machine) [2]	70-87 dBA
Saws	69-82 dBA

[1]Harris 1979 *in* Hurricane Ridge Road EA
[2]Caterpillar, Inc. (Caterpillar PM 565 Cold Planer at 23 feet engine running, not in operation) *in* Hurricane Ridge Road EA

Table 11: Wetland Impacts

Wetland Name	Direct	Direct	Indirect	Indirect
Wetland	**Square Feet**	**Acres**	**Square Feet**	**Acres**
A	6,600	0.2	700	<0.1
B	2,700	<0.1	250	<0.1
C	0	0	0	0
D	0	0	0	0
E	0	0	0	0
F	0	0	0	0
G	0	0	75	<0.1
H	0	0	25	<0.1

Table 12: Stream-Associated Wetland Impacts

Stream Name	Direct	Direct	Indirect	Indirect
Stream	**Square Feet**	**Acres**	**Square Feet**	**Acres**
A	375	<0.01	20	0
B	500	<0.1	150	<0.01
C	390	<0.01	100	<0.01
D	200	<0.1	75	<0.01

Table 13: Disturbance, Disruption, and/or Physical Injury Distance Thresholds for Marbled Murrelets April 1 – September 23. Distances are to a Known Occupied Marbled Murrelet Nest Tree or Suitable Nest Trees in Unsurveyed Nesting Habitat

Project Activity	No Effect	May Affect Not Likely to Adversely Affect (Disturbance distance)	May Affect, Likely to Adversely Affect (Disruption distance)	Likely to Adversely Affect (Direct Injury and/or Mortality)
Light maintenance (e.g. road brushing and grading) at campgrounds, administrative facilities, and heavily used roads	> 0.25 mile	</= 0.25 mile	N/A	N/A
Log hauling on heavily used roads	> 0.25 mile	</= 0.25 mile	N/A	N/A
Chainsaws (includes felling hazard trees)	> 0.25 mile	111 yards to 0.25 mile	</= 110 yards	Potential for mortality if trees felled contain platforms
Heavy equipment for road construction, road repairs,	> 0.25 mile	111 yards to 0.25 mile	</= 110 yards	N/A

Project Activity	No Effect	May Affect Not Likely to Adversely Affect (Disturbance distance)	May Affect, Likely to Adversely Affect (Disruption distance)	Likely to Adversely Affect (Direct Injury and/or Mortality)
bridge construction, culvert replacements, etc.				
Pile-driving (steel H pipes, pipe piles) **Rock crushing and screening equipment**	> 0.25 mile	121 yards to 0.25 mile	</= 120 yards	>/= 5 yards (injury)
Helicopter: Boeing Vertol 107, Sikorsky S-64 (SkyCrane)	> 0.25 mile	151 yards to 0.25 mile	</= 150 yards	50 yards (injury/mortality)
Helicopters: K-MAX, Bell 206 L4, Hughes 500	> 0.25 mile	111 yards to 0.25 mile	</= 110 yards	50 yards (injury/mortality)

Source: USFWS 2015

Note: Other activities (such as blasting, Chinook helicopter and fixed wing aircraft use, tree climbing, and pile burning) are identified in the original table that would not be part of the proposed road rehabilitation projects.

Appendix 4: Cumulative Effects Projects and Plans

Past Projects

- **Elwha River Ecosystem and Fisheries Restoration Plan/DEIS, FEIS, SEIS, ROD**

The purpose of this project was to restore the Elwha River ecosystem and native anadromous fisheries through the removal of two hydroelectric dams and implementation of fisheries restoration and revegetation. Dam and facility removal began in 2011 and was completed in 2014. The Elwha River is free-flowing once again and access for migratory fish has been restored. The natural flow of sediment has also been reinstated and sand bars, estuary, and beaches at the river's mouth have re-developed. Approximately 400,000 native seedlings have been planted and more than 6,000 pounds of seeds have been spread to help revegetate the former reservoirs. Roads and trails in the Elwha Valley were closed to all public access for a period of about two years. The EIS allowed for road widening and turn straightening to allow very large construction equipment to pass. This widening and straightening did not occur.

- **Whiskey Bend Road Repair**

In 2015, a landslide on Whiskey Bend Road closed vehicle access to the Whiskey Bend Trailhead. The road prism was stabilized at the slide location using soil nails and shotcrete to create a retaining wall structure.

