U.S. Fish and Wildlife Service

Environmental Assessment

Quinault National Fish Hatchery Fish Exclusion Barrier

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The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people.

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ACRONYMS AND ABBREVIATIONS

AMSL	Above Mean Sea Level
APE	Area of Potential Effects
ASME	American Society of Mechanical Engineers
BA	Biological Assessment
BLM	Bureau of Land Management
BMPs	Best Management Practices
BOMC	Birds of Migratory Concern
CFR	Code of Federal Regulations
cfs	cubic feet per second
CZMA	Coastal Zone Management Area
DAHP	Washington State Department of Archaeology and Historic Preservation
dB	Decibel
DBH	Diameter at Breast Height
DCH	Designated Critical Habitat
DPS	distinct population segment
EA	Environmental Assessment
Ecology	Washington State Department of Ecology
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EM	Emergent
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FO	Forested
fps	foot per second
FR	Federal Register
IHN	infectious hematopoietic necrosis
ITAs	Indian Trust Assets
LF	linear feet
MBOC	Migratory Birds of Concern
MBTA	Migratory Bird Treaty Act
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NAP	Natural Area Preserves
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act

NMFS	National Marine Fisheries Service
NPS	National Park Service
NRCA	Natural Resources Conservation Areas
NRHP	National Register of Historic Places
NTU	Nephelometric Turbidity Unit
NWPS	National Wilderness Preservation System
NWSRS	National Wild and Scenic Rivers System
OHWM	Ordinary High Water Mark
P	Palustrine
PFMC	Pacific Fishery Management Council
QIN	Quinault Indian Nation
QNFH	Quinault National Fish Hatchery
R	Riverine
RCW	Revised Code of Washington
SPCC Plan	Spill Control and Countermeasures Plan
SS	scrub-shrub
UB	Unconsolidated bottom
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
UV	Ultraviolet
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WHR	Washington Historic Register
WISAARD	Washington Information System for Architectural and Archaeological Records Data
WDNR	Washington Department of Natural Resources
WSP	Washington State Parks

SECTION 1
INTRODUCTION, PURPOSE AND NEED

1.1 Introduction

The U.S. Fish and Wildlife Service (USFWS) is proposing improvements to the Quinault National Fish Hatchery (QNFH) electric fish barrier located on Cook Creek in Grays Harbor County, Washington (Figure 1-1). The USFWS's QNFH is currently equipped with an electric fish barrier extending across Cook Creek. Recent discovery of infectious haematopoietic necrosis (IHN) in steelhead stocks downstream of the existing fish barrier, public and wildlife safety concerns, operational issues of the barrier system, and the USFWS's desire to have the system operate at maximum efficiency (to the greatest extent practical) during fish migration periods, have led to the recognition of the need to install a different type of exclusion barrier. The primary goal of this document is to analyze impacts to the natural and human environment from the proposed project.

This Environmental Assessment (EA) is being prepared by the USFWS to comply with the requirements of the National Environmental Policy Act (NEPA) of 1969 and its implementing regulations, which are set forth in the Council on Environmental Quality regulations 40 CFR Parts 1500-1508. The EA assists the USFWS in determining if the selected alternative would have a significant impact on the quality of the human environment and if preparation of an Environmental Impact Statement is required.

1.2 Project Location

The QNFH is located along Cook Creek, approximately 5.5 miles west-southwest of Neilton, in Grays Harbor County, Washington (Figure 1-1). The QNFH is located on land owned and managed by the USFWS within the boundary of the Quinault Indian Nation reservation. It adjoins the U.S. Forest Service (USFS) Olympic National Forest, which is located to the southwest of the facility. Table 1-1 identifies the legal description, coordinates, and address of the QNFH facility.

Table 1-1. QNFH Location Description

Sections (S)/Township (T)/Range (R)	Coordinates (WGS84)	Address
NE ¼ of S.31 and NW ¼ of S.32 / T.22N / R.10W	47.358478, -123.992543°	3 Sockeye Road, Quinault, WA 98575

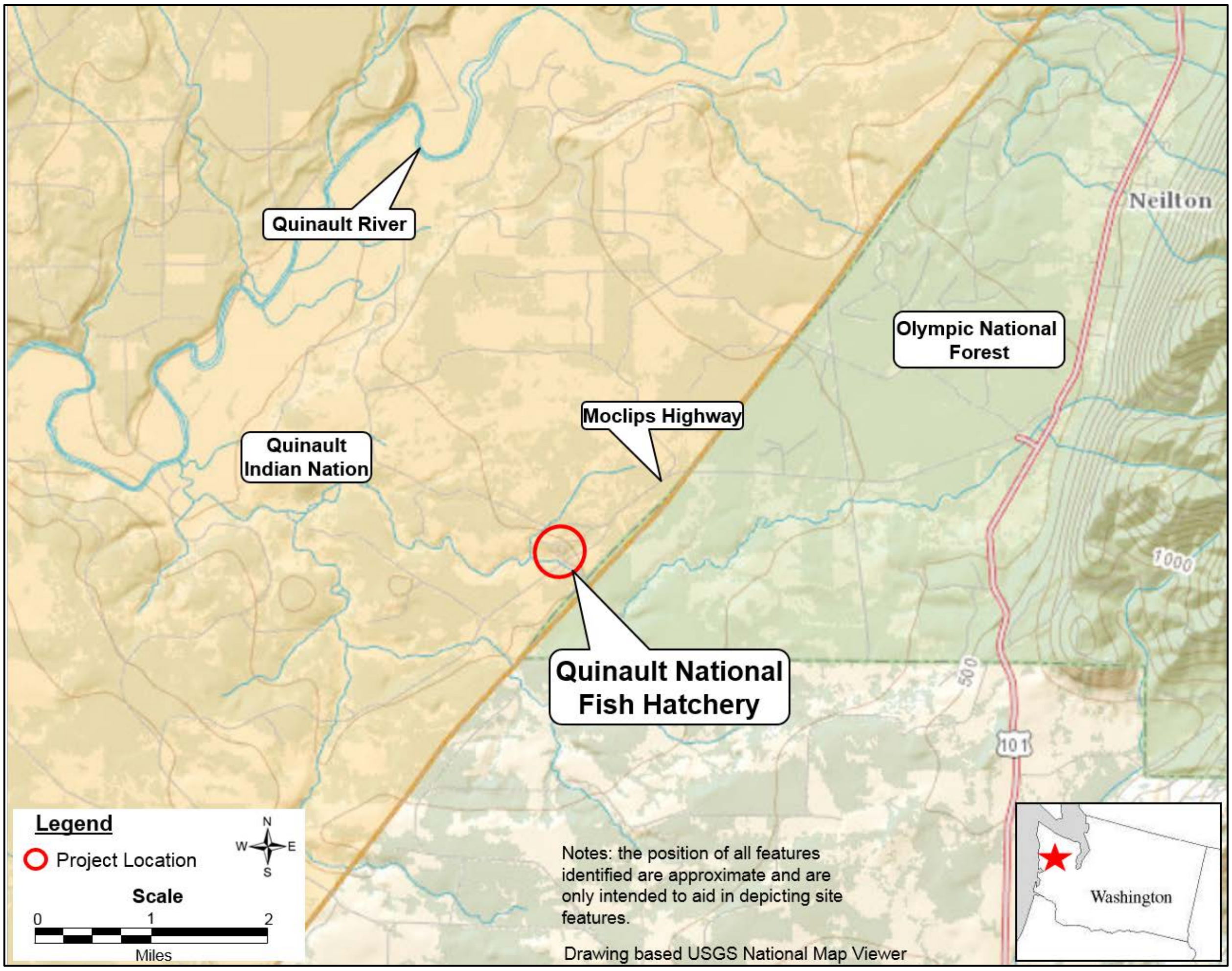


Figure 1-1. Vicinity Map

1.3 Background

The QNFH was established in 1968 to restore and enhance the depleted salmon and steelhead fish runs in the area. A hanging probe electric barrier was originally constructed in 1971 as a preventative measure to ensure that the upstream hatchery water intake was not exposed to fish diseases discovered in the creek. In 2002, the hanging probe fish barrier was replaced with an electric fish barrier consisting of a concrete slab extending across the river, abutments on each bank, and seven electrodes. When energized, the electrodes create an electric field that deters upstream fish passage.

The existing electric fish barrier is not currently functioning as designed and has experienced the following issues:

- Highly variable river conductivity has caused difficulty in setting the electrode current accurately, resulting in failure to prevent upstream fish passage as well as accidental killing of fish.
- Wildlife entering the river during low flows when the electric fish barrier is energized has been killed.
- Individuals have ignored fenced areas/signage and have entered the river near the electric fish barrier, causing safety concerns.

- Large quantities of bed load and debris load in the river have deposited on the electric fish barrier as well as immediately upstream and downstream of the barrier. This debris disables the function of the barrier and the electrodes must be de-energized to clear the barrier of debris.
- The electric fish barrier is not as effective during low flow conditions as desired.

Additionally, the USFWS has discovered IHN in the steelhead stocks in Cook Creek downstream of the electric barrier. To prevent introduction of IHN into the hatchery water supply, which is located upstream of the barrier, the USFWS desires the fish barrier system to operate at maximum efficiency (to the greatest extent practical) during fish migration periods.

1.4 Purpose and Need

The purpose of the project is to construct a new fish barrier in Cook Creek that operates to maximum efficiency (to the greatest extent practical) for the unique conditions that exist at the creek while maintaining the functionality of the QNFH. The QNFH is on a stretch of low gradient creek with very high sediment and debris loads, particularly in the fall and winter when the barrier is required to be operational. The current fish barrier is experiencing operational issues associated with these high sediment and debris load conditions. The proposed project will fund replacing the existing weir, modifying riprap and an access road, and adding a fish bypass ladder.

Additionally, the proposed project addresses routine maintenance activities, which include cleaning of water intakes and removal of large woody debris and gravel buildup near or on the weir. The repairs and maintenance activities are needed to allow the weir and fish ladder to function properly, allow fish passage, and improve human safety.

The need for the project is to eliminate the human and animal safety concerns, to remedy the operational issues of the existing electric fish barrier system, and to provide a system that reduces the potential for fish diseases to enter the QNFH upstream water supply. The current electric fish barrier system poses a threat to human and animal life. Aquatic and terrestrial wildlife have been killed on the electric fish barrier during low flow conditions. Additionally, the area is commonly used by the public for fishing, and individuals have ignored posted hazard signs and entered the water. Individuals who enter the water at the barrier are in danger of electric shock. Finally, IHN was discovered among the steelhead stocks in Cook Creek downstream of the electric barrier. To prevent introduction of IHN into the hatchery water supply, the hatchery needs a fish barrier system that is capable of preventing fish passage not only during fish migration periods but also during summer low flows and extreme high flows.

The funding of construction of the new fish barrier in Cook Creek will allow the hatchery to operate at maximum efficiency (to the greatest extent practical) for the unique conditions that exist at the creek.

The specific operational objectives of the project proposed for funding include the following:

- Eliminate the human health and safety risk associated with electric shock from the existing electric weir;
- Comply with National Marine Fisheries Service (NMFS) 2008 Anadromous Salmonid Passage Facility Design criteria for fish exclusion barriers to provide an effective upstream blockage for adult fish;
- Help prevent the introduction of IHN or other fish pathogens into the hatchery water supply;

- Comply with the in-water work construction requirements of regulatory agencies such as, but not limited to, Quinault Indian Nation, U.S. Army Corps of Engineers, and Washington Department Fish and Wildlife;
- Prevent fish kills at low flows due to errors in calibration and disturbances from accumulated gravel that interferes with electrical current in the existing weir; and
- Reduce the need for personnel to enter the river for operation and maintenance of the barrier.

1.5 Tribal Trust and Responsibilities

To comply with Executive Order 13175, the USFWS performed necessary consultation with Indian tribal governments. For this project, the Quinault Indian Nation (QIN) is the only tribal government involved. Consultation letters including project information have been sent to the QIN. Tribal consultation will be ongoing throughout the development of this EA and throughout the permitting process for the project.

1.6 Project Area and Existing Conditions

The project area consists of the extents depicted in the Existing Site Plan (Figure 1-2). The project area encompasses the construction limits that will be utilized during the installation of the new fish barrier system.

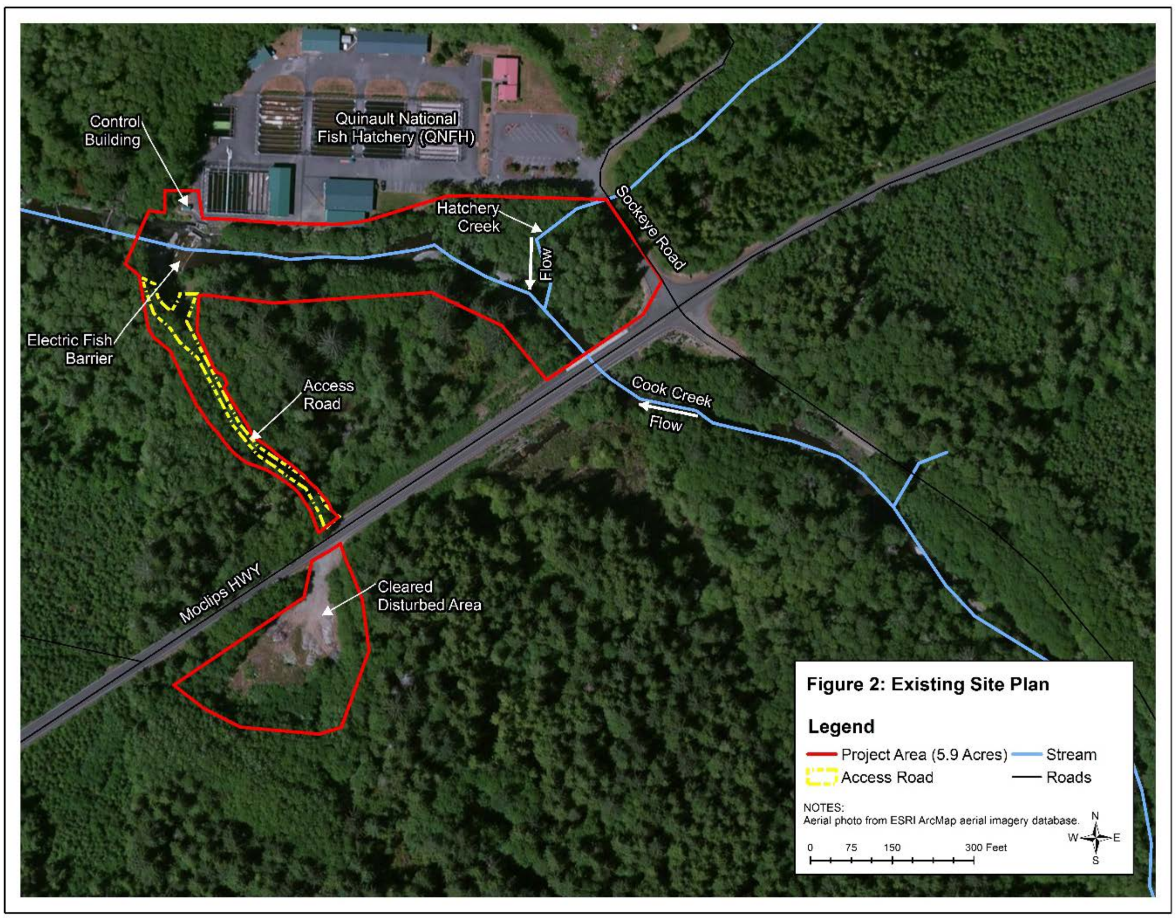


Figure 1-2. Existing Site Plan

Existing Electric Fish Barrier System

The existing electric fish barrier system consists of an approximately 104-foot-wide barrier that is skewed 15 degrees from perpendicular to the river flow (Figure 1-3). Seven electrodes extend across a channel slab and up the abutment walls on each side of the channel (Figure 1-4). The barrier was modified from the original design by the addition of a wood weir, with a sill bolted to the upstream side (Figure 1-4). The main flow channel makes up the majority of the barrier (Figure 1-5). Approximately 10 feet of the barrier is a low flow channel that is located on the north side of Cook Creek (right bank). This channel is 1 foot below the main channel elevation and is separated from the main flow channel by a 1-foot-wide, 5-foot-tall concrete abutment wall (Figure 1-6). A fish entrance into the hatchery is located on the right bank adjacent to the low flow channel (Figure 1-6). A 12-foot by 8-foot control building that houses the existing electric fish barrier operation and control equipment is located approximately 30 feet north of the creek (Figure 1-7).

The existing fish barrier operates by creating a pulsed direct electric current between the electrodes that are embedded in the slab. Fish passage is prevented when the electrodes are energized by creating an electric field in the water that the fish sense and will typically avoid. The current increases from downstream to upstream and is automatically adjusted by a computerized control system that senses the water level at the barrier and adjusts the system accordingly. If fish attempt to swim through the electric field they will encounter a progressively stronger current and will either retreat volitionally or are stunned and swept downstream by the current. During low water level conditions, the electrodes in the main slab can be de-energized while the bypass section remains energized. This function is intended to allow the barrier to continue to prevent fish passage in the low flow section when the water depth is too shallow for safe operation of the main slab electrodes.

Figure 1-3. Existing Electric Fish Barrier
(General view looking south at the existing system.)

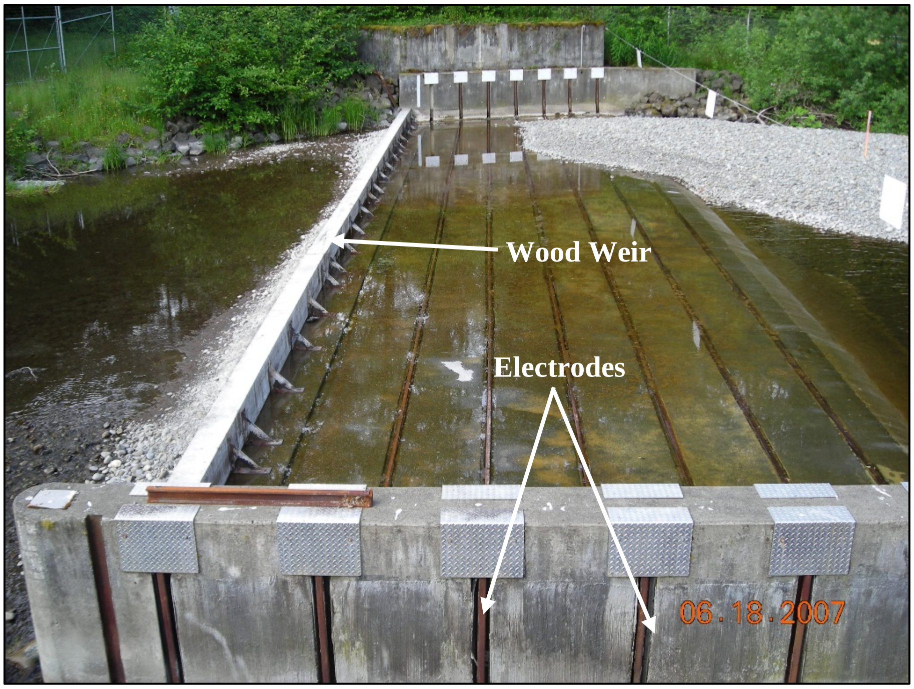


Figure 1-4. Channel Slab
(General view looking southwest across the channel slab.)

Figure 1-5. Main Flow Channel
(General view looking south at the main flow channel.)

Figure 1-6. Low Flow Channel and Fish Entrance
(General view looking east at the low flow channel and fish entrance.)

Figure 1-7. Control Building
(General view looking northwest at the electric fish barrier control building.)

Access Road

An existing access road extends from the Moclips Highway to the electric fish barrier on the south bank of Cook Creek (Figure 1-2). The gravel road is approximately 12 feet wide by 550 feet long. This road provides maintenance access to the south side of the electric barrier, as well as pedestrian access to the south side of Cook Creek. The area directly surrounding the barrier on the south side of Cook Creek is fenced with locked access gates for public safety. A pedestrian access route to Cook Creek extends along the west side of the fenced area and allows public access to the creek approximately 30 feet downstream of the electric barrier. Figures 1-8 and 1-9 below show the existing access road conditions.

Figure 1-8. Access Road
(Looking northwest from the Moclips Highway along the existing access road alignment.)

Figure 1-9. Access Road
(Looking north at the north portion of the existing access road.)

Cleared/Disturbed Area

Across the Moclips Highway (Figure 1-2) from the existing access road an open area exists that has been disturbed and cleared of vegetation. This area will be utilized as a construction staging area for the proposed project. Figures 1-10 and 1-11 below show the existing conditions of the cleared/disturbed area.

Figure 1-10. Cleared/Disturbed Area
(Standing at the Moclips Highway looking south across the cleared/disturbed area.)

Figure 1-11. Cleared/Disturbed Area
(Looking north-northwest across the cleared/disturbed area.)

