US Army Corps of Engineers
Walla Walla District

STAHL H.B. FARMS AND JSH FARMS RIVER PUMPING STATIONS: FISH SCREENING AND INTAKE MODIFICATIONS PROJECT

Environmental Assessment

Prepared for:

U.S. Army Corps of Engineers
Walla Walla District
Environmental Compliance Section

Prepared by:

Pacific Habitat Services
Wilsonville, Oregon

January 2013

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

FOREWORD

As required by the National Environmental Policy Act of 1969 and subsequent implementing regulations promulgated by the Council on Environmental Quality, this Environmental Assessment has been prepared to determine whether the action proposed by the U.S. Army Corps of Engineers constitutes a "…major Federal action significantly affecting the quality of the human environment…" and whether an environmental impact statement is required. This assessment documents the evaluation and consideration of environmental effects throughout the study and planning process for the proposed project. Based on the project purpose and objectives, alternative concepts for this project were developed and evaluated.

Section 1 of the document presents the general background of the project, and the purpose of the project. This information facilitates the development of alternatives that are documented in Section 2 and provides the basis for much of the environmental analysis in Section 3.

Section 2 presents the alternatives that were developed and reviewed, and which alternatives were removed from further consideration. This section also presents brief summaries of potential impacts of each alternative. The environmental effects of the alternatives that were determined to be reasonable in fulfilling the project purpose are evaluated in detail in Section 3.

Section 3 discusses the existing environmental conditions in the project study area and the anticipated effects that would occur for each alternative. In addition, the "No Action" alternative is evaluated, which provides a comparison to the other alternatives. The descriptions of the biological, physical, cultural, and socio-economic resources serve as a basis for evaluation and comparison of the anticipated effects of the alternatives.

Section 4 identifies the legal, policy, and regulatory requirements associated with the proposed alternatives. The implications for each of those requirements are discussed.

Section 5 presents the results of discussions with the agencies having regulatory responsibility or who manage the natural resources within the project area; and Section 6 lists the references cited within the document.

The Appendices contain supporting documentation, including Biological Opinions issued by the National Marine Fisheries Service and the U.S. Fish and Wildlife Service, and the results of a Section 106 archaeological review and inventory.

1. INTRODUCTION

1.1 Background

The U.S. Army Corps of Engineers (Corps) proposes to amend or issue new easements to allow Stahl H.B. Farms and JSH Farms to modify and extend their existing river pumping station intakes and fish screening facilities located along the Columbia River at river mile 301.6, near the city of Hermiston in Umatilla County, Oregon (Township 5 North, Range 30 West, Sections 7 and 8; Latitude 45.9295/ Longitude 119.0991) (Figure 1). The Stahl H.B. Farms and JSH Farms pumping stations were built in 1974 and 1972, respectively, and withdraw water from the Columbia River for irrigation and currently hold an easement from the Corps. The Stahl H.B. Farms system currently serves 7,109 acres of primary water rights on the farm and 6,033 acres of water rights within the Echo Irrigation District (including Hales Farms). The JSH Farms system currently serves 2,908 acres of primary water rights on the farm. Without the uninterrupted flow of irrigation water, these acres and the value they represent would be in jeopardy (IRZ 2012).

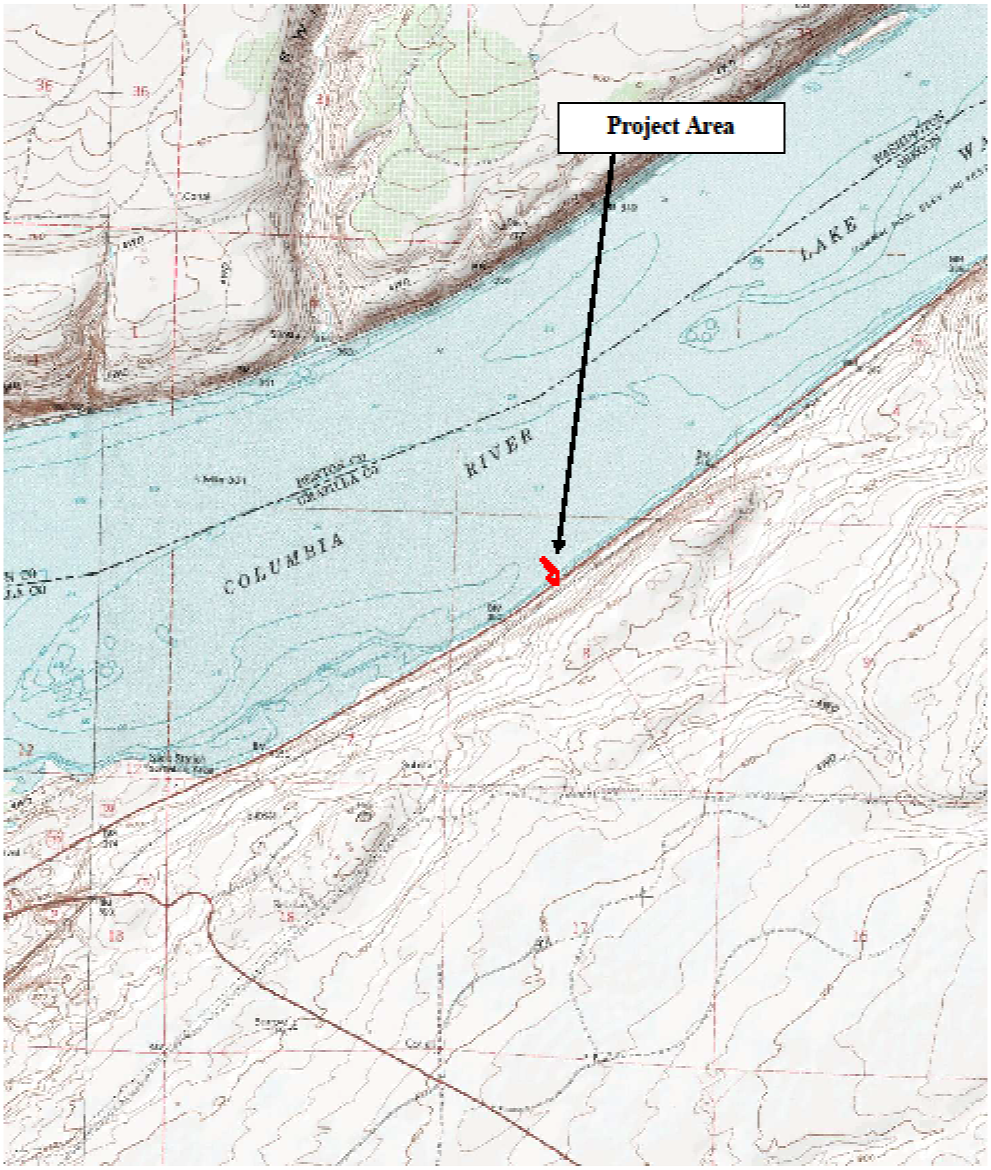
Sediments are accumulating in front of and underneath the Stahl H.B. Farms pumping station, restricting flows and causing damage to the Stahl H.B. Farms intake pumps and threatening to damage the JSH Farms intake pumps. This problem has been developing for some time (since the early 1980s). The migration of the sands has been upstream along the shoreline. Prevailing winds blow sediments into the river and the eddy current has moved them upstream. What used to be an area of open water is now a sand beach extending from the Stahl H.B. Farms pump station west (downstream) along the river bank. A sheet pile wall was installed downstream of the Stahl H.B. Farms pump station in the 1990s to slow the encroachment of sediments; however, the accumulation of sediments at the pump station has continued. If proposed modifications to this station are not made, routine maintenance dredging would be required to remove these accumulated sediments to avoid restricted flow and continued damage to the intake pumps (IRZ 2012).

The Stahl H.B. Farms pumping station consists of eleven 1,000 horsepower and one 500 horsepower vertical turbine pumps. Each pump is set inside a cylindrical screen measuring 3 feet in diameter by 10 feet long. The combined design capacity of the 12 pumps is 66,000 gallons per minute (gpm) (147 cfs). The total currently authorized water right rate is 60,143 gpm (134 cfs). The excess design capacity is to provide backup if one or more pumps needs to be taken out of service for repair during the season. All twelve pumps are not run at the same time (IRZ 2012).

The JSH Farms pumping station consists of seven 800 horsepower vertical turbine pumps with a total water right rate of 27,567 gpm (61 cfs). Each pump is set inside a box screen measuring 4 feet by 3.5 feet by 20 feet long. Sandy sediments accumulating in front of the Stahl H.B. Farms pumping station downstream are being suspended in the upstream current and are drawn into the JSH Farms pumping station, therefore causing damage to the pumps. Additional water withdrawals are not being proposed for either pumping stations.

1.2 Project Purpose and Need

The purpose of the proposed project is to modify the existing intake and fish screening facilities at the Stahl H.B. Farms and JSH Farms pumping stations to reduce or avoid ongoing sedimentation problems, maintain the uninterrupted flow of current irrigation water right volume, reduce the need for maintenance dredging, and meet current National Marine Fisheries Service (NMFS) fish passage and intake screening criteria, therefore minimizing impacts to juvenile salmonids during pumping operations.



6/14/12 4973

Location and general topography for the Stahl H.B. Farms and JSH Farms River Pumping Station: Fish Screening and Intake Modifications Project in Umatilla County, Oregon (USGS Juniper, OR quadrangle, courtesy of mytopo.com).

FIGURE 1

Pacific Habitat Services, Inc.

2. ALTERNATIVES

National Environmental Policy Act (NEPA) and Corps planning guidance (ER 1105-2-100) require the consideration of a reasonable range of alternatives during the planning process. The project design team identified four alternative concepts for this project, including a "No Action" alternative that does not satisfy the purpose and need (P&N) for the project, but provides a baseline from which to compare the other alternatives. The other three alternatives are:

Alternative 2 – Routine maintenance dredging
Alternative 3 – Installation of extended intake pipes and replacement fish screens
Alternative 4 – Installation of flat screens at the pumping stations

The alternatives were evaluated to determine if they were feasible from an engineering, environmental, and economic standpoint, and that they were consistent with the underlying P&N. This section presents the alternatives that were developed and carried forward for further evaluation, any alternatives that were removed from further consideration and identifies the preferred alternative. Brief summaries of potential impacts of each alternative are also discussed. A more detailed discussion of impacts is presented in Section 3.

2.1. Alternative 1 – No Action

With the No Action alternative, no modifications to the Stahl H.B. Farms or JSH Farms pumping stations would take place. The pump intakes would continue to be operated in their current state. Sandy sediments would continue to accumulate in front of the Stahl H.B. Farms pumping station resulting in restricted flows and continued damage to the Stahl H.B. Farms intake pumps, and potential damage to the JSH Farms intake pumps. No annual maintenance dredging of irrigation intakes would be conducted.

The No Action alternative would likely jeopardize the continued flow of irrigation water to those acres serviced by the Stahl H.B Farms and JSH Farms pumping stations, resulting in potential loss of crops and local revenue. In addition, the No Action alternative would not upgrade the existing intake screens and pumps to meet current NMFS fish passage and intake screening criteria, resulting in the continued potential for entrainment and/or impingement of juvenile salmonids during pumping operations. Furthermore, the No Action alternative would likely result in temporary impacts to aquatic resources, threatened and endangered fish species, and water quality during inevitable repair and/or replacement of the damaged pumps. There would be little to no effect on vegetation, wildlife, aesthetics, land use/ownership, cultural resources, recreation, air quality, noise, or wetlands.

2.2. Alternative 2 – Routine maintenance dredging

Alternative 2 would include routine maintenance dredging of the accumulated sediments in front of and under the Stahl H.B. Farms pumping station in order to maintain pumping operations. This would include the dredging of up to 1,500 cubic yards in 2012 and up to 500 cubic yards annually. Accumulated sediments (comprised primarily of course sand) would (if past dredging practices are followed) be removed using a Mud Cat MC-915 or similar model suction dredge operating from a floating barge. The resulting dredge material would be returned back into the river channel, approximately 300 feet north of the pumping station. The dredge material would be carried from the suction dredge through a pipe that would discharge into the river at a depth of approximately 40 feet, thereby allowing sediments to be redistributed downstream.

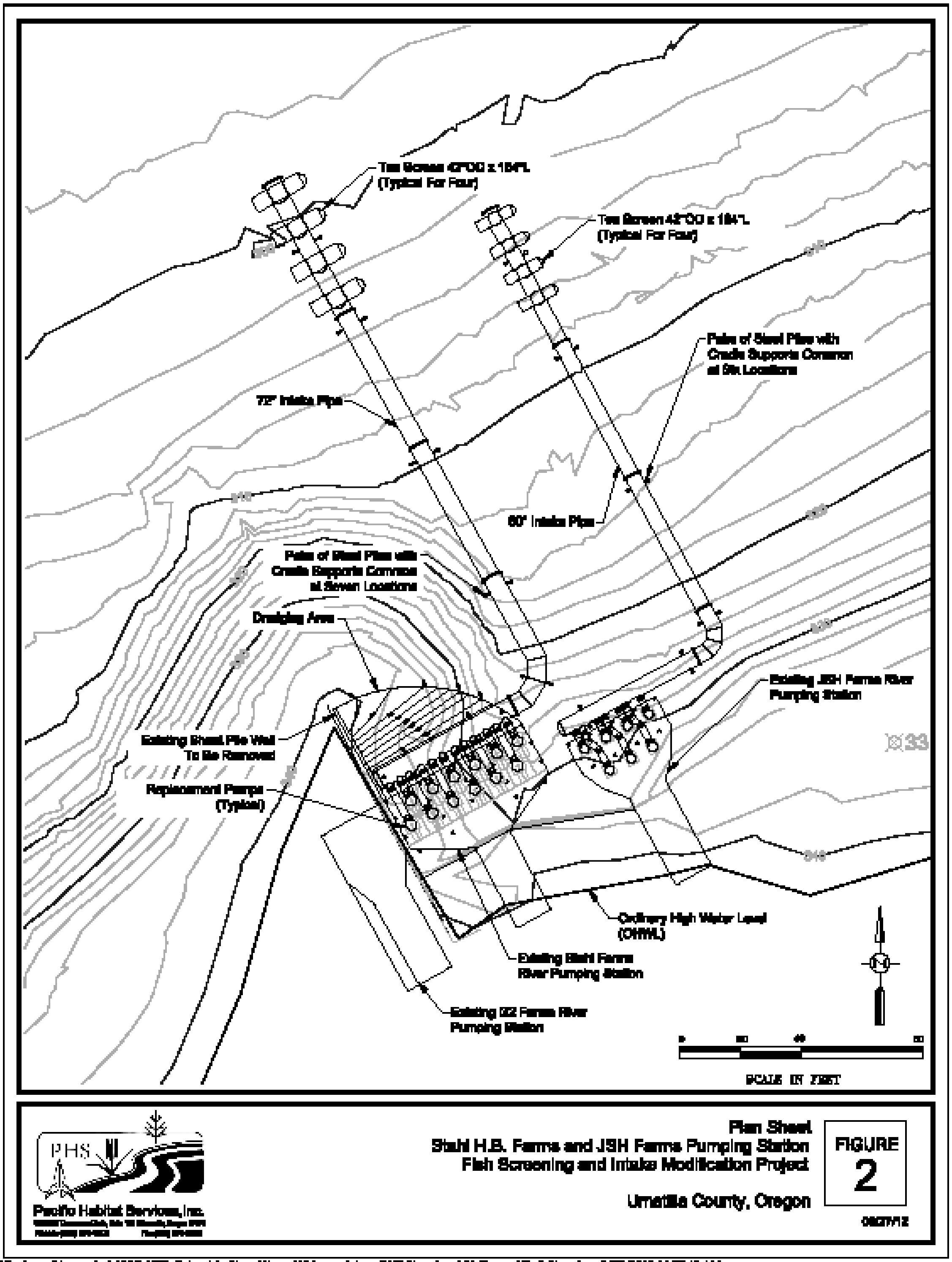
Based on discussions between the applicant and NMFS, all proposed in-water work activities (including dredging) would likely be reduced to a period of two months between January 1 and February 28 to minimize impacts to water quality and Endangered Species Act (ESA)-listed fish species. (The Oregon Department of Fish and Wildlife (ODFW)-preferred in-water work window (IWWW) for the middle Columbia River is December 1 – March 31, a period when ESA-listed salmonids are least likely to be present within the project area.) In addition, the proposed dredging equipment would utilize a relatively small dredging pump intake (8 inches in diameter) that would remain buried in the substrate up to a foot during dredging, and be equipped with a bar screen (2-inch spacing) and mud shield to reduce re-suspension of solids.

Alternative 2 would likely result in repetitive (annual) impacts to aquatic resources, threatened and endangered fish species, and water quality during routine maintenance dredging. In addition, Alternative 2 would not upgrade the existing intake screens and pumps to meet current NMFS fish passage and intake screening criteria, resulting in the continued potential for entrainment and/or impingement of juvenile salmonids during pumping operations. Alternative 2 would not reduce or avoid ongoing sedimentation problems, maintain the uninterrupted flow of current irrigation water right volume, or reduce the need for maintenance dredging. This alternative would result in little to no effect on vegetation, wildlife, socioeconomic resources, aesthetics, land use/ownership, cultural resources, recreation, air quality, noise, or wetlands.

2.3. Alternative 3 – Installation of extended intake pipes and replacement fish screens

Alternative 3 would modify the existing intake/fish screening facilities and move them out into deeper water to avoid sediment problems and routine maintenance dredging at the Stahl H.B. Farms intake location and to meet NMFS fish passage and screening criteria. Proposed intake modifications would include (1) replacing the existing cylindrical screens with enclosed cans; (2) connecting each can to a common manifold placed along the front of each of the existing pumps stations; (3) extending a new 72-inch diameter intake pipe at Stahl H.B. Farms and a new 60-inch diameter intake pipe at JSH Farms approximately 180 feet into the Columbia River from the existing pump stations; and (4) installing new tee screens at the end of each of the new intake pipes (see Figure 2). Balancing the need to locate the intake below the surface to reduce the impact to migrating fry and fouling by floating debris, and the need to locate the intake sufficiently above the river bed to reduce sedimentation intake, determined the required distance from shore (i.e., approximately 180 feet). Installation of the extended intake pumps and fish screens would be conducted using a crane and divers operating from a floating barge. All heavy equipment (i.e., crane and suction dredge) would access the project site via existing roadways, parking areas, or floating barges.

The new intake pipes would each be supported by pipe cradles (seven cradles for the Stahl H.B. Farms pipe and six cradles for the JSH Farms pipe). Each pipe cradle would be secured to the river bottom by a pair of 12.75 inch diameter steel piles (26 total piles) installed approximately 15 feet (or to refusal) into the substrate with an APE Model 50 vibratory hammer. It is anticipated that each pile would require approximately 1 hour or less of vibratory hammer use for installation. Four new intake tee screens would then be attached to the deep end of each of the new pipe extensions. Each of the new Stahl H.B. Farms intake tee screens would measure 5 feet in diameter by 18 feet-10 inches in length, and would be affixed with NMFS approved slotted fish screen to ensure juvenile salmonids were not impinged or entrained onto the pump intake. The new JSH Farms intake screens would measure 3.5 feet in diameter by 13.5 feet in length, and would also be affixed with NMFS approved fish screen. Given that the new intake tee screens would be used to withdraw water from the river, the existing intake screens would be replaced with new 42-inch diameter by 21-foot long pump cans.



Y:\Projects Directories\4773 Columbia River Water Withdrawal\AutoCAD\Plot_dwgs\EA Figures\Fig2_Plan.dwg, 9/27/2012 11:27:43 AM

Installation of the new intake pipes and manifolds would require the removal of approximately 500 cubic yards of accumulated sediments (comprised primarily of course sand) from in front of and underneath the Stahl H.B. Farms pumping station, using a Mud Cat MC-915 or similar model suction dredge operating from a floating barge. The resulting dredge material would be returned back into the river channel, approximately 300 feet north of the pumping station.

The dredge material would be carried from the suction dredge through a pipe that would discharge into the river at a depth of approximately 40 feet, therefore allowing sediments to be redistributed downstream. Following removal of the dredge material, an existing sheet pile wall that extends approximately 35 feet into the active river channel at the west end of the pumping station would be removed.

To minimize impacts to water quality and ESA-listed fish species, all in-water work activities (including dredging) would be reduced to a period of two months between January 1 and February 28 of the ODFW-preferred IWWW for the middle Columbia River (December 1 – March 31), a period when ESA-listed salmonids are least likely to be present within the project area. In addition, the proposed dredging equipment would utilize a relatively small dredging pump intake (8 inches in diameter) that would remain buried in the substrate up to a foot during dredging, and be equipped with a bar screen with 2-inch openings, and a mud shield to reduce re-suspension of solids.

The pumps would be operated consistent with state water rights and would typically be in operation during the months of April through October. The intake screens would be passively (manually) cleaned and would be equipped with a self-monitoring system that would measure hydraulic head and reduce intake velocities as necessary to maintain an approach velocity of 0.2 feet per second (fps) (in compliance with NMFS criteria) to prevent entrainment or impingement of juvenile salmonids during pumping operations. The existing maximum allowable water withdrawal rates for the Stahl H.B. Farms and JSH Farms pumping stations are 60,143 gpm and 27,567 gpm respectively. The actual amount pumped during any given season is dependent on the water requirements during that year. There would be no changes made to the existing pump capacities and there would be no increase in current allowable operational withdrawal rates.

Alternative 3 would likely result in temporary impacts to aquatic resources, threatened and endangered fish species, and water quality during project construction. However, Alternative 3 would ultimately result in a net benefit to threatened and endangered fish species by meeting NMFS' current fish passage and screening criteria and moving the intakes to deeper water. The deeper depth location of the intakes should make it less likely to affect migrating juvenile salmonids, as they have habitat preference for depths less than 20 feet. In addition, Alternative 3 would avoid the repetitive (annual) impacts associated with routine maintenance dredging (i.e., Alternative 2), and would secure the continued flow of irrigation water to those acres serviced by the pumping stations. Furthermore, Alternative 3 would result in little to no effect on vegetation, wildlife, aesthetics, cultural resources, recreation, air quality, noise, or wetlands.

2.4. Alternative 4 – Installation of flat screens at the pumping stations

Alternative 4 would install flat travelling screens or flat screens with travelling brushes at the existing pumping stations to meet the approach velocity and opening size criteria for NMFS, and to handle floating debris. Such screens, however, would be at or near the shoreline where migratory fry would be moving and would typically require regular removal of accumulated sediments (dredging). Alternative 4 would likely result in temporary impacts to aquatic resources, threatened and endangered fish species, and water quality during project construction. In addition, Alternative 4 would likely result in repetitive (annual) impacts to aquatic resources, threatened and endangered fish species, and water quality during routine maintenance dredging. Alternative 4 would result in little to no effect on vegetation, other wildlife, socioeconomic resources, aesthetics, land use/ownership, cultural resources, recreation, air quality, noise, or wetlands, but it would be less effective at reducing or avoiding ongoing sedimentation problems or maintaining uninterrupted flow of current irrigation water right volume and would require annual/periodic maintenance dredging.

2.5 Alternative Screening

The following decision matrix (Table 1) demonstrates the process utilized to select the preferred alternative relative to the project purpose and goals.

Table 1. Decision matrix for selection of the preferred alternative

Alternatives	Avoids/reduces sedimentation intake and screen debris	Meets NMFS current fish passage and screening criteria	Maintains uninterrupted flow of irrigation water	Avoids routine (yearly) in-water impacts.
1) No Action	No	No	No	Yes
2) Routine dredging	Yes	No	Yes(-)	No
3) Install extended intake pipes and fish screens	**Yes**	**Yes**	**Yes**	**Yes**
4) Install flat screens	Yes(-)	Yes	Yes(-)	No

Yes (-) = localized, temporary effect, no system-wide effect

2.6 Selection of the Preferred Alternative. The only alternative that meets all screening criteria (P&N) is Alternative 3.

Alternative 3 was chosen as the preferred alternative given that it would avoid the sedimentation and debris accumulation problem, and would upgrade the intake screens and pumps to meet NMFS' current fish passage and screening criteria, therefore avoiding entrainment or impingement of juvenile salmonids during pumping operations. In addition, the deeper depth location of the intakes should make it less likely to affect migrating juvenile salmonids, as they have habitat preference for depths less than 20 feet. Furthermore, Alternative 3 would provide the most improvement to the existing intakes and would avoid routine maintenance dredging.

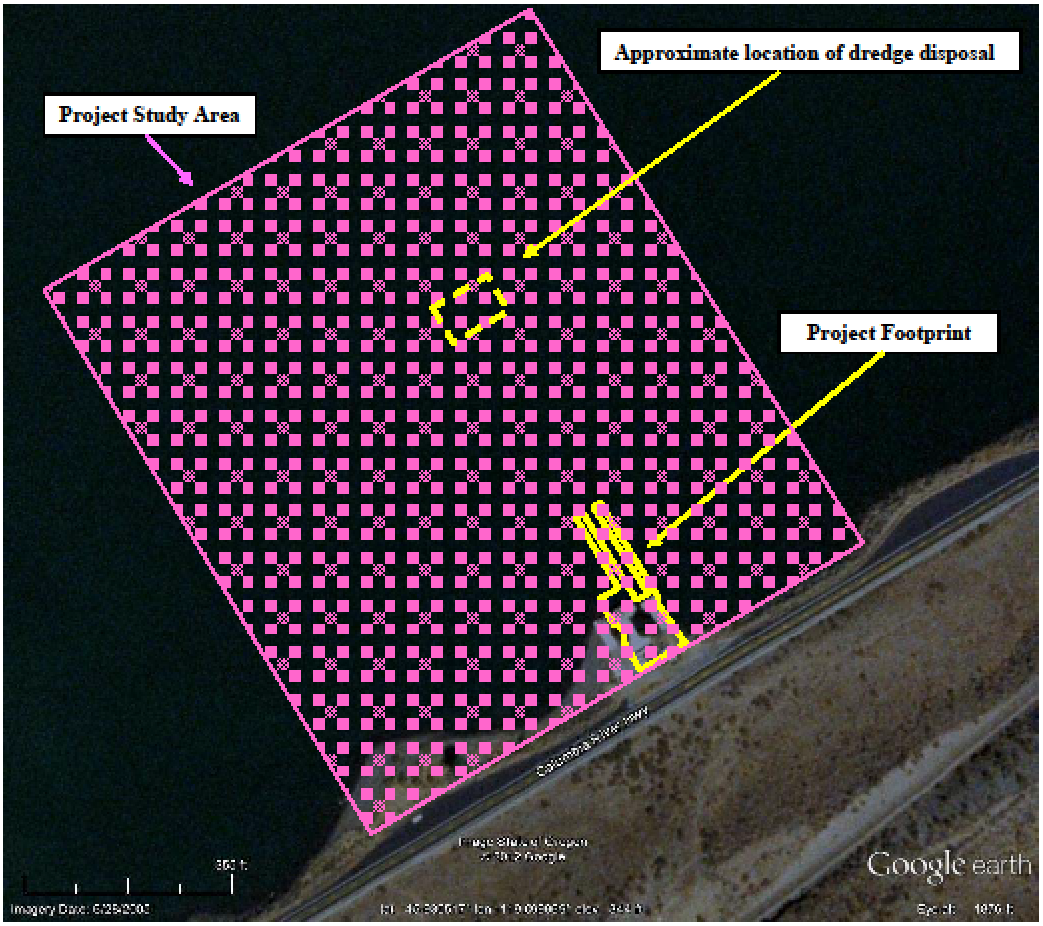
2.7 Alternatives Removed from Further Consideration

Alternative 2 – Routine Maintenance Dredging
Does not avoid ongoing sedimentation problems**,** reduce the need for maintenance dredging, or meet current National Marine Fisheries Service (NMFS) fish passage and intake screening criteria, therefore minimizing impacts to juvenile salmonids during pumping operations

Alternative 4 – Installation of flat screens at the pumping stations
As stated above, Alternative 4 would likely result in repetitive (annual) impacts to aquatic resources, threatened and endangered fish species, and water quality during routine maintenance dredging. In addition, although the pumps would meet current NMFS screening criteria, the pump intakes would still be located in a water depth of less than 20 feet, increasing their potential to affect migrating juvenile salmonids. As such, it was removed from further consideration and analysis.