- **Emergency action for bank stabilization at park entrance (2015) and road washout at Sanders Creek (2016)**

A series of emergency actions were taken following flood events in November and December 2015 and January 2016 to stabilize the bank along the Olympic Hot Springs Road at Sanders Creek, Fisherman's Corner, and near the park boundary at the Madison Falls parking area. Emergency actions included the placement of rock ballast to protect the road bench from continued erosion. Emergency action began on February 1, 2016 and ended February 17, 2016.

- **Long-term bank stabilization at park entrance (2015) and road washout at Sanders Creek (2016)**

Long-term repairs at these sites included the installation of woody debris structures and rock ballast, crushed gravel, and asphalt. Willow shoots and other native species were planted in areas of ground disturbance. The road washout at Sanders Creek in 2016 also included the installation of a temporary bridge and widening of the Sanders Creek channel to decrease velocities and erosive force of future flood waters.

- **Decommissioning of Altair Campground**

The Altair Campground was decommissioned after winter flooding in 2014-2015 eroded about half the developed area. The area was converted to a day use picnic area in 2016 due to flood frequency. Conversion to day use area included demolition/removal of the septic system and a comfort station.

- **Decommissioning of Elwha Campground**

In 2015, the campground was inundated with silt from flooding of the Elwha River. The picnic tables, CXT vault toilet, and fire rings were salvaged and moved to locations outside of the floodplain, the restroom was demolished, and a septic tank was removed. The Elwha Campground was closed due to flood damage and the changing course of the Elwha River.

- **Continued Existence and Routine Maintenance of Infrastructure**

Past construction and continued infrastructure maintenance include roads, facilities, trails, parking areas, campgrounds and picnic areas. Routine road maintenance activities include pothole patching, repairing and replacing asphalt, sweeping the roadway, vegetation brushing, clearing culverts and ditches, and replacing drainage structures. Routine trail maintenance activities include brushing and removing fallen trees from the trail corridor; maintaining, repairing, and rebuilding damaged or deteriorated trail tread, trail bridges, drainage structures, stock fords, and other structural elements.

- **Sweets Field Temporary Corral**

Storm damage to the Olympic Hot Springs Road in 2016 rendered the park's primary stock facility inaccessible by vehicle. A temporary facility was constructed in Sweets Field .The facility supports 30 head of stock between April and October each year until a long-term solution for the Olympic Hot Springs Road has been determined and implemented.

- **Subgrade Boring within Olympic Hot Springs Road**

Approximately two test borings and 12 subgrade borings were drilled within the Olympic Hot Springs Road prism between the Olympic National Park Elwha entrance station and the Boulder Creek Trailhead. The subsurface borings provided information on the current pavement structure and condition of the roadway.

- **Olympic Hot Springs Road Temporary Administrative Vehicle Access**

The park installed three temporary bridges across the most recent (November 2017) Olympic Hot Springs Road washouts. The purpose of the temporary administrative vehicle access was to remove equipment and materials necessary for park operations and complete preservation maintenance on buildings in the Elwha Historic District. The temporary bridges, including the Mabey Bridge, were removed in late summer 2018 to prevent damage to the bridges from future high flows and possibly detrimentally affect river hydrology from bridge debris.

Current Projects

- **US Highway 101 Elwha River Bridge Reconstruction/EA**

The existing Highway 101 Elwha River Bridge is past the end of its original design service life. Also, in September of 2016, it became apparent that the piers that support the existing bridge were being undermined due to changes in river conditions and the original piers were not built into bedrock. Emergency stabilization of the piers has been necessary, and ongoing bridge monitoring is being provided until long-term public safety needs can be ensured with a bridge replacement. Washington State Department of Transportation is currently developing an EA to analyze alternatives. Olympic National Park is a cooperating agency on this project.

- **Fire Management Plan/EA**

An EA is being prepared to update the park's programmatic Fire Management Plan. The proposed action includes bringing the plan into conformance with NPS wildland fire policy directives and standards set forth in Director's Order-18, its companion guidance document, Reference Manual 18, and NPS *Management Policies 2006* addressing wildland fire management and resource protection.

- **Lake Mills Trail**

This project would complete development of the trail into the former Lake Mills reservoir. The Lake Mills Trail project would complete the loop trail connecting to the West Lake Mills Trail at Boulder Creek, providing visitors with delineated trail access and reducing impacts to sensitive revegetation areas.

- **Sweets Field Helicopter Staging Area**

Sweets Field is used as a helicopter staging area for projects including, but not limited to, waste management, rehabilitation of the Hayden Pass Trail burned area, and fire management operations. Sweets Field is also a potential staging area for the Mountain Goat Management Plan.