Cook Creek and Hatchery Creek

Cook Creek and Hatchery Creek are the two drainages in the project area. Cook Creek extends along the entire project alignment. Hatchery Creek, which is a tributary to Cook Creek, is located in the central portion of the project area (Figure 1-2). Figures 1-12 through 1-17 below show the conditions of Cook Creek and Hatchery Creek within the project area.

Figure 1-12. Cook Creek at the Electric Fish Barrier (low flow)
(General view looking west at Cook Creek low flow conditions across the electric fish barrier.)

Figure 1-13. Cook Creek at the Electric Fish Barrier (high flow)
(General view looking west at Cook Creek high flow conditions across the electric fish barrier.)

Figure 1-14. Cook Creek at Moclips Highway (high flow)
(General view of Cook Creek downstream of the Moclips Highway Bridge, looking northwest.)

Figure 1-15. Cook Creek upstream of Moclips Highway (low flow)
(General view of Cook Creek upstream of the Moclips Highway, looking east-southeast.)

Figure 1-16. Hatchery Creek
(General view along Hatchery Creek alignment, looking upstream.)

Figure 1-17. Hatchery Creek flowing into Cook Creek
(General view of Hatchery Creek confluence with Cook Creek.)

Water Intake

The primary water supply to the QNFH is from Cook Creek. Cook Creek water is diverted to the hatchery using a gravity flow diversion system. The water intake is located south of the hatchery at the end of a dirt road. To help funnel water to the intake, a wooden diversion wall that is approximately 6 feet wide by 45 feet long with an adjacent 10-foot-wide by 36-foot-long riprap wall is located on the left bank. From the intake chamber, water flows 900 feet underneath a graveled road through a 48-inch-diameter pipeline to a headbox, screen chamber, and a sediment basin, collectively called the sediment basin. The sediment basin looks like a concrete pool that measures 33.5 feet wide by 43.5 feet long with an average depth of 4 feet. When Cook Creek water first reaches the sediment basin, it flows through the headbox or to a bypass pipe that directs water back to Cook Creek. Water that stays in the sediment basin then enters a screen chamber and passes through inclined metal screens measuring approximately 32 feet wide by 6 feet long. The screens prevent materials such as leaves, sticks, and fish from entering the settling pond. Screened water then enters a sloped sediment pond, which removes some settleable solids before allowing the water to flow to a 48-inch-diameter outlet pipe that goes to the hatchery.

1.7 Background

The scoping process provided the means to identify relevant resources or environmental concerns, which were then analyzed in detail or deemed irrelevant and eliminated from detailed study. A list of resource concerns was compiled for the project from concerns identified by the public or agencies during an internal scoping meeting.

Scoping meetings were held on May 3, 2014; June 20, 2014; December 11, 2014; and November 5, 2015. Personnel from regulatory agencies and their consultants who attended all or some of the scoping meetings included representatives of the USFWS, Quinault Indian Nation (QIN), U.S. Forest Service (USFS), National Marine Fisheries Service (NMFS), Washington Department of Fish and Wildlife (WDFW), Washington Department of Ecology (Ecology), and U.S. Army Corps of Engineers (USACE). The meetings provided opportunity for the agencies and project personnel to express any specific concerns and their relevance to the proposed action.

A summary of resource concerns and their relevancy to the proposed action is provided in Table 1-2 below.

Table 1-2. Resource Concerns Summary

Item/Concern	Relevant to the proposed Action? Yes	No	Rationale
Physical Environment			
Prime and Unique Farmland		X	Farmland is not located in or near the project area.
Geology / Mineral Resources / Energy Production		X	According to a Mineral Resource Maps of Washington (Moen 1978), there are no metallic, non-metallic, sand/gravel pits, stone quarries, or energy resources in or near the project area.
Surface/Groundwater Quality	**X**		No change in groundwater quality. Temporary impacts to surface water quality from increased turbidity during construction.
Groundwater Quantity		X	No change from existing conditions.
Waters of the U.S.	**X**		Impacts to Cook Creek and tributaries from inundation and in-water work. Alternatives will require a USACE 404 permit. Consultation with USACE will be performed.

Item/Concern	Relevant to the proposed Action? Yes	No	Rationale
Regional Water Mgt. Plans and Coastal Zone Management Areas	X		The project area is located within a Coastal Zone Management Area (CZMA).
Floodplain Management		X	The Federal Emergency Management Agency (FEMA) has not completed a study to determine the flood hazard for the project area and a flood hazard map has not been published.
Wetlands	**X**		Wetlands exist within the project area and will be impacted by project actions.
Wild and Scenic Rivers		X	None in or near the project area according to National Wild and Scenic Rivers System (NWSRS) Map (NWSRS 2014).
Sole Source Aquifers		X	None in or near the project area according to the U.S. Environmental Protection Agency (USEPA) Sole Source Aquifer Program Map (USEPA 2013).
Air Quality / Clean Air Act		X	Project actions will not have a measurable impact to air quality and no permits are required
Greenhouse gasses / Climate Change		X	The project will have no measurable impact to greenhouse gasses or climate change.
Biological Environment			
Special Status Plant Species (Federal and State listed)	**X**		There is no suitable habitat or critical habitat for any USFWS listed plant species within the project area according to USFWS Trust Resources List (USFWS 2014a) for the project area. There are two State-listed sensitive plant species from the Grays Harbor County list of State-listed species (Washington Department of Natural Resources [WDNR] 2014) (pink fawn-lily *Erythronium revolutum*, and tall bugbane *Cimicifuga elata*) that have suitable habitat in the project area.
Forest Resources	**X**		Clearing of trees will be performed for project construction.
Noxious Weeds and Invasive Plant Species		X	Construction disturbance increases risk of invasive species becoming established. Best Management Practices (BMPs) will be implemented and measures taken to reduce or eliminate species from becoming established.
Natural Areas/Conservation Areas		X	According to the WDNR Natural Areas Map (WDNR 2013), there are no Natural Resources Conservation Areas (NRCA) or Natural Area Preserves (NAP) located in or near the project area. There are no National Conservation Areas located in or near project area according to National Monument and National Conservation Areas Map (Bureau of Land Management [BLM] 2015).
Riparian Areas	**X**		Clearing of trees will be performed for project construction within riparian areas.
Essential Fish Habitat	**X**		Essential Fish Habitat (EFH) for Chinook Salmon and Coho Salmon is located within the project area.
National Wildlife Refuges / Wilderness Areas		X	No National Wildlife Refuges or Wilderness Areas are located in or near the project area according to the Wilderness Areas map (National Wilderness Preservation System [NWPS] 2014) and Wildlife Refuge Map (USFWS 2014b).
Wildlife Habitat	**X**		Disturbance to general wildlife and wildlife habitat during construction.
Coral Reefs		X	N/A

Item/Concern	Relevant to the proposed Action? Yes	No	Rationale
Special Status Animal Species (Federal and State listed)	**X**		Bull Trout designated critical habitat (DCH) located approximately 400 feet downstream of project area. Northern Spotted Owl and Marbled Murrelet DCH adjoins project area to the east. Marbled Murrelet observed at the hatchery. The hatchery is in a designated spotted owl circle. Streaked Horned Lark and Yellow-billed Cuckoo, Dolly Varden, and Fisher were identified in FWS species list. However, none of those species would be affected by this action. Compliance with Endangered Species Act (ESA) Section 7 is being completed.
Invasive Animal Species		X	No potential for introduction of invasive animal species.
Migratory Birds/Bald and Golden Eagles	**X**		USFWS Trust Resource List identified the potential for 14 Birds of Migratory Concern (BOMC) to occur in the area (USFWS 2014a).
Livestock Grazing		X	Livestock grazing does not occur in or near the project area.
Human Environment			
Socioeconomics		X	The project area is located on Federal land at least 5-¼ miles from the nearest community. There are no communities in or near the project area that will be measurably affected socially or economically from the project actions.
Historic Properties/Cultural Resources	**X**		Section 106 Cultural Resource Compliance will be completed and a field survey is complete.
Hazardous Materials		X	All Federal, state, and local laws and regulations will be followed pertaining to pollution and contamination of the environment to prevent pollution of surface water, groundwater, soil, and air with any hazardous materials. Level I compliance will be completed.
Environmental Justice and Civil Rights		X	No concerns as no area populations will be impacted by project actions.
Public Health and Safety	**X**		Beneficial impact to public health and safety by removing the threat of injury from electric shock on the barrier.
Recreation		X	No designated recreation areas or trails in project area. The QNFH visitor center is open to the public daily 8:00 a.m.– 4:30 p.m. Construction activities will not impact operation hours or public access to the visitor center.
Land Use/ Public Access	**X**		No changes to existing land use. Fishing access at the barrier will be temporarily unavailable during construction.
Visual Resources		X	There are no high vantage points, scenic overlooks, or scenic driving routes present in the project area.
National Scenic and Historic Trails		X	No National Scenic and Historic Trails located in or near project area according to a National Trails System Map (National Park Service [NPS] 2010).
Natural Areas and Parklands		X	No Natural Areas located in or near project area according to Washington's Natural Areas Map (WDNR 2013). No State or National Parks located in or near project area according to State Parks Map (Washington State Parks [WSP] 2015) and NPS Map (NPS 2013).
Transportation Infrastructure		X	There will be no modification or impacts to transportation infrastructure.
Noise		X	Temporary construction-related noise. All county and state noise ordinance laws and regulations will be adhered to. There are no residences or commercial businesses located in or near the project area that are sensitive to noise.

Item/Concern	Relevant to the proposed Action? Yes	No	Rationale
National Landmarks, Monuments and Historical Sites		X	None located in or near project area based on National Natural Landmarks Map (NPS 2012), National Monument and National Conservation Areas Map (BLM 2015), and National Register of Historic Places (NRHP) data (NPS 2007).
Scientific Resources		X	N/A

Resource concerns determined to be relevant to the proposed project are discussed in detail in Section 4.

SECTION 2
ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 Formulation Process

Numerous alternatives were developed by the project team based on the ability to address the purpose and need of the project, and were formulated in consideration of four criteria: completeness, effectiveness, efficiency, and acceptability. In accordance with NEPA (40 CFR 1502.14), some of these initial alternatives were eliminated from further analysis due to high cost or other critical factors. One action alternative (Velocity Fish Barrier – Obermeyer Weir) and one no action alternative were selected by the USFWS and the project team to be analyzed.

The following seven alternatives and options were considered early in the project scoping phases, but were eliminated from detailed study as they were either considered ineffective or unacceptable.

2.1.1 Picket Barrier

This alternative consists of installing a picket barrier structure within Cook Creek. The barrier structure would be installed perpendicular to the flow, and would extend across the creek. The following three picket barrier options were considered: bottom hinged picket barrier operated by a hydraulic cylinder, bottom hinged picket barrier operated by an air bladder, and a bridge-supported bar rack with pivoting panels. Picket barriers are proven designs that can work well in locations with minimal sediment or debris loads and with adequate depth of water at the full range of design flows to meet the NMFS required maximum average velocity through the pickets of 1.0 foot per second (fps). All three options would cost on the order of $1,000,000 to construct, including contingencies, design, permitting, and administration. Of the three options, the bridge-mounted picket barrier would be the preferred option because the picket panels could be accessed for cleaning or repair without having to enter the creek or having to wait for flows to subside.

The QNFH site is on a stretch of low gradient creek with very high sediment and debris loads, particularly in the fall and winter when the barrier is required to be operational. As a result, all three options could be expected to require extensive operation and maintenance efforts to deal with the heavy sediment and debris loading. Picket panels would need to be either lowered or removed to clean and flush debris during high flows, which would also allow for the possibility of fish passage during those periods. In addition, water depths at the site are not adequate to provide the required area for the picket panels in order to keep the average velocities through the panels below the maximum allowed 1.0 fps. This alternative was eliminated from detailed study as it was not determined to be feasible for this location.

2.1.2 Velocity Barrier – Fixed Concrete

This alternative consists of creating a high velocity, shallow flow over an elevated apron immediately downstream of a weir with a vertical barrier. A velocity barrier requires the apron slope of 1 foot, the weir height of 3.5 feet, and the head over the weir of 2 feet for a total required minimum drop across the barrier of 6.5 feet. Building a velocity barrier as a fixed concrete structure with concrete apron slab, concrete weir, concrete abutments, and training walls would permanently raise the water surface elevation upstream of the barrier by 6.5 feet. An increase of the water surface elevation by 6.5 feet would require that extensive levees be built upstream of the barrier to prevent flooding of the hatchery and adjacent lands.

This alternative would be very effective as a fish barrier and would pass sediment and debris. It would require minimum maintenance. However, head requirements would result in elevated upstream water elevations that would necessitate levees to be built, with additional cost and permitting requirements. This alternative was eliminated from detailed study due to the extensive impacts and permitting requirements.

2.1.3 Vertical Drop Structure

A vertical drop structure simply provides a vertical drop greater than the maximum jumping height of the target species. For the QNFH project, a structure would need to be constructed to an overflow weir crest a minimum of 10 feet above the maximum downstream water elevation. Using a 2-foot drop over the vertical structure weir would result in a total backwater of 12 feet in the creek, and additional levees would need to be constructed to contain the creek. This alternative was eliminated from detailed study because it is not a feasible choice for Cook Creek.

2.1.4 Electric Barrier

Modifications to the existing barrier would consist of reducing the width of the barrier to increase the creek velocities, thus reducing the deposition of bed load at the barrier, and building a permanent concrete weir on the upstream side of the electric barrier to act as a velocity barrier at low stream flows. These modifications would help reduce bed load and small debris accumulations, reduce fish kill, and improve barrier efficiency. This alternative would result in a minor increase in the water surface elevation compared with the existing condition. This alternative was eliminated from detailed study because it would not eliminate fish and mammal kills and would still be dangerous for humans.

2.1.5 Turning Off Electric Barrier

Brief consideration was given to simply turning off the electric barrier without replacing it with another type of barrier. However, with no barrier in place, fish disease would be allowed to spread upstream in Cook Creek. Further, escapement of fish returning to the hatchery could result in genetic mixing of wild and hatchery fish. The QIN expressed opposition to turning off the electric barrier without replacing the electric barrier with an effective barrier. This alternative was eliminated from further consideration.

2.1.6 Clean Water Supply

This alternative consists of removing the electric barrier and restoring the stream to a natural flowing channel. A disinfection system would be installed on the hatchery intake water supply to kill any pathogens that may be present in the water. QNFH has a total surface water right of 55 cubic feet per second (cfs). The recommended system to treat the surface water would include a 40-micron mechanical pre-filtration, followed by ultraviolet (UV) disinfection. Mechanical filtration, utilizing a drum filter, typically costs on the order of $15,000 per cfs of treated flow at a 40-micron screening level. Based on historical data from other projects, the cost of UV disinfection averages $9,000 per cfs of treated flow at a dose rate of 50 MJ/sec-cm^2, with UV transmissivity in the 80-90% range. Including equipment enclosures, electrical work, yard piping and valves, sitework, contingency, as well as design, permitting, and administration, the total cost of the system would be in the range of $4,000,000. This alternative was eliminated from detailed study due to the high upfront capital cost as well as the high long-term maintenance costs.

2.1.7 Flood Wall with Obermeyer Weir

An Obermeyer weir with a velocity fish barrier and a concrete or sheetpile flood wall was considered, with the flood wall proposed for construction along approximately 1,275 feet of the south bank of Cook Creek (outside of the existing Ordinary High Water Mark [OHWM]). This flood wall was proposed to contain the high design flow, and to protect adjacent wetlands. The flood wall would have stood 4 to 8 feet above ground, and extended 4.5 feet (concrete) or 20 to 40 feet (sheetpile) below ground.

To facilitate construction and provide access, an approximately 25-foot to 30-foot wide strip of vegetation clearing and grubbing would have been required along the entire wall alignment (approximately 0.70 acres). To prevent woody debris from catching on the new velocity fish barrier, woody vegetation would need to be cleared between the existing OHWM and proposed OHWM (approximately 2.15 acres), outside of the area planned for clearing and grubbing. Woody vegetation clearing would have consisted of removal of shrubs and trees over 12 inches in height or 2 inches in diameter. Trees between 2 inches and 6 inches in diameter would have been cut at the base and the root left in place. Trees over 6 inches in diameter would have been cut at 36 inches above existing ground and the stump left in place. Continued cutting of vegetation near the flood wall would have been routine maintenance to maintain the flood wall.

Some of the flood wall and vegetation clearing would have occurred in existing wetlands. The flood wall would have disturbed more wetland area than it would have protected by preventing inundation of existing wetlands. The flood wall portion of the construction plan with an Obermeyer weir was therefore abandoned.

2.2 Alternatives Considered for Detailed Study

One action alternative considered for the project was carried forward to detailed analysis in this EA. The No Action Alternative must also be considered. The two alternatives are described below.

2.2.1 No Action

Under the No Action Alternative, the USFWS would not provide funding for improvements to the QNFH electric barrier. This alternative would leave the existing conditions intact. This alternative would not eliminate fish and mammal kills, and the electric barrier would still be dangerous for humans. Additionally, this alternative would not reduce the maintenance effort involved at the weir, and would not be effective at preventing adult fish from traveling upstream during large storm events.

2.2.2 Velocity Barrier – Obermeyer Weir

This alternative funds the demolition and removal of the existing electric fish barrier system, and funds installation of a velocity fish barrier utilizing an Obermeyer weir. The Obermeyer weir would allow the barrier to be lowered during flood events. Improvements would be made to the existing access road that extends from the Moclips Highway to the south bank of Cook Creek. The cost for this alternative is approximately $1,800,000. A Proposed Site Plan can be seen in Figure 2-1 below. A detailed description of each improvement is also included below.

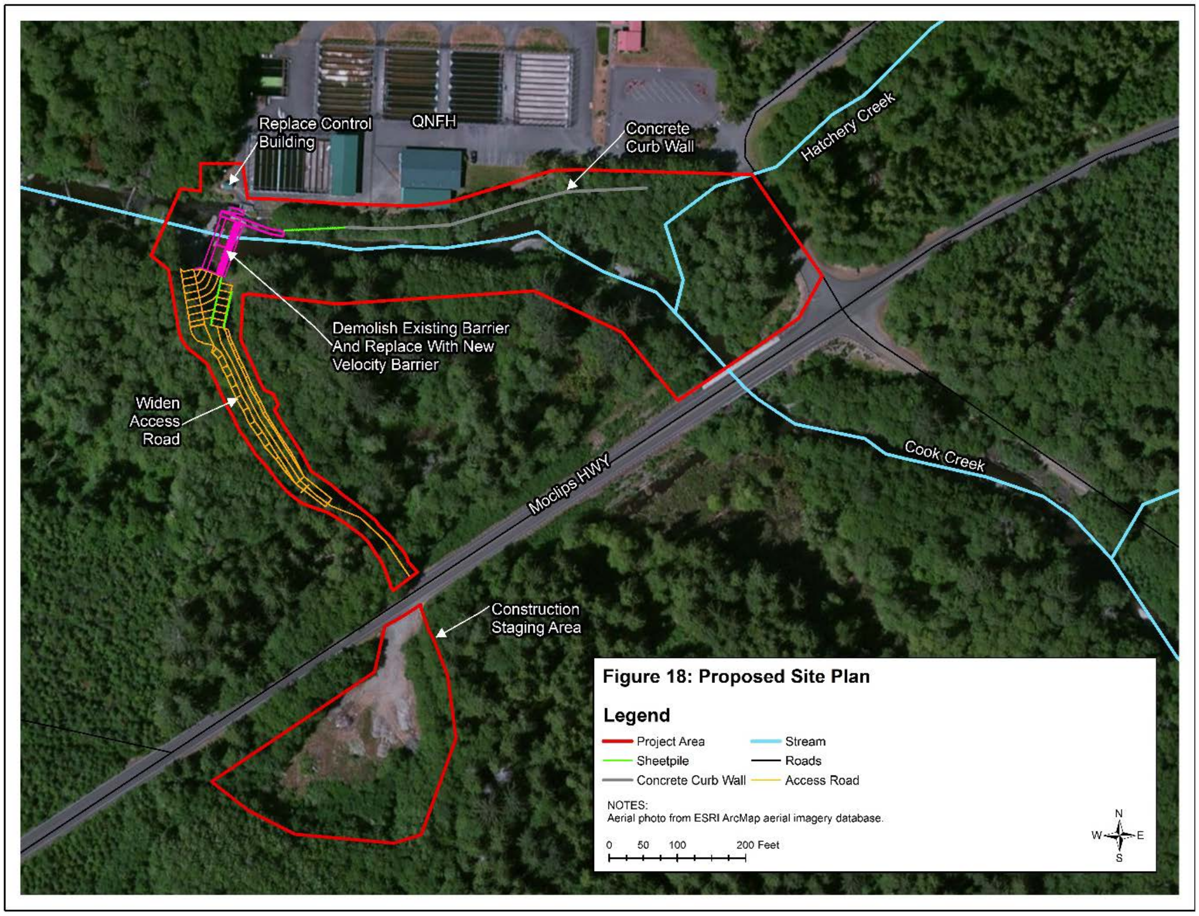


Figure 2-1. Proposed Site Plan

The weir work activities would be primarily accomplished in 2016. Most of the work activities, such as the construction of the new weir, fishway, control building, and access road extension would be scheduled for the summer months. The water intake diversion wall repair and spawning building re-piping activities would likely take place between 2017 and 2020. The maintenance cleaning may be undertaken both in 2016 and 2017 (and, if needed, on an annual to triennial basis thereafter).