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section discusses the existing environmental conditions of the project study area and the anticipated effects that would occur for each alternative over a wide range of environmental and social elements. In addition, the "No Action" alternative is evaluated which provides a comparison to the other alternatives. For the purposes of this assessment, the project study area includes the existing Stahl H.B. Farms and JSH Farms pumping stations, the proposed project footprint, and a portion of the Columbia River that extends 300 feet around and 500 feet downstream of proposed in-water construction activities (see Figure 3). Descriptions of the biological, physical, cultural, and socio-economic resources serve as a basis for evaluation and comparison of the anticipated effects of the alternatives, which are also presented. A total of 14 environmental resources were initially reviewed – vegetation, wildlife, aquatic resources, threatened and endangered species, water quality, socioeconomics, aesthetics, land use/land ownership, cultural resources, recreation, air quality, noise, wetlands and cumulative effects. After preliminary analysis it was determined the proposed action would have no major impacts/effects on aesthetics, land use/land ownership, recreation, air quality, noise and wetlands and therefore only vegetation, wildlife, aquatic resources, threatened and endangered species, water quality, cultural resources and cumulative effects warranted further consideration and discussion.



6/14/12 4973

Project study area for the Stahl H.B. Farms and JSH Farms River Pumping Station Fish Screening and Intake Modifications Project in Umatilla County, Oregon (Google Earth, 2005).

FIGURE 3

Pacific Habitat Services, Inc.

3.1. Vegetation

3.1.1. Existing Conditions – Vegetation

The majority of the project site is located over and within the main channel of the Columbia River. As such, vegetation within the project study area is confined to a small area along the immediate, rip-rap shoreline. Vegetation surrounding the project study area is dominated by species typical of the sagebrush-steppe vegetation community in eastern Oregon, including rabbitbrush (*Ericameria nauseosa*), antelope brush (*Purshia tridentate*) and cheatgrass (*Bromus tectorum*). Other species observed along the shoreline include big sagebrush (*Artemisia tridentata*), common mullein (*Verbascum Thapsus*), tall tumblemustard (*Sisymbrium altissimum*), and willow species (*Salix* sp.).

3.1.2. Environmental Consequences – Vegetation

Alternative 1 – No Action
The No Action alternative would have no direct, indirect or cumulative effects on vegetation.

Alternative 3 - Installation of extended intake pipes and replacement fish screens
As with Alternative 2, this alternative would not require upland disturbance. All heavy equipment (i.e., crane and suction dredge) would access the project site via existing roadways, river access points, and floating barges. As such, Alternative 3 would have no direct, indirect, or cumulative effects on vegetation.

3.2. Wildlife

3.2.1. Existing Conditions – Wildlife

Habitats for wildlife species within the project study area are extremely limited. Vegetation is confined to a small area along the immediate, rip-rap shoreline. Surrounding the project study area, habitat is defined as a typical sagebrush-steppe community (as described above in Section 3.1.1) and open water habitat. No wildlife species were observed during a February 22, 2012 site visit.

In the vicinity of the project study area, the representative wildlife species that use sagebrush-steppe and open water communities include common species such as osprey (*Pandion haliaetus*), bald eagle (*Haliaeetus leucocephalus*), various raptors and songbirds, waterfowl, bats, rabbits and other small mammals, mule deer (*Odocoileus hemionus*), and coyote (*Canis latrans*). Osprey and bald eagle may use the open water habitat within the project study area for hunting. Songbirds such as grasshopper sparrows and waterfowl such as mallards or teal may also use the open water habitat within the project study area for foraging. Small and large mammals such as skunks and mule deer may utilize the surrounding areas.

3.2.2. Environmental Consequences – Wildlife

Alternative 1 – No Action
Given the existing site conditions and regular occurrence of human activity (i.e., boating and vehicle traffic) within the vicinity of the project study area, the No Action alternative would have little to no direct, indirect or cumulative effects on wildlife.

Alternative 3 - Installation of extended intake pipes and replacement fish screens
As with Alternative 2, Alternative 3 would not require any disturbance of upland wildlife habitats. All heavy equipment (i.e., crane and suction dredge) would access the project site via existing roadways, river access points, and floating barges. Construction activities may result in minor short-term noise disturbance for wildlife species that may be foraging within the vicinity of the project study area. However, all work activities associated with Alternative 3 would be reduced to a period of two months between January 1 and February 28, during which time, wildlife species would be able to avoid the disturbance area. As such, Alternative 3 would have little to no direct, indirect, or cumulative effects on wildlife.

3.3. Aquatic Resources

3.3.1. Existing Conditions – Aquatic Resources

Fish species in Lake Wallula reservoir include a mixture of native riverine and introduced species that are typically associated with lake-like conditions (Hjort et al. 1981 and Mullan et al. 1986, as cited in USACOE 2011a). Species composition throughout the Columbia River has changed over the years due to the blockage of spawning migrations and modification of habitats (U.S. ACOE 2011a). Cold water resident species (such as trout [*Oncorhynchus* sp.], whitefish [*Prosopium* sp.], and white sturgeon [*Acipenser transmontanus*]) that were once common in the middle Columbia River have declined since the construction of the dams and have been replaced by cool and warm water species (such as carp [*Cyprinus carpio*], bass [*Micropterus* sp.], catfish [*Ictalurus punctatus*], and walleye [*Sander vitreus*]) (ACOE 2011a). In addition, Pacific lamprey (*Entosphenus tridentatus*) runs in the Columbia River basin historically numbered in the hundreds of thousands at Bonneville Dam as recently as 1965, but their distribution and abundance has been reduced by construction of dams and diversions as well as degradation of spawning and rearing habitat (Thompson et al. 2010, as cited in ACOE 2011a). Salmonids that occur in Lake Wallula include: steelhead and resident rainbow trout (*O. mykiss*), bull trout (*Salvelinus confluentus*), Chinook salmon (*O. tshawytscha*), sockeye salmon (*O. nerka*), and hatchery-origin coho salmon (*O. kisutch*). Some of the salmonid species present in Lake Wallula are listed under the Federal ESA, as discussed in the Threatened and Endangered Species section below.

3.3.2. Environmental Consequences – Aquatic Resources

<u>Alternative 1 – No Action</u>
The No Action alternative would likely result in direct impacts to aquatic resources during inevitable repair and/or replacement of the damaged intake pumps. Ideally, pump repair and/or replacement would occur during the winter months when fewer salmonids would be present within the project study area, and when operation of the pumps (i.e., irrigation) would not be required. However, given that failure of the damaged pumps could occur at any time of the year, the timeframe associated with repair and/or replacement cannot be predicted. In addition, the No Action alternative would not improve existing fish passage conditions, resulting in the continued potential for entrainment and/or impingement of juvenile salmonids during pumping operations. The No Action alternative would add slightly to the cumulative effects on aquatic resources.

<u>Alternative 3 - Installation of extended intake pipes and replacement fish screens</u>
Alternative 3 would likely result in temporary, direct impacts to aquatic resources resulting from potential entrainment and substrate modification during project construction. However, Alternative 3 would ultimately result in a net indirect benefit to threatened and endangered fish species by meeting NMFS' current fish passage and screening criteria and moving the intakes to deeper water. The deeper depth location of the intakes should make it less likely to affect migrating juvenile salmonids, as they have habitat preference for depths less than 20 feet. In addition, Alternative 3 would avoid the repetitive (annual) impacts associated with routine maintenance dredging (i.e., Alternative 2).

Alternative 3 may result in entrainment if juvenile fish species and/or lamprey ammocetes are drawn into the suction dredge or impinged upon the intake screen during proposed dredging activities. However, given the proposed timing of in-water work (January 1 – February 28), the surface area of the suction dredge intake (8 inches in diameter), and depth that the dredge intake will remain buried in the substrate (up to a foot during dredging); it is likely that the risk of injury or lethal take of ESA-listed fish species from proposed dredging activities would be minimal.

Short-term, localized project-related increases in background turbidity levels would likely occur as a result of activities associated with dredging and piling installation. Given the existing substrate conditions (course sand), proposed dredging (suction dredge) and disposal methods (into the river at a depth of approximately 40 feet), increases in background turbidity associated with short-term dredging activities would be minimized. In addition, it is anticipated that turbidity associated with vibratory hammer use during piling installation would be highly localized. As such, short-term, localized increases in background turbidity resulting from temporary work within the river channel would not be expected to result in any net change in function of the in-stream habitat. Forage quantity for juvenile salmonids would likely be temporarily reduced within the dredging area as benthic organisms become entrained by the dredge; however, re-colonization of benthic organisms would likely occur within a month following completion of dredging (NMFS 2009). It is reasonably certain that given the proposed timing of in-water work and the relative size of the impact area, the concentration of suspended sediments resulting from Alternative 3 would not result in any significant, long-term effect to aquatic resources.

Given the lack of complex habitat structure within the action area, introduction of the new intake pipes may provide simple in-water structures, velocity refuge, and overhead cover that can attract salmonid predators such as northern pikeminnow (*Ptychocheilus oregonensis*), smallmouth bass (*M. dolomieui*), and largemouth bass (*M. salmoides*). However, based on the proposed depth of the new intake pipes (20 to 40 feet) and apparent lack of salmonid rearing within the vicinity of the action area, it is unlikely that the new intake pipes would provide preferred ambush cover for potential predators. Given that a positive relationship between submerged pipe structures and predation on juvenile salmonids has not been scientifically established, the potential effects of the new intake pipes on salmonid predation is likely unquantifiable, although not discountable.

Aquatic resources have been affected greatly by the creation of reservoirs on the Columbia River which slow the flow, deepen the water, and cause sand and silt to deposit at higher rates than in a natural river. Alternative 3 would improve fish passage conditions at an existing intake facility, resulting in little to no cumulative effects on aquatic resources.

3.4. Threatened and Endangered Species

3.4.1. Existing Conditions – Threatened and Endangered Species

No ESA-listed wildlife or plant species are known to occur within the vicinity of the project study area (USFWS 2012). However, the Columbia River supports several salmonid populations listed as threatened or endangered under the Federal ESA. ESA-listed Chinook salmon, sockeye salmon, steelhead, and bull trout are known to occur within the vicinity of the project study area at various times of the year (see Table 1). Further discussion of the natural history and potential occurrence of these ESA-listed fish species within the project study area is provided below. Biological Opinions from the NMFS and USFWS have been written for the preferred alternative (Alternative 3) and are included in Appendix A.

Table 2. ESA-listed species known to occur within the vicinity of the project study area.

Species	Population	Federal Status	Closest Designated Critical Habitat*	Potential Site Use*
Chinook salmon *Oncorhynchus tshawytscha*	Upper Columbia River Spring-Run Evolutionarily Significant Unit (ESU)	Endangered (70FR37160)	Columbia River	Adult and juvenile migration
	Snake River Spring/ Summer-Run ESU	Threatened (70FR37160)	Columbia River	Adult and juvenile migration
	Snake River Fall-Run ESU	Threatened (70FR37160)	Columbia River	Adult and juvenile migration
Sockeye salmon *Oncorhynchus nerka*	Snake River ESU	Endangered (70FR37160)	Columbia River	Adult and juvenile migration
Steelhead *Oncorhynchus mykiss*	Middle Columbia River Distinct Population Segment (DPS)	Threatened (71FR834)	Columbia River	Adult and juvenile migration

Species	Population	Federal Status	Closest Designated Critical Habitat*	Potential Site Use*
	Upper Columbia River DPS	Threatened (71FR834)	Columbia River	Adult and juvenile migration
	Snake River Basin DPS	Threatened (71FR834)	Columbia River	Adult and juvenile migration
Bull trout *Salvelinus confluentus*	Columbia River Interim Recovery Unit (IRU)	Threatened (63FR31647)	Columbia River	Adult and juvenile migration

*Sources: NMFS 2012; StreamNet 2012

Upper Columbia River Spring-Run Chinook Salmon

Chinook salmon of the Upper Columbia River (UCR) Spring-Run Evolutionarily Significant Unit (ESU) were originally listed as endangered on March 24, 1999 (64 FR 14308) and reaffirmed as endangered on June 28, 2005 (70 FR 37160). The UCR Spring-Run Chinook salmon ESU includes all naturally spawned populations of spring Chinook salmon in all river reaches accessible to spring Chinook salmon in Columbia River tributaries upstream of Rock Island Dam and downstream of Chief Joseph Dam in Washington, as well as six artificial propagation programs (70 FR 37160).

Critical Habitat for the UCR Spring-Run Chinook salmon ESU was designated on September 2, 2005 and became effective on January 2, 2006, and includes the Columbia River within the project study area (70 FR 52630). The Primary Constituent Elements (PCEs) associated with UCR Spring-Run Chinook salmon Critical Habitat within the project study area includes freshwater migration corridors. The physical and biological features identified by NMFS as essential for UCR Spring-Run Chinook salmon migration include water quality and quantity, natural cover, and corridors free of artificial obstructions (70 FR 52630).

UCR Spring-Run Chinook salmon migrate through the Columbia River within the project study area as adults and juveniles, but do not appear to utilize the area for spawning or rearing (StreamNet 2012). Adult and juvenile Chinook salmon typically migrate through the project study area between early April and late October (DART 2012). However, based on the Columbia River Data Access in Real Time (DART) 10-year average (2002-2011) for adult and smolt Chinook passage at McNary Dam, Chinook salmon could occur within the project study area as early as mid-March and as late as early December (DART 2012).

Snake River Spring/Summer-Run Chinook Salmon

Chinook salmon of the Snake River (SR) Spring/Summer-Run ESU were originally listed as threatened on April 22, 1992 (57 FR 14653) and were reaffirmed as threatened on June 28, 2005 (70 FR 37160). The SR Spring/Summer-Run Chinook salmon ESU includes all naturally spawned populations of spring/summer-run Chinook salmon in the mainstem Snake River and the Tucannon River, Grande Ronde River, Imnaha River, and Salmon River subbasins, as well as fifteen artificial propagation programs (57 FR 14653).

Critical Habitat for the SR Chinook salmon ESU was designated on December 28, 1993 (58 FR 68543) and revised on October 25, 1999 (64 FR 57399), and includes the Columbia River within the project study area. The PCEs associated with SR Spring/Summer-Run Chinook salmon Critical Habitat within the project study area include juvenile and adult migration corridors. The physical and biological features identified by NMFS as essential for juvenile and adult SR Spring/Summer-Run Chinook salmon migration include substrate, water quality and quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space and safe passage (58 FR 68543).

SR Spring/Summer-Run Chinook salmon migrate through the Columbia River within the project study area as adults and juveniles, but do not appear to utilize the area for spawning or rearing (StreamNet 2012). As discussed above, adult and juvenile Chinook salmon typically migrate through the project study area between early April and late October (DART 2012).

Snake River Fall-Run Chinook Salmon

Chinook salmon of the SR Fall-Run ESU were originally listed as threatened on April 22, 1992 (57 FR 14653) and were reaffirmed as threatened on June 28, 2005 (70 FR 37160). The SR Fall-Run Chinook salmon ESU includes all naturally spawned populations of fall-run Chinook salmon in the mainstem Snake River below Hells Canyon Dam, and in the Tucannon River, Grande Ronde River, Imnaha River, Salmon River, and Clearwater River subbasin, as well as four artificial propagation programs (70 FR 37160).

Critical Habitat for the SR Fall-Run Chinook salmon ESU was designated on December 28, 1993 (58 FR 68543), and includes the Columbia River within the project study area. The PCEs associated with SR Fall-Run Chinook salmon Critical Habitat within the project study area include juvenile and adult migration corridors. The physical and biological features identified by NMFS as essential for juvenile and adult SR Fall-Run Chinook salmon migration include substrate, water quality and quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space and safe passage (58 FR 68543).

SR Fall-Run Chinook salmon migrate through the Columbia River within the project study area as adults and juveniles, but do not appear to utilize the area for spawning or rearing (StreamNet 2012). As discussed above, adult and juvenile Chinook salmon typically migrate through the project study area between early April and late October (DART 2012).

Snake River Sockeye Salmon

Sockeye salmon of the SR ESU were originally listed as endangered on November 20, 1991 (56 FR 58619) and reaffirmed as endangered on June 28, 2005 (70 FR 37160). The SR sockeye salmon ESU includes all anadromous and residual sockeye salmon from the Snake River Basin, Idaho, as well as artificially propagated sockeye salmon from the Redfish Lake captive propagation program (70 FR 37160).

Critical Habitat for the SR sockeye salmon ESU was designated on December 28, 1993 (58 FR 68543), and includes the Columbia River within the project study area. The PCEs associated with SR sockeye salmon Critical Habitat within the project study area include juvenile and adult migration corridors. The physical and biological features identified by NMFS as essential for juvenile and adult SR sockeye salmon migration include substrate, water quality and quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space and safe passage (58 FR 68543).

SR sockeye salmon migrate through the Columbia River within the project study area as adults and juveniles, but do not appear to utilize the area for spawning or rearing (StreamNet 2012). Adult and juvenile sockeye salmon typically migrate through the action area between early June and late July (DART 2012). However, based on the Columbia River DART 10-year average (2002-2011) for adult and smolt sockeye passage at McNary Dam, juvenile sockeye salmon could occur within the project study area as late as early December (DART 2012).

Middle Columbia River Steelhead

The Middle Columbia River (MCR) steelhead Distinct Population Segment (DPS) was originally listed as threatened on March 25, 1999 (64 FR 14517), and reaffirmed on January 5, 2006 (71 FR 834). This

DPS includes all naturally spawned anadromous steelhead populations below natural manmade impassable barriers in streams from above the Wind River in Washington, and the Hood River in Oregon, upstream to, and including, the Yakima River. The MCR steelhead DPS excludes steelhead from the Snake River Basin, as well as seven artificial propagation programs.

Critical Habitat for the MCR steelhead DPS was designated on September 2, 2005 (70 FR 52630) and became effective on January 2, 2006, and includes the Columbia River within the project study area. The PCEs associated with MCR steelhead Critical Habitat within the project study area include freshwater migration corridors. The physical and biological features identified by NMFS as essential for MCR steelhead migration include water quality and quantity, natural cover, and corridors free of artificial obstructions (70 FR 52630).

MCR steelhead migrate through the Columbia River within the project study area as adults and juveniles, but do not appear to utilize the area for spawning or rearing (StreamNet 2012). Adult and juvenile steelhead typically migrate through the project study area between early March and late December (DART 2012).

Upper Columbia River Steelhead

The UCR steelhead DPS was originally listed as endangered on August 18, 1997 (62 FR 43937) and was downgraded to threatened on January 5, 2006 (71 FR 834). The threatened status was then reinstated to endangered per a U.S. District Court decision in June 2007, and was then again downgraded to threatened per a U.S. District Court order on June 18, 2009 (72 FR 42605). This DPS includes all naturally spawned anadromous steelhead populations below natural and man-made impassable barriers in streams in the Columbia River Basin upstream from the Yakima River to the U.S. - Canada border, as well as six artificial propagation programs.

Critical Habitat for the UCR steelhead DPS was designated on September 2, 2005 (70 FR 52630) and became effective on January 2, 2006, and includes the Columbia River within the project study area. The PCEs associated with UCR steelhead Critical Habitat within the project study area include freshwater migration corridors. The physical and biological features identified by NMFS as essential for UCR steelhead migration include water quality and quantity, natural cover, and corridors free of artificial obstructions (70 FR 52630).

UCR steelhead migrate through the Columbia River within the project study area as adults and juveniles, but do not appear to utilize the area for spawning or rearing (StreamNet 2012). As discussed above, adult and juvenile steelhead typically migrate through the project study area between early March and late December (DART 2012).

Snake River Basin Steelhead

The Snake River Basin (SRB) steelhead DPS was originally listed as a threatened species on August 18, 1997 (62 FR 43937) and was reaffirmed on January 5, 2006 (71 FR 834). This DPS includes all naturally spawned anadromous steelhead populations below natural and manmade impassable barriers in streams in the SRB of southeast Washington, northeast Oregon, and Idaho, as well as six artificial propagation programs.

Critical Habitat for the SRB steelhead DPS was designated on September 2, 2005 (70 FR 52630) and became effective on January 2, 2006, and includes the Columbia River within the project study area. The PCEs associated with SRB steelhead Critical Habitat within the project study area include freshwater migration corridors. The physical and biological features identified by NMFS as essential for SRB steelhead migration include water quality and quantity, natural cover, and corridors free of artificial obstructions (70 FR 52630).

SRB steelhead migrate through the Columbia River within the project study area as adults and juveniles, but do not appear to utilize the area for spawning or rearing (StreamNet 2012). As discussed above, adult and juvenile steelhead typically migrate through the project study area between early March and late December (DART 2012).

Bull Trout

Bull trout were first listed as threatened under the ESA on June 10, 1998 (63 FR 31647). This original listing included the Columbia River and Klamath River DPSs. The USFWS later added the Jarbridge River, Coastal-Puget Sound, and St. Mary-Belly River DPSs to the listing. A final ruling was issued on November 1, 1999, that assigned threatened status to all populations of bull trout within the coterminous United States (64 FR 58910/58933). This final ruling consolidated the previous DPSs into a single DPS coterminous listing. Until a final bull trout recovery plan is completed, DPSs previously identified in the original listing rule are termed “interim recovery units” (IRUs). The USFWS considers bull trout threatened because of habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, past fisheries management practices, and the introduction of non-native species (63 FR 31647).

The Columbia River IRU is represented by widespread subpopulations that have declined in overall range and numbers of fish. A majority of Columbia River bull trout occur in isolated, fragmented habitats that support low numbers of fish and are inaccessible to migratory bull trout (63 FR 31647). A few remaining bull trout “strongholds” still remain in the Columbia River basin. These populations are found in large areas of contiguous habitat in the Snake River basin of the central Idaho mountains, upper Clark Fork and Flathead Rivers in Montana, and several streams in the Blue Mountains in Washington and Oregon (63 FR 31647).

Critical Habitat for the Columbia River IRU was originally designated on October 6, 2004 (69 FR 59996). On January 13, 2010, the USFWS proposed to revise its designation of Critical Habitat for bull trout (75 FR 2270). In total, the USFWS proposed designating approximately 22,679 miles of streams and 533,426 acres of lakes and reservoirs in Idaho, Oregon, Washington, Montana and Nevada, and 985 miles or marine shoreline in Washington. A final ruling on Critical Habitat for bull trout in the coterminous U.S. was designated on October 18, 2010, and included the Columbia River (75 FR 63898). The physical and biological features identified by USFWS as essential for the conservation of bull trout include springs, seeps, groundwater sources, migratory habitats, abundant food base, complex aquatic environments, water temperature, substrates, natural hydrograph, permanent water quality and quantity, and non-native predatory species presence (75 FR 63898).

Bull trout in the Columbia River IRU migrate through the Columbia River within the project study area as adults and juveniles, but do not utilize the area for spawning or rearing (StreamNet 2012). This section of the Columbia River (from the Umatilla River and upriver past the Walla Walla River) is utilized by bull trout almost year around for foraging (Bianca Streif, USFWS biologist, pers. comm., June 25, 2012). The Walla Walla River and Umatilla River are the closest core areas for local populations of bull trout relative to the project study area. The project study area does not appear to support preferable habitat conditions for bull trout given the relatively shallow water depth, lack of overwater structures, unfavorable sandy substrates, and operational disturbance activities. However, there have been several recent accounts of bull trout entering the Umatilla River downstream of McNary Dam, some of which have migrated from the Walla Walla River (located upstream of the action area) (Bianca Streif, USFWS biologist, pers. comm., June 25, 2012). As such, a few adult and/or juvenile bull trout may be present within or near the project study area.

3.4.2. Environmental Consequences – Threatened and Endangered Species

<u>Alternative 1 – No Action</u>

The No Action alternative would likely result in direct impacts to threatened and endangered fish species during inevitable repair and/or replacement of the damaged intake pumps. Ideally, pump repair and/or replacement would occur during the winter months when fewer ESA-listed salmonids would be present within the project study area, and when operation of the pumps (i.e., irrigation) would not be required. However, given that failure of the damaged pumps could occur at any time of the year, the timeframe associated with repair and/or replacement cannot be predicted. In addition, the No Action alternative would not improve existing fish passage conditions, resulting in the continued potential for entrainment and/or impingement of juvenile ESA-listed salmonids during pumping operations. The No Action alternative would add slightly to the cumulative effect on threatened and endangered fish species.

Alternative 2 – Routine maintenance and dredging

Alternative 2 would likely result in repetitive (annual) direct impacts to threatened and endangered fish species resulting from potential entrainment and substrate modification during routine maintenance dredging. Entrainment may occur if juvenile ESA-listed salmonids are drawn into the suction dredge or impinged upon the intake screen during proposed dredging activities. The potential for entrainment is largely dependent on the likelihood of ESA-listed fish species occurring within the dredge prism, the depth of dredging, the surface area of the suction dredge, and the life stage of the species. Given the proposed timing of in-water work (January 1 – February 28), the surface area of the suction dredge intake (8 inches in diameter), and depth that the dredge intake would remain buried in the substrate (up to a foot during dredging); it is likely that the risk of injury or lethal take of ESA-listed fish species from proposed dredging activities would be minimal.