- **Mountain Goat Management Plan/EIS**

A combination of capture and translocation and lethal removal activities are being used to eliminate or greatly reduce nonnative mountain goats from the Olympic Peninsula. The purpose of this project is to allow the NPS to reduce or eliminate impacts on park resources from nonnative mountain goats, while reducing potential public safety issues associated with the presence of mountain goats in the park.

- **Olympic National Park Final General Management Plan (GMP) and EIS (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 broad direction for managing Olympic Hot Springs Road. The proposed project is consistent with the GMP by retaining road access to the Boulder Creek Trailhead (NPS 2008: 95).

- **Temporary Off-road Access for Geotechnical Investigation/EA**

A geotechnical investigation is being conducted to determine the engineering feasibility of relocating a portion of Olympic Hot Springs Road outside of the floodplain. The investigation includes developing an equipment access path, drilling approximately 22 off-road test borings, excavating two test pits, and monitoring subsurface conditions along a one-mile stretch of the slope east of Olympic Hot Springs Road. Monitoring instruments were installed at the off-road test boring sites to collect data and monitor slope stability.

Future Projects

- **Pacific Northwest National Scenic Trail/EA**

The primary purpose of the plan is to provide Congress information it needs to meet its oversight responsibility for the Pacific Northwest National Scenic Trail. To some extent, therefore, the plan is a report on the progress achieved to date in the administration of the trail. In addition, the plan provides an opportunity to organize the accumulated policy directions, guidelines, and understanding about administration of the trail for the benefit of the private, state, and federal partners in the trail project. The plan is intended to provide a framework for development and management of the trail and its immediate environs.

- **Wilderness Stewardship Plan/EIS**

The purpose of this Wilderness Stewardship Plan is to guide the preservation, management, and use of park wilderness to ensure that it remains unimpaired for future use and enjoyment. National Park Service (NPS) policy directs the plan to include "desired future conditions, as well as establish indicators, standards, conditions, and thresholds beyond which management actions will be taken to reduce human impacts to wilderness resources." The overarching goal of the plan is to restore, protect, and enhance overall wilderness character.

- **WDFW Wolf Translocation and Reintroduction EIS**

WDFW is currently in the scoping process, under the State Environmental Policy Act, for the development of a conservation and management plan to guide long-term wolf conservation and management, once wolves are recovered https://wdfw.wa.gov/species-habitats/at-risk/species-recovery/gray-wolf/post-recovery-planning

Appendix 5: Impact Avoidance, Minimization and Mitigation Measures

The following measures would be included in the proposed project (as appropriate) to minimize impacts to park resources.

Soils and Vegetation

- Locate staging areas where they will minimize new disturbance of soils and vegetation.
- Minimize ground disturbance to the extent possible.
- Minimize driving over or compacting root-zones of trees to be retained.
- Reuse excavated soil, where possible in the project area.
- Pile excavated soil away from trees to remain.
- Adjust excavations to preserve soils within the dripline of trees to remain.
- Revegetate project areas with native seeds and plants.
- NPS certifies all fill and topsoil as being from a weed free source before it is brought in.

Measures to minimize impacts to vegetation:

- Preserve vegetation within the project area by marking, fencing, or another appropriate technique. In other words, removing vegetation would be done in a manner that would not affect vegetation not proposed for removal.
- Erect temporary barriers (e.g., orange construction fence) to protect existing large trees, plants and critical root zones designated to remain but are within or just outside the clearing limits.
- Where larger roots need to be removed, cut them with a sharp tool rather than tearing them with an excavator.
- Include a contractor damage clause for impacts to trees / vegetation outside the project area as part of the contract.
- Take measures to prevent the introduction of exotic species in the project area and staging areas.
- Require all earth moving equipment and hand tools to enter the park free of dirt, dust, mud, seeds, or other potential contaminants.
- Clean equipment exhibiting any dirt or other material attached to frame, tires, beds, wheels, or other parts, thoroughly. The contractor would use pressure washing and/or steam cleaning before entering the park.
- Prevent the introduction of nonnative aquatic species by pressure washing vehicles and inspecting them prior to entering water.
- Certify as weed free or clean, all fill, rock, or additional topsoil used in the project, including ensuring that the park has approved the source of this material in advance.
- Require all workers to check boots, backpacks, tools, equipment, and vehicles for weed seeds and mud that could harbor weed seeds before first entering the park or after use in an area outside the park.
- Protect staging areas from spillover impacts by placing silt fencing or other barriers and return these areas to pre-construction condition upon project completion.
- Use only native species, appropriate to the site, in revegetation (seeding or planting).