The water intake diversion wall repair is expected to take 5 to 20 days. The spawning building re-piping activities are expected to take 10 to 30 days. The maintenance activities such as cleaning excessive material from weir, fish ladder, or fish intake generally take 1 or 2 days for each activity. The length of time between cleaning these structures can vary from annual to triennial, depending on previous winter weather and upland activities. Maintenance cleanings are generally carried out during the low flows and within the fish window.

During the 2016 season, all work except cleaning activities would be completed within approximately 90 to 120 working days, with construction activities occurring during daylight hours. Timing and duration of several work activities noted below may overlap. It is estimated that the mobilization, staging area set-up, staking, and surveys would take approximately 5 to 10 days. Demolishing the old control building and constructing a new control building are expected to take 5 to 14 days. The demolition of the old weir and construction of the new weir are expected to take 20 to 100 days.

Some work activities may start outside of the summer months. The activities outside of the summer months would not include any in-water activities and would not cause turbidity in water bodies. Some of these activities include removal and replacement of the control building, equipment and material mobilization, staging area set-up, staking, construction and land surveys, and tree clearing. In addition, they may include other work activities like installing straw wattles, silt fences, and other Best Management Practices.

This Velocity Barrier – Obermeyer Weir alternative includes the following components:

Temporary Staging Area

The construction staging area would be located off the Moclips Highway in a previously disturbed area (Figures 1-10, 1-11, and 2-1). There would be no additional clearing of vegetation in this area and the site would be stabilized. Equipment includes but would not be limited to excavators, loaders, skids steers, concrete trucks, dump trucks, and compaction equipment.

Erosion Control and Marking

The next step of construction would involve marking the limits of the approved work areas, such as right-of-way boundaries, and flagging the location of approved areas. Establishing the clearing limits would preserve vegetation adjacent to the work areas. Shoreline, wetland boundaries, and other environmentally sensitive areas would be marked or fenced for protection (Figure 2-2). Underground utilities (i.e., cables, conduits, and pipelines) would be located and flagged to prevent accidental damage during construction. Virtually all work areas would be outlined with silt fencing, and if needed straw wattles at the base to prevent runoff. No trees would be removed for the silt fencing (unless the vegetation would already be removed for needed setbacks). If trees were compromised due by the silt fence installation, straw wattles would be used.

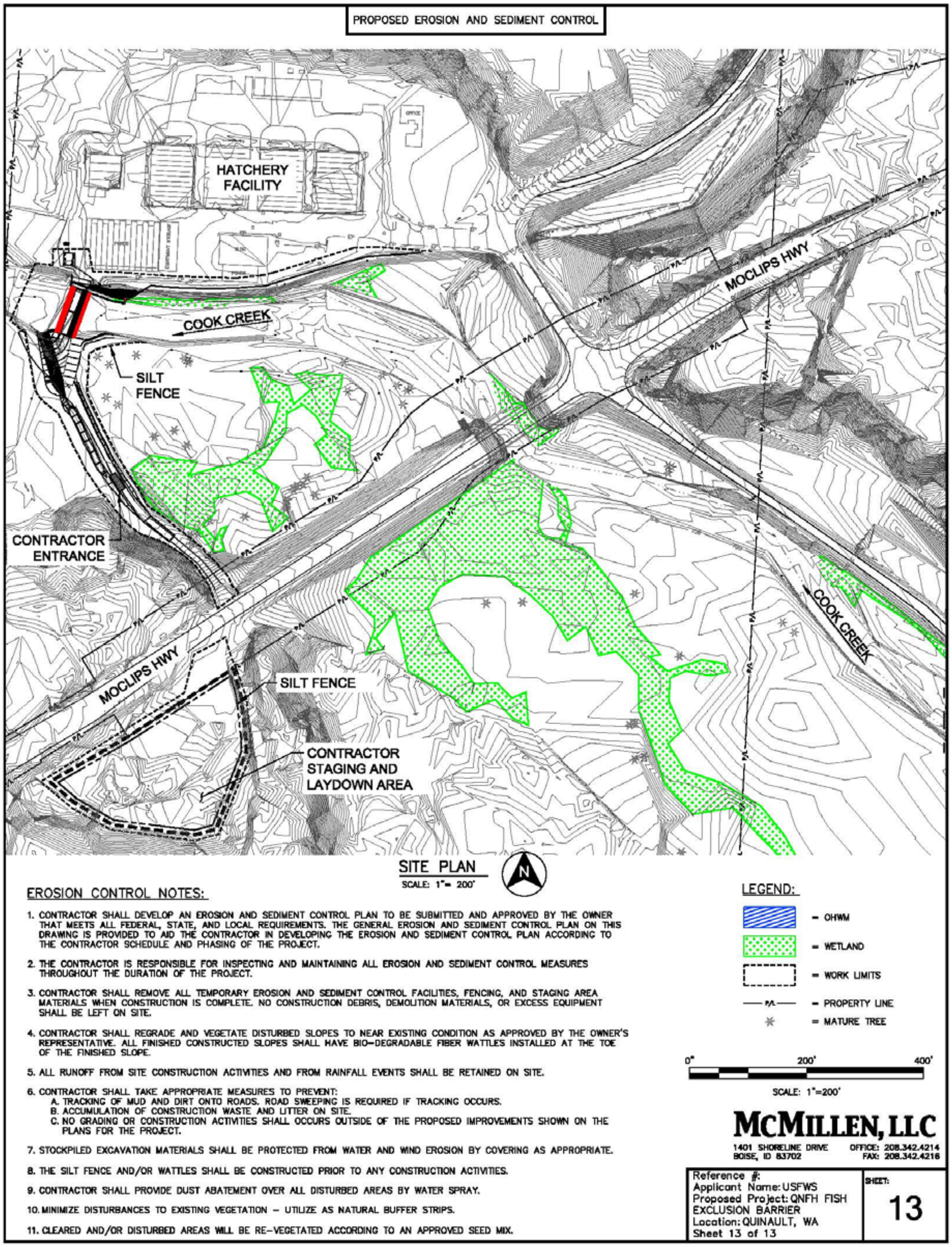


Figure 2-2. Erosion Control Drawing

Control Building

The existing electric weir control building, located approximately 30 feet north of the existing fish barrier structure, would be demolished and replaced with a new pre-engineered metal building. The existing building is a conventional wood frame building approximately 7 feet wide by 12 feet long by (84 square-feet) on a strip of concrete (Figure 2-3). The current control building houses a computer and other electric components for the weir, and a few hand tools. The new building would be larger, measuring approximately 15 feet wide by 20 feet long (300 square-feet), and made with metal siding and a concrete slab (Figure 2-4). The control building would house the weir compressor, a U.S. Geological Survey (USGS) gauge, a security camera, and a few hand tools. A backup generator powered by propane would be located behind the building. Two 2-inch-diameter conduit pipes with wires and air hose components would lead from the control building to the weir housing.

The new construction, and demolition of the old control building, would be located entirely on fill, pavement, or on grass and weeds. The proposed project activities would not remove or harm any trees. An excavator would trench a 2-foot-wide by 3- to 4-foot-deep line from the control building to the new weir for the conduit. Work activities for demolition of the old building and construction of the new building may start in March and last approximately 6 to 14 days. Trenching below the ordinary high water mark would not start until weir work began (during the fish window period).

Equipment for the construction and demolition of the control building would be typical for this type of work. This may include backhoes, trucks, bulldozers, and other such devices.

Figure 2-3. Picture of Existing Control Building

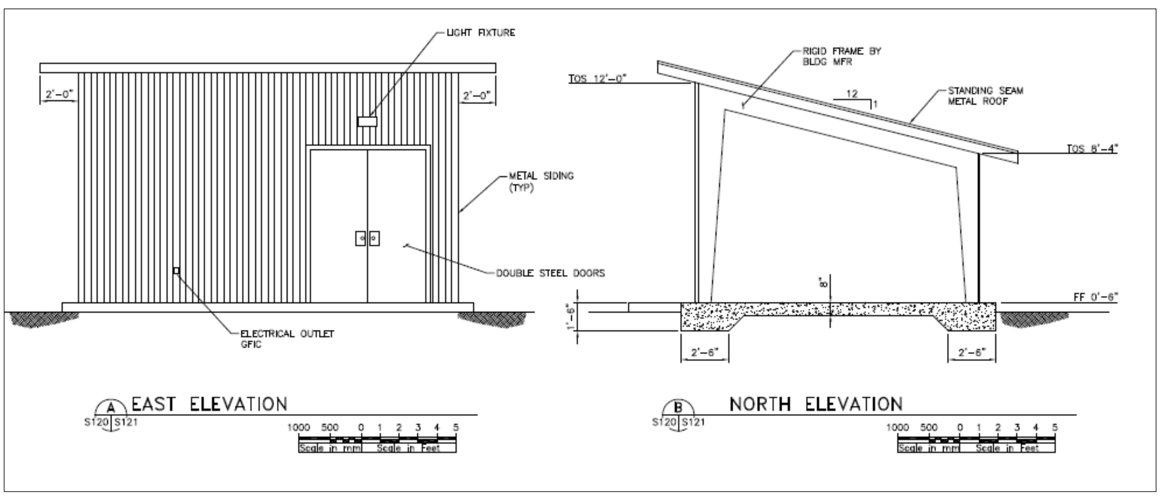


Figure 2-4. New Control Building Engineering Drawing

The current conditions surrounding the project activities include six wetlands. These wetlands are noted as Wetlands A–D in Figure 2-5. The water surface elevation upstream of the weir would be raised approximately 6.5 feet, resulting in an increase in inundation of 5.23 acres. A rise in stream level would occur along approximately 1,817 linear feet of Cook Creek and 170 linear feet of Stream 1 (Hatchery Creek). The proposed project actions are estimated to eliminate 0.18 acres of wetland, as all of wetlands A, B, and C would become riverine. An additional 0.76 acres of wetland area are expected to be inundated more deeply, but to remain a wetland. New wetland would be created in 4.24 acres of upland that would be inundated and become wetland. Figure 2-6 illustrates the areas that would be inundated, and Figures 2-7 through 2-11 are pictures of Wetlands A, B, C, and D and Cook Creek.

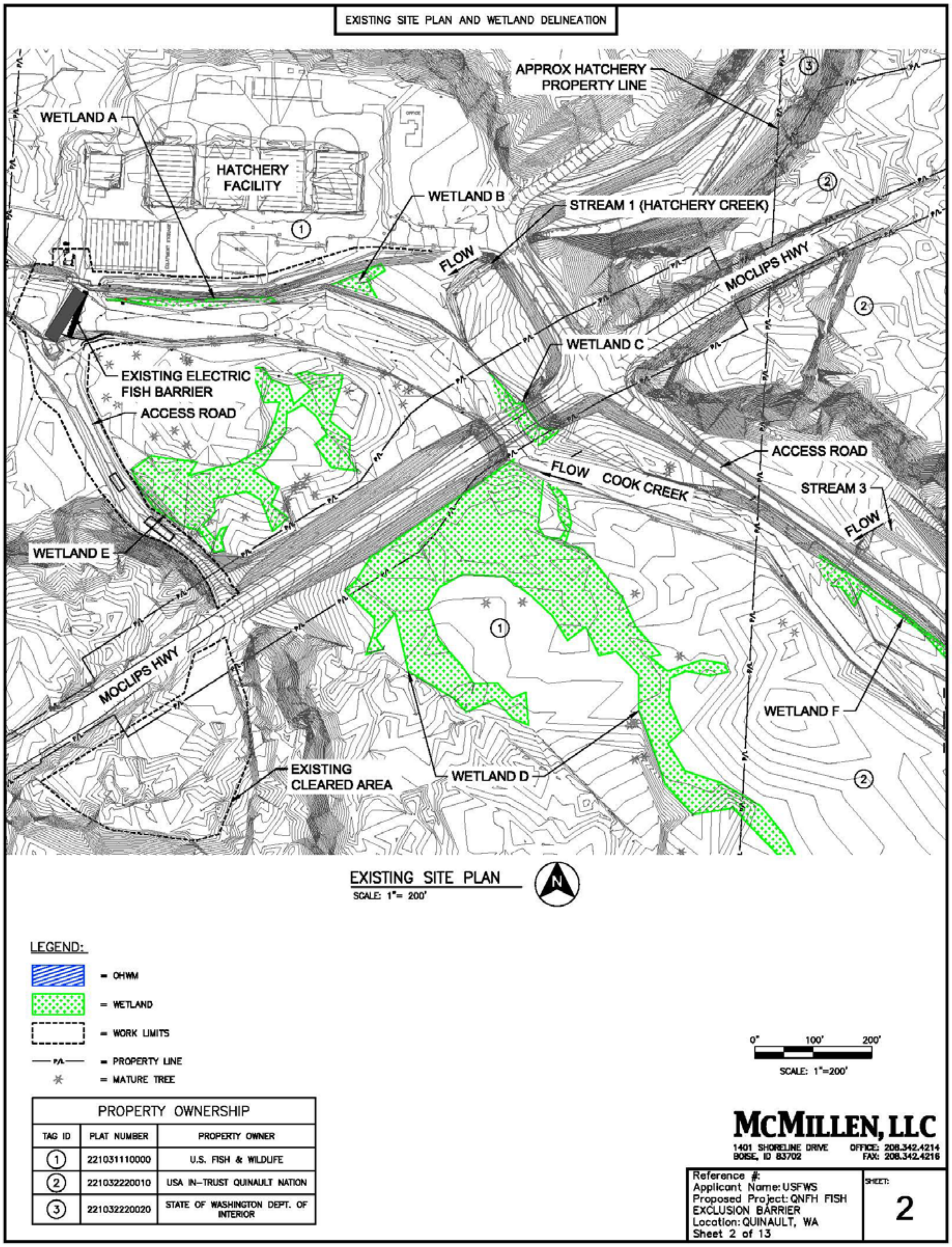


Figure 2-5. Engineering Drawing Noting Existing Conditions

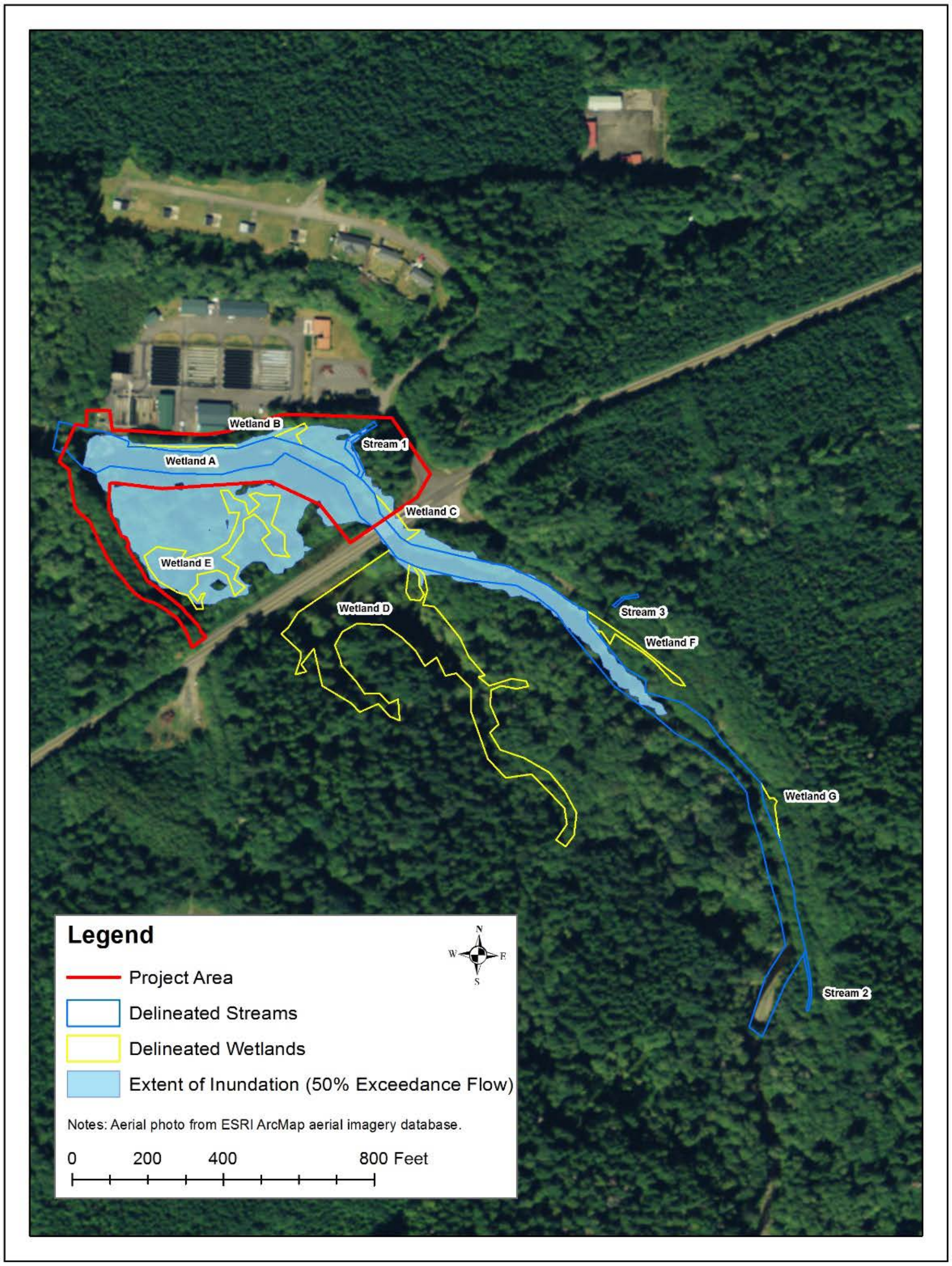


Figure 2-6. Extent of Inundation at 50% Exceedance Flow after Construction of the New Weir

Figure 2-7. General View of Cook Creek and Wetland A Upstream of the Fish Barrier (7/2011)

Figure 2-8. General View of Cook Creek and Wetland B, Looking Downstream (7/2011)

Figure 2-9. General view of Cook Creek and Wetland C under Moclips Highway Bridge, Looking Downstream (7/2011)

Figure 2-10. General View of Wetland D, Looking South (7/2011)

Figure 2-11. General View of Cook Creek Looking Upstream from the Moclips Highway Bridge

Access Road

An existing access road on the south bank of Cook Creek would be used for the construction and maintenance of the new weir. This gravel road is approximately 16 feet wide by 550 feet long. To allow fishermen access to Cook Creek without traversing through hatchery grounds, and allow easier access for maintenance activity, the access road would be widened by approximately 2 to 4 feet. The first 240 linear feet that lead to the new weir would be raised approximately 12 to 18 inches for leveling (Figure 2-12). Concrete would not be used; clean gravel material would be used to widen and raise where needed.