In the short-term, annual substrate modification could also elevate turbidity levels and reduce forage quantity, therefore disrupting behavioral patterns of juvenile ESA-listed salmonids, including feeding and sheltering. Forage quantity for juvenile salmonids would likely be reduced within the dredging area as benthic organisms became entrained by the dredge. Although, re-colonization of benthic organisms would likely occur within a month following completion of dredging (NMFS 2009), repetitive (annual) dredging could result in longer term indirect impacts. In addition, Alternative 2 would not improve existing fish passage conditions, resulting in the continued potential for entrainment and/or impingement of juvenile ESA-listed salmonids during pumping operations. Repetitive (annual) dredging activities associated with Alternative 2 would add slightly to the cumulative effects on threatened and endangered fish species.

Alternative 3 - Installation of extended intake pipes and replacement fish screens

Alternative 3 would likely result in temporary, direct impacts to threatened and endangered fish species resulting from potential entrainment and substrate modification during project construction. However, Alternative 3 would ultimately result in a net indirect benefit to threatened and endangered fish species by meeting NMFS' current fish passage and screening criteria and moving the intakes to deeper water. The deeper depth location of the intakes should make it less likely to affect migrating juvenile ESA-listed salmonids, as they have habitat preference for depths less than 20 feet. In addition, Alternative 3 would avoid the repetitive (annual) impacts associated with routine maintenance dredging (i.e., Alternative 2).

Alternative 3 may result in entrainment if juvenile ESA-listed salmonids are drawn into the suction dredge or impinged upon the intake screen during proposed dredging activities. However, given the proposed timing of in-water work (January 1 – February 28), the surface area of the suction dredge intake (8 inches in diameter), and depth that the dredge intake would remain buried in the substrate (up to a foot during dredging); it is likely that the risk of injury or lethal take of ESA-listed fish species from proposed dredging activities would be minimal.

Short-term, localized project-related increases in background turbidity levels would likely occur as a result of activities associated with dredging and piling installation. Given the existing substrate conditions (course sand), proposed dredging (suction dredge) and disposal methods (into the river at a depth of approximately 40 feet); increases in background turbidity associated with short-term dredging activities would be minimized. In addition, it is anticipated that turbidity associated with vibratory hammer use during piling installation would be highly localized. As such, short-term, localized increases in background turbidity resulting from temporary work within the river channel are not expected to result in any net change in function of the in-stream habitat. Forage quantity for juvenile ESA-listed salmonids would likely be temporarily reduced within the dredging area as benthic organisms became entrained by the dredge, however, re-colonization of benthic organisms will likely occur within a month following completion of dredging (NMFS 2009). It is reasonably certain that given the proposed timing of in-water work and the relative size of the impact area, the concentration of suspended sediments resulting from proposed project activities would not result in any significant, long-term effect to threatened and endangered fish species.

Given the lack of complex habitat structure within the action area, introduction of the new intake pipes may provide simple in-water structures, velocity refuge, and overhead cover that can attract salmonid predators such as northern pikeminnow (*Ptychocheilus oregonensis*), smallmouth bass (*M. dolomieui*), and largemouth bass (*M. salmoides*). However, based on the proposed depth of the new intake pipes (20 to 40 feet) and apparent lack of salmonid rearing within the vicinity of the action area, it is unlikely that the new intake pipes would provide preferred ambush cover for potential predators. Given that a positive relationship between submerged pipe structures and predation on juvenile salmonids has not been scientifically established, the potential effects of the new intake pipes on salmonid predation is likely unquantifiable, although not discountable.

Aquatic resources have been greatly affected by the creation of reservoirs on the Columbia River which slow the flow, deepen the water, and cause sand and silt to deposit at higher rates than in a natural river. Alternative 3 would improve fish passage conditions at an existing intake facility, resulting in little to no cumulative effects on threatened and endangered fish species.

3.5. Water Quality

3.5.1. Existing Conditions – Water Quality

In general, the water quality throughout the Columbia River basin has been significantly affected by human activities such as dams and diversion structures, water withdrawals, farming and grazing, road construction, mining activities, and urbanization. Increased stream temperatures have occurred throughout the basin and have a significant effect on salmonid metabolism, growth rate, disease resistance, timing of adult migrations, fry emergence, and smoltification. In addition, excess nutrients, low levels of dissolved oxygen, heavy metals, and changes in pH have all directly affected the water quality for salmon and steelhead both as adults and juveniles as these fish migrate both downstream and upstream between spawning grounds and rearing areas.

The middle Columbia River within the Lake Wallula reservoir is listed on the Oregon Department of Environmental Quality (ODEQ) 303(d) list for year round temperature exceedance (ODEQ 2012a). Based on the Columbia River DART 10-year average (2002-2011), temperatures at McNary range between a low of approximately 4^{o} Celsius (C) in mid-February, to a high of over 22^{o} C in mid-August (DART 2012). Many factors have contributed to increased stream temperatures, but they are primarily related to land-use practices including dams, channel simplification and widening, and vegetation removal. There has also been an incremental loss of wetlands and increases in groundwater withdrawals which have contributed to lower base-stream flows, and which in turn contribute to temperature increases. In addition, the middle Columbia River within the Lake Wallula reservoir is 303(d) listed for polychlorinated biphenyls (PCBs), and has an approved Total Maximum Daily Load (TMDL) for dioxin and total dissolved gas (TDG) (ODEQ 2012a).

The Portland Sediment Evaluation Team granted a no-test exclusion for sediment samples collected within the dredging area based on the small volume of material to be dredged and the distance of the project area from potential sources of contamination (PHS 2012).

3.5.2. Environmental Consequences – Water Quality

Alternative 1 – No Action

The No Action alternative would likely result in minor direct and indirect impacts to water quality during inevitable repair and/or replacement of the damaged intake pumps. The timeframe and exact construction impacts associated with repair and/or replacement cannot be predicted. The No Action alternative may add slightly to the cumulative effects on water quality.

Alternative 3 - Installation of extended intake pipes and replacement fish screens

Alternative 3 would likely result in short-term, localized project-related increases in background turbidity levels as a result of activities associated with dredging and piling installation. As with Alternative 2, given the existing substrate conditions (course sand), proposed dredging (suction dredge) and disposal methods (into the river at a depth of approximately 40 feet); increases in background turbidity associated with short-term dredging activities would be minimized. In addition, it is anticipated that turbidity associated with vibratory hammer use during piling installation would be highly localized. Furthermore, Alternative 3 would avoid the repetitive (annual) impacts associated with routine maintenance dredging (i.e., Alternative 2). As such, it is reasonably certain that given the proposed timing of in-water work and the relative size of the action area, the concentration of suspended sediments resulting from Alternative 3 activities would not result in any significant direct, indirect, or cumulative effects to water quality.

As stated above, equipment operating near and over the river channel within the project study area represent potential sources of chemical contamination. Accidental spills of construction material or petroleum products would adversely affect water quality. All conditions of ODEQ's 401 Water Quality Certification would be followed, including development and implementation of a Pollution Control Plan (PCP) that would include containment measures and spill response for construction-related chemical hazards.

3.6. Socioeconomics

3.6.1. Existing Conditions – Socioeconomics

As discussed above, the Stahl H.B. Farms pumping station currently serves 7,109 acres of primary water rights on Stahl H.B. farmland within Umatilla County; and 1,576 acres of primary and 4,457 acres of supplemental water rights within the Echo Irrigation District (including Hales Farms) within Umatilla and Morrow Counties. The JSH Farms system currently serves 2,908 acres of primary water rights on JSH farmland in Umatilla County (IRZ 2012).

Umatilla and Morrow Counties have estimated populations of 76,725 and 11,170, respectively (USDC 2012). Farmland irrigation has been key to economic diversification and growth within both counties. Agriculture and food processing represent two of the largest industries within these counties, along with forest products, tourism, manufacturing, recreation, aggregate (gravel) production, and wind power generation. Umatilla County agriculture contributes over 100 million dollars in annual income to the county and supports local food processing, transportation, trade, and service employment and payrolls (UCPD 2010). Umatilla County's agricultural sector has consistently ranked among the top ten Oregon counties in total agricultural productivity (UCPD 2010).

Stahl H.B. farmlands support a variety of local crops, including potatoes, corn, wheat, grass seed and mint. Of these, potatoes make up approximately 1/3 of total crop production. Stahl H.B. Farms currently supports 12 families that live on the farm, and employs approximately 20 full time employees and over 100 seasonal farm workers annually. Within the Echo Irrigation District, Stahl H.B. Farms also supplies irrigation to Hales Farms, which is comprised of two brothers and their families, as well as full time and seasonal employees.

JSH farmland also supports a variety of local crops, including mint, dill, corn, potatoes, onions, lavender, and grass seed. JSH Farms is comprised of seven brothers and their families, four of which currently live on the farm. In addition, JSH Farms employs approximately 20 full time staff employees and over 150 seasonal farm staff annually.

3.6.2. Environmental Consequences – Socioeconomics

Alternative 1 – No Action

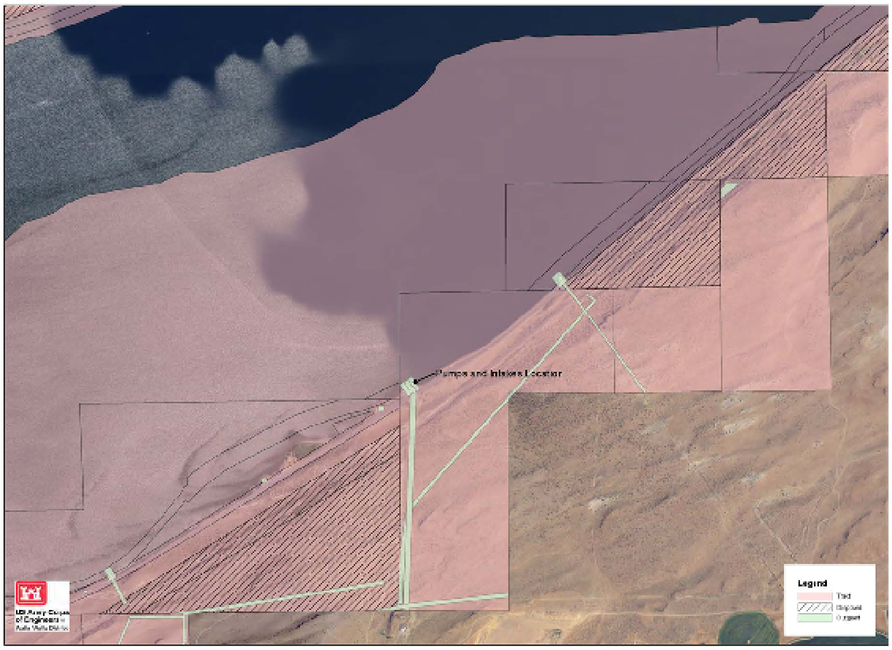
The No Action alternative would likely jeopardize the continued flow of irrigation water to those acres serviced by the Stahl H.B Farms and JSH Farms pumping stations, resulting in potential loss of crops and local revenue. As such, in the event that inevitable pump failure were to occur during the agricultural growing season, the No Action alternative would likely result in direct, indirect, and cumulative impacts to local economies within Umatilla and Morrow Counties.

Alternative 2 – Routine maintenance and dredging

Alternative 2 would likely maintain pumping operations with little direct, indirect, or cumulative impacts to socioeconomic resources. However, yearly sediment accumulations may continue to damage the existing pumps over time, resulting in potential pump failure and inevitable replacement.

Alternative 3 - Installation of extended intake pipes and replacement fish screens

Alternative 3 would improve existing pumping operations with no direct, indirect, or cumulative negative impacts to socioeconomic resources. In the long term, Alternative 3 would benefit local economies within Umatilla and Morrow Counties by securing the continued flow of irrigation water to those acres serviced by the Stahl H.B. Farms and JSH Farms pumping stations.



4973
10/14/12

Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070

Property Ownership within the Vicinity of the Stahl H.B. Farms and JSH Farms River Pumping Station
(Courtesy of U.S. Army Corps of Engineers, Walla Walla District)

FIGURE
4

3.7. Cultural Resources

3.7.1. Existing Conditions – Cultural Resources

The area now known as the Lake Wallula shoreline is an area of rich cultural heritage, where people have lived for more than ten thousand years (U.S. ACOE 2011a). Recorded archaeological sites of the prehistoric and historic eras are numerous around the reservoir shoreline. Types of prehistoric and historic cultural sites which might be encountered include rockshelters, pithouses, fishing stations, fort/trading post remains, townsites, roadways/trails, homesteads and other remains of the long history of human use of the area (U.S. ACOE 2011a).

In February of 2010, Reiss-Landreau Research (RLR) completed an archaeological review and inventory of a proposed addition to the JSH Farms pumping station facility (RLR 2012; Appendix B). The field survey consisted of a visual reconnaissance of the 0.12 acre lot, as well as a set of controlled shovel test probes. After reconnaissance and review, RLR found no evidence of subsurface cultural resources at this location. It was their belief that the entire project area was located over a disturbed ground surface. For the current project, RLR has no ability to observe or inventory the dredging areas without dewatering them or undertaking cost prohibitive underwater surveys. RLR was also of the opinion that because the sediments around the existing intakes are currently disturbed, it would not be possible to determine archaeological context within the disturbed sediments (RLR 2012).

3.7.2. Environmental Consequences – Cultural Resources

<u>Alternative 1 – No Action</u>
The No Action alternative would have no direct, indirect, or cumulative effects on cultural resources.

<u>Alternative 2 – Routine maintenance and dredging</u>
Given the disturbed nature of the existing project site and the depth of recently accumulated sediments in front of and underneath the Stahl H.B. Farms pumping station (which would be removed), it is anticipated that in-water dredging activities associated with Alternative 2 would have little to no direct, indirect, or cumulative effects on cultural resources. In addition, Alternative 2 would not require upland ground disturbance.

<u>Alternative 3 – Installation of extended intake pipes and replacement fish screens</u>
As with Alternative 2, it is anticipated that Alternative 3 would have little to no direct, indirect, or cumulative effect on cultural resources given the disturbed nature of the project site and existing sediments. Alternative 3 would also not require upland ground disturbance as vehicles/equipment would stay on existing roads and pumping station platform.

3.8. Cumulative Effects

Cumulative effects are defined as, *"the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions"* (40 CFR 1508.7).
No new activities are reasonably certain to occur that would compound the environmental effects of the preferred alternative (Alternative 3). There have been numerous prior actions that have resulted in adverse environmental impacts to water quality, aquatic resources and endangered fish species.

Alternative 3 would likely result in temporary impacts to aquatic resources, threatened and endangered fish species, and water quality during project construction. However, Alternative 3 would ultimately result in a net benefit to threatened and endangered fish species by meeting NMFS' current fish passage and screening criteria and moving the intakes to deeper water. The deeper depth location of the intakes should make it less likely to affect migrating juvenile salmonids, as they have habitat preference for depths less than 20 feet. In addition, Alternative 3 would avoid the repetitive (annual) impacts associated with routine maintenance dredging (i.e., Alternative 2), and would secure the continued flow of irrigation water to those acres serviced by the pumping stations. Furthermore, Alternative 3 would result in little to no effect on vegetation, wildlife and cultural resources.

4. ENVIRONMENTAL LAWS, REGULATIONS, AND POLICIES

Section 4 identifies the legal, policy, and regulatory requirements associated with the proposed/preferred alternatives. Summaries of compliance and coordination activities for each of the laws, policies, or regulation are provided.

4.1. National Environmental Policy Act

As required by the National Environmental Policy Act of 1969 and subsequent implementing regulations promulgated by the Council on Environmental Quality, the Corps has prepared this Environmental Assessment to determine whether the action proposed constitutes a major Federal action significantly affecting the quality of the human environment and whether an environmental impact statement is required. If no significant impacts are identified, compliance with NEPA would be achieved upon the signing of a Finding of No Significant Impact. However, if significant impacts are identified, an Environmental Impact Statement (EIS) would be required. Completion of an EIS and the signing of a Record of Decision would then achieve compliance with NEPA.

4.2. Clean Water Act

The Clean Water Act sets national goals and policies to eliminate discharge of water pollutants, regulate discharge of toxic pollutants, and prohibit discharge of pollutants from point sources without permits. The Clean Water Act also authorizes the EPA to establish water quality criteria that are used by States to establish specific water quality standards.

The proposed alternative would require a Corps permit under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act for proposed fill within the Columbia River. The Corps has confirmed that the preferred alternative would be permitted under programmatic Nationwide Permit 3 (Maintenance), which is pre-certified for a Section 401 Water Quality Certification through the ODEQ. The contractor would follow all conditions of the project’s Water Quality Certification, including preparation of a Pollution Control Plan.

4.3. Clean Air Act

The Clean Air Act of 1970 established a comprehensive program for improving and maintaining air quality throughout the United States. The goals of the Clean Air Act are achieved through permitting of stationary sources, controlling the emission of toxic substances from stationary and mobile sources, and establishing the NAAQS. The act required the EPA to adopt national ambient air quality standards for priority pollutants, which include sulfur dioxide, particulate matter, carbon monoxide, ozone, nitrogen dioxide, and lead. These standards are designed to protect human health and welfare. Areas in which the air pollutant levels exceed adopted standards for one or more pollutants are considered to be in “non-attainment.” Those areas where pollutant levels do not exceed standards are considered to be in “attainment.” The project site area is in an attainment area. The most likely source of air pollution is emissions from diesel powered equipment. However, given the remote location of the project site and relatively short duration of project activities, this is not likely to violate air quality standard or require further compliances.

4.4. Endangered Species Act

Section 7 of the Endangered Species Act (ESA) states each Federal agency shall, in consultation with and with assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat. A Biological Assessment (BA) has been prepared and submitted to the U.S. Fish and Wildlife Service (USFWS) and NMFS for formal consultation under the ESA. The Corps determined the preferred alternative *may affect, is likely to adversely affect* UCR Spring-Run Chinook Salmon, SR Spring/Summer-Run Chinook salmon, SR Fall-Run Chinook Salmon, SR sockeye salmon, MCR steelhead, UCR steelhead, SRB steelhead, and bull trout. Biological Opinions from the NMFS and USFWS have been written for the preferred alternative (Alternative 3) and are included in Appendix A. Both agencies concluded the proposed action is not likely to jeopardize the continued existence of listed ESA species. The following Reasonable and Prudent Measures were provided.

NMFS:
-Minimize incidental take resulting from dredging and construction
-Minimize incidental take resulting from construction effects to water quality (e.g. turbidity)
-Ensure completion of a monitoring and reporting program

USFWS:
-Reduce potential project related adverse impacts to bull trout and bull trout critical habitat
-Monitor to the extent possible, any detectable adverse project effects to bull trout

4.5. National Historic Preservation Act

The National Historic Preservation Act requires that Federal agencies evaluate the effects of Federal undertakings on historical, archaeological, and cultural resources, and that they consult with the State Historic Preservation Office (SHPO) and other interested parties regarding adverse cultural resource impacts. The project study area was evaluated by the Corps. Based on the report of findings, the Corps determined that no historic properties would be affected by the project. The Oregon State Historic Preservation Office concurred with that finding. (Concurrence letter attached in Appendix B.)

The Corps also consulted with the Confederated Tribes of the Umatilla Indian Reservation (CTUIR). The CTUIR expressed concerns with the location of the project and requested monitoring during the project. The Corps agreed to monitoring.

4.6. Native American Graves Protection and Repatriation Act

The Native American Graves Protection and Repatriation Act addresses the discovery, identification, treatment, and repatriation of Native American and Native Hawaiian human remains and cultural items (associated funerary objects, unassociated funerary objects, sacred objects, and objects of cultural patrimony). In the event of an inadvertent discovery during construction, the project would be stopped and the appropriate parties would be contacted.

4.7 Fish and Wildlife Coordination Act

In accordance with the Fish and Wildlife Coordination Act, the Corps is required to consult with the USFWS and the lead fish and wildlife agency in the state that the work is to be performed on water resource projects. This project is considered operation and maintenance so this act does not apply. However, the Corps has coordinated with both the USFWS and the ODFW to get their input on how to minimize the environmental impacts of the project.

4.8 Migratory Bird Treaty Act

The Migratory Bird Treaty Act involves conservation and protection of migratory birds in accordance with treaties entered into between the United States and Mexico, Canada, Japan, and the former Union of Soviet Socialist Republics; must protect other wildlife, including threatened or endangered species; and must restore or develop adequate wildlife habitat. The migratory birds protected under this Act are specified in the respective treaties. In regulating these areas, the Secretary of the Interior is authorized to manage timber, range, agricultural crops, and other species of animals, and to enter into agreements with public and private entities.

All work proposed for this project would likely occur outside the nesting season. However, any activities near potential migratory bird nesting sites would be monitored for active nesting prior to disturbance. If active nests were found, work in that area would be delayed until the young birds leave the nest.

4.9 E.O. 11988 Floodplain Management

This Executive Order outlines the responsibilities of Federal agencies in the role of floodplain management. Each agency shall evaluate the potential effects of actions on floodplains and should avoid undertaking actions that directly or indirectly induce development in the floodplain or adversely affect natural floodplain values. Alternatives considered for this project would maintain designed levels of flood protection and would not induce development in the floodplain.

4.10 E.O. 11990 Protection of Wetlands

This order directs Federal agencies to provide leadership in minimizing the destruction, loss, or degradation of wetlands. Section 2 of this order states that, in furtherance of the National Environmental Policy Act of 1969, agencies shall avoid undertaking or assisting in new construction located in wetlands unless there is no practicable alternative. Wetlands do not exist within or adjacent to the project site. As such, alternatives considered for this project would not impact or degrade wetlands.

4.11 State and Local Laws, Policies, and Regulations

The preferred alternative would require Stahl H.B. Farms and JSH Farms to obtain an Oregon Department of State Lands (DSL) Removal-Fill Permit for work within a "waters of the state" (Columbia River). This permit application is currently in review by the DSL. Stahl H.B. Farms and JSH Farms would obtain all necessary State or local permits prior to construction of the preferred alternative.

5. PUBLIC AND AGENCY INVOLVEMENT

This section presents the results of discussions with the agencies having responsibility for permitting of the project or managing the natural resources within the project area.

5.1. Agency Consultation and Coordination

Coordination was conducted with the following agencies during preparation of the Environmental Assessment:

Federal:
U.S. Fish and Wildlife Service
National Marine Fisheries Service
Confederated Tribes of the Umatilla Indian Reservation
U.S. Army Corps of Engineers, Portland District

State:
Oregon Department of Fish and Wildlife
Oregon State Historic Preservation Office

6. REFERENCES

Columbia River Data Access in Real Time (DART). 2012. Data query for McNary Dam. http://www.cbr.washington.edu/dart/dart.html. Accessed June 2012.

Federal Register (56 FR 58619). 1991. *Endangered and Threatened Species; Endangered Status for Snake River Sockeye Salmon*. Final rule. November 20, 1991.

Federal Register (57 FR 14653). 1992. *Endangered and Threatened Species; Threatened Status for Snake River Spring/Summer Chinook Salmon, Threatened Status for Snake River Fall Chinook Salmon*. Final rule. April 22, 1992.

Federal Register (58 FR 68543). 1993. *Designated Critical Habitat; Snake River Sockeye Salmon, Snake River Spring/Summer Chinook Salmon, and Snake River Fall Chinook Salmon*. Final rule. December 28, 1993.

Federal Register (62 FR 43937). 1997. *Endangered and Threatened Species; Listing of Several Evolutionarily Significant Units (ESUs) of West Coast Steelhead*. Final rule. August 18, 1997.

Federal Register (63 FR 31647). 1998. *Endangered and Threatened Wildlife and Plants: Determination of Threatened Status for the Klamath River and Columbia River Distinct Population Segments of Bull Trout*. Final rule. June 10, 1998.

Federal Register (64 FR 14308). 1999. *Endangered and Threatened Species; Threatened Status for Three Chinook Salmon Evolutionarily Significant Units (ESUs) in Washington and Oregon, and Endangered Status for One Chinook Salmon ESU in Washington*. Final rule. March 24, 1999.

Federal Register (64 FR 14517). 1999. *Endangered and Threatened Species: Threatened Status for Two ESUs of Steelhead in Washington and Oregon*. Final rule, notice of determination. March 25, 1999.

Federal Register (64 FR 57399). 1999. *Designated Critical Habitat: Revision of Critical Habitat for Snake River Spring/Summer Chinook Salmon*. Final rule. October 25, 1999.

Federal Register (64 FR 58910, 58933). 1999. *Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for Bull Trout in the Coterminous United States*. Final rule. November 1, 1999.

Federal Register (69 FR 59996). 2004. *Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Klamath River and Columbia River Distinct Population Segment of Bull Trout*. Final rule. October 6, 2004.

Federal Register (70 FR 37160). 2005. *Endangered and Threatened Species: Final Listing Determinations for 16 ESUs of West Coast Salmon, and Final 4(d) Protective Regulations for Threatened Salmonid ESUs*. Final rule. June 28, 2005.

Federal Register (70 FR 52630). 2005. *Endangered and Threatened Species; Designation of Critical Habitat for 12 Evolutionarily Significant Units of West Coast Salmon and Steelhead in Washington, Oregon, and Idaho*. Final rule. September 2, 2005.

Federal Register (71 FR 834). 2006. *Endangered and Threatened Species: Final Listing Determinations for 10 Distinct Population Segments of West Coast Steelhead*. Final rule. January 5, 2006.

Federal Register (72 FR 42605). 2009. *Listing Endangered and Threatened Species: Change in Status for the Upper Columbia River Steelhead Distinct Population Segment*. Final rule; Correcting Amendment. June 18, 2009.

Federal Register (75 FR 2270). 2010. *Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for Bull Trout in the Coterminous United States. Proposed rule.* January 13, 2010.

Federal Register (75 FR 63898). 2010. *Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for Bull Trout in the Coterminous United States*. Final rule. October 18, 2010.

Hjort, R.C., B.C. Mundy, and P.L. Hulett. 1981. Habitat requirements for resident fishes in the reservoirs of the Lower Columbia River. Final contract report to U.S. Army Corps of Engineers, Portland District, prepared by Oregon State University, Department of Fisheries and Wildlife under contract no. DACW57-79-C-0067. Portland, Oregon: U.S. Army Corps of Engineers.

IRZ Consulting. 2012. Sediment Sampling and Analysis Plan for the Stahl H.B. Farm River Pumping Station Fish Screening and Intake Modifications Project. June 2012.

Mullan, J., M. Dell, S. Hays, and J. McGee. 1986. Some factors affecting fish production in the mid-Columbia River 1934-1983. Report number FRI/FAO-86-15. Leavenworth, Washington: U.S. Fish and Wildlife Service, Fisheries Assistance Office.