- Use existing roadways or travel paths whenever reasonable; minimize the number of new access paths to reduce impacts to vegetation and soil.
- Cease project operations under high flow conditions that inundate the project area, except for efforts to avoid or minimize resource damage.
- Rehabilitate disturbed areas in a manner that results in similar or better than pre-work conditions through spreading of stockpiled materials, seeding, and/or planting with locally native seed mixes or plants. Planting shall be completed no later than fall planting season of the year following construction.

Measures to prevent additional impacts from nonnative invasive plants:

- Control undesirable plant species in high-priority areas and other areas as necessary. To prevent the introduction of, and minimize the spread of nonnative vegetation and noxious weeds, implement the following measures during construction:
    - Minimize soil disturbance.
    - Pressure wash and/ or steam clean all construction equipment, except hauling vehicles, before entering the park to ensure that all equipment, machinery, rocks, gravel, or other materials are cleaned and weed free before entering the park.
    - Pressure wash hauling vehicles before entering the park for the first time; subsequent entries would not require pressure washing unless the vehicle shows signs of mud, plant material, or other substances that could be considered harmful.
    - Cover all haul trucks bringing asphalt or other fill materials from outside the park to prevent seed transport.
    - Limit vehicle parking to within construction limits, existing roadways, parking lots, or the access routes.
    - Limit disturbance to roadsides and culvert areas, including limiting equipment to the roadbed area-no machinery or equipment should access areas outside the construction zone.
    - Obtain all fill, rock, or additional topsoil from the project area, if possible. If not possible, then obtain weed-free fill, rock, or additional topsoil from NPS-approved sources outside the park.
    - Revegetate disturbed sites as soon as practicable following construction activities.
    - Monitor disturbed areas for up to three years following construction to identify growth of nonnative vegetation.

Measures to Improve Opportunities for Restoration:

- Optimal vegetation restoration actions include:
    - Salvaging topsoil and native vegetation before construction begins, and reuse these materials during restoration of disturbed areas.
    - Monitor revegetation success for up to three years following construction, replanting and controlling invasive plants as needed.

Acoustic Environment and Soundscapes

- Mitigate the sounds at their source by using modern equipment with engine insulation and mufflers. To the extent possible, relocate noisy work to a louder acoustic environment, conduct the work during a different time of day, or consider noise barriers for extraordinarily loud work.

Water Resources

- Use vegetable-based hydraulic fluid in all machinery.
- Inspect all machinery for leaks (fuel, oil, hydraulic fluid, etc.) prior to starting work each day and making all necessary repairs to machinery before starting work.
- Employ best management practices when working in or near wetlands.
- Locate staging and stockpiling areas away from surface water.
- Delineate staging areas to prevent incremental expansion.
- Cover stockpiled fine-grained soil and rock and, if overwintered, surround piles with a breathable, water-repellent fabric, such as silt fence, anchored around the perimeter.
- Use temporary sediment-control devices such as filter fabric fences or sediment traps during culvert replacement to minimize fine sediment delivery to water sources.
- Use mulch, matting, netting; filter fabric fencing; sediment traps and ponds; temporary stream bypasses; or surface water interceptor swales and ditches to prevent water runoff from contamination.
- Identify the minimum area to be cleared, define the extent, and clear only those areas necessary for construction.
- Minimize the amount of disturbed ground and the duration of soil exposure to rainfall.
- Minimize soil disturbance, and revegetate disturbed areas as soon as practical.
- Scarify slopes, if necessary, to slow erosion.
- Retain silt fencing in disturbed areas until stabilization (by reseeding or revegetation).
- Construct temporary diversion devices such as swales, trenches, culverts, or drains to divert stormwater runoff away from disturbed areas, including exposed slopes.
- Use native duff or shredded wood chips to cover exposed soil as soon as practical.
- Install protective construction fencing around, adjacent to, or near wetland and/or riparian areas to be protected.
- Limit the duration of the in-water work as much as possible.
- Time projects undertaken adjacent to or near wetlands to occur during the dry season, usually late summer.
- Develop and implement a Stormwater Pollution Prevention Plan (SWPP) for construction activities to control surface runoff, reduce erosion, and prevent sedimentation from entering water bodies during construction.
- Develop and implement a comprehensive Spill Prevention/Response Plan that complies with federal and state regulations and addresses all aspects of spill prevention, notification, emergency spill response strategies for spills occurring on land and water, reporting requirements, monitoring requirements, personnel responsibilities, response equipment type and location, and drills and training requirements.
- Use work area isolation techniques when working near flowing streams.