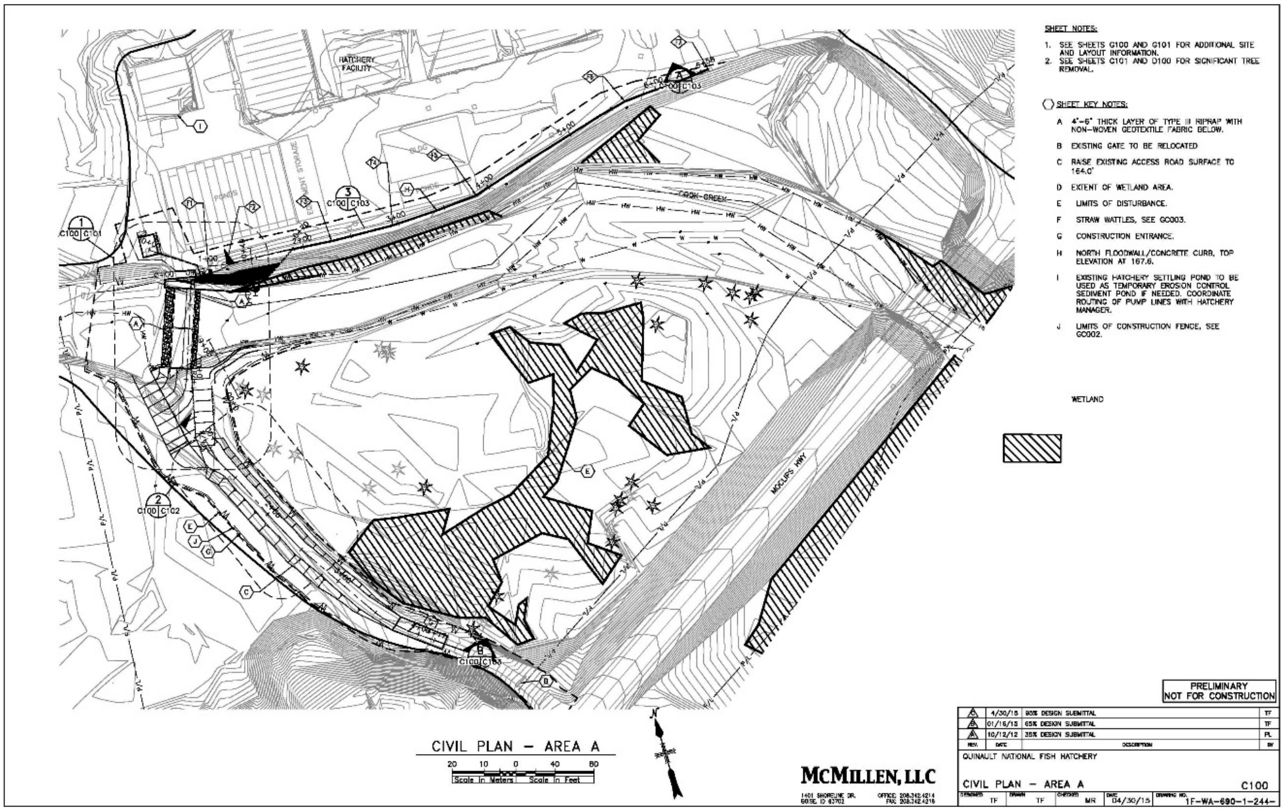


Figure 2-12. Engineering Drawing Noting Setbacks and Road Widening on the Access Road

The access road is surrounded by brush, grass, and small (5 to 10 inches in diameter at breast height [DBH]) maple trees (Figure 2-13). Approximately 10 to 30 maples and brush and grass would be removed to widen the access road. Little or no road widening is expected along Wetland D in the southern part of the road near the Moclips Highway intersection. Road widening would require typical construction equipment such as backhoes, large trucks, and excavators. Road widening and leveling is expected to take 4 to 10 days.

Figure 2-13. General View of Existing Access Road to the South Bank of Cook Creek, Looking Northwest

Where the road approaches the weir, the road would be widened to allow a secured access driveway to be installed. First a 15-foot-wide by 50-foot-long riprap pad would be installed to protect upstream maintenance fixtures. The sides of the access driveway would be enclosed with sheet pile. A vibratory hammer would be used to install the sheet pile. Adjacent to the driveway an area roughly 45-foot-wide by 105-foot-long by would be filled with crushed gravel to allow additional parking and movability for equipment during maintenance.

Fish Ladder

The existing concrete fish barrier, including the concrete apron, concrete electric fish barrier, and wingwalls would be demolished and removed, along with any remaining conduit or piping. The existing fishway (i.e., fish ladder) leading into the hatchery and adjacent fishway wall would be protected during demolition and would remain in place (Figures 2-14 and 2-15).

Figure 2-14. Photo Noting Existing Fishway

Before demolition, temporary workspaces would be required on both sides of the creek. Initially, a temporary workstation would be located on the right bank, on concrete or on a flat landscape with grasses near the control building. As with all of the work activities, the first step is marking the limits of the approved work areas, and installing temporary erosion control measures such as silt fencing, and straw wattles. The temporary erosion control measures would be maintained to minimize the potential for sediment runoff.

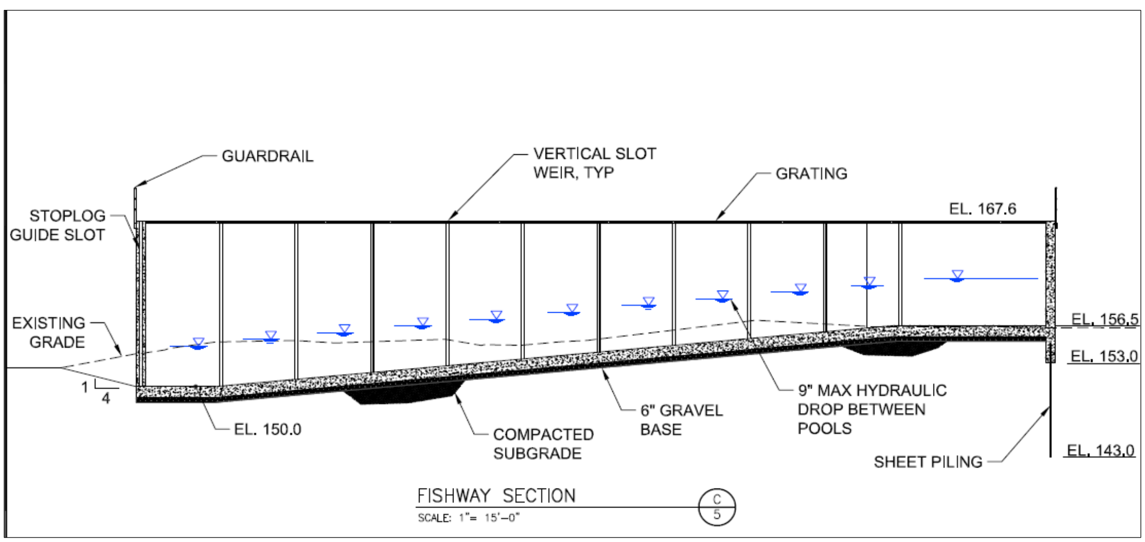


Figure 2-15. Detailed Drawing of the Fishway

Cofferdams

For maintenance of water quality during construction, it is necessary to isolate in-water work areas from the actively flowing stream by using cofferdams. The demolition of the old and the installation of the new weir would require two cofferdam phases. Phase one would be to construct an approximately 30-foot-wide by 110-foot-long cofferdam that would direct the river flow across the weir to channel left, i.e., away from the existing fishway that leads fish into the hatchery (Figure 2-16).

Sandbags could probably be used to construct the cofferdams and would be made of material from a nearby rock quarry. The sacks would be placed side by side by means of a land-based excavator to form a barrier and isolate the construction work area from the stream. The bags and spaces between them would be temporarily sealed on the river side with an impermeable liner to prevent leakage into the construction area. The liner would be placed and sealed by hand. If a sturdier dam was needed and/or for deeper areas, cofferdam construction could include placement of ecology blocks and/or a system such as PortaDam™.

After cofferdams installation and before dewatering the work site, any fish would be removed. An on-site professional fisheries biologist would coordinate fish salvage activities prior to dewatering, and any salvaged fish would be returned to the river. A fish biologist would net or seine for fish. That biologist would note the estimated sizes and types of fish. If fish types were unknown, the biologist would photograph the fish. After all fish were removed, the site would be dewatered. Any muddy water and any subsequent seepage into the work area would be pumped into an existing settling basin at the hatchery. If settling basin capacity was insufficient or not available, pumped water might be discharged into a dissipation/sediment filtration device, such as a geotextile filter bag or straw bale structure, located someplace above high water for infiltration.

Any water that might seep into the construction area during construction would be removed in the same manner, allowing any particulates to settle out in the settling basin before water was returned to the river.

Once the cofferdam was erected, the concrete walls (not adjacent to the existing fishway) and a portion of the concrete weir that was enclosed in the cofferdam would be demolished. This would be accomplished through mechanical means, such as a jackhammer attached to a tracked excavator, or a concrete cutter. Once the concrete was removed, a fish ladder would be constructed. Gravel base material would be placed utilizing a loader and excavator. Gravel material would be compacted with a sheepsfoot compactor. Forms (wood or steel) would be used to form the rectangle-shaped 8-foot-wide by 100-foot-long fish ladder (Figure 2-17). It is likely that high-strength concrete and rebar would be used to strengthen the fish ladder. Concrete would be placed using a concrete pump truck. Once the concrete was dry and the construction forms removed, aluminum stop logs would be installed in the structure to create fish pools. The time needed for fish ladder installation is approximately 20 to 90 days.

Once the concrete was dry, contractors would start removing the cofferdam. The first step would be removal of the impermeable liner by hand. A land-based excavator would be used to relocate the gravel sacks to the second cofferdam phase. This cofferdam would start on the river left and extend to the new fish ladder entrance. Water would then be forced to the river right, through the new fish ladder. Once the cofferdam was completed, another row of sandbags/ecology blocks would be placed from the river left to the river right at the fish ladder exit.

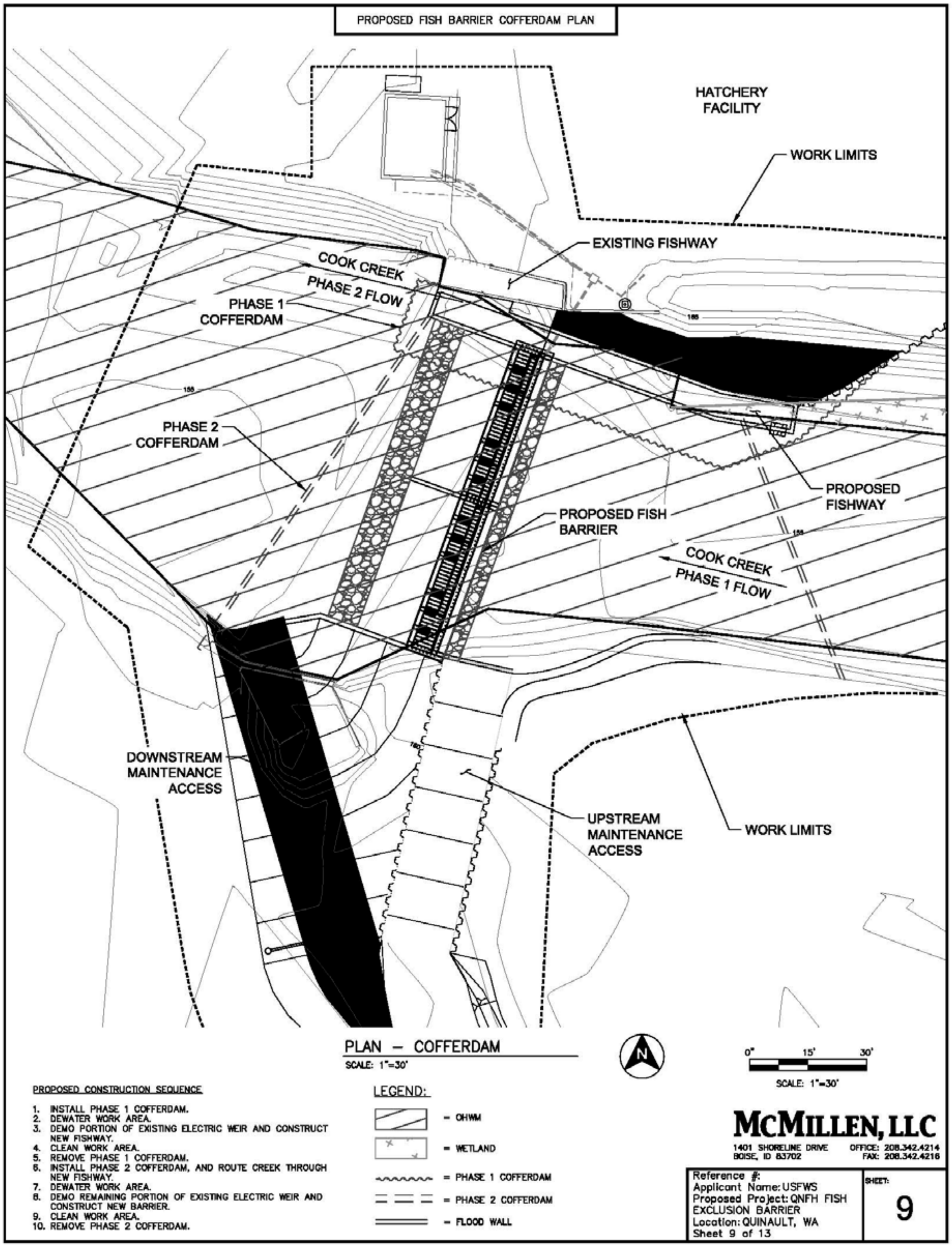


Figure 2-16. Cofferdam Plan

All further construction work described below would be performed behind the cofferdams and would be isolated from the free-flowing river.

Further work would continue to remove the remaining portions of the concrete weir. As with the demolition of the weir near the new fish ladder, concrete would be removed through mechanical means, such as a jackhammer attached to a tracked excavator, or a concrete cutter. Prior to constructing the concrete apron, the ground would be compacted using a compactor. Once the ground was compacted a 6-inch thick layer of crushed rock would be poured and compacted. Using a vibratory hammer, sheet metal would also be buried along the side of the weir. Forms to construct the 20-foot-long by 80-foot-wide downstream concrete apron would be installed (Figure 2-19). The apron would be a 24-inch thick, reinforced concrete foundation having tapered concrete. A land-based concrete truck would be used to pour the concrete for the apron.

To help protect the weir, a total of six riprap fixtures would be installed adjacent to the weir. Riprap fixtures would be located at the weir entrance and exit points, with each side having one in the middle and the other two along the side (Figure 2-18). The riprap fixture would be either 8- or 4-feet-long by 5-feet-wide, with a 4-foot thick layer of 12-inch boulders (Figures 2-17 and 2-18). An excavator working on shore would be used to install the boulders. Once the concrete cured, steel Obermeyer weir gates would be installed. The gates would be separated into two gate panels, both 40 feet wide, and separated by a 12-inch-thick concrete pier. Constructing the new weir is expected to take 20 to 90 days.

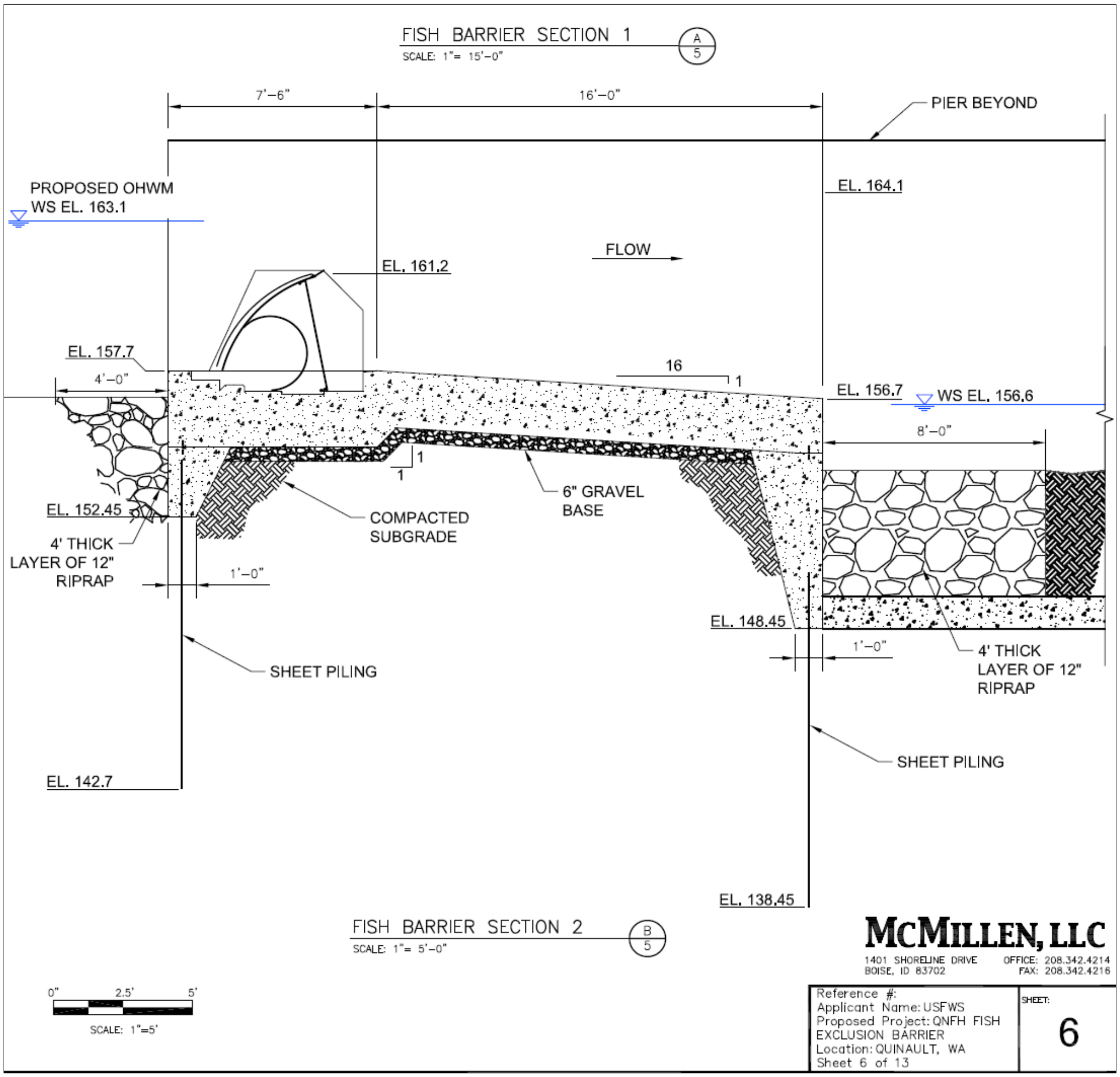


Figure 2-17. Detailed Drawing of the Weir Base

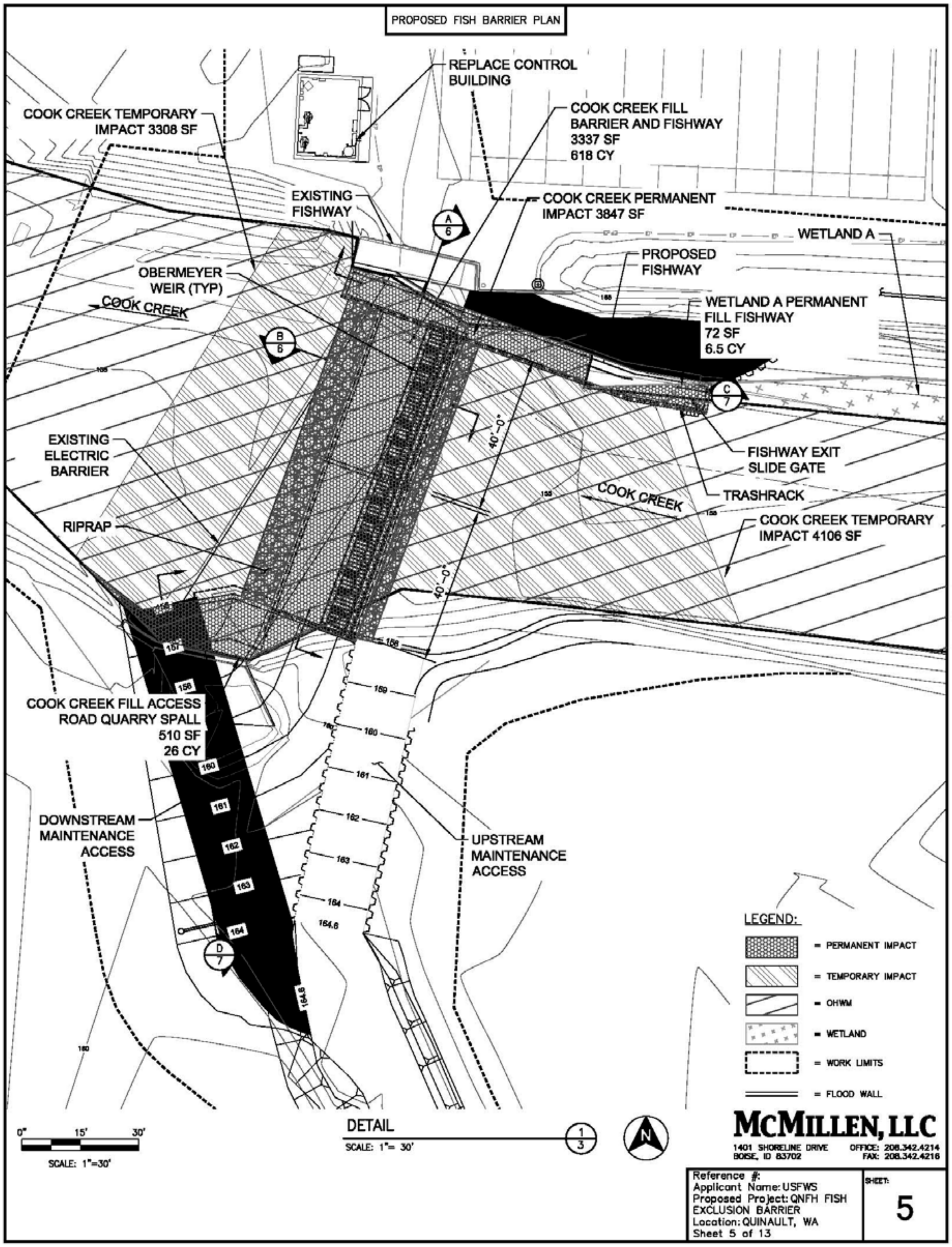


Figure 2-18. Engineering Drawing of the Fish Ladder, Weir, and Access Road

Concrete Curb

A small concrete curb 6 inches to 1 foot high would be installed on the berm on the right bank of the creek to protect the hatchery in case of a 100-year flood. A small backhoe would be used to remove vegetation from the top of the berm. Trees greater than 3 inches in diameter would be avoided and allowed to remain on the top of the berm. Construction of the concrete curb is expected to take 1 week. A trench would be excavated, and then rebar and forms would be set up. The concrete would be poured, and after several days of curing, the forms would be removed. The area would then be hydroseeded with approved certified weed free native grass mix appropriate to the area.