National Marine Fisheries Service (NMFS). 2009. *Endangered Species Act Section 7 Formal Consultation, Informal Conference Report on Green Sturgeon Proposed Critical Habitat, Informal Consultation on Green Sturgeon, and Magnuson-Stevens Act Essential Fish Habitat Consultation on Access Maintenance Dredging and In-Water Disposal by the Portland Yacht Club, Willow Bar Slough, Columbia River Mile 94.4, (HUC 1708000302), Columbia County, Oregon (Corps No.: NWP-1997-548). NMFS Reference No. 2008/00648.* March 30, 2009.

National Marine Fisheries Service (NMFS). 2012. Northwest Regional Office, ESA Salmon Listings. http://www.nwr.noaa.gov/ESA-SalmonListings/SalmonPopulations/Coho/Index. cfm. Accessed June 2012.

Oregon Department of Environmental Quality (ODEQ). 2012a. Oregon's 2010 Integrated Report Assessment Database and 303(d) List. http://www.deq.state.or.us /wq/assessment/ rpt2010/search.asp. Accessed June 2012.

Pacific Habitat Services, Inc. (PHS). *2012. Biological Assessment for the Stahl H.B. Farm and JSH Farm River Pumping Stations: Fish Screening and Intake Modifications Project*. Wilsonville, Oregon. September 2012.

Reiss-Landreau Research (RLR). 2012. Letter to IRZ Consulting regarding *JSH Farms and Stahls Pumping station projects 2012*. Dated August 7, 2012.

StreamNet. 2012. Data Query and Critical Habitat Mapper. http://www.streamnet.org/ . Accessed June 2012.

Streif, Bianca. June 25, 2012. Personal communication with Eric Campbell (PHS). USFWS Biologist.

Thompson, K., J.K. Brostrom, and C.W. Luzier. 2010. Best management practices to minimize adverse effects to Pacific lamprey (*Entosphenus tridentatus*): Columbia River Basin. USDA Forest Service, USDI Fish and Wildlife Service, and USDI Bureau of Land Management.

Umatilla County Planning Department (UCPD). 2010. Umatilla County Comprehensive Plan. Revised June 7, 2010.

U.S. Army Corps of Engineers (ACOE). 2011a. McNary Shoreline Management Plan Revised Programmatic Environmental Assessment. Walla Walla District, Environmental Compliance Section. December 2011.

U.S. Department of Commerce (USDC). 2012. U.S. Census Bureau. State and County Quick Facts. http://quickfacts.census.gov/qfd/states/41/41049.html. Accessed September 2012.

U.S. Fish and Wildlife Service. 2012. Federally Listed, Proposed, Candidate Species and Species of Concern under the Jurisdiction of the Fish and Wildlife Service which may Occur within Umatilla County, Oregon. http://www.fws.gov/oregonfwo/Species/Lists/Documents/County/UMATILLA%20COUNTY.pdf. Accessed September 2012.

Appendix A

Agency Biological Opinions

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

Refer to NMFS No:
NWR-2012-4014

December 20, 2012

Shawn Zinszer
Acting Chief, Regulatory Branch
U.S. Army Corps of Engineers
P.O. Box 2946
Portland, Oregon 97208-2946

Re: Endangered Species Act Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Stahl H.B. and JSB Farm River Pumping Stations and Intake Modification, Middle Columbia-Lake Wallula (HUC 170701010207), Columbia River (RM 301.6), Umatilla County, Oregon, (Corps No.: NWP-2012-329)

Dear Mr. Zinszer:

The enclosed document contains a biological opinion (opinion) prepared by the National Marine Fisheries Service (NMFS) pursuant to section 7(a)(2) of the Endangered Species Act (ESA) on the effects of the U.S. Army Corps of Engineers permitting of the Stahl H.B. and JSB Farm River Pumping Stations and Intake Modification pursuant to section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403) and section 404 of the Clean Water Act (33 U.S.C. 1251-1376, as amended). In this opinion, NMFS concludes that the proposed action is not likely to jeopardize the continued existence of Middle Columbia River steelhead (*Oncorhynchus mykiss)*, Upper Columbia River (UCR) steelhead, Snake River Basin steelhead, UCR spring-run Chinook salmon (*O. tshawytscha*), Snake River (SR) spring/summer run Chinook salmon, SR fall-run Chinook salmon, and SR sockeye salmon (*O. nerka*), or result in the destruction or adverse modification of their designated critical habitat.

As required by section 7(b)(4) of the ESA, NMFS is providing an incidental take statement with the opinion. The incidental take statement describes reasonable and prudent measures NMFS considers appropriate to minimize the impact of incidental take associated with this action. The take statement sets forth nondiscretionary terms and conditions, including reporting requirements, that the Federal action agency must comply with to carry out the reasonable and prudent measures. Incidental take from actions that meet these terms and conditions will be exempt from the ESA's prohibition against the take of listed species.

This document also includes the results of our analysis of the action's likely effects on essential fish habitat (EFH) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), and includes two conservation recommendations to avoid, minimize, or otherwise offset potential adverse effects on EFH. These conservation recommendations are a subset of the ESA take statement's terms and conditions. Section 305(b)(4)(B) of the MSA requires Federal agencies to provide a detailed written response to NMFS within 30 days after receiving these recommendations.

If the response is inconsistent with the EFH conservation recommendations, the Corps must explain why the recommendations will not be followed, including the scientific justification for any disagreements over the effects of the action and the recommendations. In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we request that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

Please direct questions regarding this opinion to Rebecca Dittmann, fish biologist in the Eastern Oregon Branch of the Oregon State Habitat Office, at 541.975.1835, ext. 222.

Sincerely,

William W. Stelle, Jr.
Regional Administrator

cc: Gary Miller, USFWS,

Endangered Species Act Biological Opinion
and
Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat Response
for the

Stahl H.B. and JSB Farm River Pumping Stations and Intake Modification Middle Columbia-Lake Wallula (HUC 170701010207), Columbia River (RM 301.6) Umatilla County, Oregon
(Corps No.: NWP-2012-329)

NMFS Consultation Number: NWR-2012-4014

Action Agency: U.S. Army Corps of Engineer

Affected Species and Determinations:

ESA-Listed Species	**Status**	**Is Action Likely to Adversely Affect Species or Critical Habitat?**	**Is Action Likely To Jeopardize the Species?**	**Is Action Likely To Destroy or Adversely Modify Critical Habitat?**
Middle Columbia River steelhead (*Oncorhynchus mykiss*)	Threatened	Yes	No	No
Upper Columbia River steelhead	Threatened	Yes	No	No
Snake River Basin steelhead	Threatened	Yes	No	No
Upper Columbia River spring-run Chinook (*O. tshawytscha*)	Endangered	Yes	No	No
Snake River spring/summer run Chinook	Threatened	Yes	No	No
Snake River fall-run Chinook	Threatened	Yes	No	No
Snake River sockeye salmon (*O. nerka)*	Endangered	Yes	No	No

Fishery Management Plan That Describes EFH in the Project Area	**Does Action Have an Adverse Effect on EFH?**	**Are EFH Conservation Recommendations Provided?**
Pacific Coast Salmon	Yes	Yes

Consultation Conducted By: National Marine Fisheries Service, Northwest Region

Issued By:

William W. Stelle, Jr.
Regional Administrator

Date: December 20, 2012

TABLE OF CONTENTS

LIST OF ACRONYMS

BA	biological assessment BMP
	best management practice
CFR	Code of Federal Regulations
cfs	cubic feet per second
CHART	critical habitat analytical review team
COE	U.S. Army Corps of Engineers
DPS	distinct population segment
EFH	essential fish habitat
ESA	Endangered Species Act
ESU	evolutionarily significant unit
FR	Federal register
FCRPS	Federal Columbia River power system
HUC	hydrologic unit code
ICTRT	interior Columbia Basin technical recovery team
ITS	incidental take statement
MCR	middle Columbia River
MPG	major population group
MSA	Magnuson Stevens Act
NMFS	National Marine Fisheries Service
OHW	ordinary high water
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
PAH	polycyclic aromatic hydrocarbon
PCE	primary constituent element
RM	river mile
RPM	reasonable and prudent measure
TSS	total suspended solids
μg/L	microgram per liter
U.S.C.	United States Code
VSP	viable salmonid population

1. INTRODUCTION

This Introduction section provides information relevant to the other sections of this document and is incorporated by reference into Sections 2 and 3 below.

1.1 Background

The National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531, *et seq*.), and implementing regulations at 50 CFR 402.

We also completed an essential fish habitat (EFH) consultation on the proposed action, in accordance with section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801, *et seq*.) and implementing regulations at 50 CFR 600.

The opinion, incidental take statement, and EFH conservation recommendations are each in compliance with the Data Quality Act (44 U.S.C. 3504(d)(1) *et seq*.) and they underwent pre-dissemination review.

The proposed action is located in migratory corridor habitat for Middle Columbia River (MCR) steelhead (*Oncorhynchus mykiss*), Upper Columbia River (UCR) steelhead, Snake River Basin (SR) steelhead, UCR Chinook Spring-Run salmon (*O. tshawytscha*), SR Summer/Spring-Run Chinook salmon, SR Fall-Run Chinook salmon, and SR Sockeye (*O. nerka*).

1.2 Consultation History

On September 21, 2012 NMFS received a request from the U.S. Army Corps of Engineers (COE) to initiate section 7 consultation and MSA EFH consultation on the on the permitting of the Stahl and JSB Farm River Pumping Stations and Intake Modification, in Umatilla County, Oregon. This biological opinion is based on information provided in the September 11, 2012, biological assessment (BA), email, telephone conversations and other sources of information.

After review of an early BA, staff from the Oregon State Habitat Office coordinated with an engineer from our Hydropower Division and the project consultant to address questions and review the intake modification designs. The BA included engineering designs that meet NMFS fish passage criteria (NMFS 2011a). The plans were approved[1] by a hydraulic engineer from NMFS Northwest Region Hydropower Division. NMFS initiated consultation on September 21, 2012.

The proposed action is located in the Columbia River, which is migratory corridor habitat for Middle Columbia River (MCR) steelhead (*Oncorhynchus mykiss*), Upper Columbia River (UCR) steelhead, Snake River Basin (SRB) steelhead, UCR Chinook spring-run salmon (*O. tschawytscha)*, Snake River (SR) summer/spring run Chinook salmon, SR fall-run Chinook

[1] Phone conversation between Rebecca Dittmann (NMFS fish biologist) and Larry Swenson (NMFS hydraulic engineer concerning new intake designs meeting NMFS fish passage criteria on September 10, 2012.

salmon, and SR sockeye salmon (*O. nerka*) and the area has been designated as EFH for Chinook and coho salmon (*O. kisutch*). The COE determined that the proposed action may adversely affect all of these species, their critical habitats, and EFH. A complete record of this consultation is on file at the Eastern Oregon Branch Office in La Grande, Oregon.

1.3 Proposed Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration.

The COE proposes to authorize the Stahl and JSB Farm River Pumping Stations and Intake Modification along 130 feet (ft) of the Columbia River (Figure 1) by issuing a permit under section 10 of the Rivers and Harbors Act and section 404 of the Clean Water Act. The Stahl Farm and the JSH Farm are applicants for the permit for the project.

Figure 1. Project Site Area (Cambell and Van Staveren 2012)

All in-water construction and restoration work will be conducted during a 6-week period between January 1, 2013 and February 28, 2013. The scheduled work period lies within the Oregon Department of Fish and Wildlife's (ODFW) recommended in-water work window for this area (December 1 to March 31) (ODFW 2008). The reduced in-river work period will help minimize potential adverse effects to ESA- listed salmonids through use of the timeframe when there is the lowest potential of fish presence in the area.

The applicant proposes to move existing intake/fish screening facilities from the shore of the Columbia River into deeper water to avoid routine maintenance dredging at the present near-shore intake location, and to meet NMFS fish passage and screening criteria. Proposed intake modifications will include: (1) Replacing the existing cylindrical screens with enclosed cans; (2) connecting each can to a common manifold placed along the front of the existing stations; (3) extending new intake pipes from the manifolds to deeper water; and (4) installing new tee screens at the end of each of the new intake pipes (see Figure 2 and submitted BA for specific engineering details).

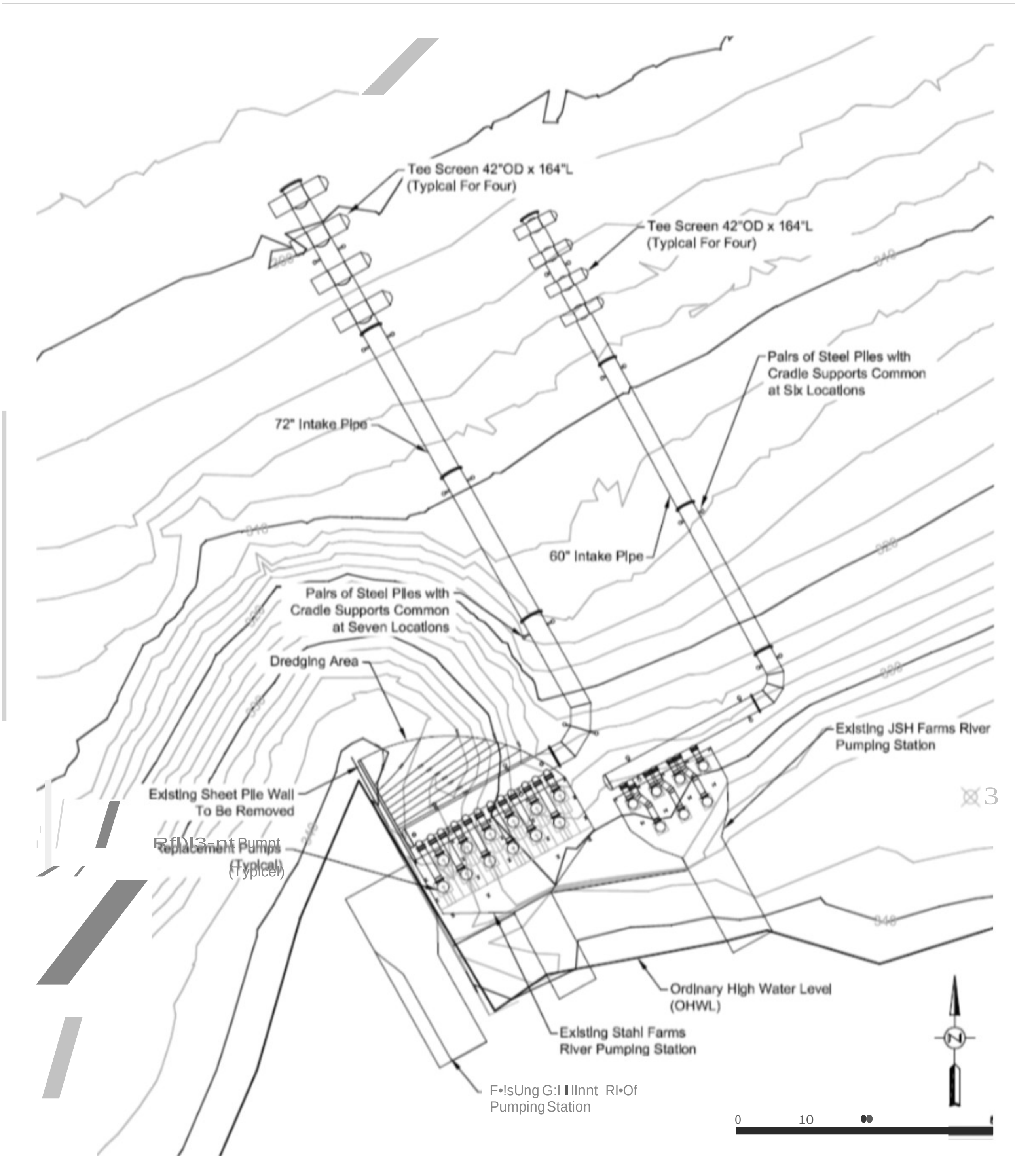


Figure 2. Project Design Overview for Stahl and JSH Farms Pumping Stations Modifications

The new fish screens will improve the intake approach velocity, thereby meeting NMFS' current fish screen criteria of preventing entrainment or impingement of juvenile salmonids during pumping operations. In addition, the deeper depth of the intakes should make it less likely to affect migrating juvenile salmonids, as this fish life stage prefers shoreline habitats less than 20 ft in depth. Installation of the replacement intake manifold at the pumping station will also require dredging of the river bank and near-shore river bottom to facilitate construction activities.

Installation of Extended Intake Pipes and Fish Screens

The two new intake pipes (a 72-inch diameter pipe for the Stahl Farm and a 60-inch diameter intake pipe for the JSH Farm) will each extend approximately 180 ft into the Columbia River from the existing pump stations. The new intake pipes will each be supported by pipe cradles (seven cradles for the Stahl Farm pipe and six cradles for the JSH Farm pipe). Each pipe cradle will be secured to the river bottom by a pair of 12.75-inch diameter steel piles (26 total piles) installed approximately 15 ft (or to depth of refusal due to rock) into the substrate with an APE Model 50 vibratory hammer. It is anticipated that each pile will require approximately 1 hour or less of vibratory hammer use for installation.

Four new intake tee screens (see Figure 2, above) will then be attached to the deep end of each of the new pipe extensions. Each of the new Stahl Farm intake tee screens will measure 5 ft in diameter by 18 ft 10 inches in length, and will be affixed with NMFS-approved slotted fish screen to ensure juvenile salmonids are not impinged or entrained onto the pump intake. The new JSH Farm intake screens will measure 3.5 ft in diameter by 13.5 ft in length, and will also be affixed with NMFS-approved fish screen. The difference in screen size dimensions is due to the different pumping capacity/requirements for each pipe (see below).

The pumps will be operated consistent with state water rights and are typically in operation during the months of April through October. The intake screens will be passively cleaned and will be equipped with a self-monitoring system that will measure hydraulic head and reduce intake velocities as necessary to maintain an approach velocity of 0.2 ft per second (fps), in compliance with NMFS criteria (NMFS 2011). Installation of the new intake pump and fish screens will be conducted using a crane and SCUBA divers operating from a floating barge. Given that the new intake tee screens will be used to withdraw water from the river, the existing intake screens will be replaced with new 42-inch diameter by 21-ft long pump cans.

The existing maximum allowable water withdrawal rates for the Stahl Farm and JSH Farm pumping stations are 60,143 gallons per minute (gpm) and 27,567 gpm, respectively. The actual amount pumped during any given season is dependent on the water requirements during that year. There will be no changes made to the existing pump capacities at these stations and there will be no increase in current allowable operational water withdrawal rates.

All heavy equipment *(i.e.,* crane and suction dredge) will access the project site via existing roadways, parking areas, disturbed upland areas, or floating barges. As such, no additional upland disturbance is anticipated. The following is a general sequence of proposed project activities:

1. Conduct overall project mobilization and implement environmental controls (*i.e.*, isolation and sediment control measures).
2. Install new pump cans at the Stahl Farm and JSH Farm pumping stations.
3. Dredge and dispose of accumulated sediment under and in front of the Stahl pumping station as required to install the new manifold.
4. Remove existing 35 ft long sheet pile wall at the Stahl pumping station and install 26 new steel piles (14 at the Stahl station and 12 at the JSH station) to support the new intake pipe cradles.
5. Install three pipe cradle assemblies in front of each of the existing pump stations and one cradle on the last set of piles.
6. Install the new manifolds and intake pipes.
7. Install each of the remaining pipe cradle assemblies under the new intake pipes.
8. Install four tee screens onto the new Stahl intake pipe, and four tee screens onto the new JSH intake pipe.
9. Install the pipes connecting the manifolds to each pump can.
10. Site restoration, as needed.

Dredging of Accumulated Sediment

Accumulated sediments (comprised primarily of course sand) will be removed from in front of and underneath the Stahl pumping station using a Mud Cat MC-915 or similar model suction dredge operating from a floating barge. Removal of the accumulated sediment will allow for installation of the new 72-inch diameter manifold. The resulting dredge material will be returned back into the river channel, approximately 300 ft downstream of the pumping station.

The dredge material will be carried from the suction dredge through a pipe that will discharge into the river at a depth of approximately 40 ft,, therefore allowing sediments to be redistributed downstream. All conditions of the Oregon Department of Environmental Quality's (ODEQ) 401 Water Quality Certification will be followed during proposed dredging activities.

The dredging area is approximately 1,700 square ft (ft^2) (0.04 acre), with a depth of 1 to 15 ft, depending on the depth of accumulated sediment. The bulk of the sediment removal will be required in front of the pump station in order to place the manifold at the correct elevation. The total estimated volume of sediment to be removed from underneath and in front of the pump station is approximately 300 cubic yards (yd^3). Following removal of the dredge material, an existing sheet pile wall that extends approximately 35 ft into the active river channel at the west end of the pumping station will be removed.

Given that the proposed dredging equipment will require back and forth movement within the relatively small dredging area, it will not be feasible to isolate the in-water work area during proposed dredging activities. Isolation curtains would inhibit the ability to properly operate the dredge. As such, to minimize impacts to water quality and ESA-listed fish species, all in-water work activities (including dredging) will be reduced to a period of two months (January 1 and February 28) within the ODFW-preferred In-water Work Window (IWWW) for the Middle Columbia River (December 1 – March 31). The IWWW is a period when ESA-listed salmonids are least likely to be present within the project area. In addition, the proposed dredging equipment will utilize a relatively small dredging pump intake (8 inches in diameter) that will remain buried in the substrate up to 1 ft during dredging, and be equipped with a bar screen with 2-inch openings, and a mud shield to reduce re-suspension of solids. It will not be feasible to use a NMFS approved fish screen on the dredging pump intake given that it would accumulate course sediment and not allow for proper operational velocity of the suction dredge.

Sediment Analysis

Sediment sampling was conducted within the proposed dredging area on July 25, 2012, in accordance with the sediment Sampling and Analysis Plan (SAP) prepared for the project. Following review of the SAP, the interagency Portland Sediment Evaluation Team granted a no-test exclusion based on the small volume of material to be dredged and the distance of the project area from potential sources of contamination. The COE prepared a technical memorandum[2] regarding the SAP approval and no-test exclusion.

Site Restoration

It is anticipated that the proposed project will not require upland disturbance. However, in the event that an upland area is inadvertently disturbed during project staging or access, the area will be restored with the appropriate method (*e.g*., grading, hydro-seed application, and/or native plantings).

1.4 Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). For this consultation, action area includes the in-water work area as well as habitat upstream or downstream from the project which may be impacted by this project. The area is defined to include the in- stream channel and substrate and any disturbed riparian or upland shorelines extending approximately 300 ft. upstream and 500 ft downstream of the proposed construction site. Turbidity created by the proposed action is expected to extend approximately up to 500 ft. downstream of the project area. In addition to the in-water work areas, all upland areas including riparian and floodplains affected by the project are part of the action area.

The project area is occupied by MCR steelhead, UCR steelhead, SRB steelhead, UCR Chinook salmon, SR spring/summer-run Chinook salmon, SR Fall Chinook salmon, and SR sockeye salmon and is designated as critical habitat for all these species.

Designated EFH for Chinook salmon and coho salmon occurs within the project area.

[2] Portland Sediment Evaluation Team Memorandum detailing the suitability of the dredging material for aquatic, unconfined placement dated September 27, 2012.

2. ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat on which they depend. Section 7(a)(2) of the ESA requires Federal agencies to consult with the United States Fish and Wildlife Service, NMFS, or both, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their designated critical habitat. Section 7(b)(3) requires that at the conclusion of consultation, the Service provide an opinion stating how the agencies' actions will affect listed species or their critical habitat. If incidental take is expected, Section 7(b)(4) requires the provision of an incidental take statement (ITS) specifying the impact of any incidental taking, and including reasonable and prudent measures to minimize such impacts.

2.1 Approach to the Analysis

Section 7(a)(2) of the ESA requires Federal agencies, in consultation with NMFS, to insure that their actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. The jeopardy analysis considers both survival and recovery of the species. The adverse modification analysis considers the impacts to the conservation value of the designated critical habitat.

"To jeopardize the continued existence of a listed species" means to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR 402.02).

This biological opinion does not rely on the regulatory definition of 'destruction or adverse modification' of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.[3]

We will use the following approach to determine whether the proposed action described in Section 1.3 is likely to jeopardize listed species or destroy or adversely modify critical habitat:

- Identify the range-wide status of the species and critical habitat likely to be adversely affected by the proposed action.
- Describe the environmental baseline for the proposed action.
- Analyze the effects of the proposed actions.
- Describe any cumulative effects.
- Integrate and synthesize the above factors to assess the risk that the proposed action poses to species and critical habitat.
- Reach jeopardy and adverse modification conclusions.

[3] Memorandum from William T. Hogarth to Regional Administrators, Office of Protected Resources, NMFS (Application of the "Destruction or Adverse Modification" Standard Under Section 7(a)(2) of the Endangered Species Act) (November 7, 2005).

2.2 Rangewide Status of the Species and Critical Habitat

This opinion examines the status of each species that would be affected by the proposed action. The status is the level of risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. The species status section helps to inform the description of the species' current "reproduction, numbers, or distribution" as described in 50 CFR 402.02. The opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the current function of the essential physical and biological features that help to form that conservation value.

One factor affecting the status of ESA-listed species considered in this opinion, and aquatic habitat at large is climate change. Climate change is likely to play an increasingly important role in determining the abundance of ESA-listed species, and the conservation value of designated critical habitats, in the Pacific Northwest. These changes will not be spatially homogeneous across the Pacific Northwest. Areas with elevations high enough to maintain temperatures well below freezing for most of the winter and early spring would be less affected. Low-lying areas that historically have received scant precipitation contribute little to total streamflow and are likely to be more affected.

During the last century, average regional air temperatures increased by 1.5°F, and increased up to 4°F in some areas (USGCRP 2009). Warming is likely to continue during the next century as average temperatures increase another 3 to 10°F (USGCRP 2009). Overall, about one-third of the current cold-water fish habitat in the Pacific Northwest is likely to exceed key water temperature thresholds by the end of this century (USGCRP 2009).

Precipitation trends during the next century are less certain than for temperature but more precipitation is likely to occur during October through March and less during summer months, and more of the winter precipitation is likely to fall as rain rather than snow (ISAB 2007, USGCRP 2009). Where snow occurs, a warmer climate will cause earlier runoff so stream flows in late spring, summer, and fall will be lower and water temperatures will be warmer (ISAB 2007, USGCRP 2009).

Higher winter stream flows increase the risk that winter floods in sensitive watersheds will damage spawning redds and wash away incubating eggs (USGCRP 2009). Earlier peak stream flows will also flush some young salmon and steelhead from rivers to estuaries before they are physically mature, increasing stress and the risk of predation (USGCRP 2009). Lower stream flows and warmer water temperatures during summer will degrade summer rearing conditions, in part by increasing the prevalence and virulence of fish diseases and parasites (USGCRP 2009). Other adverse effects are likely to include altered migration patterns, accelerated embryo development, premature emergence of fry, variation in quality and quantity of tributary rearing habitat, and increased competition and predation risk from warm-water, non-native species (ISAB 2007).