Prevention of Fuel Spills: The following BMPs to control adverse impacts of fuel spills would also be used:

- Conduct refueling activities at least 100 feet from water sources.
- Make absorbent pads available within the work site to clean up spills if needed.
- Restrict the location of equipment fueling and maintenance sites, ensure requirements for spill containment such as temporary earth berms, and identify other measures to safeguard aquatic and terrestrial habitat from construction-related contaminants.

Fish and Wildlife

- Schedule construction activities with consideration of wildlife lifecycles to minimize impacts during sensitive periods (e.g., bird nesting and breeding seasons).
- Schedule in-water work, including culvert and riprap placement to avoid spawning fish, incubating eggs and other sensitive periods for fish and aquatic wildlife.
- Minimize habitat impacts (vegetation clearing) by delineating construction limits.
- Limit the effects of light and noise on wildlife habitat through controls on construction equipment and timing of construction activities.
- Maintain escape routes for animals that might fall into excavated pits and trenches. If erosion control matting is used, only tightly woven fiber netting or unbound materials (e.g., shredded bark) would be used to ensure that small animals would not be trapped. No plastic netted materials would be used.
- Use standard measures to prevent inadvertent spills of fuel, oil, hydraulic fluid, antifreeze, and other toxic chemicals that could affect wildlife.
- Require the contractor to maintain strict garbage control to prevent from being attracted to the project area. No food scraps would be discarded or fed to wildlife.
- Maintain proper food storage, disposing of all food waste and food-related waste promptly, using bear-resistant receptacles, and removing all garbage off site at the end of each working day.

Special Status Wildlife

- Delineate construction limits with fencing, tape, snow fencing, or similar materials.
- Outline resource protection measures clearly in special contract requirements.
- Limit construction activities during marbled murrelet nesting season and sensitive feeding periods to two hours after sunrise and two hours before sunset.
- Educate contractors about the sensitivity of park resources and special status species.
- Avoid disturbance beyond the construction zone.
- Stage construction equipment and materials in designated areas.
- Minimize impacts from activities such as blasting.
- Maintain construction equipment (i.e., mufflers) to minimize unintended noise.
- Use only approved commercial material sources and disposal sites.
- Develop and implement a revegetation plan to restore disturbed areas.
- Restore disturbed areas to approximate natural contours, replace topsoil, and seed and/or plant as soon after the completion of construction as possible.
- Monitor revegetated areas after construction to determine if reclamation efforts are successful or if additional remedial actions are necessary. Remedial actions can include installing erosion control structures, reseeding and/or replanting the area, and controlling nonnative plant species.
- Avoid introduction of nonnative, including noxious, plant species.
- Adhere to noise and work restrictions during the nesting season.

Cultural Resources

- Stop work in the area of identification and nearby areas if archeological resources are discovered at any point during the project work (as directed by the park) until the find is evaluated and action taken to avoid or mitigate the impact.
- When it is necessary to stop work due to archeological resources discovery, the contractor would cease all activities in the area of discovery, allow archeologists to complete investigations, and take measures to protect the resources discovered as directed by the park. (During this time, work may proceed in unaffected areas.)
- Determine if a monitoring plan is needed pending final construction plans, the cultural material that may be encountered, important archeological questions to address, and a range of treatment options (e.g., avoidance, data recovery) for any findings.
- Avoid further impact by modifying project plans as needed at the site if archeological resources are discovered during implementation. If this is not possible, collect as much information as possible about the site in accordance with applicable laws and regulations and consult with applicable agencies and tribes as specified in the implementing regulations for Section 106 of the NHPA.
- Monitor ground-disturbing actions during construction to ascertain presence/absence of archeological materials within the construction zone. Focus monitoring where historical deposits might be present. Evaluate the eligibility of the site under National Register of Historic Places criteria if monitoring results in the discovery of archeological materials.
- Follow procedures outlined in the Native American Graves Protection and Repatriation Act in the unlikely event that human remains or any grave goods are exposed. This would include the potential need to stop work for a minimum of 30 calendar days although work may resume in non-sensitive areas.

Visitor Experience

- Require the contractor to provide a delay schedule weekly with daily updates to the Federal Highway Administration's project engineer to better inform management regarding impacts on visitation and park operations.
- Provide a means to allow for evening, weekend and holiday work, including construction delays, with permission of the superintendent.
- Make materials deliveries (to the degree possible) during non-commute hours and by proceeding along the shortest route possible.
- Use press releases, signs in the park and state highway information recordings to inform visitors of road conditions during the project.
- Take advantage of longer summer days by extending working hours.
- Implement the park’s vehicle idling policy through liaison with the contractor and project manager and in the project’s special contracting requirements.

Appendix 6: Table of Contents

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