Water Intake Diversion Wall and Riprap

The water for hatchery production is primarily drawn from an intake located on Cook Creek. An adjacent upstream wooden diversion wall that is approximately 10 feet tall by 45 feet long with a 6-foot-tall by 36-foot-long riprap section helps channel water to the intake and minimizes the chances of a new channel forming. The wooden wall is made of several approximately 1-foot-wide by 10-foot-long and 3-inch-thick boards nailed to 10 piles (Figure 2-19). The wooden wall, supporting piles, and riprap would be repaired or replaced due to deterioration and age. The repaired wall would be the same size as the existing wall, and it would be made of non-creosote or non-treated material. The water intake diversion wall and riprap repair would take place between 2017 and 2020, during the fish in-water work window. The work activities are expected to take 5 to 20 days.

Figure 2-19. Photo of Existing Diversion Wall

The intake diversion wall and supporting riprap are located on the left bank. Staff and needed equipment can easily reach the right bank by an access road. Staff and equipment reaching the left bank would require a temporary culvert or fording directly across the creek. During the in-water work window, the wetted channel width would approximately be 50 feet wide with discharge estimated at 10 to 30 cfs.

The proposed project would require one tracked excavator with an attached pile driver, and a truck. The tracked excavator would be stationed on the left bank, while the truck would be stationed on the right bank. Because the work activities would take place adjacent to and upstream of the water intake, any turbid water could be channeled to the intake, from where it could be directed to the Environmental Protection Agency (EPA) sedimentation pond.

Depending on the existing conditions, one of two methods are proposed for the equipment to reach the left bank. If conditions are dry, with minimal discharge (<10 cfs), fording equipment across the creek would have the least impact. If needed, a temporary culvert would be constructed of boulders, fabricated mats, or geotextile fabric with flumes underneath. Before either method was used, erosion control measures such as silt fences would be placed to prevent streambank materials from entering the water.

The culvert would be constructed using a standard flume construction method that involves diverting water through one or more flume pipes placed in the water body. The first step in the flume crossing method would involve placing a sufficient number of adequately sized flume pipes in Cook Creek. An estimated five 36-inch-diameter pipes/flumes would be used. Before the flume pipes would be installed they would be inspected to ensure they are free of dirt, grease, oil, and other pollutants. Flumes would be placed with an excavator without entering any waterway. Once the flumes were in place, geotextile fabric or, if available, fabricated mats would be placed directly on top of the flumes and would extend to the shoreline. If needed, a foot to a few inches of 6-inch cobbles would be placed on top of the geotextile fabric to provide a temporary road bed. The cobbles would come from a local quarry, with little or no soil mixed in.

Once the needed equipment was stationed on the left bank, sandbags could probably be used to construct the cofferdam around the diversion wall and adjacent riprap. Sandbags would be made of material from a nearby rock quarry. The sacks would be placed side by side by means of a land-based excavator to form a barrier and isolate the construction work area from the stream. The bags and spaces between them would be temporarily sealed on the river side with an impermeable liner to prevent leakage into the construction area. The liner would be placed and sealed by hand. If a sturdier dam was needed and/or for deeper areas, cofferdam construction might include placement of ecology blocks and/or a system such as PortaDam™.

After cofferdam installation and before the dewatering of the work site, any fish would be removed from the work site. An on-site professional fisheries biologist would coordinate fish salvage activities prior to dewatering, and any salvaged fish would be returned to the river. A fish biologist would net or seine for fish. That biologist would note the estimated sizes and types of fish. If fish types were unknown, the biologist would photograph the fish. After all fish were removed, the site would be dewatered. Any muddy water and any subsequent seepage into the work area would be pumped into a dissipation/sediment filtration device, such as a geotextile filter bag or straw bale structure, located someplace above high water for infiltration.

Any water that might seep into the construction area during construction would be removed in the same manner, allowing any particulates to settle out in the settling basin before water was returned to the river. Further project activities would be in the dry.

Once the cofferdam was erected, the diversion wall and supporting piles would be repaired or replaced. A vibratory hammer would be used to remove old piles and install new piles. Hand-held tools would likely be used to nail replaced boards to the diversion wall. An excavator would also be used to repair the adjacent riprap wall. The excavator would place 1- to 3-foot boulders in the riprap. The riprap repair would require approximately 1 to 4 cubic yards of new rock. No riverbed gravels would be excavated.

The riverbank above the riprap and diversion wall is fairly flat with only grasses and brush. No trees over 5 inches DBH would be damaged or harmed from the diversion wall work activities.

Once the temporary culvert was no longer needed, cobbles would be removed by means of an excavator or backhoe. The geotextile and flumes would be removed using landward machinery like an excavator, backhoe, or crane. All construction debris would be disposed of at an approved offsite location and the work area would be restored to pre-construction land contours. Temporary erosion control measures, such as revegetation with native plants, would be implemented if the hatchery manager saw fit. Estimated time to install and remove the temporary culvert is approximately 1 to 4 days. Repairing the diversion wall and riprap is expected to take 3 to 20 days.

Spawning Building Re-piping

Currently, the water used in the hatchery incubation and spawning buildings is discharged directly to Cook Creek via a pipe to an outfall by the fish ladder. This approximately 30-inch-diameter pipe starts at the hatchery building and travels approximately 200 feet to the spawning building before extending another approximately 200 feet to the outfall at the fish ladder. The proposed project would re-pipe the hatchery and spawning buildings so that water would be discharged to the pollution abatement pond (also known as the EPA pond).

The proposed project activities would be located entirely on upland surfaces in existing concrete, asphalt, or graveled areas. A new 30-inch-diameter pipe would likely junction at the spawning building and travel approximately 200 to 300 feet to the pollution abatement pond. To install the pipe, a trench approximately 5 to 20 feet deep and 3 to 4 feet wide would be made. Concrete cutters and excavators would be used to remove asphalt or concrete. The pipe would likely be made of steel, and would be lowered into the trench using an excavator. Joints would be welded and sealed by a qualified welder using applicable American Welding Society, American Society of Mechanical Engineers (ASME standards).

Before the pipe was lowered in, the trench would be inspected to be free of rocks and other debris that could damage the pipe. If water was present in the trench, dewatering might be necessary. Where dewatering was required, water would be pumped from the trench and discharged to upland areas using a filter bay or straw bale dewatering structure. The dewatering structure would be sized to handle the volume of water in the trench. Dewatering would occur in a manner that would not cause erosion and would not result in silt-laden water flowing into any water body.

After the pipe was lowered into the trench, the trench would be backfilled. Previously excavated materials would be pushed back into the trench using bladed equipment or backhoes. Equipment for the proposed project would be stored at the hatchery, on concrete or asphalt areas. Unused excavated materials would be taken to a licensed disposal site. Work activities are expected to take 10 to 30 days during the summer months. Funding would be in place, and therefore work activities would take place, after 2016.

Maintenance

General maintenance activities would be required to ensure that the velocity barrier and water intake remained in good operating condition. These maintenance activities are listed below.

- Accumulated gravel would be cleaned out of the fish ladder entrance pool with a shovel and bucket approximately once per year. To accomplish this, the fish ladder would be shut down by closing the fishway exit gate and placing stop logs in the entrance slot. The water would be pumped out of the entrance pool with a portable submersible pump and the accumulated gravel removed.

- Large debris would be removed from the central pier or Obermeyer weir as needed after high flow events. This is anticipated to occur approximately biennially to triennially.
- Accumulated sediment and gravel would be dredged as needed after large high-flow events downstream of the existing and proposed fishways to maintain the entrance into the fishways. This is anticipated to occur approximately once every 5 years.
- Accumulated materials from the sediment intake basin along Cook Creek would be cleaned annually to triennially using a vacuum truck or excavator. Cleaning would be completed during the fish work window. During the sediment basin cleanings, water would be supplied to the hatchery using the existing bypass pipeline. Sediment basin cleanings would take 1 to 2 days each.

2.2.3 Construction Work Windows

The following in-water work windows have been established by the regulatory agencies to minimize impacts to fish species during construction. These work windows are general estimates. Stream and in-water work may be required outside of these windows. Coordination with the regulatory agencies would be performed for proposed in-water work outside of these times.

- U.S. Army Corps of Engineers (USACE) – July 15 through August 31
- Washington Department of Fish and Wildlife (WDFW) – July 16 through October 15

2.2.4 Project Schedule and Sequencing

The following describes the construction sequencing for the project activities:

May 2016 or Earlier

- Mobilize project equipment and materials to site.
- Coordinate utility locating services, staking for construction, and land survey.
- Set up staging and laydown area.
- Install temporary Best Management Practices (BMPs) including, silt fence, straw wattles, stabilized construction ingress/egress, and haul roads above and below the OHWM.
- Establish traffic control.
- Demolish the remaining control building, and dispose of material at an approved off-site location.
- Clear vegetation that is not within the wetted width without causing any turbidity.
- Install a new pre-engineered metal building to house the Obermeyer weir gate operation and control equipment.
- Widen the existing access road and construct upstream and downstream maintenance access roads.

June 2016

- Clear vegetation limits for concrete curb on berm. Dispose of cleared woody vegetation on the outside of the concrete wall or at an approved location per direction of USFWS.
- Install a sandbag and ecology block cofferdam (Phase 1) for work on the northern section of the barrier using an excavator.
- Demolish the northernmost section of the existing fish barrier and dispose of the material at an approved off-site location.
- Install the fishway.

July 2016

- Install a sandbag and ecology block cofferdam (Phase 2) for work on the southern section of the fish barrier and remove the cofferdam on the northern section (Phase 1).
- Begin installation of the velocity fish barrier system.

August 2016

- Continue installation of the velocity fish barrier system.

September 2016

- Continue installation of the velocity fish barrier system.

October 2016

- Complete installation of the velocity fish barrier system.
- Demobilize project equipment and materials from the site.

General equipment used during construction activities may consist of excavators, loaders, skid steers, and sheetpile driver.

2.2.5 Best Management Practices

- All of the project activities are required to comply with the water quality standards (RCW 940.48 and WAC 173-201A) set forth by the Washington State Department of Ecology (Ecology). The current Ecology Water Quality Implementing Agreement allows for a mixing zone a distance of 300 feet downstream of the project. At 300 feet, sediment levels are not to exceed 5 Nephelometric Turbidity Units (NTU) over background turbidity. Turbidity testing by a monitoring team is required during in-water work activities. The monitoring team may cause all work activities to be suspended until sediment levels are compliant with the water quality standards.
- After placement of the cofferdams, fish removal would be conducted if necessary by a professional biologist using netting gear. All captured fish would be identified and tallied and returned to a downstream site.
- If fish were observed, any in-water work would be halted until fish could be removed or until they moved away from the area.

- Pumped water should be channeled to a settling pond or to an infiltration system.
- Only non-treated wood should be used for in-water work.
- Gravel materials can only come from the hatchery (stockpile), or from the adjacent rock quarry.
- To minimize the potential for spills, contractors are required to have and know the contents of their Spill Prevention Control and Countermeasures (SPCC) Plan.
- Prior to any on-site construction activities, temporary erosion and sediment prevention control plan measures would be installed. These measures include installation of temporary orange plastic construction fencing, sediment fencing, and straw wattles, as needed. These measures would be used to prevent any stormwater runoff that may occur during construction from carrying any sediment into the creek. These measures would be maintained, replaced, or upgraded as necessary during construction to ensure their effectiveness. USFWS staff would daily review the measures and require contractors to take additional measures as needed. Disturbed soil areas would be repaired and protected with adequate ground cover (straw, compost, mulch, etc.). After construction was completed, the site would be cleaned of sediment and construction debris before removal of the temporary cofferdams.
- Removal of trees should be avoided as much as possible.
- Activities that may generate sound levels in excess of 92 decibels (dB) (e.g., concrete cutting) are to begin no earlier than 2 hours after sunrise and stop no later than 2 hours before sunset.
- If at any time fish kill was noted from the project activities, immediate notification shall be made to Yvonne Dettlaff with USFWS (or her supervisor) at 360.753.9582.
- Any provisions required by the QIN, WDFW, and/or USACE would be followed.

For further information on mitigation, please see the Wetland Mitigation and Monitoring Plan, Appendix A.

SECTION 3
AFFECTED ENVIRONMENT

3.1 Introduction

The purpose of this section is to describe the area that could be affected by the proposed alternatives, including the areas of physical, biological, and human environment resources affected by the proposed action. The purpose of describing the affected environment is to define the context in which the impacts could occur. The environmental analysis process has been conducted in compliance with applicable Federal, state, and local regulations. The resources described below were determined during the scoping process to be relevant to the proposed action. Resources determined to not be relevant to the proposed action have been eliminated from detailed study. Refer to Section 1.0, Table 1-2, for a complete list of resources and rationale for including or eliminating them from detailed study.

Table 3-1. Physical Setting Summary

Physical Setting Information		Information Source
Location		
The project area is located along Cook Creek at the QNFH located at 3 Sockeye Road, near Quinault, Grays Harbor County, Washington.		N/A
Topography		
Elevation	Approximately 160 to 200 feet above mean sea level (AMSL).	U.S. Geologic Survey (USGS) Stevens Creek 7.5' Quadrangle (USGS 2011)
General Topographic Gradient	Gently sloping northwest.	
Geology		
Geologic Units	Alpine outwash, late Wisconsinan (Qao)	WDNR Geologic Map of the Shelton 1:100,000 Quadrangle, Washington (Logan 2003)
Unit Description	Pleistocene undifferentiated till and outwash sand and gravel that is gray in color with local orange weathering. Material consists of mostly ground and end moraine. The deposit is locally covered with weathered loess that is cream-colored.	
Soil Characteristics		
Soil Type	Soil data not available.	Soil Survey website (USDA-NRCS 2013)
Hydrology		
Hydrologic Unit	17100102	Surf Your Watershed (USEPA 2015)
Surface Water Bodies	Cook Creek and associated tributaries	USGS Stevens Creek 7.5' Quadrangle (USGS 2011)

3.2 Physical Environment

3.2.1 Surface Water Quality

Information available for water quality in Cook Creek near the project area is limited to temperature data recorded for a section of Cook Creek directly upstream of the Moclips Highway. Available data indicate that this section of Cook Creek had a Category 1 temperature rating for 2012. A Category 1 rating indicates that the temperature meets tested standards for clean waters.

3.2.2 Waters of the U.S.

A Wetlands and Waters of the U.S. Delineation Report was completed for the project (Appendix A). Table 3-2 lists the waters of the U.S. identified in the report that are located within the project area.

Table 3-2. Waters of the U.S. Summary

Waters of the U.S.	Cowardin Classification			
	System	Subsystem	Class	Subclass
Stream 1 (Hatchery Creek)	Riverine (R)	Lower Perennial (2)	Unconsolidated Bottom (UB)	Cobble-Gravel (1)
Cook Creek	R	2	UB	1

See the Wetlands and Waters of the U.S. Delineation Report attached in Appendix A for additional information.

3.2.3 Wetlands

Table 3-3 lists wetlands identified in the Wetlands and Waters of the U.S. Delineation Report (Appendix A) that are located in and near the project area (Figure 3-1). Table 3-3 also identifies how much of each wetland surveyed is located within the project area.

Table 3-3. Wetlands Summary

Wetland	Cowardin Classification			Hydrogeomorphic Classification	Size (Acres)	Wetlands in Project Area (Acres)
	System	Class	Water Regime			
A	P	SS	Seasonally Flooded/Saturated (E)	Riverine	0.06	0.06
B	P	EM	Seasonally Flooded/Saturated (E)	Riverine	0.05	0.05
C	P	EM	Seasonally Flooded (C)	Riverine	0.08	0.08
D	P	EM	Permanently Flooded (H)	Depressional	2.54	0
E	P	EM	Semi-Permanently Flooded (F)	Depressional	0.73	0
F	P	EM	Semi-Permanently Flooded (F)	Slope	0.11	0
G	P	FO	Saturated	Slope	0.05	0
Total					**3.61**	**0.53**

P=Palustrine, SS=Scrub-Shrub, EM=Emergent, FO=Forested

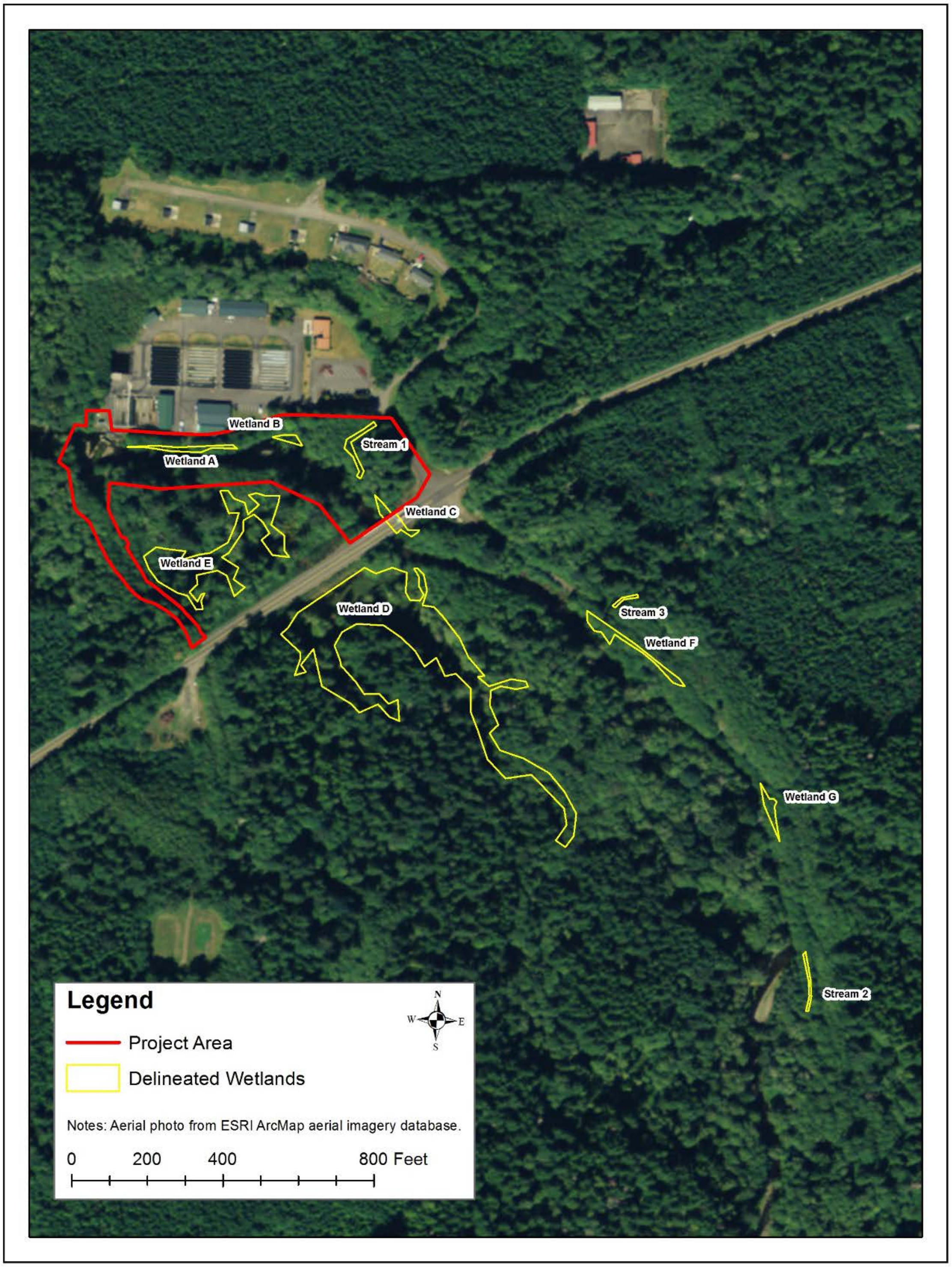


Figure 3-1. Wetlands in and near the Project Area

See the Wetlands and Waters of the U.S. Delineation Report attached in Appendix A for additional information.