The earth's oceans are also warming, with considerable interannual and inter-decadal variability superimposed on the longer-term trend (Bindoff *et al*. 2007). Historically, warm periods in the coastal Pacific Ocean have coincided with relatively low abundances of salmon and steelhead, while cooler ocean periods have coincided with relatively high abundances (Scheuerell and Williams 2005, Zabel *et al*. 2006, USGCRP 2009). Ocean conditions adverse to salmon and steelhead may be more likely under a warming climate (Zabel *et al*. 2006).

2.2.1 Status of the Species

For Pacific salmon, steelhead, and other relevant species NMFS commonly uses four parameters to assess the viability of the populations that, together, constitute the species: spatial structure, diversity, abundance, and productivity (McElhany *et al*. 2000). These "viable salmonid population" (VSP) criteria, therefore, encompass the species' "reproduction, numbers, or distribution" as described in 50 CFR 402.02. When these parameters are collectively at appropriate levels, they maintain a population's capacity to adapt to various environmental conditions and allow it to sustain itself in the natural environment. These attributes are influenced by survival, behavior, and experiences throughout a species' entire life cycle, and these characteristics, in turn, are influenced by habitat and other environmental conditions.

"Spatial structure" refers both to the spatial distribution of individuals in the population and the processes that generate that distribution. A population's spatial structure depends fundamentally on habitat quality and spatial configuration and the dynamics and dispersal characteristics of individuals in the population.

"Diversity" refers to the distribution of traits within and among populations. These range in scale from DNA sequence variation at single genes to complex life history traits (McElhany *et al.* 2000).

"Abundance" generally refers to the number of naturally-produced adults (*i.e*., the progeny of naturally-spawning parents) in the natural environment (*e.g*., on spawning grounds).

"Productivity," as applied to viability factors, refers to the entire life cycle; *i.e*., the number of naturally-spawning adults produced per parent. When progeny replace or exceed the number of parents, a population is stable or increasing. When progeny fail to replace the number of parents, the population is declining. McElhany *et al*. (2000) use the terms "population growth rate" and "productivity" interchangeably when referring to production over the entire life cycle. They also refer to "trend in abundance," which is the manifestation of long-term population growth rate.

For species with multiple populations, once the biological status of a species' populations has been determined, NMFS assesses the status of the entire species using criteria for groups of populations, as described in recovery plans and guidance documents from technical recovery teams. Considerations for species viability include having multiple populations that are viable, ensuring that populations with unique life histories and phenotypes are viable, and that some viable populations are both widespread to avoid concurrent extinctions from mass catastrophes and spatially close to allow functioning as meta-populations (McElhany *et al.* 2000).

The summaries that follow describe the status of the 7 ESA-listed species, and their designated critical habitats, that occur within the geographic area of this proposed action and are considered in this opinion. More detailed information on the status and trends of these listed resources, and their biology and ecology, are in the listing regulations and critical habitat designations published in the Federal Register (Table 1).

Table 1. Listing status, status of critical habitat designations and protective regulations, and relevant Federal Register (FR) decision notices for ESA-listed species considered in this opinion. Listing status: 'T' means listed as threatened under the ESA; 'E' means listed as endangered.

Species	Listing Status	Critical Habitat	Protective Regulations
Chinook salmon *(Oncorhynchus tshawytscha)*			
Upper Columbia River spring-run	E 6/28/05; 70 FR 37160	9/02/05; 70 FR 52630	ESA section 9 applies
Snake River spring/summer-run	T 6/28/05; 70 FR 37160	10/25/99; 64 FR 57399	6/28/05; 70 FR 37160
Snake River fall-run	T 6/28/05; 70 FR 37160	12/28/93; 58 FR 68543	6/28/05; 70 FR 37160
Sockeye salmon *(O. nerka)*			
Snake River	E 8/15/11; 70 FR 37160	12/28/93; 58 FR 68543	ESA section 9 applies
Steelhead (*O. mykiss*)			
Middle Columbia River	T 1/5/06; 71 FR 834	9/02/05; 70 FR 52630	6/28/05; 70 FR 37160
Upper Columbia River	T 1/5/06; 71 FR 834	9/02/05; 70 FR 52630	2/1/06; 71 FR 5178
Snake River Basin	T 1/5/06; 71 FR 834	9/02/05; 70 FR 52630	6/28/05; 70 FR 37160

NMFS established recovery domains to better integrate recovery planning information that NMFS is developing on the conservation status of the species and critical habitats considered in this consultation. Recovery domains are the geographically-based areas that NMFS is using to prepare multi-species recovery plans. All the seven species within this consultation are with the Interior Columbia Basin recovery domain (Table 2).

Table 2. Recovery planning domains identified by NMFS and their ESA-listed salmon and steelhead species.

Recovery Domain	Species
Interior Columbia (IC)	UCR spring-run Chinook salmon SR spring/summer-run Chinook salmon SR fall-run Chinook salmon SR sockeye salmon UCR steelhead MCR steelhead SRB steelhead

When NMFS began recovery planning for salmon and steelhead in the Interior Columbia Basin, we convened a technical recovery team (ICTRT) comprised of Federal, state, and tribal biologists as well as scientists from private consulting firms and academia. This team assisted NMFS in developing information on historical population structure and also produced ESA technical products to support development of ESA recovery criteria. As part of this effort, the

ICTRT identified independent populations for each Interior Columbia Basin ESA-listed species, and grouped them together into genetically similar major population groups (MPGs). Most ESUs and DPSs are made up of several MPGs.

The ICTRT also recommended population-specific biological viability criteria for each of the individual populations for each ESU and DPS. These criteria are integrated to develop a total population viability rating. The population viability ratings, in order of increasing risk, are highly viable, viable, moderate risk, and high risk. A further bifurcation occurs at the moderate risk rating. Populations rated at moderate risk are candidates for achieving a "maintained" status.

Additional criteria to be identified in the Recovery Plan must be met before a population at moderate risk can be considered "maintained." Populations that do not meet these additional criteria would remain rated at moderate risk and would generally not contribute to viability at the MPG level.

To date, the TRTs have divided the seven species of salmon and steelhead considered in this opinion into a total of 82 populations within the Interior Columbia Basin. The overall viability of a species is a function of the VSP attributes of its constituent populations. The size and distribution of the populations considered in this opinion generally have declined over the last few decades due to natural phenomena and human activity, including climate change (as described in Section 2.2), the operation of hydropower systems, over-harvest, effects of hatcheries, and habitat degradation. Enlarged populations of terns, seals, California sea lions, and other aquatic predators in the Pacific Northwest may be limiting the productivity of some Pacific salmon and steelhead populations (Ford 2011).

Viability status or probability is described below for each of the populations considered in this opinion.

Interior Columbia Recovery Domain. As described earlier, species in the Interior Columbia recovery domain include UCR spring-run Chinook salmon, SR spring/summer-run Chinook salmon, SR fall-run Chinook salmon, SR sockeye salmon, UCR steelhead, MCR steelhead, and SRB steelhead. The ICTRT identified 82 populations of those species based on genetic, geographic (hydrographic), and habitat characteristics (Table 3). All 82 populations identified use the mainstem of the Columbia River, and the Columbia River estuary, or part thereof, for migration, rearing, and smoltification.

Table 3. Populations of ESA-listed salmon and steelhead in the IC recovery domain.

Species	Populations
UCR spring-run Chinook salmon	3
SR spring/summer-run Chinook salmon	32
SR fall-run Chinook salmon	1
SR sockeye salmon	1
MCR steelhead	17
UCR steelhead	4
SRB steelhead	24

The ICTRT also recommended viability criteria that follow the VSP framework (McElhany *et al.* 2006) and described biological or physical performance conditions that, when met, indicate a population or species has a 5% or less risk of extinction over a 100-year period (ICTRT 2007; NRC 1995).

Status of UCR Spring-run Chinook Salmon

Spatial Structure and Diversity**.** This species includes all naturally-spawned populations of Chinook salmon in all river reaches accessible to Chinook salmon in Columbia River tributaries upstream of the Rock Island Dam and downstream of Chief Joseph Dam (excluding the Okanogan River), the Columbia River upstream to Chief Joseph Dam, and progeny of six artificial propagation programs. The ICTRT identified four independent populations of UCR spring-run Chinook salmon in the upriver tributaries of Wenatchee, Entiat, Methow, and Okanogan (extirpated), but no major groups due to the relatively small geographic area affected (Ford 2011; ICTRT 2003)(Table 5).

Table 4. Scores for the key elements (A&P, diversity, and integrated SS/D) used to determine current overall viability risk for spring-run UCR Chinook salmon (Ford 2011). Risk ratings range from very low (VL), low (L), moderate (M), high (H), to very high (VH) and extirpated (E).

Population	A&P	Diversity	Integrated SS/D	Overall Viability Risk
Wenatchee River	H	H	H	H
Entiat River	H	H	H	H
Methow River	H	H	H	H
Okanogan River				E

The composite SS/D risks for all three of the extant populations in this MPG are at "high" risk. The spatial processes component of the SS/D risk is "low" for the Wenatchee River and Methow River populations and "moderate" for the Entiat River (loss of production in lower section increases effective distance to other populations). All three of the extant populations in this MPG are at "high" risk for diversity, driven primarily by chronically high proportions of hatchery-origin spawners in natural spawning areas and lack of genetic diversity among the natural-origin spawners (Ford 2011).

Increases in natural origin abundance relative to the extremely low spawning levels observed in the mid-1990s are encouraging; however, average productivity levels remain extremely low. Overall, the viability of Upper Columbia Spring Chinook salmon ESU has likely improved somewhat since the last status review, but the ESU is still clearly at "moderate-to-high" risk of extinction (Ford 2011).

Abundance and Productivity. UCR spring-run Chinook salmon is not currently meeting the viability criteria (adapted from the ICTRT) in the Upper Columbia Recovery Plan. A&P remains at "high" risk for each of the three extant populations in this MPG/ESU (Table 4). The 10-year geometric mean abundance of adult natural origin spawners has increased for each population relative to the levels for the 1981-2003 series, but the estimates remain below the corresponding ICTRT thresholds. Estimated productivity (spawner to spawner return rate at low to moderate escapements) was on average lower over the years 1987-2009 than for the previous period. The combinations of current abundance and productivity for each population result in a "high" risk rating.

Limiting Factors include (NOAA Fisheries 2011; UCSRB 2007):

- Mainstem Columbia River hydropower–related adverse effects: upstream and downstream fish passage, ecosystem structure and function, flows, and water quality
- Degraded freshwater habitat: Floodplain connectivity and function, channel structure and complexity, riparian areas and large woody debris recruitment, stream flow, and water quality have been degraded as a result of cumulative impacts of agriculture, forestry, and development
- Degraded estuarine and nearshore marine habitat
- Hatchery related effects: including past introductions and persistence of non-native (exotic) fish species continues to affect habitat conditions for listed species
- Harvest in Columbia River fisheries

Status of SR Spring/summer-run Chinook Salmon

Spatial Structure and Diversity**.** This species includes all naturally-spawned populations of spring/summer-run Chinook salmon in the mainstem Snake River and the Tucannon River, Grande Ronde River, Imnaha River, and Salmon River subbasins; and progeny of fifteen artificial propagation programs. The ICTRT identified 28 extant and 4 extirpated populations of SR spring/summer-run Chinook salmon, and aggregated these into major population groups (Ford 2011; ICTRT 2003). Each of these populations faces a "high" risk of extinction (Ford 2011) (Table 5).

Table 5. SR spring/summer-run Chinook salmon ecological subregions, populations, and scores for the key elements (A&P, diversity, and integrated SS/D) used to determine current overall viability risk for SR spring/summer-run Chinook salmon (Ford 2011). Risk ratings range from very low (VL), low (L), moderate (M), high (H), to very high (VH), and extirpated (E).

Ecological Subregions	Spawning Populations (Watershed)	A&P	Diversity	Integrated SS/D	Overall Viability Risk
Lower Snake River	Tucannon River	H	M	M	H
	Asotin River				E
Grande Ronde and Imnaha rivers	Wenaha River	H	M	M	H
	Lostine/Wallowa River	H	M	M	H
	Minam River	H	M	M	H
	Catherine Creek	H	M	M	H
	Upper Grande Ronde R.	H	M	H	H
	Imnaha River	H	M	M	H
	Big Sheep Creek				E
	Lookingglass Creek				E

Ecological Subregions	Spawning Populations (Watershed)	A&P	Diversity	Integrated SS/D	Overall Viability Risk
South Fork Salmon River	Little Salmon River	*	*	*	H
	South Fork mainstem	H	M	M	H
	Secesh River	H	L	L	H
	EF/Johnson Creek	H	L	L	H
Middle Fork Salmon River	Chamberlin Creek	H	L	L	H
	Big Creek	H	M	M	H
	Lower MF Salmon	H	M	M	H
	Camas Creek	H	M	M	H
	Loon Creek	H	M	M	H
	Upper MF Salmon	H	M	M	H
	Pistol Creek				E
	Sulphur Creek	H	M	M	H
	Bear Valley Creek	H	L	L	H
	Marsh Creek	H	L	L	H
Upper Mainstem Salmon	N. Fork Salmon River	H	L	L	H
	Lemhi River	H	H	H	H
	Pahsimeroi River	H	H	H	H
	Upper Salmon-lower mainstem	H	L	L	H
	East Fork Salmon River	H	H	H	H
	Yankee Fork	H	H	H	H
	Valley Creek	H	M	M	H
	Upper Salmon main	H	M	M	H
	Panther Creek				E

* Insufficient data.

Abundance and Productivity. Population level status ratings remain at "high" risk across all MPGs within the ESU, although recent natural spawning abundance estimates have increased, all populations remain below minimum natural origin abundance thresholds (Table 6). Spawning escapements in the most recent years in each series are generally well below the peak returns but above the extreme low levels in the mid-1990s. Relatively low natural production rates and spawning levels below minimum abundance thresholds remain a major concern across the ESU.

The ability of SR spring/summer-run Chinook salmon populations to be self-sustaining through normal periods of relatively low ocean survival remains uncertain. Factors cited by Good (2005) remain as concerns or key uncertainties for several populations. Overall, the new information considered does not indicate a change in the biological risk category since the last status review (Ford 2011).

Limiting Factors include (NOAA Fisheries 2011):

- Degraded freshwater habitat: Floodplain connectivity and function, channel structure and complexity, riparian areas and large wood supply, stream substrate, elevated water temperature, stream flow, and water quality have been degraded as a result of cumulative impacts of agriculture, forestry, and development
- Mainstem Columbia River and Snake River hydropower impacts

- Harvest-related effects
- Predation

Status of SR Fall-run Chinook Salmon

Spatial Structure and Diversity**.** This species includes all naturally-spawned populations of fall-run Chinook salmon in the mainstem Snake River below Hells Canyon Dam, and in the Tucannon River, Grande Ronde River, Imnaha River, Salmon River, and Clearwater River, and progeny of four artificial propagation programs. The ICTRT identified three populations of this species, although only the lower mainstem population exists at present, and it spawns in the lower main stem of the Clearwater, Imnaha, Grande Ronde, Salmon and Tucannon rivers. The extant population of Snake River fall-run Chinook salmon is the only remaining population from an historical ESU that also included large mainstem populations upstream of the current location of the Hells Canyon Dam complex (Ford 2011; ICTRT 2003). The population is at moderate risk for diversity and spatial structure. Overall, the new information considered does not indicate a change in the biological risk category since the last status review (Ford 2011).

Abundance and Productivity. The recent increases in natural origin abundance are encouraging. However, hatchery origin spawner proportions have increased dramatically in recent years – on average, 78% of the estimated adult spawners have been hatchery origin over the most recent brood cycle. The apparent leveling off of natural returns in spite of the increases in total brood year spawners may indicate that density dependent habitat effects are influencing production or that high hatchery proportions may be influencing natural production rates. The A&P risk rating for the population is “moderate.” Given the combination of current A&P and SS/D ratings summarized above, the overall viability rating for Lower SR fall Chinook salmon would be rated as “maintained.”[4]

Limiting Factors include (NOAA Fisheries 2011):

- Degraded freshwater habitat: Floodplain connectivity and function, and channel structure and complexity have been degraded as a result of cumulative impacts of agriculture, forestry, and development.
- Harvest-related effects
- Loss of access to historic habitat above Hells Canyon and other Snake River dams
- Mainstem Columbia River and Snake River hydropower impacts
- Hatchery-related effects
- Degraded estuarine and nearshore habitat

Status of SR Sockeye Salmon

Spatial Structure and Diversity**.** This species includes all anadromous and residual sockeye salmon from the Snake River basin, Idaho, and artificially-propagated sockeye salmon from the Redfish Lake captive propagation program. The ICTRT identified historical sockeye salmon production in at least five Stanley Basin and Sawtooth Valley lakes and in lake systems

[4] “Maintained” population status is for populations that do not meet the criteria for a viable population but do support ecological functions and preserve options for ESU/DPS recovery.

associated with Snake River tributaries currently cut off to anadromous access (*e.g.,* Wallowa and Payette Lakes), although current returns of SR sockeye salmon are extremely low and limited to Redfish Lake (ICTRT 2007).

Abundance and Productivity. This species is still at extremely high risk across all four basic risk measures (abundance, productivity, spatial structure and diversity). Although the captive brood program has been successful in providing substantial numbers of hatchery produced *O. nerka* for use in supplementation efforts, substantial increases in survival rates across life history stages must occur to re-establish sustainable natural production (Hebdon *et al.* 2004; Keefer *et al.* 2008). Overall, although the risk status of the Snake River sockeye salmon ESU appears to be on an improving trend, the new information considered does not indicate a change in the biological risk category since the last status review (Ford 2011).

Limiting Factors. The key factor limiting recovery of SR sockeye salmon ESU is survival outside of the Stanley Basin. Portions of the migration corridor in the Salmon River are impeded by water quality and temperature (Idaho Department of Environmental Quality 2011). Increased temperatures likely reduce the survival of adult sockeye returning to the Stanley Basin. The natural hydrological regime in the upper mainstem Salmon River Basin has been altered by water withdrawals. In most years, sockeye adult returns to Lower Granite suffer catastrophic losses (Reed *et al.* 2003) (*e.g.*, > 50% mortality in one year) before reaching the Stanley Basin, although the factors causing these losses have not been identified. In the Columbia and lower Snake River migration corridor, predation rates on juvenile sockeye salmon are unknown, but terns and cormorants consume 12% of all salmon smolts reaching the estuary, and piscivorous fish consume an estimated 8% of migrating juvenile salmon (NOAA Fisheries 2011).

Status of MCR Steelhead

Spatial Structure and Diversity**.** This species includes all naturally-spawned steelhead populations below natural and artificial impassable barriers in streams from above the Wind River, Washington, and the Hood River, Oregon (exclusive), upstream to, and including, the Yakima River, Washington, excluding steelhead from the Snake River basin; and progeny of seven artificial propagation programs. The ICTRT identified 17 extant populations in this DPS (ICTRT 2003). The populations fall into four major population groups: the Yakima River Basin (four extant populations), the Umatilla/Walla-Walla drainages (three extant and one extirpated populations); the John Day River drainage (five extant populations) and the Eastern Cascades group (five extant and two extirpated populations) (Table 6) (Ford 2011; NMFS 2009).

Table 6. Ecological subregions, populations, and scores for the key elements (A&P, diversity, and integrated SS/D) used to determine current overall viability risk for MCR steelhead (Ford 2011; NMFS 2009). Risk ratings range from very low (VL), low (L), moderate (M), high (H), to very high (VH), and extirpated (E). Maintained (MT) population status indicates that the population does not meet the criteria for a viable population but does support ecological functions and preserve options for recovery of the DPS.

Ecological Subregions	Population (Watershed)	A&P	Diversity	Integrated SS/D	Overall Viability Risk
Cascade Eastern Slope Tributaries	Fifteenmile Creek	L	L	L	Viable
	Klickitat River	M	M	M	MT?
	Eastside Deschutes River	L	M	M	Viable
	Westside Deschutes River	H	M	M	H*
	Rock Creek	H	M	M	H?
	White Salmon				E*
	Crooked River				E*
John Day River	Upper Mainstem	M	M	M	MT
	North Fork	VL	L	L	Highly Viable
	Middle Fork	M	M	M	MT
	South Fork	M	M	M	MT
	Lower Mainstem	M	M	M	MT
Walla Walla and Umatilla rivers	Umatilla River	M	M	M	MT
	Touchet River	M	M	M	H
	Walla Walla River	M	M	M	MT
Yakima River	Satus Creek	M	M	M	Viable (MT)
	Toppenish Creek	M	M	M	Viable (MT)
	Naches River	H	M	M	H
	Upper Yakima	H	H	H	H

* Re-introduction efforts underway (NMFS 2009).

Straying frequencies into at least the Lower John Day River population are high. Out-of-basin hatchery stray proportions, although reduced, remain very high in the Deschutes River basin.

Abundance and Productivity. Returns to the Yakima River basin and to the Umatilla and Walla Walla Rivers have been higher over the most recent brood cycle, while natural origin returns to the John Day River have decreased. There have been improvements in the viability ratings for some of the component populations, but the MCR steelhead DPS is not currently meeting the viability criteria (adopted from the ICTRT) in the MCR steelhead recovery plan (NMFS 2009). In addition, several of the factors cited by Good (2005) remain as concerns or key uncertainties. Natural origin spawning estimates of populations have been highly variable with respect to meeting minimum abundance thresholds. Overall, the new information considered does not indicate a change in the biological risk category since the last status review (Ford 2011).

Limiting Factors include (NMFS 2009; NOAA Fisheries 2011):

- Degraded freshwater habitat: Floodplain connectivity and function, channel structure and complexity, riparian areas, fish passage, stream substrate, stream flow, and water quality have been degraded as a result of cumulative impacts of agriculture, forestry, tributary hydro system activities, and development
- Mainstem Columbia River hydropower–related impacts
- Degraded estuarine and nearshore marine habitat
- Hatchery-related effects
- Harvest-related effects
- Effects of predation, competition, and disease

Status of UCR Steelhead

Spatial Structure and Diversity**.** This species includes all naturally-spawned steelhead populations below natural and manmade impassable barriers in streams in the Columbia River Basin upstream from the Yakima River, Washington, to the U.S.-Canada border, and progeny of six artificial propagation programs. Four independent populations of UCR steelhead were identified by the ICTRT in the same upriver tributaries as for UC spring-run Chinook salmon (*i.e.*, Wenatchee, Entiat, Methow, and Okanogan; Table 7) and, similarly, no major population groupings were identified due to the relatively small geographic area involved (Ford 2011; ICTRT 2003). All extant populations are considered to be at high risk of extinction (Table 8)(Ford 2011). With the exception of the Okanogan population, the Upper Columbia populations rated as "low" risk for spatial structure. The "high" risk ratings for SS/D are largely driven by chronic high levels of hatchery spawners within natural spawning areas and lack of genetic diversity among the populations. The proportions of hatchery origin returns in natural spawning areas remain extremely high across the DPS, especially in the Methow and Okanogan River populations. Overall, the new information considered does not indicate a change in the biological risk category since the last status review (Ford 2011).

Table 7. Summary of the key elements (A&P, diversity, and integrated SS/D) and scores used to determine current overall viability risk for UCR steelhead populations (Ford 2011). Risk ratings range from very low (VL), low (L), moderate (M), high (H), to very high (VH).

Population (Watershed)	A&P	Diversity	Integrated SS/D	Overall Viability Risk
Wenatchee River	H	H	H	H
Entiat River	H	H	H	H
Methow River	H	H	H	H
Okanogan River	H	H	H	H

Abundance and Productivity. Upper Columbia steelhead populations have increased in natural origin abundance in recent years, but productivity levels remain low. The modest improvements in natural returns in recent years are probably primarily the result of several years of relatively good natural survival in the ocean and tributary habitats.

Limiting Factors include (NOAA Fisheries 2011; UCSRB 2007):

- Mainstem Columbia River hydropower–related adverse effects
- Impaired tributary fish passage
- Degraded freshwater habitat: Floodplain connectivity and function, channel structure and complexity, riparian areas and large woody debris recruitment, stream flow, and water quality have been degraded as a result of cumulative impacts of agriculture, forestry, and development.
- Effects of predation, competition, and disease mortality: Fish management, including past introductions and persistence of non-native (exotic) fish species continues to affect habitat conditions for listed species.
- Hatchery-related effects
- Harvest-related effects

Status of SRB Steelhead

Spatial Structure and Diversity**.** This species includes all naturally-spawned steelhead populations below natural and manmade impassable barriers in streams in the Snake River Basin of southeast Washington, northeast Oregon, and Idaho, and progeny of six artificial propagation programs. The ICTRT identified 24 historical populations in five major groups (Table 8) (Ford 2011; ICTRT 2011). The ICTRT has not assessed the viability of this species. The relative proportion of hatchery fish in natural spawning areas near major hatchery release sites is highly uncertain. There is little evidence for substantial change in ESU viability relative to the previous BRT and ICTRT reviews. Overall, therefore, the new information considered does not indicate a change in the biological risk category since the last status review (Ford 2011).

Table 8. Ecological subregions, populations, and scores for the key elements (A&P, diversity, and integrated SS/D) used to determine current overall viability risk for SRB steelhead (Ford 2011; NMFS 2011b). Risk ratings range from very low (VL), low (L), moderate (M), high (H), to very high (VH). Maintained (MT) population status indicates that the population does not meet the criteria for a viable population but does support ecological functions and preserve options for recovery of the DPS.

Ecological subregions	Spawning Populations (Watershed)	A&P	Diversity	Integrated SS/D	Overall Viability Risk*
Lower Snake River	Tucannon River	**	M	M	H
	Asotin Creek	**	M	M	MT
Grande Ronde River	Lower Grande Ronde	**	M	M	Not rated
	Joseph Creek	VL	L	L	Highly viable
	Upper Grande Ronde	M	M	M	MT
	Wallowa River	**	L	L	H
Clearwater River	Lower Clearwater	M	L	L	MT
	South Fork Clearwater	H	M	M	H
	Lolo Creek	H	M	M	H
	Selway River	H	L	L	H
	Lochsa River	H	L	L	H
Salmon River	Little Salmon River	**	M	M	MT
	South Fork Salmon	**	L	L	H
	Secesh River	**	L	L	H
	Chamberlain Creek	**	L	L	H
	Lower MF Salmon	**	L	L	H
	Upper MF Salmon	**	L	L	H
	Panther Creek	**	M	H	H
	North Fork Salmon	**	M	M	MT
	Lemhi River	**	M	M	MT
	Pahsimeroi River	**	M	M	MT
	East Fork Salmon	**	M	M	MT
	Upper Main Salmon	**	M	M	MT
Imnaha	Imnaha River	M		M	MT

* There is uncertainty in these ratings due to a lack of population-specific data.
** Insufficient data.

Abundance and Productivity. The level of natural production in the two populations with full data series and the Asotin Creek index reaches is encouraging, but the status of most populations in this DPS remains highly uncertain. Population-level natural origin abundance and productivity inferred from aggregate data and juvenile indices indicate that many populations are likely below the minimum combinations defined by the ICTRT viability criteria.

Limiting Factors include (ICTRT 2011;NOAA Fisheries 2011):

- Mainstem Columbia River hydropower–related adverse effects
- Impaired tributary fish passage

- Degraded freshwater habitat: Floodplain connectivity and function, channel structure and complexity, riparian areas and large woody debris recruitment, stream flow, and water quality have been degraded as a result of cumulative impacts of agriculture, forestry, and development
- Impaired water quality and increased water temperature
- Related harvest effects, particularly for B-run steelhead
- Predation
- Genetic diversity effects from out-of-population hatchery releases

2.2.2 Status of the Critical Habitats

We reviewed the status of designated critical habitat affected by the proposed action by examining the condition and trends of essential physical and biological features throughout the designated area. These features are essential to the conservation of the listed species because they support one or more of the species' life stages (*e.g.*, sites with conditions that support spawning, rearing, migration and foraging).

For salmon and steelhead, NMFS ranked watersheds within designated critical habitat at the scale of the fifth-field hydrologic unit code (HUC5) in terms of the conservation value they provide to each listed species they support.[5] The conservation rankings are high, medium, or low. To determine the conservation value of each watershed to species viability, NMFS' critical habitat analytical review teams (CHARTs) evaluated the quantity and quality of habitat features (for example, spawning gravels, wood and water condition, side channels), the relationship of the area compared to other areas within the species' range, and the significance to the species of the population occupying that area (NOAA Fisheries 2005). Thus, even a location that has poor quality of habitat could be ranked with a high conservation value if it were essential due to factors such as limited availability (*e.g.*, one of a very few spawning areas), a unique contribution of the population it served (*e.g.*, a population at the extreme end of geographic distribution), or the fact that it serves another important role (*e.g.*, obligate area for migration to upstream spawning areas).

This section examines critical habitat condition for UCR spring-run Chinook salmon, SR spring/summer run Chinook salmon, SR fall-run Chinook salmon, SR sockeye salmon, MCR steelhead, UCR steelhead, and SRB steelhead in the Interior Columbia recovery domains.

The physical or biological features of freshwater spawning and incubation sites include water flow, quality and temperature conditions and suitable substrate for spawning and incubation, as well as migratory access for adults and juveniles (Tables 9 and 10). These features are essential to conservation because without them the species cannot successfully spawn and produce offspring. The physical or biological features of freshwater migration corridors associated with spawning and incubation sites include water flow, quality and temperature conditions supporting larval and adult mobility, abundant prey items supporting larval feeding after yolk sac depletion, and free passage (no obstructions) for adults and juveniles. These features are essential to

[5] The conservation value of a site depends upon "(1) the importance of the populations associated with a site to the ESU [or DPS] conservation, and (2) the contribution of that site to the conservation of the population through demonstrated or potential productivity of the area" (NOAA Fisheries 2005).

conservation because they allow adult fish to swim upstream to reach spawning areas and they allow larval fish to proceed downstream and reach the ocean.

Table 9. PCEs of critical habitats designated for ESA-listed salmon and steelhead species considered in the opinion (except SR spring/summer-run Chinook salmon, SR fall-run Chinook salmon, and SR sockeye salmon), and corresponding species life history events.

Primary Constituent Elements		**Species Life History Event**
Site Type	**Site Attribute**	
Freshwater spawning	Substrate Water quality Water quantity	Adult spawning Embryo incubation Alevin growth and development
Freshwater rearing	Floodplain connectivity Forage Natural cover Water quality Water quantity	Fry emergence from gravel Fry/parr/smolt growth and development
Freshwater migration	Free of artificial obstruction Natural cover Water quality Water quantity	Adult sexual maturation Adult upstream migration and holding Kelt (steelhead) seaward migration Fry/parr/smolt growth, development, and seaward migration
Estuarine areas	Forage Free of artificial obstruction Natural cover Salinity Water quality Water quantity	Adult sexual maturation and “reverse smoltification” Adult upstream migration and holding Kelt (steelhead) seaward migration Fry/parr/smolt growth, development, and seaward migration
Nearshore marine areas	Forage Free of artificial obstruction Natural cover Water quantity Water quality	Adult growth and sexual maturation Adult spawning migration Nearshore juvenile rearing
Offshore marine areas	Forage Water quality	Adult growth and sexual maturation Adult spawning migration Subadult rearing

Table 10. PCEs of critical habitats designated for SR spring/summer-run Chinook salmon, SR fall-run Chinook salmon, SR sockeye salmon, and corresponding species life history events.

Primary Constituent Elements		Species Life History Event
Site	**Site Attribute**	
Spawning and juvenile rearing areas	Access (sockeye) Cover/shelter Food (juvenile rearing) Riparian vegetation Space (Chinook, coho) Spawning gravel Water quality Water temp (sockeye) Water quantity	Adult spawning Embryo incubation Alevin growth and development Fry emergence from gravel Fry/parr/smolt growth and development
Adult and juvenile migration corridors	Cover/shelter Food (juvenile) Riparian vegetation Safe passage Space Substrate Water quality Water quantity Water temperature Water velocity	Adult sexual maturation Adult upstream migration and holding Kelt (steelhead) seaward migration Fry/parr/smolt growth, development, and seaward migration
Areas for growth and development to adulthood	Ocean areas – not identified	Nearshore juvenile rearing Subadult rearing Adult growth and sexual maturation Adult spawning migration

<u>CHART Salmon and Steelhead Critical Habitat Assessments.</u> The CHART for each recovery domain assessed biological information pertaining to areas under consideration for designation as critical habitat to identify the areas occupied by listed salmon and steelhead, determine whether those areas contained PCEs essential for the conservation of those species and whether unoccupied areas existed within the historical range of the listed salmon and steelhead that are also essential for conservation. The CHARTs assigned a 0 to 3 point score for the PCEs in each HUC5 watershed for:

Factor 1. Quantity,
Factor 2. Quality – Current Condition,
Factor 3. Quality – Potential Condition,
Factor 4. Support of Rarity Importance,
Factor 5. Support of Abundant Populations, and
Factor 6. Support of Spawning/Rearing.

Thus, the quality of habitat in a given watershed was characterized by the scores for Factor 2 (quality – current condition), which considers the existing condition of the quality of PCEs in the

HUC5 watershed; and Factor 3 (quality – potential condition), which considers the likelihood of achieving PCE potential in the HUC5 watershed, either naturally or through active conservation/restoration, given known limiting factors, likely biophysical responses, and feasibility.

Interior Columbia Recovery Domain. Critical habitat has been designated in the IC recovery domain, which includes the Snake River Basin, for SR spring/summer-run Chinook salmon, SR fall-run Chinook salmon, UCR spring-run Chinook salmon, SR sockeye salmon, MCR steelhead, UCR steelhead, and SRB steelhead. Major tributaries in the Oregon portion of the IC recovery domain include the Deschutes, John Day, Umatilla, Walla Walla, Grande Ronde, and Imnaha rivers.

Habitat quality in tributary streams in the IC recovery domain varies from excellent in wilderness and roadless areas to poor in areas subject to heavy agricultural and urban development (NMFS 2009; Wissmar *et al.* 1994). Critical habitat throughout much of the IC recovery domain has been degraded by intense agriculture, alteration of stream morphology (*i.e.*, channel modifications and diking), riparian vegetation disturbance, wetland draining and conversion, livestock grazing, dredging, road construction and maintenance, logging, mining, and urbanization. Reduced summer stream flows, impaired water quality, and reduction of habitat complexity are common problems for critical habitat in developed areas.

Migratory habitat quality in this area has been severely affected by the development and operation of the FCRPS dams and reservoirs in the mainstem Columbia River, Bureau of Reclamation tributary projects, and privately owned dams in the Snake and Upper Columbia river basins. For example, construction of Hells Canyon Dam eliminated access to several likely production areas in Oregon and Idaho, including the Burnt, Powder, Weiser, Payette, Malheur, Owyhee, and Boise river basins (Good *et al.* 2005), and Grand Coulee and Chief Joseph dams completely block anadromous fish passage on the upper mainstem Columbia River. Hydroelectric development modified natural flow regimes, resulting in higher water temperatures, changes in fish community structure leading to increased rates of piscivorous and avian predation on juvenile salmon and steelhead, and delayed migration for both adult and juveniles. Physical features of dams such as turbines also kill migrating fish. In-river survival is inversely related to the number of hydropower projects encountered by emigrating juveniles.

Similarly, development and operation of extensive irrigation systems and dams for water withdrawal and storage in tributaries have altered hydrological cycles. A series of large regulating dams on the middle and upper Deschutes River affect flow and block access to upstream habitat, and have extirpated one or more populations from the Cascades Eastern Slope major population (ICTRT 2003). Similarly, operation and maintenance of large water reclamation systems such as the Umatilla Basin and Yakima Projects have significantly reduced flows and degraded water quality and physical habitat in this domain.

Many stream reaches designated as critical habitat in the IC recovery domain are over-allocated under state water law, with more allocated water rights than existing streamflow. Withdrawal of water, particularly during low-flow periods that commonly overlap with agricultural withdrawals, often increases summer stream temperatures, blocks fish migration, strands fish, and alters sediment transport (Spence *et al.* 1996). Reduced tributary stream flow has been identified as a major limiting factor for all listed salmon and steelhead species in this recovery domain except SR fall-run Chinook salmon and SR sockeye salmon (NMFS 2007; NOAA Fisheries 2011).

Many stream reaches designated as critical habitat are listed on the state of Oregon's Clean Water Act section 303(d) list for water temperature. Many areas that were historically suitable rearing and spawning habitat are now unsuitable due to high summer stream temperatures. Removal of riparian vegetation, alteration of natural stream morphology, and withdrawal of water for agricultural or municipal use all contribute to elevated stream temperatures. Contaminants such as insecticides and herbicides from agricultural runoff and heavy metals from mine waste are common in some areas of critical habitat.

The IC recovery domain is a very large and diverse area. The CHART determined that few watersheds with PCEs for Chinook salmon or steelhead are in good to excellent condition with no potential for improvement. Overall, most IC recovery domain watersheds are in fair-to-poor or fair-to-good condition. However, most of these watersheds have some or high potential for improvement. In Washington, the Upper Methow, Lost, White, and Chiwawa watersheds are in good-to-excellent condition with no potential for improvement. In Oregon, only the Lower Deschutes, Minam, Wenaha, and Upper and Lower Imnaha Rivers HUC5 watersheds are in good-to-excellent condition with no potential for improvement. In Idaho, a number of watersheds with PCEs for steelhead (Upper Middle Salmon, Upper Salmon/Pahsimeroi, Middle Fork Salmon, Little Salmon, Selway, and Lochsa rivers) are in good-to-excellent condition with no potential for improvement. Additionally, several Lower Snake River HUC5watersheds in the Hells Canyon area, straddling Oregon and Idaho, are in good-to-excellent condition with no potential for improvement (Table 11).

Table 11. **Interior Columbia Recovery Domain:** Current and potential quality of HUC5 watersheds identified as supporting historically independent populations of ESA-listed Chinook salmon (CK) and steelhead (ST) (NOAA Fisheries 2005). Watersheds are ranked primarily by "current quality" and secondly by their "potential for restoration."

Current PCE Condition	Potential PCE Condition
3 = good to excellent	3 = highly functioning, at historical potential
2 = fair to good	2 = high potential for improvement
1 = fair to poor	1 = some potential for improvement
0 = poor	0 = little or no potential for improvement

Watershed Name and HUC5 Code(s)	Listed Species	Current Quality	Restoration Potential
Upper Columbia # 1702000xxx			
White (101), Chiwawa (102), Lost (801) & Upper Methow (802) rivers	CK/ST	3	3
Upper Chewuch (803) & Twisp rivers (805)	CK/ST	3	2
Lower Chewuch River (804); Middle (806) & Lower (807) Methow rivers	CK/ST	2	2
Salmon Creek (603) & Okanogan River/Omak Creek (604)	ST	2	2
Upper Columbia/Swamp Creek (505)	CK/ST	2	1
Foster Creek (503) & Jordan/Tumwater (504)	CK/ST	1	1
Upper (601) & Lower (602) Okanogan River; Okanogan River/Bonaparte Creek (605); Lower Similkameen River (704); & Lower Lake Chelan (903)	ST	1	1
Unoccupied habitat in Sinlahekin Creek (703)	ST Conservation Value "Possibly High"		
Upper Columbia #1702001xxx			
Entiat River (001); Nason/Tumwater (103); & Lower Wenatchee River (105)	CK/ST	2	2
Lake Entiat (002)	CK/ST	2	1
Columbia River/Lynch Coulee (003); Sand Hollow (004); Yakima/Hansen Creek (604), Middle Columbia/Priest Rapids (605), & Columbia River/Zintel Canyon (606)	ST	2	1
Icicle/Chumstick (104)	CK/ST	1	2
Lower Crab Creek (509)	ST	1	2
Rattlesnake Creek (204)	ST	0	1
Yakima #1703000xxx			
Upper (101) & Middle (102) Yakima rivers; Teanaway (103) & Little Naches (201) rivers; Naches River/Rattlesnake Creek (202); & Ahtanum (301) & Upper Toppenish (303) & Satus (305) creeks	ST	2	2
Umtanum/Wenas (104); Naches River/Tieton River (203); Upper Lower Yakima River (302); & Lower Toppenish Creek (304)	ST	1	2
Yakima River/Spring Creek (306)	ST	1	1
Lower Snake River #1706010xxx			
Snake River/Granite (101), Getta (102), & Divide (104) creeks; Upper (201) & Lower (205) Imnaha River; Snake River/Rogersburg (301); Minam (505) & Wenaha (603) rivers	ST	3	3
Grande Ronde River/Rondowa (601)	ST	3	2
Big (203) & Little (204) Sheep creeks; Asotin River (302); Catherine Creek (405); Lostine River (502); Bear Creek (504); & Upper (706) & Lower (707) Tucannon River	ST	2	3
Middle Imnaha River (202); Snake River/Captain John Creek (303);	ST	2	2

Upper Grande Ronde River (401); Meadow (402); Beaver (403); Indian (409), Lookingglass (410) & Cabin (411) creeks; Lower Wallowa River (506); Mud (602), Chesnimnus (604) & Upper Joseph (605) creeks			
Ladd Creek (406); Phillips/Willow Creek (408); Upper (501) & Middle (503) Wallowa rivers; & Lower Grande Ronde River/Menatche Creek (607)	ST	1	3
Five Points (404); Lower Joseph (606) & Deadman (703) creeks	ST	1	2
Tucannon/Alpowa Creek (701)	ST	1	1
Mill Creek (407)	ST	0	3
Pataha Creek (705)	ST	0	2
Snake River/Steptoe Canyon (702) & Penawawa Creek (708)	ST	0	1
Flat Creek (704) & Lower Palouse River (808)	ST	0	0
Upper Salmon and Pahsimeroi #1706020xxx			
Germania (111) & Warm Springs (114) creeks; Lower Pahsimeroi River (201); Alturas Lake (120), Redfish Lake (121), Upper Valley (123) & West Fork Yankee (126) creeks	ST	3	3
Basin Creek (124)	ST	3	2
Salmon River/Challis (101); East Fork Salmon River/McDonald Creek (105); Herd Creek (108); Upper East Fork Salmon River (110); Salmon River/Big Casino (115), Fisher (117) & Fourth of July (118) creeks; Upper Salmon River (119); Valley Creek/Iron Creek (122); & Morgan Creek (132)	ST	2	3
Salmon River/Bayhorse Creek (104); Salmon River/Slate Creek (113); Upper Yankee Fork (127) & Squaw Creek (128); Pahsimeroi River/Falls Creek (202)	ST	2	2
Yankee Fork/Jordan Creek (125)	ST	1	3
Salmon River/Kinnikinnick Creek (112); Garden Creek (129); Challis Creek/Mill Creek (130); & Patterson Creek (203)	ST	1	2
Road Creek (107)	ST	1	1
Unoccupied habitat in Hawley (410), Eighteenmile (411) & Big Timber (413) creeks	Conservation Value for ST "Possibly High"		
Middle Salmon, Panther and Lemhi #1706020xxx			
Salmon River/Colson (301), Pine (303) & Moose (305) creeks; Indian (304) & Carmen (308) creeks, North Fork Salmon River (306); & Texas Creek (412)	ST	3	3
Deep Creek (318)	ST	3	2
Salmon River/Cow Creek (312) & Hat (313), Iron (314), Upper Panther (315), Moyer (316) & Woodtick (317) creeks; Lemhi River/Whimpey Creek (402); Hayden (414), Big Eight Mile (408), & Canyon (408) creeks	ST	2	3
Salmon River/Tower (307) & Twelvemile (311) creeks; Lemhi River/Kenney Creek (403); Lemhi River/McDevitt (405), Lemhi River/Yearian Creek (406); & Peterson Creek (407)	ST	2	2
Owl (302) & Napias (319) creeks	ST	2	1
Salmon River/Jesse Creek (309); Panther Creek/Trail Creek (322); & Lemhi River/Bohannon Creek (401)	ST	1	3
Salmon River/Williams Creek (310)	ST	1	2
Agency Creek (404)	ST	1	1
Panther Creek/Spring Creek (320) & Clear Creek (323)	ST	0	3
Big Deer Creek (321)	ST	0	1
Mid-Salmon-Chamberlain, South Fork, Lower, and Middle Fork Salmon #1706020xxx			
Lower (501), Upper (503) & Little (504) Loon creeks; Warm Springs (502); Rapid River (505); Middle Fork Salmon River/Soldier (507) &	ST	3	3

Lower Marble Creek (513); & Sulphur (509), Pistol (510), Indian (511) & Upper Marble (512) creeks; Lower Middle Fork Salmon River (601); Wilson (602), Upper Camas (604), Rush (610), Monumental (611), Beaver (614), Big Ramey (615) & Lower Big (617) creeks; Middle Fork Salmon River/Brush (603) & Sheep (609) creeks; Big Creek/Little Marble (612); Crooked (616), Sheep (704), Bargamin (709), Sabe (711), Horse (714), Cottonwood (716) & Upper Chamberlain Creek (718); Salmon River/Hot Springs (712); Salmon River/Kitchen Creek (715); Lower Chamberlain/McCalla Creek (717); & Slate Creek (911)			
Marsh (506); Bear Valley (508) Yellow Jacket (604); West Fork Camas (607) & Lower Camas (608) creeks; & Salmon River/Disappointment Creek (713) & White Bird Creek (908)	ST	2	3
Upper Big Creek (613); Salmon River/Fall (701), California (703), Trout (708), Crooked (705) & Warren (719) creeks; Lower South Fork Salmon River (801); South Fork Salmon River/Cabin (809), Blackmare (810) & Fitsum (812) creeks; Lower Johnson Creek (805); & Lower (813), Middle (814) & Upper Secesh (815) rivers; Salmon River/China (901), Cottonwood (904), McKenzie (909), John Day (912) & Lake (913) creeks; Eagle (902), Deer (903), Skookumchuck (910), French (915) & Partridge (916) creeks	ST	2	2
Wind River (702), Salmon River/Rabbit (706) & Rattlesnake (710) creeks; & Big Mallard Creek (707); Burnt Log (806), Upper Johnson (807) & Buckhorn (811) creeks; Salmon River/Deep (905), Hammer (907) & Van (914) creeks	ST	2	1
Silver Creek (605)	ST	1	3
Lower (803) & Upper (804) East Fork South Fork Salmon River; Rock (906) & Rice (917) creeks	ST	1	2
Little Salmon #176021xxx			
Rapid River (005)	ST	3	3
Hazard Creek (003	ST	3	2
Boulder Creek (004)	ST	2	3
Lower Little Salmon River (001) & Little Salmon River/Hard Creek (002)	ST	2	2
Selway, Lochsa and Clearwater #1706030xxx			
Selway River/Pettibone (101) & Gardner (103) creeks; Bear (102), White Cap (104), Indian (105), Burnt Knob (107), Running (108) & Goat (109) creeks; & Upper Selway River (106); Gedney (202), Upper Three Links (204), Rhoda (205), North Fork Moose (207), Upper East Fork Moose (209) & Martin (210) creeks; Upper (211), Middle (212) & Lower Meadow (213) creeks; Selway River/Three Links Creek (203); & East Fork Moose Creek/Trout Creek (208); Fish (302), Storm (309), Warm Springs (311), Fish Lake (312), Boulder (313) & Old Man (314) creeks; Lochsa River/Stanley (303) & Squaw (304) creeks; Lower Crooked (305), Upper Crooked (306) & Brushy (307) forks; Lower (308), Upper (310) White Sands, Ten Mile (509) & John's (510) creeks	ST	3	3
Selway River/Goddard Creek (201); O'Hara Creek (214) Newsome (505) creeks; American (506), Red (507) & Crooked (508) rivers	ST	2	3
Lower Lochsa River (301); Middle Fork Clearwater River/Maggie Creek (401); South Fork Clearwater River/Meadow (502) & Leggett creeks; Mill (511), Big Bear (604), Upper Big Bear (605), Musselshell (617), Eldorado (619) & Mission (629) creeks, Potlatch River/Pine Creek (606); & Upper Potlatch River (607); Lower (615), Middle (616) & Upper (618) Lolo creeks	ST	2	2
South Fork Clearwater River/Peasley Creek (502)	ST	2	1

Upper Orofino Creek (613)	ST	2	0
Clear Creek (402)	ST	1	3
Three Mile (512), Cottonwood (513), Big Canyon (610), Little Canyon (611) & Jim Ford (614) creeks; Potlatch River/Middle Potlatch Creek (603); Clearwater River/Bedrock (608), Jack's (609) Lower Lawyer (623), Middle Lawyer (624), Cottonwood (627) & Upper Lapwai (628) creeks; & Upper (630) & Lower (631) Sweetwater creeks	ST	1	2
Lower Clearwater River (601) & Clearwater River/Lower Potlatch River (602), Fivemile Creek (620), Sixmile Creek (621) and Tom Taha (622) creeks	ST	1	1
Mid-Columbia #1707010xxx			
Wood Gulch (112); Rock Creek (113); Upper Walla Walla (201), Upper Touchet (203), & Upper Umatilla (301) rivers; Meacham (302) & Birch (306) creeks; Upper (601) & Middle (602) Klickitat River	ST	2	2
Glade (105) & Mill (202) creeks; Lower Klickitat River (604); Mosier Creek (505); White Salmon River (509); Middle Columbia/Grays Creek (512)	ST	2	1
Little White Salmon River (510)	ST	2	0
Middle Touchet River (204); McKay Creek (305); Little Klickitat River (603);Fifteenmile (502) & Fivemile (503) creeks	ST	1	2
Alder (110) & Pine (111) creeks; Lower Touchet River (207), Cottonwood (208), Pine (209) & Dry (210) creeks; Lower Walla Walla River (211); Umatilla River/Mission Creek (303) Wildhorse Creek (304); Umatilla River/Alkali Canyon (307); Lower Butter Creek (310); Upper Middle Columbia/Hood (501); Middle Columbia/Mill Creek (504)	ST	1	1
Stage Gulch (308) & Lower Umatilla River (313)	ST	0	1
John Day #170702xxx			
Middle (103) & Lower (105) South Fork John Day rivers; Murderers (104) & Canyon (107) creeks; Upper John Day (106) & Upper North Fork John Day (201) rivers; & Desolation Creek (204)	ST	2	2
North Fork John Day/Big Creek (203); Cottonwood Creek (209) & Lower NF John Day River (210)	ST	2	1
Strawberry (108), Beech (109), Laycock (110), Fields (111), Mountain (113) & Rock (114) creeks; Upper Middle John Day River (112); Granite (202) & Wall (208) creeks; Upper (205) & Lower (206) Camas creeks; North Fork John Day/Potamus Creek (207); Upper Middle Fork John Day River (301) & Camp (302), Big (303) & Long (304) creeks; Bridge (403) & Upper Rock (411) creeks; & Pine Hollow (407)	ST	1	2
John Day/Johnson Creek (115); Lower Middle Fork John Day River (305); Lower John Day River/Kahler Creek (401), Service (402) & Muddy (404) creeks; Lower John Day River/Clarno (405); Butte (406), Thirtymile (408) & Lower Rock (412) creeks; Lower John Day River/Ferry (409) & Scott (410) canyons; & Lower John Day River/McDonald Ferry (414)	ST	1	1
Deschutes #1707030xxx			
Lower Deschutes River (612)	ST	3	3
Middle Deschutes River (607)	ST	3	2
Upper Deschutes River (603)	ST	2	1
Mill Creek (605) & Warm Springs River (606)	ST	2	1
Bakeoven (608) & Buck Hollow (611) creeks; Upper (701) & Lower (705) Trout Creek	ST	1	2
Beaver (605) & Antelope (702) creeks	ST	1	1

White River (610) & Mud Springs Creek (704)	ST	1	0
Unoccupied habitat in Deschutes River/McKenzie Canyon (107) & Haystack (311); Squaw Creek (108); Lower Metolius River (110), Headwaters Deschutes River (601)	ST Conservation Value "Possibly High"		

2.3 Environmental Baseline

The "environmental baseline" includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

The effects from climate change to the environmental baseline in the action area are described above in Section 2.2.

Species Baseline within the Action Area. The biological requirements of salmon and steelhead in the action area vary depending on the life history stage present and the natural range of variation present within that system (Groot and Margolis 1991; Spence *et al.* 1996).Generally, during spawning migrations, adult salmon require clean water with cool temperatures and access to thermal refugia, dissolved oxygen near 100% saturation, low turbidity, adequate flows and depths to allow passage over barriers to reach spawning sites, and sufficient holding and resting sites. Habitat requirements for juvenile rearing include seasonally suitable microhabitats for holding, feeding, and resting. Migration of juveniles to rearing areas, whether the ocean, lakes, or other stream reaches, requires access to these habitats. Physical, chemical, and thermal conditions may all impede movements of adult or juvenile fish.

Critical Habitat Baseline within the Action Area. The action area is within designated critical habitat for juvenile rearing habitat and a migration corridor for adults and juveniles of all the affected salmonid species in the Columbia River mainstem.