3.3 Biological Environment

3.3.1 Forest Resources

The project is in a forested area containing communities of deciduous and coniferous trees. Deciduous tree communities consist primarily of red alder, Scoulers willow, and big-leaf maple. Conifer tree communities consist primarily of Douglas fir, western hemlock, western red cedar, and Sitka spruce. Coniferous tree sizes range in diameter from about 24 inches to 60 inches. Most of the forested project area is dominated by small second-growth alder with a few maple trees, and a few remnant conifer trees interspersed. A survey conducted for the project area measured and surveyed trees that had a 36-inch or greater diameter at breast height (DBH). Based on the survey, there are approximately 32 trees within the project area that have a greater than 36-inch DBH.

3.3.2 Riparian Areas

Riparian habitats are generally defined as areas adjacent to waterways and water bodies that have a distinct plant community different than that of nearby uplands. Riparian plant communities stabilize riverbanks and creeks, provide for sediment and nutrient trapping, and serve as natural flood attenuation, among other functions. Undisturbed riparian zones provide a range of resident and migratory wildlife refuge from predators and shade for maintaining cool air and water temperatures. Riparian habitat is essential to fish survival and productivity. Additionally, about 85% of terrestrial vertebrate species in Washington use riparian habitat for essential life activities (Knutson and Naef 1997). The shoreline along Cook Creek is comprised of deciduous riparian vegetation such as alder, willow, big-leaf maple, vine maple, and Oregon grape.

3.3.3 Essential Fish Habitat

The Pacific Fishery Management Council (PFMC) is one of eight Regional Fishery Management Councils established under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). The PFMC develops and carries out fisheries management plans for Pacific coast groundfish, coastal pelagic species, and salmon off the coasts of Washington, Oregon, and California. Pursuant to the MSA, the PFMC has designated freshwater and marine Essential Fish Habitat (EFH) for Chinook *(Oncorhynchus tshawytscha)* and Coho Salmon (*O. kisutch)* (PFMC 2014). For purposes of this consultation, freshwater EFH for salmon in Washington includes all streams, lakes, ponds, wetlands, and other water bodies currently or historically accessible to Pacific salmon, except upstream of several impassable dams. Marine EFH for Pacific salmon in Oregon and Washington includes all estuarine, nearshore, and marine waters within the U.S. Exclusive Economic Zone (EEZ), i.e., less than 200 miles offshore. Consultation with the National Marine Fisheries Service on EFH is in progress.

The federally-managed species with EFH in the project area are Chinook and Coho Salmon (73 FR 60987-60994). EFH for Pink Salmon (*O. gorbuscha*) is not included in the Quinault River or Cook Creek. No groundfish or coastal pelagic species occur in the project area. Freshwater EFH consists of the following major components for both species:

- Spawning and incubation habitat;
- Juvenile rearing habitat;
- Juvenile migration corridors; and
- Adult migration corridors and adult holding areas.

Important features of essential habitat for spawning, rearing, and migration include (PFMC 2014):

- Substrate composition;
- Water quality (e.g., dissolved oxygen, nutrients, temperature, etc.);
- Water quantity, depth, and velocity;
- Channel gradient and stability;
- Food;
- Cover and habitat complexity (e.g., large woody debris, channel complexity, aquatic vegetation, etc.);
- Space;
- Access and passage; and
- Floodplain and habitat connectivity.

3.3.4 Wildlife and Habitat

The project area offers habitat for a wide range of species. A large portion of the project area is a riparian zone that provides resident and migratory wildlife species shade and refuge from predators. Large mammal species inhabiting or migrating through the project area may include black bear, bobcat, coyote, elk, mountain lion, and Columbia Blacktail deer. Smaller mammal species inhabiting or foraging in the project area may consist of rats, moles, voles, squirrels, weasels, mice, bats, shrew, beaver, muskrat, porcupine, raccoon, rabbit, skunk, and opossum. Abundant nesting and foraging habitat is also present for resident and migratory bird species including birds of prey, hummingbirds, swifts, owls, perching birds, waterfowl, and woodpeckers. Reptiles and amphibians including snakes, salamanders, frogs, and toads and their associated habitat can be found in the project area.

3.3.5 Special Status Animal Species

3.3.5.1 Federally-Listed Species

A Biological Assessment (BA) is being completed for the project. Suitable habitat for federally-listed Marbled Murrelet, Northern Spotted Owl, and Bull Trout is located within the project area, and critical habitat for these species occurs near the project area to the east for Marbled Murrelet and Northern Spotted Owl, and downstream in Cook Creek to the west for Bull Trout.

Marbled Murrelet

On October 1, 1992, the Marbled Murrelet was federally listed as a Threatened species for populations in Washington, Oregon, and California (USFWS 1992). That same year it was listed as Threatened by the State of Washington (WDFW 1993). Currently, the species can be found along 65,000 miles of coastline from Central California to the Aleutian and Pribilof Islands of Alaska. Despite Federal listing, the population continues on an overall downward trend (Falxa and Raphael 2015).

Presence and population trends for Marbled Murrelets are difficult to detect due to its secretive breeding habits at single nests in old growth forests; most seabirds breed in large colonies. Marbled Murrelets are cryptically colored, quiet when breeding to avoid detection by predators, only found on land when breeding, and occur at low densities over a wide geographic range (Bertram et al. 2015). All of these factors make detection of Marbled Murrelets and measurement of population trends challenging.

Nesting occurs within 55 miles of the ocean on mature coniferous trees usually greater than 32 inches in diameter, or, rarely on the ground or on cliffs. Marbled Murrelets lay eggs on moss- or duff-covered large limbs rather than building a nest. Based on 137 nests in Washington State, the USFWS (2012a) defines nesting season as occurring from April 1 to September 23. After September 4, the chance of encountering an active nest is very low. Marbled Murrelets lay one egg per clutch and incubation lasts 27 to 28 days. Nest fidelity from year to year is variable (Bertram et al. 2015). An investigation of Marbled Murrelet nesting on the Olympic Peninsula showed that they nest in low elevation ($\leq$3,500 feet in elevation), late seral coniferous forests (Raphael et al. 2002).

The Marbled Murrelet population continues to decline despite the protection of Federal listing as Threatened, and in Washington, State listing. The decline is largely due to road building and clear cutting, which create edge habitat and expose murrelets to greater nest predation. Murrelet conservation necessarily focuses on preserving large tracts of unbroken older-aged forests with minimal edge habitat (Raphael et al. 2002). The outer coast of Washington had greater declines in murrelet abundance than any other Conservation Zone (Raphael et al. 2015). For Zone 2, the Pacific coast of Washington, the period from 2001 to 2014 showed an annual rate of decline of -5.0%.

Marbled Murrelets are known to use river corridors, and specifically the Quinault River, as a flyway to reach interior forests. The observation of Marbled Murrelets near the fish hatchery (Gilles, pers.com. 2015) shows that they are present in the area and presumably using the relatively open corridor of Cook Creek as a flyway. Because no monitoring or surveys have been undertaken, is it not known how many murrelet may be using the area, or how far away any nests may be from the project. Northeast from the Moclips Highway and 101 Highway (approximately 0.5 miles from the Project area), Marbled Murrelets have been observed, and several showed behavior indicative of nesting nearby.

Marbled Murrelet Critical Habitat

On May 24, 1996, 3,887,800 million acres within 32 critical habitat units in Washington (1,631,300 acres), Oregon (1,515,300 acres), and California (741,200 acres) were designated for the Marbled Murrelet. The current critical habitat includes 3,698,129 acres with 1,631,300 acres in Washington. The USFWS is currently seeking public comment on Marbled Murrelet habitat and regarding the USFWS economic analysis of the impact of its critical habitat designation. The USFWS will issue a final rule regarding critical habitat on September 30, 2016 (USFWS 2015a).

The project area is currently located west of Marbled Murrelet designated critical habitat within Critical Habitat Unit WA-03-a. The shortest straight line distance from the project area to critical habitat for the Marbled Murrelet is 1,150 feet.

Northern Spotted Owl

The Northern Spotted Owl was federally listed as a threatened species on June 26, 1990 and has the potential to occur in the project area. The Northern Spotted Owl was listed due to widespread loss of habitat and the inadequacy of other regulatory mechanisms to conserve it (USFWS 2012). The listing of the spotted owl led to widespread changes in the use of Pacific Northwest forests on Federal lands. The Northwest Forest Plan was developed and changed management focus from primarily timber production to biodiversity conservation (DellaSala et al. 2015). This plan in part focuses on conservation and restoration of old growth and late successional forests (Falxa and Raphael 2015). Due to continued population declines, the USFWS has announced it will evaluate whether the status for this species should change from Threatened to Endangered under the Endangered Species Act (ESA) (USFWS 2015b). This evaluation is ongoing at the time of this EA.

Historic range for the Northern Spotted Owl was from British Columbia through western Washington and Oregon to Northern California (WDFW 2012). These owls occupy areas with structurally complex forests. They can be found throughout coniferous forests in the Olympic Peninsula (WDFW 2012). In addition to late successional and old growth forests, species habitat also encompasses younger forests where structural attributes of older forests are present (WDNR 1997). Preferred habitat has a closed canopy, with large diameter trees, snags, and deadfall. On the Olympic Peninsula, Northern Spotted Owls occur from sea level to about the 3,000-foot elevation in the Olympic Mountains (Buchanan 2015).

Northern Spotted Owls are nocturnal hunters, but also hunt opportunistically during the day. They nest in existing structures such as large cavities, broken treetops, platforms, brooms, abandoned raptor and squirrel nests, and debris accumulations. They therefore prefer to nest in forests with snags and broken treetops. Nesting in Washington starts in March and extends to August (Buchanan and Swedeen 2005). Natal dispersal begins between September 25 and October 4 in Washington (Buchanan 2015).

Despite implementation of the Northwest Forest Plan, the Northern Spotted Owl has continued to decline, and the decline is accelerating (DellaSala et al. 2015). Population size in Washington is not well known, but the trend in population size is clearly downward. On the Olympic Peninsula the annual rate of population change is -4.3 (Buchanan 2015). Habitat loss and competition with Barred Owls are the two main causes of population decline in Washington.

The extent to which a Northern Spotted Owl may use habitat near the proposed project is unknown as no long-term surveys have been completed in the area. The project is located near natural water bodies and in a coniferous landscape habitat, both of which can support spotted owls. Additionally, the proposed project is located adjacent to the Olympic National Forest, which manages the land as "late-successional forest" to provide future spotted owl habitat. A portion of this "late-successional forest" is also designated critical habitat. Additionally, WDFW has a record of a Northern Spotted Owl nest circle within a half-mile of the project area. Therefore, the presence of Northern Spotted Owl in the project area is assumed.

Northern Spotted Owl Critical Habitat

On January 15, 1992, 6,887,000 acres of Federal land was designated as critical habitat for the species with 61 units totaling 1,409,000 acres in California; 76 units totaling 3,257,000 acres in Oregon; and 53 units totaling 2,221,000 acres in Washington (USFWS 1992). The USFWS published a new proposed designation on March 8, 2012, and on December 4, 2012 a final rule for revised critical habitat for the species was published. This final rule for critical habitat increased the designated habitat to include a total of 9,577,969 acres in the U.S., with 2,918,067 acres in 4 units and 26 subunits in Washington (USFWS 2012).

Critical habitat for the Northern Spotted Owl occurs in the same location near the hatchery as for the Marbled Murrelet, and the shortest straight line distance from the project area to critical habitat is 1,150 feet.

Bull Trout

Bull Trout and Dolly Varden are char native to the Pacific Northwest and were previously considered the same species. Published taxonomic work completed in 1978 identified Bull Trout as distinct from Dolly Varden, which was accepted by the American Fisheries Society in 1980 (USFWS 1998). Bull Trout were federally listed as a threatened species on November 1, 1999 (USFWS 1999) and occur in the project area. The final Bull Trout listing created one distinct population segment (DPS) of Bull Trout within the contiguous United States by adding Bull Trout in the Coastal-Puget Sound populations (Olympic Peninsula and Puget Sound regions). Within the Coastal Recovery Unit, there are five core areas that have been identified as current population strongholds, including the Quinault River Core Area. Dolly Varden were federally listed as a proposed threatened species on January 9, 2001 due to similarity of appearance to Bull Trout (USFWS 2001).

Bull Trout populations present within the project area may be resident above the electric fish barrier, and anadromous, amphidromous, and fluvial below it. While Bull Trout have been documented to occur in the proposed project area, the amount of data and literature is limited, and their abundance and timing are not as clear as for other species. Bull Trout/Dolly Varden survey training was conducted below the hatchery weir in June 2000 and found three Bull Trout; Bull Trout were also documented in 2002 at the hatchery electric weir (Craig, in litt. 2003; Zajac, in litt. 2002 as cited in USFWS 2010). It was believed that the Bull Trout were present for opportunistic feeding on juvenile fish releases, escapees, and discarded mortalities from the hatchery. Cook Creek does not offer optimum temperatures for Bull Trout spawning and incubation (USFWS 2013).

Bull Trout Critical Habitat

The USFWS designated critical habitat for Bull Trout on October 18, 2010 (USFWS 2010). Cook Creek downstream of the project area is designated critical habitat for Bull Trout and is located in Critical Habitat Unit 1. In freshwater zones, the critical habitat extent is defined as encompassing a stream or river up to the OHWM. Bull Trout critical habitat in Cook Creek begins approximately 1,370 feet below the weir and extends downstream to Cook Creek's confluence with the Quinault River.

3.3.5.2 State-Listed Species

A Washington State habitat and species map as well as priority habitat information was requested from the WDFW on December 3, 2014. A Habitat and Species map was provided by the WDFW that shows priority fish presence along Cook Creek for Coho Salmon, Chinook Salmon, Dolly Varden, Bull Trout, Steelhead, and Cutthroat Trout within the project area. The map also provides a priority wildlife site consisting of a Bald Eagle nest on the QNFH property, north of Cook Creek. No additional species known occurrences, priority wildlife sites/areas, or other habitats are identified on the map within 1 mile of the project area.

3.3.6 Migratory Birds/Bald and Golden Eagles

Bald Eagles are afforded particular protection under two separate Acts of Congress. Under authority of the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-712), it is unlawful to take, kill, or possess migratory birds, their parts, nests, or eggs. "Take" is defined as any attempt or success at pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting. Migratory Bird Permits must be obtained through the USFWS Migratory Bird Permit Office for any unavoidable violation of the MBTA.

The Eagle Protection Act (16 U.S.C. 668) provides specific protection for Bald and Golden Eagles. The act makes it illegal to take, possess, sell, purchase, barter, or transport any Bald or Golden Eagle, alive or dead, or any part, nest, or egg thereof. "Take" includes pursuing, shooting, shooting at, poisoning, wounding, killing, capturing, trapping, collecting, molesting, or disturbing.

Bald Eagles inhabit areas near water bodies including estuaries, lakes, reservoirs, rivers, and seacoasts. They require tall trees for nesting and spotting prey. Bald Eagles feed primarily on fish but will also feed on waterfowl, turtles, rabbits, snakes, and other small animals and carrion (USFWS 2007). Suitable Bald Eagle habitat is present in the project area. Additionally, a Bald Eagle nest was recorded on June 16, 2000 in a cottonwood tree on the QNFH property north of Cook Creek.

Golden Eagles inhabit many areas from forest to desert. They nest on cliffs or in the largest trees of forested stands, but do not generally nest in densely forested areas. The eagles are aerial predators and feed on small to mid-sized reptiles, birds, and mammals up to the size of mule deer fawns and coyote pups (USFWS 2011). There is no confirmed, probable, or possible breeding evidence or habitat near the project area (WDFW 1997). Golden Eagles are not anticipated to inhabit the project area because suitable habitat for the species is not present and there are no recorded occurrences of the species near the project area.

According to the USFWS Trust Resource List (USFWS 2014a) for the project area, there are 14 Migratory Birds of Concern (MBOC) listed for this area. Based on species habitat requirements and species distribution information, 5 of the 14 MBOC have the potential to be present within the project area. These species are listed in Table 3-4 below.

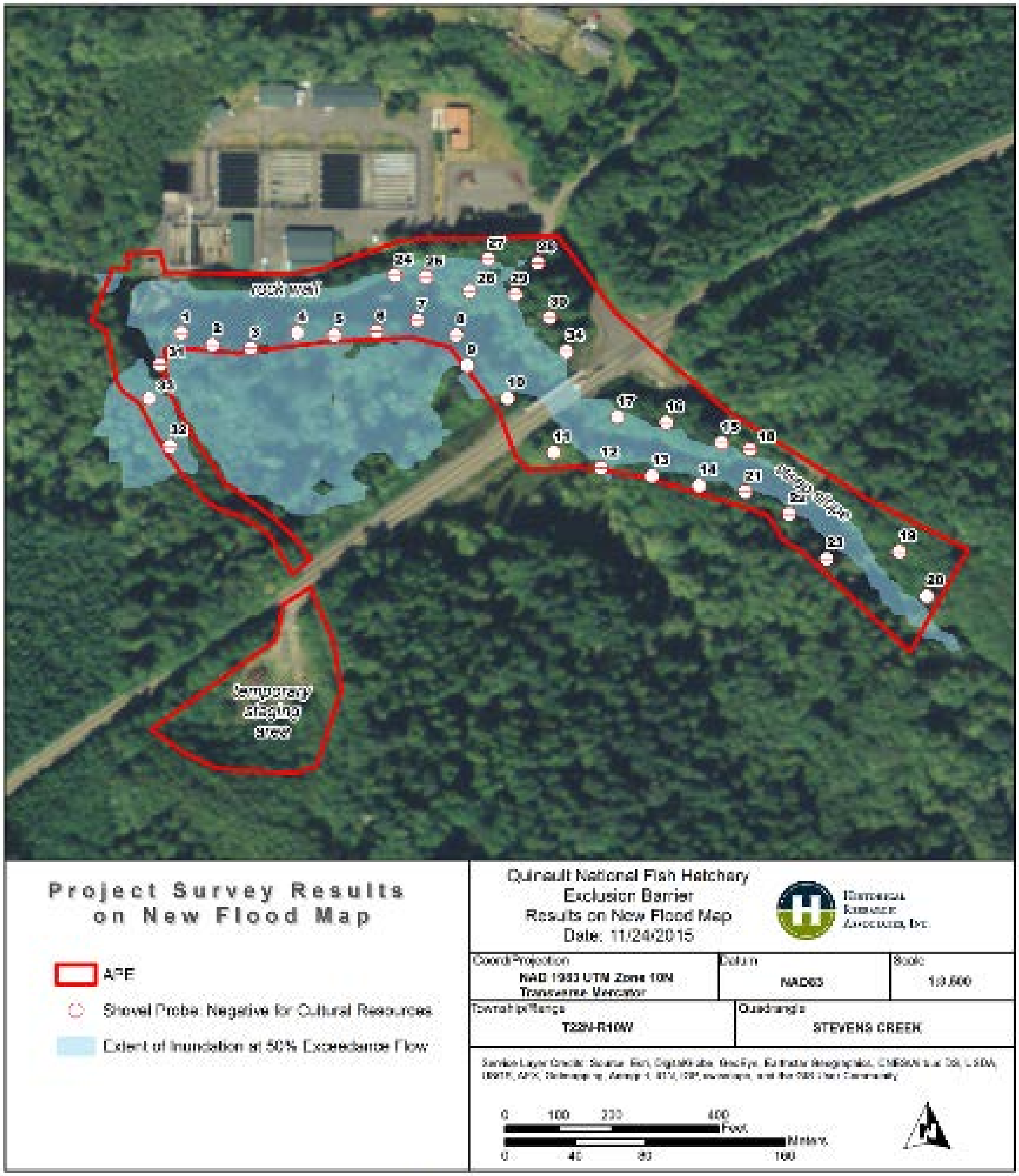
Table 3-4. MBOC with Potential to be Present in the Project Area

Species Name	Seasonal Occurrence in Project Area	Potential Nesting Habitat in Project Area	Potential Foraging Habitat in Project Area
Bald Eagle (*Haliaeetus leucocephalus*)	Year-round	Yes	Yes
Olive-Sided Flycatcher (*Contopus cooperi*)	Breeding	No	Yes
Purple Finch (*Carpodacus purpureus*)	Year-round	No	Yes
Rufous Hummingbird (*Selasphorus rufus*)	Breeding	Yes	Yes
Willow Flycatcher (*Empidonax traillii*)	Breeding	No	Yes

3.4 Human Environment

3.4.1 Historic Properties/Cultural Resources

To comply with Section 106 of the National Historic Preservation Act (NHPA), a survey of the Area of Potential Effects (APE) for cultural resources was completed by Historical Research Associates, Inc. (see Appendix B for complete report). The USFWS consulted with the QIN in defining the APE (Figure 3-2). This cultural resources inventory partially satisfies requirements of Section 106 of NHPA and its implementing regulations (36 CFR 800). Compliance with Section 106 is ongoing.