The project action area is located within the middle section of the Columbia River which runs over 450 miles from Bonneville Dam (RM 146) located along the border between Oregon and Washington, upstream to Grand Coulee Dam (RM 596) in Washington State. The project site is located along the southern shoreline of the Lake Wallula reservoir, approximately 9.5 miles upstream of McNary Dam (RM 301.6). The general topography within the action area ranges from relatively level uplands to steep sloping banks along the river. The shoreline within the action area consists of a steep, sparsely vegetated riprap bank.

The project site is comprised of the existing pump station facilities, including the elevated pumps, concrete access pads, and existing riprap shoreline. Vegetation surrounding the action area is dominated by species typical of the sagebrush-steppe vegetation community in eastern Oregon, including rabbitbrush (*Ericameria nauseosa*), antelope brush (*Purshia tridentate*) and cheatgrass (*Bromus tectorum*). Other species observed within and near the action area include big sagebrush (*Artemisia tridentate*), common mullein (*Verbascum Thapsus*), tall tumblemustard (*Sisymbrium altissimum*), and willow species (*Salix* sp.).

Columbia River Mainstem. The action area of the Columbia River has been disconnected from its floodplains and off-channel habitat by construction of levees, highways and railroads, and by filling of wetlands. Besides reducing the availability of high-quality rearing habitat, this likely has reduced the availability of cold-water refugia formed by hyporheic exchange of groundwater with the river. There is at present no suitable spawning habitat for Pacific salmon in the action area of the Columbia River mainstem, primarily due to the sandy substrate. Both adult and juvenile Pacific salmon use the general area for migration, and juveniles use the shallow areas for rearing.

Sediment transport in the action area has been substantially altered by the hydropower system, which has altered flow patterns and detained sediments behind dams. Since dam construction, the high seasonal flows that once regularly redistributed alluvial material have decreased. The floodplain has also been disconnected from the river by shoreline development. Alteration of flow regime and disruption of floodplain connectivity have impaired habitat-forming processes in the action area. Impoundment of the river, reinforcement of shorelines (retaining walls, riprap placement, *etc*.), and creation of overwater structures such as piers have created habitat conditions that favor species that prey on juvenile Pacific salmon.

The Columbia River is classified as water quality limited under section 303(d) of the Federal Clean Water Act by the Oregon Department of Environmental Quality (ODEQ) for temperature, pH and polychlorinated biphenyls (PCB) (ODEQ 2010). Numerous other pollutants of concern and toxins have been found in the Columbia River portion of the action area and downstream. Significant agricultural production occurs throughout the tributary drainages to the Columbia River in the Middle Columbia River watersheds. Conversion of habitat to agricultural lands has resulted in loss of riparian habitat, unstable streambanks due to poor cattle exclusion devices, excessive chemical levels in the water associated with pesticides and herbicides, high water temperatures and loss dissolved oxygen levels. Many tributary streams exceed appropriate width/depth ratios, resulting in high temperatures, sheet flow at high waters, and inadequate velocity levels at low flows. Agricultural production has also increased disturbance related to invasive plant species.

Although the quality of critical habitat in the Columbia River migration corridor has been reduced by the effects of hydroelectric development, agricultural and urban development, the action area remains critical because it provides the essential link between the natal streams and the marine environments necessary for the growth and development of the seven ESA-listed salmonids covered in this consultation. The CHART for the Upper Columbia, Snake, and Middle Columbia rivers (NMFS 2005) concluded that migration PCEs throughout this corridor are highly essential to the conservation of SR sockeye, SRB, UCR, and MCR steelhead, and SR and UCR Chinook since all of these species must migrate through this area as juveniles and as adults.

Environmental baseline conditions at the action area were summarized in the submitted BA using the NMFS *Matrix of Pathways and Indicators* (NMFS 1996). Data reveal that baseline conditions for measured habitat variables within the project area are all currently "functioning at risk" or "not properly functioning," as described below.

Water Quality

Temperature
The Middle Columbia River within the Lake Wallula reservoir is listed on the Oregon Department of Environmental Quality (ODEQ) 303(d) list for year round temperature exceedance (ODEQ 2012). Based on the Columbia River Data Access in Real Time (DART) 10-year average (2002-2011), temperatures at McNary range between a low of approximately 4° Celsius (C) in mid-February, to a high of over 22° C in mid-August (DART 2012). Many factors have contributed to increased stream temperatures, but they are primarily related to land-use practices, including dams, channel simplification and widening, and vegetation removal. There has also been an incremental loss of wetlands and increases in groundwater withdrawals which have contributed to lower base-stream flows, and which in turn contribute to temperature increases. As a result, this parameter is **not properly functioning**.

Sediment/Turbidity
There is currently no turbidity data available within the immediate vicinity of the action area, however, given the historic and existing land uses within the Middle Columbia River, this parameter is likely **not properly functioning**.

Chemical Contamination/Nutrients
Water quality is generally poor throughout the Middle Columbia River, as degraded riparian habitat, effluent outfalls, density of impervious surfaces, and physical disturbances to local stream systems have all led to increased chemical and nutrient contamination. The Middle Columbia River within the Lake Wallula reservoir is 303(d) listed for polychlorinated biphenyls (PCBs), and has an approved Total Maximum Daily Load (TMDL) for dioxin, and total dissolved gas (TDG) (ODEQ 2012). Based on this information, this parameter is **not properly functioning**.

Habitat Access

Physical Barriers
In general, the environment for salmonids in the Columbia River basin has been significantly affected by the development and operation of the hydropower dams associated with the Federal Columbia River Power System (FCRPS) (NMFS 2009). The action area is within the impoundment of water behind the McNary Dam, forming the Lake Wallula reservoir. Upstream and downstream fish passage for anadromous fish through the reservoir is provided downstream at the McNary Dam in Oregon and upstream at the Priest Rapids Dam in Washington. In addition, access for anadromous fish to the reservoir is provided at Ice Harbor Dam along the Snake River. Given the presence of numerous hydro facilities along the Middle Columbia River, this parameter is **at risk**.

Habitat Elements

Substrate
Substrates within the action area consist primarily of fine sands with cobble sized substrates beneath. Sand deposits on the surface range from one to several ft deep. Sediment sampling was

conducted within the action area on July 25, 2012. Physical analysis revealed that the sediment was composed of very course to course sand. The upstream dams alter the movement of sediment through the action area, resulting in few accumulations of suitable spawning gravels, and few widely spaced, sandy foraging shoals for smolts. Based on this information, this parameter is **not properly functioning**.

Large Wood

No large woody debris is present within the vicinity of the action area. As with sediments, the upstream dams have altered the movement of large wood through the action area, resulting in minimal accumulations. In addition, the shrub-steppe conditions of the Middle Columbia River do not generally provide areas for large wood recruitment. As such, this parameter is likely **not properly functioning**.

Pool Frequency

Bathymetry information across the Columbia River within the vicinity of the action area indicates that the maximum channel depth is approximately 105 ft. The average width of the river within the vicinity of the action area is approximately 6,200 ft. Given the width of the channel, as modified by McNary Dam and other hydroelectric projects, this indicator likely meets pool frequency standards, but may be **at risk** due to lack of large woody debris recruitment.

Pool Quality

Middle Columbia River off-channel flows within the action area are greater than 1 meter in depth, however, there is little adequate cover and temperatures are relatively warm. As such, this parameter is likely **at risk**.

Off-Channel Habitat

Backwater and low energy off-channel habitat does exist downstream of the project area as a result of the impoundment behind McNary Dam, however, there is little existing cover. As such, this parameter is likely **at risk**.

Refugia

As a result of the development and operation of the hydropower dams, formerly complex habitats along the Columbia River have been reduced to a single channel with little off-channel habitat and very few forms of cover. Based on these current conditions, this parameter is **not properly functioning**.

Channel Conditions and Dynamics

Width/Depth Ratio

As discussed above, bathymetry information across the Columbia River within the vicinity of the action area indicates that the maximum channel depth is approximately 105 ft. The average width of the river within the vicinity of the action area is approximately 6,200 ft. This width depth ratio far exceeds a factor of 10 and is likely **not properly functioning**.

Streambank Condition
The immediate shorelines of the action area are comprised of riprap and minimal vegetation. Given that the reservoir levels are controlled by McNary Dam and that the streambank appears to be stable with no active erosion occurring, it is likely that this indicator is 80-90% stable, and therefore **at risk**.

Floodplain Connectivity
Floodplain connectivity throughout the Columbia River basin has been reduced as a result of hydroelectric development. Overall, within the Middle Columbia River, this indicator is **not properly functioning**.

Flow/Hydrology

Water quantity problems are a significant cause of habitat degradation and reduced fish production in the Columbia River. Withdrawing water for irrigation, urban development, and other uses has increased temperatures, sedimentation, and smolt travel time. In addition, human activities have affected the timing and amount of peak water runoff from rain and snowmelt. Many riparian areas, floodplains, and wetlands that once stored water during periods of high runoff have been inundated by the reservoirs along the river.

Peak/Base Flows
Peak and base flows throughout the Columbia River basin have been significantly altered as a result of hydroelectric development along the Columbia River, and residential and agricultural development within the basin. Based on the Columbia River DART 10-year average (2002-2011), outflows at McNary Dam range seasonally from approximately 85,000 to 325,000 cfs (DART 2012). Given the existing water management requirements, this indicator is **not properly functioning**.

Drainage Network Increase
The proposed project is located within a relatively undeveloped area along the Lake Wallula reservoir. However, within the Columbia River basin there has been a significant increase in paved roads and overall drainage network density. As such, this parameter is likely **not properly functioning**.

Watershed Conditions

Road Density and Location
There are a few paved roads and some valley bottom roads within the vicinity of the action area. Based on overall road development within the basin, this parameter is likely **at risk**.

Disturbance History
As stated above, the Columbia River basin has been significantly altered as a result of hydroelectric development along the Columbia River, and residential and agricultural development within the basin. In addition, logging within the watershed has greatly reduced amount of late-successional reserves. Within the basin and action area, this indicator is **not properly functioning**.

Riparian Reserves
Riparian vegetation along the Middle Columbia River is quite sparse, comprised primarily of willows and grasses. Within the Lake Wallula reservoir the riparian reserve system is fragmented, poorly connected, and provides limited natural cover habitat and refugia. Hydroelectric operations along with urban development and agricultural practices have greatly reduced riparian reserves along the river. As such, the indicator is **not properly functioning**.

2.4 Effects of the Action on the Species and its Designated Critical Habitat

"Effects of the action" means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur.

The proposed action will have direct, short-term adverse effects on the ESA-listed species and critical habitats during construction due to interaction with fish and construction equipment, chemical contamination, increases in turbidity, altered established substrate and available forage. It will also have a combination of longer-term effects, including adverse and beneficial effects related to the installation and modification of the existing intakes and fish screens on the pump stations.

In-water Excavation and Construction. General site disturbance during construction will alter the area's use by listed species during the construction period. Construction activity will result in localized increases in turbidity and fine sediments, however, sediment and erosion control measures will minimize the movement of soil into the river. The channel excavation will increase suspended sediments, turbidity, and fine streambed sediment. All in-water excavation and construction activities will occur within a 6 week period during the in-water work period.

Chemical Contamination. As with all construction activities involving the use of mechanized equipment, accidental release of fuel, oil, and other contaminants may occur. Adverse effects to aquatic species are likely to occur from contact with chemicals from equipment leaks and fuel spills. However, best management practices (BMPs) have been included as part of the proposed action so as to greatly reduce the risks of potential adverse effects associated with chemicals. Conservation measures will be implemented to contain and minimize any potential leaks within the area where it would have short-term adverse effects on water quality and stream macro-invertebrates. Operation of machinery in close proximity to a stream increases the chance of a large fuel spill or hydraulic fluid leak contaminating the water. The probability of this occurring is very low, but not discountable.

Increased Turbidity. Mechanical activities in-stream or on the streambanks are likely to cause temporary adverse effects to aquatic habitat if construction-related sediments enter the Columbia River due to soil disturbance. These sediments are likely to appear as localized increases in turbidity due to fine sediment movement during the implementation of the proposed action. Sediment is also likely to be carried by surface runoff when erosion control structures are removed. The increase in turbidity will temporarily (days to weeks) reduce water quality.

<u>Altered Streambed Substrate Composition and Reduced Available Macro-invertebrate Forage.</u> Excavation (dredging) in the channel to install new pumping equipment and piping will remove established substrate and will result in a temporary reduction in the available established macroinvertebrate community. Additional sediment contributions from the channel excavation will likely settle into the streambed substrate within a year. Native substrate removed during the dredging portion of the proposed action will be returned to the Columbia River in the previously described methods and the approved disposal site. Macroinvertebrates are expected to re-establish the area within weeks to months following completion of the project.

2.4.1 Effects to Species

It is expected that any adverse effects to listed fish due to disturbance from construction will be relatively small in terms of both intensity and duration. Some short-term adverse effects are likely to occur during project implementation and as the project site becomes established. However, the potential for adverse effects to listed species will be avoided or greatly minimized by the BMPs and timing of the project implementation. Since all of the species addressed by this opinion have similar biology and life history, the effects of the action will affect all of them in a similar manner. Therefore, the analysis below, describes the effects of the action on salmonids rather than any specific species.

<u>Elevated Suspended Sediments and Turbidity.</u> Effects to salmonids will occur from substrate disturbance though in-water excavation and construction activities during the upgrades and modifications to the pumps stations and intake structures. These activities will temporarily increase delivery of fine sediments, increase turbidity in the water column and degrade water quality. The greater the flow of water over the disturbed area and the larger the disturbed area, the greater the movement of sediments. The in-water excavation and subsequent filling will temporarily release stored fine sediments.

Dredging and disposal operations can increase suspended sediments. Not all sediment is captured by the dredges; some will be re-deposited on the bottom while some will be suspended in the water column increasing turbidity (Hayes *et al.* 2000). Disposal may deposit the dredge material directly into the water column and thus is potentially the greatest contributors of suspended sediment and turbidly due to dredging.

The increases in suspended sediment and turbidity plumes resulting from the proposed construction activities are not likely to be of an extent, magnitude, or duration that would kill or injure listed species, but will impede adult passage and juvenile rearing for a short period of time, as fish will avoid the area for the duration of the construction. The additional energy expenditure for fish avoiding the affected area will increase the likelihood of death or injury by reducing survival or increasing chances of predation. These effects will be minimized due to the use of BMPs including: all in-water construction activities will occur during the in-water work period, these measures will reduce effects (including behavioral modifications, avoidance, and injury) to any ESA-listed salmonids remaining in the area.

Increased Sedimentation and Reduced Macro-invertebrate Forage Abundance. Additional sediment input to the system in the long term should be minimized due to the precautions taken during the in-water construction. Re-deposited fine sediments have the potential to adversely affect primary and secondary productivity (Spence *et al.* 1996), and reduce incubation success (Bell 1991) for juvenile salmonids (Bjornn and Reiser 1991). However, the action area is not used for spawning by any of the species addressed in this opinion. The increased fine sediment will result in a minor increase in substrate embeddedness likely resulting in a minor decrease in forage abundance. Substrate composition in the action area is expected to return to baseline conditions by the end of the next high flow season. The excavation of the streambed and channel will result in removal of an established streambed substrate and aquatic macro-invertebrates which will temporarily reduce forage abundance. Increases in fine sediments are reasonably likely to cause a minor decrease in aquatic invertebrate densities in the action area, resulting in a small decrease in available forage for juvenile salmonids for up to a few months. Juvenile salmonids are opportunistic predators and eat a wide variety of vertebrate and invertebrate species and are known to forage on the stream bottom for prey. The effect of the reduction in aquatic prey is likely temporary and the area will be recolonized after project completion. NMFS expects that the abundance of macro-invertebrate organisms in the areas adjoining the project area is adequate to rapidly recolonize disturbed areas. Fish that return to the area following the project completion will experience a reduction in available macro-invertebrate forage until such times as the areas becomes recolonized.

Dredging Activities. Entrainment occurs when organisms are trapped during the uptake of sediments and water by dredging machinery. The potential for entrainment depends upon the likelihood of fish occurring during the dredge period, the dredge depth, fish densities at the time and location of dredging operations, how the dredge is operated, and the affected species' life stage.

The proposed dredging methods will include an 8 inch diameter dredge pump that will remain buried up to 1 ft below the channel substrate. The dredging operations will remove approximately 300 cubic yards within an area approximately 1,700 square ft (0.04 acre), with a depth of 1 to 15 ft. Following the activities the dredge material will be reintroduced into the river at a depth of approximately 40 ft, therefore allowing native sediments to be redistributed downstream.

Any adult fish that might be present would generally be migrating mid-channel and may be found throughout the water column mostly out of the dredging areas, usually within the upper 25 ft but may be found to depths of 50 ft. Adult fish are primarily migrating above the depths dredges are operated but it would not be uncommon for adult fish to be found at the dredging depth. Adult salmon and steelhead are strong swimmers however and should be able to avoid dredges, discharge plumes and burial, NMFS is confident any potential for adult fish to be entrained or buried by the dredges is discountable. Juvenile salmon and steelhead prefer migrating and rearing along shallow water habitats and shorelines of the Columbia River and a may be present at these dredging depths. The timing of the proposed dredging is planned to occur January 1 to February 28, during the ODFW in-water work window when very few individual ESA-listed salmonids are likely to be present within the project area. NMFS anticipates that since few juvenile salmonids will be in the near vicinity of the dredging, the potential of entrainment will be very minimal but that it is not discountable.

Chemical Contamination. Fuel and lubricant spills that enter a waterbody directly or through the adjacent riparian zone can injure and kill aquatic organisms and degrade water quality. Petroleum-based contaminants, such as fuels, oils, and some hydraulic fluids contain polycyclic aromatic hydrocarbons (PAHs), which can be acutely toxic to salmonids at high levels of exposure and can also have acute and chronic lethal and sublethal effects on other aquatic organisms (Neff 1985). The proposed action includes project designs that will reduce the risk of chemical contamination during in-water work activities and maintain water quality. Following these best management practices will ensure that any contamination into the stream will be reduced to the point that only a few juvenile salmonids are likely to be injured or killed by minor leaks of contaminants into the action area. There will be no adverse effects over the long term or at the population level.

Reduction in Impingement from Improvements to Intakes and Fish Screens. The upgrades to the fish screens and modifications to the intake pumps will allow the facility to meet current fish screen criteria (NMFS 2011a). The criteria will reduce potential harm, injury, and mortality resulting from potential interactions with the pumps, intakes and screens.

Hydroacoustic Effects. The installation of steel piles in this location is likely to result in adverse effects to ESA-listed fish, potentially including injury, death and behavioral effects. There will be sub-lethal effects depending upon the effectiveness of mitigation measures and the presence of fish. Pile installation will have the following effects on the ESA-listed species: avoidance, interrupted migration, increased exposure to predation, altered feeding behavior, hearing loss or auditory tissue damage, and physical injury or death (Hastings 1996; Scholik and Yan 2002; Hastings and Popper 2005). Fish consistently avoid low frequency sounds like those of a vibratory hammer (Enger *et al.* 1993; Dolat 1997; Knudsen *et al.* 1997; Sand *et al.* 2000) and appear not to habituate to these sounds. Piles will be installed with a vibratory driver. Peak sound levels from vibratory drivers are considerably lower than impact drivers, however, total energy dissipated can be comparable resulting in similar total accumulation of lower sound levels.

Fish respond differently to sounds produced by impact hammers than to sounds produced by vibratory hammers. Vibratory hammers produce a more rounded sound pressure wave with a slower rise time in comparison to impact hammers. Because the more rounded sound pressure wave produced by vibratory hammers produces a slower increase in pressure, the potential for injury and mortality is reduced. The sharp sound pressure waves associated with impact hammers represent a rapid change in water pressure level. In general, injury and mortality effects from underwater noise are caused by these rapid pressure changes.

Although not proposed as part of the action, impact pile-driving can produce underwater sound pressure waves that can have effects on fish, varying upon the variables of: type and intensity of sounds, size of the piles, firmness of the substrate, water depth, and the type and size of the pile driver. Larger piles and firmer substrate require greater energy to drive the pile resulting in higher sound pressure levels (SPL). This is a relationship between driven energy and its transformation into overcoming friction or resonance. Hollow steel piles produce higher SPLs than similarly sized wood or concrete piles (Hastings and Popper 2005). Sound attenuates more rapidly in shallow water than in deep waters (Rogers and Cox 1988). Fish with swim bladders and smaller fish have been shown to be more vulnerable to injury (Hanson *et al.* 2003).

Interim thresholds of injury were set in an agreement dated June 11, 2008, by the Fisheries Hydroacoustic Work Group to set underwater sound pressure level criteria[6] for injury to listed fish from pile driving activities as: 206 decibel (dB) peak, 187 dB accumulated sound exposure level (SEL) for fish equal or greater than 2 grams, and 183 dB SEL for fish less than 2 grams. The NMFS has since added when the single strike SEL of 150 dB is reached as the conservative threshold to the maximum distance when fish can be injured (Stadler and Woodbury 2009). If the vibratory hammer is only used to drive all piles to the desired depth, accumulated sound exposure levels and peak sound exposure levels from this project will be well below NMFS's dual threshold interim criteria.

Species at the Population Scale. Those few fish that remain in the action area during project implementation will be exposed to stress caused by construction activities and reduced water quality. The stress is likely to be brief (minutes to hours) limited to two events (for sediment and turbidity plumes and dredging disposal) during construction. Therefore, the proposed action will not have a measurable negative effect on population abundance or productivity of any of the populations affected by the proposed action. In the long term, the project will have some, albeit minor, beneficial effects as the pump stations and intakes will be upgraded to meet fish passage and fish screen criteria. The proposed action will have no effect on population diversity or spatial structure.

Because adult salmon and steelhead are larger and more mobile than juveniles, it is unlikely that any will be killed during in-water construction although adults may move laterally or stop briefly during migration to avoid noise or other construction disturbances (Servizi and Martens 1991, Sigler 1988). However, given the conservation measures outlined above, it is unlikely that physical and chemical changes caused by the construction site associated with the proposed action, will cause delays severe enough to reduce spawning success and alter population growth rate, or cause straying that might alter the spatial structure or genetic diversity of populations. Thus, it is unlikely that the biological effects of actions will affect the VSP characteristics of salmon or steelhead populations.

2.4.2 Effects to Critical Habitat

The proposed action will affect designated critical habitat including freshwater rearing and migrations areas by causing effects during in-water construction, including chemical contamination, increases in turbidity, altered established substrate and available forage. Short-term (months) effects on critical habitat are likely to be the loss of available forage, displacement of established substrate, and water quality (excess turbidity and fine sediment) from channel

---

[6] FHWG (Fisheries Habitat Working Group). 2008. Agreement in Principal for Interim Criteria for Injury to Fish from Pile driving Activities. Memorandum of Agreement between N0AA Fisheries ' Northwest and Southwest Regions: USFWS Regions 1 and 8; California, Washington and Oregon Department of Transportation; California Department of Fish and Game; and Federal Highways Administration. June 12, 2008.

excavation resulting in delivery to streams. No long-term adverse effects to the PCEs of critical habitat are expected. Below are the likely effects on each of the PCEs of critical habitat.

Freshwater rearing sites
Floodplain connectivity: There will be no effects to floodplain connectivity.
Forage: Loss of streambed habitat for macroinvertebrates will result in a small, isolated loss in forage prey. There will be no long-term effects to forage as macroinvertebrates will recolonize affected areas within several days to weeks.

Natural cover: Established substrate will be disturbed during the excavation and in- stream construction. There will be short-term loss of natural cover during the in- stream construction. However, native substrates will be reintroduced to the sediment load of the Columbia River mainstem.

Freshwater migration corridors:
Free passage: Fish passage will be delayed during the in-water construction. Upstream migration of juvenile salmonids along the shoreline may be altered during in-water work for up to 6 weeks.

Effects to water quality, water quantity and natural cover in freshwater migration corridors will be expected to be the same as those previously described for freshwater rearing sites.

Based on the above effects, the proposed action will have small, local, short-term, negative effects on some critical habitat PCEs for up to a few months following the project completion. Any negative impacts will not reach a level to have noticeable effects on the quality and function of PCEs in the long term.

The effects of the action on PCEs will not impair the ability of critical habitat to play its intended conservation role. The adverse effects of the proposed action on critical habitat PCEs will be limited to small, short-term (days up to 1 year) effects on substrate, water quality, forage, and natural cover.

2.5 Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Future state and private actions are likely to continue to affect ESA-listed species in the Columbia River, although it is not possible to predict which specific actions will be significant given the broad geographic landscape covered by the action area, the geographic and political variation in the action area, uncertainties associated with Tribal, state, and local governments, and private actions.

The effects of activities such as agriculture, livestock grazing, and urbanization have degraded the habitat of the Columbia River and its tributaries. Many of these activities are likely to continue into the future. The impacts of these activities on habitat quality is discussed in the environmental baseline section of this opinion .The collective result of habitat degradation is characterized by commercial and residential developments, altered streamflows, structural impediments, and inadequate riparian corridors, simplified and reduced in-stream habitat, and excessive erosion and sedimentation.

NMFS assumes as the human population in the action area continues to grow, demand for agricultural, commercial, or residential development is also likely to grow. Similarly, demand for cultural and aesthetic amenities continues to grow with human population, and is reflected in decades of concentrated effort by Tribes, states, and local communities to restore an environment that supports flourishing wildlife populations, including populations of species that are now ESA-listed (CRITFC 1995; NMFS 2011c; NWPCC 2012; OWEB 2011). Reduced economic dependence on traditional resource-based industries has been associated with growing public appreciation for the economic benefits of river restoration, and growing demand for the cultural amenities that river restoration provides. Thus, many non-Federal actions have become responsive to the recovery needs of ESA-listed species. Those actions included efforts to ensure that resource-based industries adopt improved practices to avoid, minimize, or offset their adverse impacts. Similarly, many actions focused on completion of river restoration projects specifically designed to broadly reverse the major factors now limiting the survival of ESA-listed species at all stages of their life cycle. Those actions have improved the availability and quality of estuarine and nearshore habitats, floodplain connectivity, channel structure and complexity, riparian areas and large wood recruitment, stream substrates, stream flow, water quality, and fish passage. In this way, the goal of ESA-species recovery has become institutionalized as a common and accepted part of the State’s economic and environmental culture. We expect this trend to continue into the future as awareness of environmental and at-risk species issues increases among the general public.

When impacts of future state and private actions are considered collectively, they are expected to result in a neutral to slightly negative effect on population abundance and productivity. Similarly, these impacts are expected to cause a neutral to slightly negative effect on the quality and function of critical habitat PCEs in the Columbia River.