Historical Research Associates, Inc., Seattle, WA

Figure 3-2. Area of Inundation, APE, and Location of Shovel Probes during Archaeological Surveys

Prior to fieldwork, HRA staff reviewed the Washington State Department of Archaeology and Historic Preservation's (DAHP's) online database, the Washington Information System for Architectural and Archaeological Records Data (WISAARD), for cultural resource survey reports, archaeological site records, cemetery records, and NRHP and Washington Heritage Register (WHR) listed resources. According to the DAHP, the APE is located within an area with Very High Risk for containing pre-contact cultural resources.

Environmental factors (e.g., proximity to water and available food and material resources), the DAHP predictive model, and ethnographic and historic records suggest a very high probability of intact archaeological remains in the APE vicinity. The area was likely used as a travel corridor during pre-contact and ethnographic times, with groups traveling along Cook Creek for hunting and fishing purposes.

Surface and subsurface surveys were performed across the APE in order to identify archaeological materials and to assess the potential of the project area to contain archaeological materials. Neither pre-contact nor historic period cultural resources were observed during the pedestrian survey or subsurface survey within the APE around Cook Creek and along the access road to the fish weir.

3.4.2 Indian Trust Assets

Indian Trust Assets (ITAs) are the legal interests in property held in trust by the United States government for the benefit of federally recognized Indian tribes or individual Indians. ITAs often include real property and its associated natural resources, but can also be federally reserved hunting and fishing rights, federally reserved water rights, instream flows associated with trust land, water quality, fisheries, native plants, and more (U.S. Bureau of Reclamation 1994).

In upholding its fiduciary duties, the United States, as trustee, is responsible for protecting and maintaining rights reserved by, or granted to, Indian tribes or individual Indians by treaties, statutes, and executive orders. It also must ensure that trust assets not be sold, leased, or otherwise encumbered without the approval of the Secretary of the Interior (U.S. Bureau of Reclamation 1994). On August 20, 2014, Secretary of the Interior Sally Jewell issued an order upholding the Federal government's trust responsibility to federally recognized Indian tribes and individual Indian beneficiaries, which stated, among other things, "The trust responsibility consists of the highest moral obligations that the United States must meet to ensure the protection of tribal and individual Indian lands, assets, resources, and treaty and similarly recognized rights" (Jewell 2014).

The APE is located on a tributary to the Quinault River and is surrounded by the 208,000-acre Quinault Reservation, which is home to the Quinault Indian Nation (QIN). The reservation is bordered on the west by 24 miles of rugged Pacific coastline. The reservation extends inland to the foothills of the Olympic Mountains and Lake Quinault, from which the Quinault River drains southwest through the reservation to the sea. The lower Queets River runs through the northern corner of the reservation (Tiller 1996).

QIN's traditional territory extends far beyond the borders of today's reservation (Hajda 1990). In 1855, however, the Quinault and neighboring tribes agreed to the Quinault River Treaty—also known as the Olympia Treaty (ratified in 1856 and proclaimed in 1859)—with the United States that established the current reservation, while guaranteeing the Indians' right to fish "at all usual and accustomed grounds and stations" and the "privilege of hunting, gathering roots and berries, and pasturing their horses on all open and unclaimed lands" (Kappler 1904). In 1873, President Ulysses S. Grant expanded the Quinault

Reservation by Executive Order to approximately 190,000 acres for the benefit of the “Quinaielt, Quillehuete, Hoh, Quite, and other fish-eating tribes on the Pacific Coast”[1] (Grant 1873, Tiller 1996).

The Quinault Reservation supports viable steelhead and salmon fisheries in both the Pacific Ocean and in area rivers. The fisheries provide a major source of employment and tribal revenue. Associated industry, such as the tribally-owned Quinault Pride Seafood, is important to the reservation economy (Tiller 1996). The QIN’s Department of Fisheries oversees certain harvest management and other technical activities related to the QIN’s fisheries resources, and operate tribally-owned fish hatcheries (QIN 2015). Responsibility for the QNFH on Cook Creek is shared with the USFWS. The QIN continues to utilize its ocean fishery in accordance with tribal fishing rights guaranteed by the 1855 Treaty and upheld in 2015 in U.S. District Court (*Peninsula Daily News* 2015).

3.4.3 Public Health and Safety

As previously mentioned, the existing electric fish barrier at the QNFH consists of a concrete slab extending across the river, abutments on each bank, and seven electrodes. When energized, the electrodes create an electric field that deters upstream fish passage. Signage and fencing is currently in place at the barrier to notify the public that high voltage conditions exist and to keep out of the electric fish barrier area. However, individuals have ignored fenced areas/signage and have entered the river near the barrier, causing safety concerns. These safety concerns will continue to be present at the electric fish barrier as long as it is in operation.

3.4.4 Land Use and Public Access

The project area is located on Federal lands managed by the USFWS. There is no land use designation established for these lands. A fish hatchery facility, visitor center, and associated paved parking/driving areas are present in the northern portion of the project area. The visitor center and associated parking area can be accessed from a paved road (Sockeye Road) off the Moclips Highway. Additional access roads within the project area consist of a dirt maintenance access road leading from the Moclips Highway to the electric fish barrier south bank, and a dirt access road along the north side of Cook Creek east of the Moclips Highway.

[1] Note inconsistencies with current spelling of tribe names.

SECTION 4
ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

The USFWS has the responsibility under NEPA to identify and address effects on the human environment that may occur as a result of the alternative plans. These alternatives considered include the No Action and Velocity Barrier-Obermeyer Weir alternatives. The following sections describe the potential effects of the alternatives within each resource category.

4.2 Methods of Assessing Impacts

Potential impacts on the human environment are described in terms of their duration, level of intensity, type, and context. The following describes the specific terminology used to describe impacts associated with project actions.

Duration

Short Term – Temporary impacts that last during construction only (approximately 6 months or less).

Long Term – Permanent impacts that last during and/or after construction (approximately 6 months or more).

Level of Intensity

Negligible – A nearly immeasurable effect to the resource from the alternative's actions.

Slight – A small measureable effect to the resource, but not enough to add additional actions to solve the problem.

Moderate – A measureable effect to the resource from the alternative's actions.

Substantial – A significant measurable effect to the resource from the alternative's actions.

Type (can either be adverse impact or beneficial impact)

Direct Effect – Impacts caused by a proposed action and occurring at the same time and place.

Indirect Effect – Impacts caused by an action that are later in time or farther removed in distance, but are still reasonably foreseeable.

Cumulative Effect – The impact on the environment that 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 undertaking such other action.

4.3 Impacts to the Physical Environment

4.3.1 Surface Water Quality

No Action

There would be minor impact to surface water quality from this alternative because water quality conditions would remain the same as they are currently. Ongoing operational effects associated with the hatchery and weir would continue. Minor turbidity associated with the gravel removal maintenance activities would continue. Impacts to water quality from ongoing operations would continue to be negligible to moderate.

Velocity Barrier-Obermeyer Weir

In-water work within Cook Creek is proposed for this alternative and would have direct effects to surface water quality. General disturbance within the creek channel has the potential to increase water turbidity. Implementation of construction BMPs would minimize this potential. Implementation of project design elements, including BMPs, would be required to reduce the quantity of sediment (1) entering Cook Creek, and (2) flowing downstream and violating any Federal or state water quality rules and regulations. This alternative would also meet Washington antidegradation requirements. Construction BMPs would include, but would not be limited to, the following:

- A Storm Water Pollution Prevention Plan that contains erosion and sediment control and pollution prevention BMPs, such as, but not limited to, silt fences, fiber wattles, and/or earth berms, would be required and implemented.
- Water bodies adjacent to construction and staging areas would be identified, and such measures as straw bales, silt fences, and other appropriate sediment control BMPs would be implemented to prevent the entry of sediment and other contaminants into waters.
- To ensure that accidental spills did not enter waters, the storage of petroleum-based fuels and other hazardous materials and the refueling of construction machinery would not occur outside of approved designated staging/batch plant areas. Furthermore, the project would comply with state and Federal water quality standards and toxic effluent standards to minimize any potential adverse impacts from discharges to waters of the U.S.
- No construction materials would be stockpiled or deposited in or near any water bodies.

With the implementation of the BMPs listed above and those noted in Section 2.2.5, there would be only a slight, short-term adverse effect to water quality within Cook Creek from the proposed action, due to sedimentation.

The proposed project could increase water temperature through the loss of streambank and streamside vegetation. The potential increase in water temperatures due to inundation is unknown, but is expected to be slight. The loss of vegetation due to the riprap and weir construction would be limited to an additional 92 linear feet of streambank. The inundation of 1,514 and 194 linear feet of Cook and Hatchery creeks, respectively, with an increase in the OHWM of 6.5 feet upstream of the weir, would result in the loss of riparian vegetation. This loss, when compared to the overall size of Cook Creek, is slight.

Another important potential cause of increased water temperatures above the weir is the alteration of the channel morphology above the weir due to the increase in OWHM. The impacted areas of Cook and Hatchery creeks would become wider, and much deeper, which would decrease water velocities and increase travel time. The increased travel time could increase water temperatures above the velocity weir. These increased water temperatures could be transported downstream. The amount of water temperature increase at this time is unknown, but is expected to be slight.

4.3.2 Waters of the U.S.

No Action

There would be minor impact to waters of the U.S. under this alternative as no new construction activities would be involved. Ongoing operational effects associated with the weir would continue, including turbidity associated with the weir maintenance activities. Impacts to waters of the U.S. from ongoing operations would continue to be negligible to moderate and would only last during the short term.

Velocity Barrier-Obermeyer Weir

Direct long-term and short-term adverse impacts to Cook Creek and Stream 1 (Hatchery Creek) are anticipated for the actions of this alternative. The proposed action involves replacing the existing electric fish barrier structure with a new velocity fish barrier across Cook Creek. As mentioned above, the new velocity fish barrier would raise the OHWM of Cook Creek approximately 6.5 feet. This raise in water level would add an additional 5.14 acres of inundation in the project area. This raise in water level would occur along approximately 1,813 linear feet (LF) of Cook Creek and approximately 165 LF of Stream 1 (Hatchery Creek).

Additional impacts to waters of the U.S. would occur from construction of the new velocity barrier and improvements to the access road. Approximately 3,847 square-feet (0.09 acres) of permanent impacts, and approximately 7,414 square-feet (0.17 acres) of temporary impacts are anticipated from project actions. The temporary disturbance would involve the placement of two cofferdams, one upstream and one downstream of the weir. These areas would then be temporarily dewatered. All temporarily dewatered areas would be restored to their original condition to the greatest extent possible after construction was complete. Based on the amount of disturbance to the creek bed, the impacts from the project actions would likely be slight to substantial in the short and long term. A summary of the impacts to waters of the U.S. is provided in Table 4-1 below. Best Management Practices would minimize impacts to waters of the U.S.

Table 4-1. Waters of the U.S. Impacts Summary

Waters of the U.S.	Impact to Waters of the U.S.			
	Linear length in Creeks in Increased Water Elevation (LF)	**Excavating/ Filling (square-feet)**	**Temporary (square-feet)**	**Description**
Cook Creek	1,762	3,847	7,414[1]	Rise in surface water elevation. Excavation/fill from installation of fish barrier and access road. Temporary impact of surface disturbance during construction of fish barrier.
Stream 1 (Hatchery Creek)	165	-	-	Rise in surface water elevation.
Total	**1,927**	**3,847**	**7,414**	

[1] Surface disturbance from equipment and field personnel traversing the creek bed for installation of the new barrier.

4.3.3 Wetlands

No Action

There would be no impact to wetlands under this alternative.

Velocity Barrier-Obermeyer Weir

Direct long-term and short-term adverse impacts to wetlands are anticipated for the actions of this alternative. The proposed action would raise the OHWM of Cook Creek approximately 6.5 feet. This rise in water level would permanently inundate all of wetlands A, B, C, and E, as shown in Figure 3-1 and detailed in Table 4-2 below. Wetlands A, B, and C are riverine wetlands along the north edge of the creek, and would become part of the creek under most water levels. Wetland E would remain a wetland, but would be more deeply inundated than under current conditions. Excavation and filling would also occur in Wetland A. The total permanent impacts to wetlands would be 0.19 acres converted to stream. Impacts to wetlands from this alternative are depicted in Figure 4-1 below. The permanent adverse impacts would be slight based on the size of the impact area. A summary of the impact to each wetland is provided in Table 4-2 below.

Table 4-2. Wetland Impacts Summary

Wetland	Size (Acres)	Impact to Wetlands			
		Inundation (Acres)	Excavating & Filling[1] (Acres)	Total Impacted (Acres)	Nature of Impact
A	0.06	0.06	<0.002 acres	0.06	Conversion to stream
B	0.05	0.04	-	0.04	Conversion to stream
C	0.08	0.08	-	0.08	Conversion to stream
D	2.45	0.03	0.07	0.10	None
E	0.73	0.72	0	0.72	More deeply inundated stream
F	0.11	0.01	0	0.01	None
G	0.05	0.00	0	0	None
Total	**3.61**	**0.94**	**0.07**	**1.01**	

Compensatory mitigation is anticipated for impacts to wetlands from the proposed project actions. The mitigation would consist of creation of roughly four times the area of wetlands as would be lost by the conversion of Wetlands A, B, and C to stream. Monitoring of new wetlands would continue for 10 years. The alteration of wetlands would have short- and long-term impacts, with the level of intensity from slight to substantial depending on the wetland. For further details please see accompanying Mitigation and Monitoring Plan in Appendix A.

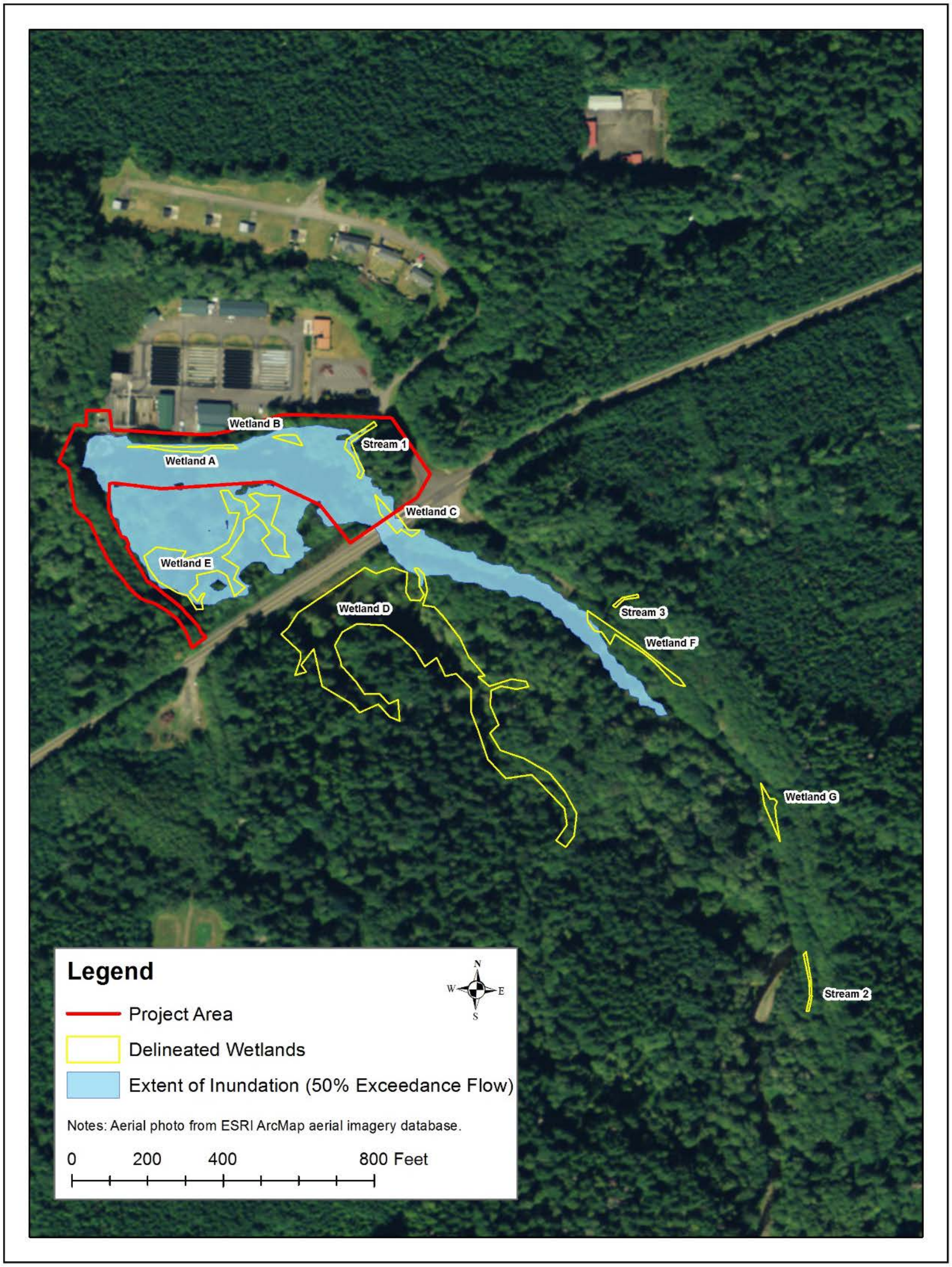


Figure 4-1. Impacts to Wetlands due to Inundation

4.4 Impacts to the Biological Environment

4.4.1 Forest Resources

No Action

There would be minimal impact to forest resources under this alternative. Ongoing operational effects associated with the weir would continue, including hazardous tree removal. Impacts to forest resources from ongoing operations would continue to be negligible to slight.

Velocity Barrier-Obermeyer Weir

Direct long-term adverse impacts to forest resources are anticipated under this alternative. To facilitate demolition of the existing weir and construction of the new weir, one large conifer almost adjacent to the weir on the south bank would be removed. Clearing along the access road would take out a number of small (<10 inches DBH) alder and a few maple trees. Raising the weir ~6.5 feet would cause deeper inundation of wetlands and inundation of uplands around the creek.

Areas to be inundated by the new weir include mostly small alders and some maple trees, and 29 large (>24 inches DBH) conifer trees. Some of these trees are expected to survive based on depth, duration, and timing of inundation, whereas other large conifers would probably die following inundation. Most of the large conifers in the area are Sitka spruce or Western red cedar, which have some tolerance of saturated soils, especially Western red cedar, which can grow in wetlands (Minore 1968). Both Western red cedar and Sitka spruce grow in coastal plains that are often inundated for short periods during winter, and both species can tolerate some flooding during the winter, although they are less tolerant of flooding in the summer (Minore 1968). However, deeper and more constant inundation will eventually kill these trees, as occurs in beaver ponds.

After construction was complete in fall 2016 and the new Obermeyer weir was in place, water levels would be held at the new inundation level for the fall, winter, and spring. Some mortality of deeply inundated trees is expected to occur during this first year of inundation. Some tree death would probably continue to gradually occur for several years in diminishing amounts after spring 2017. Dead trees would be allowed to stand, forming snags, and after falling into the creek of inundated areas, forming large woody debris in the creek. Snags are generally beneficial to wildlife, and large woody debris is beneficial for fish, but these trees would be lost as a living forestry resource.

Short- and long-term effects associated with the removal or disturbance of vegetation could persist for several years after construction activities occurred, i.e., until vegetation was reestablished. The permanent removal of existing vegetation associated with construction of the new weir, and the likely loss of trees due to inundation created from the new weir design, would likely have a slight to moderate effect to the forest resources.

4.4.2 Riparian Areas

No Action

There would be minor impact to waters of the U.S. under this alternative as no new construction activities would be involved. However, ongoing operational effects associated with the weir would continue, including turbidity associated with the weir maintenance activities. Impacts to riparian areas from ongoing operations would continue to be negligible to slight.

Velocity Barrier-Obermeyer Weir

Direct long-term adverse impacts to riparian areas are anticipated under this alternative. Clearing and grubbing along the access road would take place; this activity would remove some riparian vegetation (see Figure 1-2). In this area small alders and maples and some shrubs would be removed.

Gradual death of some trees and shrubs in the inundated areas would at least temporarily remove riparian vegetation along the creek, decreasing the amount of shade and cover along the creek, which has the potential to locally increase creek water temperatures.

Abundant riparian corridors exist within the general vicinity of the project area. There are approximately 20 miles of riparian corridor along streams and creeks within 2 miles of the project area. Riparian vegetation would be allowed to regrow and establish itself along the margins of the more deeply inundated parts of the creek and wetlands. Further, implementation of the Best Management Practices (see Section 2.2.5) would reduce impacts to the riparian areas. Based on this information, the impacts to riparian areas from this alternative would be slight to moderate.

4.4.3 Essential Fish Habitat

No Action

There would be continued slight to moderate impacts to EFH. Operational effects would continue to preclude fish from getting above the weir. Impacts to riparian areas from ongoing operations would continue to be negligible to slight.

Velocity Barrier-Obermeyer Weir

Direct short-term and indirect long-term impacts to EFH are anticipated under this alternative. Short-term impacts would occur from in-water work during demolition of the old weir and installation of the velocity barrier (approximately 4 months). The velocity weir would be constructed at the same location as the electric weir. Avoidance and minimization measures such as deploying cofferdams and turbidity curtains, using upland erosion control measures, and implementing BMPs would help reduce the likelihood that significant levels of turbidity would be generated and affect EFH downstream of the weir location. These adverse impacts are expected to be short-term, slight, localized, and insignificant at the sub-basin scale.

This alternative would raise the OHWM 6.5 feet and inundate approximately 5.18 acres, including 0.90 acres in wetlands and 0.04 acres of stream as a result of flooding 1,813 linear feet of Cook Creek and 165 linear feet of Hatchery Creek. This inundation would increase EFH in the project area by roughly 5 acres; however, the weir would exclude Chinook and Coho Salmon access to this newly-created EFH, and they were precluded from this area previously by the electric weir. The new velocity barrier includes construction of a new fishway that could allow upstream fish passage and permit access to spawning areas and habitat upstream of the barrier; however, the likelihood of allowing upstream fish passage at the weir is currently unknown.

Raising the OHWM 6.5 feet would increase the wetted width of the channel and reduce velocities above the weir. This increase in surface area and decrease in velocities may slightly increase water temperatures, which should be attenuated within a short distance downstream. Slightly increased amounts of stream hardening would occur in the vicinity of the velocity weir on both banks, mostly upstream of the weir where there is currently no access for anadromous fish. In the short term, large woody debris and cover would be increased upstream of the weir. If trees die and fall in the wetlands and upland areas inundated by the increase in OHWM, they would create additional structure to the stream above the weir. In the long term, new wetland areas would develop riparian vegetation, which would contribute to overall large woody debris and cover in EFH above the weir, and the large woody debris would eventually be transported downstream.

The project has the potential to affect water quality within and outside of the project area through slight changes in water temperature and short-term changes in turbidity.

Based on the information above, this alternative would have short- and long-term impacts to EFH.

4.4.4 Wildlife and Habitat

As stated above, riparian vegetation, which is generally beneficial for wildlife, would be removed both immediately and gradually due to inundation. A large portion of the project area is a riparian zone, and abundant riparian areas would remain both within the project area and in the immediate vicinity. Riparian vegetation along the edges of the inundated area would be allowed to regrow. Death of large trees in the inundated areas would provide snags beneficial for a number of birds and some small mammals. Overall, the impact to wildlife and habitat would be small.

4.4.5 Federally-Listed Threatened and Endangered Species

4.4.5.1 Marbled Murrelet

No Action

Under the No Action Alternative there would be minimal to slight impacts to Marbled Murrelet. Ongoing operational impacts might have negligible effects as occasional shrub, alder, or small coniferous (less than 10 DBH) trees were removed to maintain the integrity of the weir.

Velocity Barrier-Obermeyer Weir

Construction would begin before the Washington nesting season, April 1 to September 23 (USFWS 2012a), and last through nesting and fledging into the fall. Thus, murrelets can be expected to be in the area during construction. Disturbance to Marbled Murrelets from construction during nesting can cause abandonment of breeding effort, disrupt nesting activity, or cause premature dispersal of juveniles. Construction equipment generally produces sound levels less than 92 decibels (dB), but some of it can occasionally produce sound slightly above 92 dB. For the proposed project, the only equipment that would produce noise above 92 dB is a backhoe with a concrete breaker attached and a pile driver. These two pieces of equipment would operate only at the weir for weir removal and construction of the new weir.

The USFWS concluded previously (2003) that sound exceeding 92 dB can significantly disrupt breeding behavior in Marbled Murrelets. Such disturbance can include adults flushing from nests, and missed feeding of chicks. Because construction would occur throughout the 2016 nesting season, murrelets may be exposed to disruptive sound levels.

The USFWS found that by a distance of 100 feet, sound levels had attenuated 30%. Sound levels near any potential nests would therefore be below disturbance levels (USFWS 2003). There are no murrelet nest trees within 100 feet of the weir.

No nesting habitat for the Marbled Murrelet would be immediately removed or degraded by the proposed action. The one large conifer that would be removed does not have a platform suitable for nesting (Gilles, pers. com. 2015). Areas to be inundated by the new weir include 29 large (>24 inches DBH) conifer trees. Some of these trees are expected to survive based on depth, duration, and timing of inundation, whereas other large conifers would probably die following inundation. However, in general, much of the area is second-growth trees with much alder present, and overall the habitat is not the late successional, large, contiguous patches of forest preferred by Marbled Murrelets. Tree death would gradually diminish the potential number of trees available for murrelet nesting. After construction completion in fall 2016 and placement of the new Obermeyer weir, water levels would be held at the new inundation level for the fall, winter, and spring. Some mortality of deeply inundated trees is expected to occur during this first year of inundation. Thus, fewer nest platforms may be available in 2017.

Because the first wave of tree mortality would occur between fall 2016 and spring 2017, no sudden mortality of a nest tree is expected during the nesting season. Some tree death would probably continue to gradually occur for several years in diminishing amounts after spring 2017, possibly also removing viable platform trees. Dead trees would be allowed to stand, forming snags. While snags and large woody debris are generally beneficial to wildlife, they are not known to be used by Marbled Murrelets in any direct manner.

Although it is possible that Marbled Murrelets nest near the hatchery, it is unlikely because the forest is mostly composed of small second-growth alder and maple, with some conifer saplings, and a few large remnant conifers. Marbled Murrelets usually choose large patches of contiguous habitat with few edges. The forest around the hatchery generally has a large amount of edge habitat created by Cook Creek, the Moclips Highway, the hatchery access roads, and the clearing for the hatchery and associated buildings. Relatively nearby, extensive patches of suitable, contiguous, late successional conifer forests are available for murrelets to use within the Quinault River Valley (Raphael et al. 2002).

The impacts to Marbled Murrelet are expected to be slight to moderate due to noise during construction and loss of tree material that could have been used for forging and nesting.

Marbled Murrelet Critical Habitat

Critical habitat would not be affected by the proposed project. Critical habitat occurs on the east side of the Moclips Highway, about 1,150 feet from the project area. This critical habitat is relatively far—1,890 feet from construction disturbance and noise—and therefore would not be affected by construction activities. It is also beyond the area that would be newly inundated; that area extends 1,813 linear feet up the creek from the weir. However, inundation would stop 412 feet from critical habitat. No direct impact from inundation would occur, nor would any trees falling over from inundation be able to impact this area. No impacts to critical habitat for the Marbled Murrelet are likely.

4.4.5.2 Northern Spotted Owl

No Action

Under the No Action Alternative, there would be minimal impacts to Northern Spotted Owl. Ongoing operational impacts might have negligible effects as occasional shrub, alder, or small coniferous (less than 10 DBH) trees were removed to maintain the integrity of the weir.

Velocity Barrier-Obermeyer Weir

There have been no long-term surveys for the Northern Spotted Owl in the vicinity of the QNFH, and thus the frequency, abundance, and seasonality of any Northern Spotted Owl are unknown. However, because a nest circle was found within a half-mile, their presence is assumed. The project area contains open water, snags, and some remnant conifer trees in what is otherwise mostly alder and maple forest. These habitat features could support the Northern Spotted Owl.

In Washington, the nesting season for Northern Spotted Owl is March 1 to August 31, with juveniles dispersing in September and October (Buchanan and Swedeen 2005). Project construction would thus occur during the nesting season and during juvenile dispersal. Noise from construction above 92 dB could disturb breeding animals.

However, disturbance from construction is not likely to occur. Northern Spotted Owls prefer large stands of mature forests with multi-layered structure. Most forests do not obtain this structure until they are about 150–200 years old. The younger forest near the fish hatchery, with its patchy nature, makes it highly unlikely that Northern Spotted Owl would choose to nest there. Further, there is extensive late successional forest in the Quinault River watershed that is available nearby with habitat more conducive to their needs (Raphael et al. 2002).

Only one large conifer would be removed for construction of the new weir at the fish hatchery. This tree does not contain a broken top, large cavities, or any platform usable to Northern Spotted Owl for nesting. Small alders and maples would be removed, but these do not constitute important components of their habitat needs.

No nesting habitat for the Northern Spotted Owl would be immediately removed or degraded by the action. The one large conifer that would be removed does not have any suitable structures such as large cavities or platforms suitable for nesting (Gilles, pers. com. 2015).

Areas to be inundated by the new weir include 29 large (> 24 inches DBH) conifer trees. Some of these trees are expected to survive based on depth, duration, and timing of inundation, whereas other large conifers would probably die following inundation. However, deeper and more constant inundation would eventually kill these trees, as occurs in beaver ponds (Harris 1990). These trees may include possible nesting opportunities for the Northern Spotted Owl. Potential nest trees are those with large cavities, broken treetops, platforms, brooms, abandoned raptor and squirrel nests, and debris accumulations.

Because the first wave of tree mortality would occur between fall 2016 and spring 2017, no sudden mortality of a nest tree is expected during the nesting season. Some tree death would probably continue to gradually occur for several years in diminishing amounts after spring 2017, possibly also removing viable platform trees. Dead trees would be allowed to stand, forming snags. These snags may be beneficial to Northern Spotted Owl by increasing the number of possible nesting trees. However, much of the area is second-growth trees with much alder present, and overall the habitat is not the late successional, large, contiguous patches of forest preferred by Northern Spotted Owl.

As with the Marbled Murrelet, it is unlikely that Northern Spotted Owls nest within the project area. The forest is mostly composed of small second-growth alder and maple, with some conifer saplings and a few large remnant conifers. Northern Spotted Owls prefer old growth (>150 years old) areas with complex multi-layered forests. Relatively nearby, extensive patches of suitable, late successional conifer forests are available for Northern Spotted Owls to use within the Quinault River Valley (Raphael et al. 2002).

Overall, the project has the potential to result in negligible to slight impacts to Northern Spotted Owls.

Northern Spotted Owl Critical Habitat

Critical habitat would not be affected by the proposed project. Critical habitat for the Northern Spotted Owl occurs in the same location as for the Marbled Murrelet, i.e., on the east side of the Moclips Highway about 1,150 feet from the project area. This critical habitat is relatively far—1,890 feet from construction disturbance and noise—and therefore would not be affected by construction activities. It is also beyond the area that would be newly inundated; that area extends 1,813 linear feet up the creek from the weir. However, inundation would stop 412 feet from critical habitat. No direct impact from inundation would occur, nor would any trees falling over from inundation be able to impact this area. No impacts to critical habitat for the Northern Spotted Owl are likely.

4.4.5.3 Bull Trout

No Action

Direct long-term adverse impacts to federally-listed fish species, Bull Trout and Dolly Varden, would occur under this alternative. The barrier currently poses potential hazards including electric shock and/or death to fish that travel over the barrier. This hazard will continue as long as the electric fish barrier is in operation. Additionally, the electric fish barrier does not allow upstream fish passage. This blocks fish species from habitat and spawning areas upstream of the barrier. Based on this information, this alternative would have a slight to moderate impact to these two federally-listed fish species.

Velocity Barrier-Obermeyer Weir

Portions of the project have the ability to impact Coastal-Puget Sound Bull Trout, Dolly Varden, and Bull Trout critical habitat. The activities that may cause stressors include inundating wetlands and uplands; increasing OHWM by 6.5 feet upstream of the project; widening the existing access road; demolishing the old weir (concrete apron, concrete electric fish barrier, and wingwalls); constructing and operating the velocity fish barrier (weir) and fishway; and demobilizing the site.

The project has the potential to affect water quality within and outside of the project area through slight changes in water temperature and short-term changes in turbidity. Coastal-Puget Sound Bull Trout can be expected to be present within the project area during construction. The proposed project may adversely affect Bull Trout, Dolly Varden, and Bull Trout critical habitat through exposure to long-term increased water temperatures, and short-term increased turbidity, habitat alteration, loss of woody debris and cover, and disturbance.

Replacing the electric fish barrier with a velocity barrier would eliminate the hazard potential to federally-listed fish species. The new velocity barrier would consist of construction of a new fishway that could allow upstream fish passage, with the potential to allow fish passage to spawning areas and habitat upstream of the barrier; however, the likelihood of allowing passage is unknown. Short-term adverse impacts would consist of temporary in-water work for demolition of the current weir and construction of the velocity fish barrier. This temporary in-water work would increase suspended sediment in Cook Creek for approximately 4 months during construction. Short-term adverse impacts would be slight because construction BMPs would be in place to minimize suspended sediment.

The proposed project could increase water temperature due to the loss of streambank and streamside vegetation in response to inundation of 1,514 linear feet of Cook Creek and 194 linear feet of Hatchery Creek. In addition, the inundated areas of Cook and Hatchery creeks would become wider, and much deeper, which would decrease water velocities and increase water travel time and insolation. These changes may slightly increase water temperature above the weir. In addition, the loss of riparian vegetation with initial inundation would further reduce shading and may add to insolation and contribute to this water temperature increase, at least until new riparian vegetation has matured at the new inundation level. Water temperatures at and above the velocity weir can influence water temperatures downstream in Bull Trout critical habitat, which currently begins approximately 1,370 feet below the velocity weir. The amount of water temperature increase at this time is unknown, but is expected to be slight. In its current state, Cook Creek does not provide optimum Bull Trout spawning and incubation temperatures (USFWS 2013); any increase in water temperatures would decrease the likelihood of Bull Trout utilization of this portion of Cook Creek.

4.4.6 State-Listed Species

No Action

Direct long-term adverse impacts to state-listed fish species (Pacific Lamprey, Bull Trout, Dolly Varden, Chinook Salmon, Cutthroat, Coho Salmon, and Steelhead) would occur under this alternative. The barrier currently poses potential hazards including electric shock and/or death to fish that travel over the barrier. This hazard will continue as long as the electric fish barrier is in operation. Additionally, the electric fish barrier does not allow upstream fish passage. This blocks fish species from habitat and spawning areas upstream of the barrier. Based on this information, this alternative would have a moderate adverse impact to these state-listed fish species.

Velocity Barrier-Obermeyer Weir

Direct long-term beneficial impacts, and short-term adverse impacts to state-listed species, are anticipated for this alternative. Replacing the electric fish barrier with a velocity barrier would eliminate the hazard potential to state-listed fish species (Pacific Lamprey, Bull Trout, Dolly Varden, Chinook Salmon, Cutthroat, Coho Salmon, and Steelhead). The new velocity barrier would consist of a new fishway that could allow upstream fish passage. This fishway would allow fish to access spawning areas and habitat upstream of the barrier. Based on this information, this alternative would have a moderate long-term beneficial impact to these state-listed fish species when compared to the existing conditions for the barrier. Short-term adverse impacts would consist of temporary in-water work for construction of the velocity fish barrier. This temporary in-water work would increase suspended sediment in Cook Creek for approximately 6 months during construction. Short-term adverse impacts would be slight because construction BMPs would be in place to minimize suspended sediment.

4.4.7 Migratory Birds/Bald and Golden Eagles

No Action

There would be no impact to migratory birds/Bald and Golden Eagles under this alternative.

Velocity Barrier-Obermeyer Weir

Direct short-term adverse impacts to the Bald Eagle are anticipated under this alternative. Bald Eagles, if present, may be temporarily disturbed and displaced to adjacent habitats. Once construction was completed, they could return to the area. Temporary impacts would be negligible because abundant habitat is available in the surrounding area.

4.4.8 Indian Trust Assets

No Action

Under the No Action Alternative there would be no construction, and activities and uses of the land in the project area would remain the same; thus, no impacts to Indian Trust Assets would occur.

Velocity Barrier-Obermeyer Weir

Implementation of the project is expected to have both negative and positive impacts on Indian Trust Assets. The new barrier would be more effective at preventing passage of disease above the hatchery on Cook and Hatchery creeks, thus helping to preserve fisheries resources. No long-term negative impacts are anticipated to land, minerals, federally reserved hunting and fishing rights, federally reserved water rights, instream flows, water quality, wildlife resources, and cultural sites. The only negative impact may be short-term loss of fishing and/or fishing access immediately below the weir during construction.

4.4.9 Historic Properties/Cultural Resources

No Action

There would be no new impacts to historic properties or cultural resources under this alternative.

Velocity Barrier-Obermeyer Weir

A thorough examination of historic records, and extensive surface and subsurface surveys, found no pre-contact nor historic period cultural resources within the APE. There would thus be no impacts to cultural resources from the proposed action (see Cultural Resources Report in Appendix B for further information).

4.4.10 Public Health and Safety

No Action

There would be long-term adverse impacts to public health and safety under this alternative. The barrier currently poses potential hazards including electric shock and/or death. These hazards will continue as long as the electric fish barrier is in operation. Based on this information, this alternative would have a moderate to substantial impact to public health and safety.

Velocity Barrier-Obermeyer Weir

Direct long-term beneficial impacts to public health and safety are anticipated under this alternative. Replacing the electric fish barrier with a velocity barrier would eliminate hazard potential. This is anticipated to have a moderate beneficial impact to public health and safety.

4.4.11 Land Use and Public Access

No Action

There would be no new impact to public access under this alternative because access would remain as it is.

Velocity Barrier-Obermeyer Weir

There would be short-term adverse impacts and long-term beneficial impacts to public access under this alternative. During construction, the maintenance access road to the south bank of Cook Creek would be closed to the public (approximately 6 months). Part of this alternative includes widening the access road and removing the gate at the access entrance off the Moclips Highway. This would open up the access road to public vehicular access. This opening is anticipated to have a slight beneficial impact to public access.

4.5 Cumulative Impacts

As defined by NEPA regulations (40 Code of Federal Regulations [CFR] 1508.7, cumulative effects result from the incremental effects of the Proposed 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. For purposes of this analysis, past, present, and reasonably foreseeable future actions are defined as follows:

- Past actions include activities that were associated with past actions and may involve present operations.
- Present actions include activities that may just have been completed, are currently underway, or are planned for the near future.
- Reasonably foreseeable future actions include private or public projects already funded, permitted, or under regulatory review, or included in an approved final planning document.

Past Actions:

- Development (houses, hatchery, roads).
- General maintenance activities at the hatchery, including but not limited to painting, pavement repairs, roof work, water intake repairs, and new buildings.
- Timber resource activities, from restoration activities to timber harvest.
- Moclips Highway road improvements, including but not limited to bridge repair over Cook Creek, and pavement repairs.
- Transmission line repairs along Moclips Highway.

Present Actions:

- Recreational use of Cook Creek, primarily fishing.
- General maintenance activities at the hatchery, including, but not limited to, raceway cleaning, general yard work, and constructing a new residential house.
- Transmission line repairs along Moclips Highway.

Reasonably Foreseeable Future Actions:

- Timber resource activities, from restoration activities to timber harvest.
- Hatchery maintenance activities, including, but not limited to, painting, pavement repairs, roof work, water intake repairs, and new buildings.

- Recreational use of Cook Creek, primarily fishing.
- Transmission line repairs along Moclips Highway.

4.6 Irreversible and Irretrievable Resource Commitments

NEPA requires that environmental analysis include identification of "… any irreversible and irretrievable commitments of resource which would be involved in the Proposed Action should it be implemented." Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects this use could have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (e.g., extinction of a threatened or endangered species or the disturbance of a cultural resource).

Implementing the proposed action would involve a commitment of a range of natural, physical, human, and fiscal resources. Considerable amounts of fossil fuels, labor, and construction materials would be expended. Additionally, large amounts of labor and natural resources would be used in the fabrication and preparation of construction materials. These materials are generally not retrievable. They are not, however, in short supply and their use would not have an adverse effect upon continued availability of these resources. Any construction would also require a substantial one-time expenditure of Federal funds that would not be retrievable.

SECTION 5
COORDINATION

5.1 Interagency and Public Coordination

Internal scoping meetings were held on May 3, 2014; June 20, 2014; December 11, 2014; and November 5, 2015. Attendance of personnel for some but possibility not all of the meetings include representatives from the USFWS, Quinault Indian Nation, Washington Department of Fish and Wildlife, Quinault Fisheries, U.S. Forest Service, and McMillen Jacobs Associates. The meetings provided opportunity for the agencies and project personnel to express any specific concerns and their relevance to the proposed action.

5.2 Elected Officials, Agencies, and Organizations Contacted for the Project

Elected Officials

- None

Federal Agencies

- U.S Army Corps of Engineers
- U.S. Fish and Wildlife Service
- Bureau of Indian Affairs
- U.S. Environmental Protection Agency (EPA)
- National Marine Fisheries Service
- U.S. Forest Service

State, Local, and Tribal Government

- Washington Department of Ecology
- Washington Department of Fish and Wildlife
- Quinault Indian Nation
- Grays Harbor County
- Washington Department of Transportation

SECTION 6
REFERENCES

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APPENDIX A

SUPPORTING INFORMATION

Wetlands and Waters of the U.S. Delineation Report

APPENDIX B

SUPPORTING INFORMATION

Cultural Resources Report