2.6 Integration and Synthesis

The Integration and Synthesis section is the final step of NMFS’ assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the effects of the action (Section 2.4) to the environmental baseline (Section 2.3) and the cumulative effects (Section 2.5) to formulate the agency’s biological opinion as to whether the proposed action is likely to: (1) Result in appreciable reductions in the likelihood of both survival and recovery of the species in the wild by reducing its numbers, reproduction, or distribution; or (2) reduce the value of designated or proposed critical habitat for the conservation of the species. These assessments are made in full consideration of the status of the species and critical habitat (Section 2.2).

The project will adversely affect ESA-listed steelhead and salmon and designated critical habitat by causing effects including chemical contamination, increases in turbidity, altered established substrate and available forage, hydroacoustic disturbance and temporary reductions in habitat access. Habitat degradation during the construction will include temporary short-term adverse effects in the action area but the condition of the action area will return to pre-project conditions in the long-term. ESA-listed fish will have reduced risk of impingement from the new screens. Hydroacoustic disturbance will be greatly reduced by the pile installation only occurring with-in the recommended IWWW and only a vibratory hammer will be used for the installation. The temporary turbidity plume resulting from in-water excavation is not expected to extend beyond 500 ft downstream from the project site. During the following migration period and rearing year, fish may encounter an incremental increase in fine sediments, but the amount attributable to the project will be so low as to be immeasurable.

The status of the species affected by the proposed action varies from very high risk (SR sockeye salmon) to moderate risk (MCR steelhead). The status of critical habitat at the designation-wide scale varies. As described in Section 2.2, all Columbia River salmon and steelhead species in this opinion migrate through the out-migrating juveniles and then again as adult fish on their upstream spawning migration. The viability of the various populations that comprise the seven salmon and steelhead species considered in this opinion ranges from extirpated, or nearly so, to populations that are at a low risk for extinction.

Short-term effects to critical habitat PCEs will include channel and streambanks modifications, degraded water quality and altered sediment transport balance, habitat access, reductions of available space, cover and available forage. These short-term effects will revert to pre-project quality within several months. Long-term benefits will include preventing impingement and injury to individual fish as the pumps and intakes will meet fish passage and screen criteria. The conditions of the environmental baseline in the action area identify the parameters of water quality, habitat access and habitat elements as all “functioning at risk” or “not properly functioning”. Habitat is degraded from past and current activities including agriculture, livestock grazing, water withdrawals and urbanization. These activities are likely to continue into the future and on balance, we expect cumulative effects to have a neutral or slightly negative effect on population viability and quality of critical habitat. Although some elements of critical habitat are degraded, the conservation value of critical habitat in the action area as high. The implementation of the proposed action will not further degrade the habitat or impair the ability of the habitat to support any of the affected population or the recovery of the species as a whole.

The number of juveniles adversely affected by the action will be a small proportion of the total number of individuals in any of the affected steelhead and salmon populations. The project will not cause a measurable negative effect on population abundance, productivity, spatial structure, or diversity. In the long term, the proposed action may result in small increases in population abundance and productivity and improved spatial structure due to improved fish passage and reduced potential injury to listed individual fish. The action is not expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of any steelhead or salmon in the wild by reducing their reproduction, numbers, or distribution, and therefore will not jeopardize the continued existence of the species.

The analysis showed that the amount of time and area dredging operations could potentially kill or injure ESA-listed fish is extremely small compared to the amount of time the fish may actually be present and area of potentially occupied habitat. Therefore, NMFS concluded individuals of ESA-listed fish potentially may be killed or injured, but the number of individual fish actually killed or injured is likely to be extremely small and would not significantly affect the abundance or productivity of any ESA-listed fish population. The risk of impacts resulting in population level effects is also very small because:

- Dredging operations will avoid most of the smolt outmigration period and will occur when juvenile densities in the shallow side channels are lowest.
- A very small number of individuals of any population will be exposed to dredging.
- The habitat affected by dredging and disposal operations and the short duration of potential effects is extremely small compared to the total available habitat for ESA-listed species.

2.7 Conclusion

After reviewing the current status of the listed species, the environmental baseline within the action area, the effects of the proposed action, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of SRB steelhead, UCR steelhead, MCR steelhead, SR spring/summer run Chinook salmon, SR fall-run Chinook salmon, UCR spring-run Chinook salmon, and SR sockeye salmon or destroy or adversely modify their designated critical habitats.

2.8. Incidental Take Statement

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by regulation to include significant habitat modification or degradation that results in death or injury by significantly impairing essential behavioral patterns including breeding, spawning, rearing, migrating, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. For purposes of this consultation, we interpret "harass" to mean an intentional or negligent action that has the potential to injure an animal or disrupt its normal behaviors to a point where such behaviors are abandoned or significantly altered.[7] Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA, if that action is performed in compliance with the terms and conditions of this incidental take statement.

[7] NMFS has not adopted a regulatory definition of harassment under the ESA. The U.S. Fish and Wildlife Service defines "harass" in its regulations as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering (50 CFR 17.3). The interpretation we adopt in this consultation is consistent with the U.S. Fish and Wildlife definition of the term.

2.8.1 Amount or Extent of Take

The Project will occur in rearing, and migration habitat for the seven species in this opinion. Juvenile steelhead and salmonids are likely to be rearing in the action area during construction when adverse habitat effects of the proposed action will occur. Take in the form of harm is reasonably certain to occur because some of those individuals will be injured or killed. Adverse effects to juvenile salmonids will also occur from habitat modifications during construction activities in the action area. Juvenile salmonids in the vicinity that avoid the area will experience behavioral modifications and stress due to avoiding the work area. Adult steelhead and salmon are unlikely to be present in the shallow water areas and during the in-water construction. Adult salmonids are mobile and likely to volitionally move out of the action area during the in-water construction and activities.

The proposed action will implement activities that amount to significant habitat modification or degradation that will cause a physiological effect or impair essential behavioral patterns (rearing, feeding, or migration) and thus increase the likelihood of injury or death. The adverse effects of those actions on habitat will include the following: (1) Behavioral modifications resulting from displacement and temporary impediment and disturbance preventing upstream migration in the construction work area for rearing juveniles; (2) decreased feeding, growth, and survival from reduced short-term access habitat and feeding opportunities in the immediate work area; (3) decreased feeding, growth and survival from reduced water quality and pollution during dredging and excavation; (4) reducing survival from additional stress and increasing exposure to predation.; and (5) reduced survival from additional stress, behavioral modification and from hydroacoustic sound effects.

ESA-listed salmon and steelhead that are located downstream of in-stream work areas will be harassed by increases in turbidity and degraded water quality created by dredging and in-stream construction. Fish avoiding the area will experience behavior modifications and expend additional energy and will increase their likelihood of death or injury by reduced condition and increased exposure to predation. Heavy equipment use in the water and shoreline areas will result in small amount of fuel, oils and chemical that will cause pollution and degrade water quality. In-stream construction will result in increases in sedimentation and temporary reduction of access to habitat and disturb invertebrate forage. The in-in-stream disposal of the native substrates following the dredging will also create increased sediment in the water column. The NMFS anticipates that the visible turbidity plume will not exceed 500 ft downstream from work areas based on similar projects completed by ODFW in the vicinity of the proposed action.

Adverse effects from hydroacoustic sound will likely occur through behavior modification, additional stress and increasing exposure to predation to juvenile salmonids rearing or migrating through the area. The use of only vibratory hammer installation will reduce the potential risk of injury or morality occurring immediately during pile installation; however, cumulative exposure to low sound pressure and delayed take may occur from reduced feeding, altered behavior or stress, and increased vulnerability to predators following when fish leave the vicinity of the project. Since it is not practical for NMFS to identify injuries or take that occurs to fish as a result of exposure to these cumulative vibratory sounds after they have left the project area, NMFS uses the number of 26 new steel piles installed via vibratory hammer as an extent of take indicator.

Salmon and steelhead migrating in the area during construction may encounter harm or injury, behavioral modifications and stress that may decrease feeding, growth and survival. However, there is no practical way to observe or count these individuals without significant additional risk of killing or injuring them. In such circumstances, NMFS uses the causal link established between the activity and a change in habitat conditions affecting the listed species to describe a quantified extent of take. Here, the best available indicator for the extent of take from the associated habitat modification is the length of the visible turbidity plume extending downstream of the in-water work areas because the length of the visible turbidity plume is proportional to all of the take pathways, and it is readily measurable.

In the accompanying opinion, NMFS determines that this level of incidental take is not likely to jeopardize the continued existence of the species or the extent of take of either: (1) a visible turbidity plume in excess of 500 ft length or, (2) vibratory hammer installation of more than 26 piles will trigger the reinitiation provisions of this opinion.

2.8.2 Effect of the Take

In Section 2.7 above, NMFS determines that the level of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

2.8.3 Reasonable and Prudent Measures and Terms and Conditions

"Reasonable and prudent measures" are nondiscretionary measures to minimize the amount or extent of incidental take (50 CFR 402.02). "Terms and conditions" implement the reasonable and prudent measures (50 CFR 402.14). These must be carried out for the exemption in section 7(o)(2) to apply.

The following measures are necessary and appropriate to minimize the impact of incidental take of listed species due to the proposed action:

The COE shall:

1. Minimize incidental take resulting from dredging, pile-installation and construction interaction with fish.
2. Minimize incidental take resulting from construction effects to water quality (turbidity, erosion and pollution).
3. Ensure completion of a monitoring and reporting program to confirm that the take exemption for the proposed action is not exceeded, and that the terms and conditions in this incidental take statement are effective in minimizing incidental take.

2.8.4 Terms and Conditions

The measures described below are non-discretionary, and must be undertaken by the COE and ODFW, must become binding conditions of the permit issued to ODFW, for the exemption in section 7(o)(2) to apply. The COE has a continuing duty to regulate the activity covered by this incidental take statement. If the COE (1) fails to assume and implement the terms and conditions or (2) fails to require ODFW to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit document, the protective coverage of section 7(o)(2) may lapse.

1. To implement Reasonable and Prudent Measure #1 (dredging, pile installation and construction interaction), the COE shall ensure that:

   a. In-water construction and dredging will be conducted during the reduced timeframe contained within the ODFW recommended IWWW.
   b. An ODFW or other supervisory fish biologist experience with in water construction activities in the project area will supervise that the appropriate minimization measure are followed to reduced interactions of equipment with fish.
   c. Pile installation will only occur within the IWWW. All piles will only be installed by the use of a vibratory hammer.

2. To implement Reasonable and Prudent Measure #2 (construction effects to water quality), the COE shall ensure that:

   a. Emergency Erosion Controls. Ensure that a supply of sediment control materials (*e.g.*, biofilter, sandbags, straw bales[8], wattles) is on site for emergency erosion control purposes.
   b. Temporary Erosion Controls. Place and appropriately install erosion controls until site restoration is complete.
   c. Mechanical Staging. Vehicles must be fueled, operated, maintained, and stored as follows:
      i. Vehicle staging, cleaning, maintenance, refueling, and fuel storage must take place in a vehicle staging area 150 ft or more from any stream, waterbody or wetland. All vehicles operated within 150 ft of any stream, waterbody or wetland must be inspected daily for fluid leaks before leaving the vehicle staging area. Any leaks detected must be repaired in the vehicle staging area before the vehicle resumes operation. Inspections must be documented in a record that is available for review on request by COE or NMFS.
      ii. All equipment operated must be cleaned before beginning operations to remove all external oil, grease, dirt, and mud.
      iii. Stabilize all disturbed areas following any break in work unless construction will resume in 4 days.

---

[8] When available, use certified weed-free straw or hay bales to prevent introduction of noxious weeds.

iv. A chemical and pollution control plan will be prepared and carried out, commensurate with the scope of the project, that includes:
   (1) The name, phone number, and address of the person responsible for accomplishing the plan.
   (2) Best management practices to confine, remove, and dispose of construction waste, including every type of debris, discharge water, concrete, petroleum product, or other hazardous materials generated, used, or stored on-site.
   (3) Procedures to contain and control a spill of any hazardous material generated, used or stored onsite, including notification of proper authorities.

3. To implement Reasonable and Prudent Measure #3 (monitoring and reporting), the COE shall:

a. <u>Prepare a Monitoring Report.</u> Conduct monitoring and prepare and submit a report to NMFS describing the applicant's success in meeting the terms and conditions contained in this Opinion. The content of the report shall include:

i. <u>Project identification.</u>
   (1) Project name.
   (2) Type of activity.
   (3) Project location by 6th field USGS HUC and by latitude and longitude as determined from the appropriate 7-minute USGS quadrangle map.
   (4) Supervisory fish biologist – name and contact information.
   (5) Starting and ending dates for work completed.

ii. <u>Photo documentation.</u> Photos of habitat conditions[9] at the in-water work site before, during, and after project completion.
   (1) General views and close-ups showing details of the project and project area, including pre- and post-construction.
   (2) Label each photo with date, time, project name, photographer's name, and the subject.

iii. <u>Monitoring results for construction and pile-driving effects</u>
   (1) Description of the visually monitored downstream extent of turbidity plumes resulting from in-water construction.
   (2) A summary of chemical, pollution and erosion control inspection results, including a description of any erosion control failure, contaminant release, and efforts to correct such incidences.
   (3) A summary of the total duration of all pile installations during the project implementation.

iv. <u>Fish Observation Monitoring</u>
   (1) Any incidence of observed injury or mortality.
   (2) Number of listed salmon and steelhead observed.

---

[9] Relevant habitat conditions may include characteristics of stream channels, eroding and stable streambanks in the project area, riparian vegetation, water quality, flows at base, bankfull and over-bankfull stages, and other visually-discernible environmental conditions at the project area, and upstream and downstream from the project.

(3) Location and condition of salmon and steelhead released.

v. Methods of work area and take minimization.

4. Submit Reports Upon Project Completion. To submit the monitoring report, or to reinitiate consultation, contact:

Oregon State Habitat Office
National Marine Fisheries Service
Attn: **NWR-2012-4014**
1201 NE Lloyd Blvd., Ste. 1100
Portland, OR 97232-2182

2.9. Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02). The following conservation recommendations are discretionary measures that NMFS believes are consistent with this obligation and therefore should be carried out by the Federal action agency:

1. NMFS recommends COE work with other land owners on long-term plans and designs to upgrade and modify other existing pump stations and intakes to prevent injury to fish and aquatic resources.
2. NMFS recommends COE work with private land owners and other non-governmental organizations to seek future funding sources for restoration of more natural streambanks along the developed and altered banks of the Columbia River mainstem upstream and downstream of the action area. Such efforts may increase habitat complexity to benefit fisheries and aquatic resources.

Please notify NMFS if the COE carries out these recommendations so that we will be kept informed of actions that are intended to improve the conservation of listed species or their designated critical habitats.

2.10 Reinitiation of Consultation

As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded, (2) new information reveals effects of the agency action on listed species or designated critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an effect on the listed species or critical habitat not considered in this opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT CONSULTATION

The consultation requirement of section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. The MSA (section 3) defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Adverse effects include the direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside EFH, and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH.

This analysis is based, in part, on the EFH assessment provided by the Federal action agency and descriptions of EFH contained in the fishery management plans developed by the Pacific Fishery Management Council (PFMC) and approved by the Secretary of Commerce for Pacific coast salmon (PFMC 1999)**.**

3.1 Essential Fish Habitat Affected by the Project

The proposed action and action area in this opinion are described in the Introduction to this document. This action area includes areas designated as EFH for all life stages of Chinook salmon.

3.2 Adverse Effects on Essential Fish Habitat

Based on information provided in the BA and the analysis of effects presented in the ESA portion of this document, NMFS concludes the effects on Chinook salmon habitat are the same as those for the listed salmonids in this Opinion and are described in detail in the *Effects of the Action* section of this opinion.

The proposed action is likely to affect EFH in the following manner:

1. In-water construction and excavation will result in loss of the established streambed substrates and shallow-water habitat. Restoration of stream channel and fish passage will have long-term beneficial effects to habitat access.
2. Short-term elevation of turbidity and sedimentation within and immediately upstream and downstream from the construction area. A visible turbidity plume is likely to extend up to 500 ft downstream from in-water work site.
3. A short-term minor decrease in macro-invertebrates may occur as a result of increased fine sediment in stream substrates due to in-stream work. Macro-invertebrates will recolonize the affected area within a few months.
4. Habitat in project area and in-water channel will be temporarily blocked during in-water isolation of work area.

3.3 Essential Fish Habitat Conservation Recommendations

NMFS expects that full implementation of these EFH conservation recommendations would protect, by avoiding or minimizing the adverse effects described in section 3.2 above, approximately 10 acre of designated EFH for Pacific coast salmon.

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, two conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02).

The following two conservation measures are necessary to avoid, mitigate, or offset the impact of the proposed action on EFH. These conservation recommendations are a subset of the ESA terms and conditions.

1. Construction. Follow the term and condition #1 (work area isolation) and term and condition #2 (water quality). Methods will be used to isolate the work from the channel. Water quality will be maintained during construction activities through the use of erosion control measures, proper mechanical staging and the development and implementation of a chemical/pollution contamination plan.
2. Monitoring and Reporting. Follow term and condition #3 (monitoring).

The NMFS believes that these conservation recommendations are necessary conservation measures to avoid, mitigate, or offset the impact of the proposed action on EFH.

The COE is required to complete a supplemental EFH consultation with NMFS if it substantially revises its plans for this action in a manner that may adversely affect EFH or if new information becomes available that affects the basis for NMFS' EFH conservation recommendations [50 CFR 600.920(k)].

3.4 Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, the Federal agency must provide a detailed response in writing to NMFS within 30 days after receiving an EFH Conservation Recommendation from NMFS. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH Conservation Recommendations, unless NMFS and the Federal agency have agreed to use alternative time frames for the Federal agency response. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NMFS Conservation Recommendations, the Federal agency must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects [50 CFR 600.920(k)(1)].

In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we ask that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

3.5 Supplemental Consultation

The COE must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH conservation recommendations [50 CFR 600.920(l)].

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

Section 515 of the Treasury and General Government Appropriations Act of 2001 (Public Law 106-554) (Data Quality Act) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these Data Quality Act (DQA) components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

4.1 Utility: Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users are the COE and ODFW.

An individual copy was provided to the COE. This consultation will be posted on the NMFS Northwest Region website (http://www.nwr.noaa.gov). The format and naming adheres to conventional standards for style.

4.2 Integrity: This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, Security of Automated Information Resources," Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

4.3 Objectivity:

Information Product Category: Natural Resource Plan.
Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA Regulations, 50 CFR 402.01, *et seq*., and the MSA implementing regulations regarding EFH, 50 CFR 600.920(j).

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the Literature Cited section. The analyses in this opinion/EFH consultation contain more background on information sources and quality.

Referencing: All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

Review Process: This consultation was drafted by NMFS staff with training in ESA and MSA implementation, and reviewed in accordance with Northwest Region ESA quality control and assurance processes.

5. REFERENCES

Bell, M.C. 1991. Fisheries handbook of engineering requirements and biological criteria. Fish Passage Development and Evaluation Program. U.S. Army Corps of Engineers. North Pacific Division.

Bindoff, N.L., J. Willebrand, V. Artale, A, Cazenave, J. Gregory, S. Gulev, K. Hanawa, C. Le Quéré, S. Levitus, Y. Nojiri, C.K. Shum, L.D. Talley and A. Unnikrishnan. 2007. Observations: Oceanic Climate Change and Sea Level. P. 385-432 in: Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.). Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Bjornn, T.C. and D.W. Reiser. 1991. Habitat requirements of salmonids in streams in W.R. Meehan, editor. Influences of forest and rangeland management on salmonid fishes and their habitats. American Fisheries Society Special Publication, 19:83-138.

BOR (Bureau of Reclamation). 2001. Final Biological Assessment of Effects to Multiple Listed Salmonid Species From Continued Operation and Maintenance of the Umatilla Project and Umatilla Basin Project, and Effects to Essential Fish Habitat for Chinook Salmon. Supplemental to the December, 1999 Biological Assessment on the Federal Columbia River Power System Prepared for the National Marine Fisheries Service, Portland, OR by Upper Columbia Area Office, BOR, Yakima, WA. 89 p. plus appendices.

Bottom, D.L., C.A. Simenstad, J. Burke, A.M. Baptista, D.A. Jay, K.K. Jones, E. Casillas, and M.H. Schiewe. 2005. Salmon at river's end: The role of the estuary in the decline and recovery of Columbia River salmon. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-68. 246 p.

Bradbury, B., W. Nehlsen, T.E. Nickelson, K.M.S. Moore, R.M. Hughes, D. Heller, J. Nicholas, D.L. Bottom, W.E. Weaver, and R.L. Beschta. 1995. Handbook for prioritizing watershed protection and restoration to aid recovery of native salmon: Ad hoc working group sponsored by Oregon State Senator Bill Bradbury, Pacific Rivers Council. 56 p.

Busch, S., P. McElhany, and M. Ruckelshaus. 2008. A comparison of the viability criteria developed for management of ESA listed Pacific salmon and steelhead. National Marine Fisheries Service, Northwest Fisheries Science Center. Seattle. http://www.nwfsc.noaa.gov/trt/trt_documents/viability_criteria_comparison_essay_oct_10.pdf.

Campbell, E., and J. Van Staveren. 2012. Biological Assessment for Stahl H.B. Farm and JSH Farm River Pumping Stations: Fish Screening and Intake Modifications Projects . Prepared by Pacific Habitat Services, Inc. September 11, 2012.

CRITFC (Columbia River Intertribal Fish Commission). 1995. Wy-Kan-Ush-Mi Wa-Kish-Wit: Spirit of the Salmon, the Columbia River Anadromous Fish Restoration Plan of the Nez Perce, Umatilla, Warm Springs, and Yakama Tribes. Two Volumes. Columbia River Inter-Tribal Fish Commission and member Tribes. Portland, Oregon.

Dolat, S.W. 1997. Acoustic measurements during the Baldwin Bridge demolition. Prepared for White Oak Construction by Sonalysts, Inc, Waterford, CT. March 14. 34 p. plus appendices.

Enger, P.S., H.E. Karlsen, F.R. Knudsen, and O. Sand. 1993. Detection and reaction of fish to infrasound. Fish Behavior in Relation to Fishing Operations, 1993, ICES Marine Science Symposia. 196:108-112. Copenhagen, Sweden.

FHWG (Fisheries Habitat Working Group). 2008. Agreement in Principal for Interim Criteria for Injury to Fish from Pile driving Activities. Memorandum of Agreement between N0AA Fisheries ‘ Northwest and Southwest Regions: USFWS Regions 1 and 8; California, Washington and Oregon Department of Transportation; California Department of Fish and Game; and Federal Highways Administration. June 12, 2008.

Ford, M.J. (ed.). 2011. Status review update for Pacific salmon and steelhead listed under the Endangered Species Act: Pacific Northwest. U.S. Dept. Commerce. NOAA Tech. Memo. NMFS-NWFSC-113, 281 p.

Fresh, K.L., E. Casillas, L.L. Johnson, and D.L. Bottom. 2005. Role of the estuary in the recovery of Columbia River Basin salmon and steelhead: An evaluation of the effects of selected factors on salmonid population viability. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-69, 105 p.

Good, T. P., R. S. Waples & P. B. Adams. 2005. Updated status of federally listed ESUs of West Coast salmon and steelhead. U.S. Department of Commerce, NOAA Technical Memorandum, NMFS-NWFSC-66. 598 pp.

Groot, C. and L. Margolis (editors). 1991. Pacific Salmon Life Histories. Univ. of British Columbia Press, Vancouver, B.C.

Hastings, M.C., A.N. Popper, J.J. Finneran, and P. Lanford. 1996. Effects of low frequency sound on hair cells of the inner ear and lateral line of the teleost fish *Astronotus ocellatus*. Journal of the Acoustical Society of America 99: 1759-1766.

Hastings, M.C., and A.N. Popper. 2005 (revised). Effects of sound on fish. Report to California Department of Transportation, contract no. 43A0139, task order 1.

Hebdon, J.L., P. Kline, D. Taki, and T.A. Flagg. 2004. Evaluating reintroduction strategies for Redfish Lake Sockeye Salmon captive brood progeny. American Fisheries Society Symposium 44:401-413. http://www.mendeley.com/research/evaluating-reintroduction-strategies-redfish-lake-sockeye-salmon-captive-broodstock-progeny/

Hogarth, W.T. 2005. Memorandum from William T. Hogarth, to Regional Administrators, Office of Protected Resources, NMFS, Regarding Application of the "Destruction or Adverse Modification" Standard Under Section 7(a)(2) of the Endangered Species Act, 3p. November 7.

Idaho Department of Environmental Quality. 2011. Idaho Department of Environmental Quality final 2010 integrated report. Boise, Idaho.

Interior Columbia Basin Technical Recovery Team (ICTRT). 2003. Independent populations of Chinook, steelhead, and sockeye for listed evolutionarily significant units within the Interior Columbia River domain. July. U.S. Department of Commerce, NOAA Fisheries.

Interior Columbia Basin Technical Recovery Team (ICTRT). 2007. Viability criteria for application to Interior Columbia Basin salmonid ESUs. Interior Columbia Tecnical Recovery Team, review draft (March). Northwest Fisheries Science Center, National Marine Fisheries Service. Seattle.

Interior Columbia Basin Technical Recovery Team (ICTRT). 2011. Draft recovery plan for Idaho Snake River spring/summer Chinook and steelhead populations in the Snake River spring/summer Chinook salmon evolutionarily significant unit and Snake River steelhead distinct population segment (chapters 1-3). National Marine Fisheries Service, Northwest Region, Protected Resources Division. Boise, Idaho. http://www.idahosalmonrecovery.net.

ISAB (Independent Scientific Advisory Board). 2007. Climate change impacts on Columbia River Basin fish and wildlife. ISAB Climate Change Report, ISAB 2007-2, Northwest Power and Conservation Council, Portland, Oregon.

Keefer, M.L., C.A. Peery, and M.J. Henrich. 2008. Temperature mediated en route migration mortality and travel rates of endangered Snake River sockeye salmon. Ecology of Freshwater Fish 17:136-145.

Knudsen, F.R., P.S. Enger, and O. Sand. 1994. Avoidance responses to low frequency sound in downstream migrating Atlantic salmon smolt, *Salmo salar*. Journal of Fish Biology 45:227–233.

Knudsen, F.R., C.B. Schreck, S.M. Knapp, P.S. Enger and O. Sand. 1997. Infrasound produces flight and avoidance responses in Pacific juvenile salmonids. Journal of Fish Biology.

McElhany, P., M.H. Ruckelshaus, M.J. Ford, T.C. Wainwright, and E.P. Bjorkstedt. 2000. Viable salmonid populations and the recovery of evolutionarily significant units. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-42. Seattle. 156 p.

McElhany, P., C. Busack, M. Chilcote, S. Kolmes, B. McIntosh, J. Myers, D. Rawding, A. Steel, C. Steward, D. Ward, T. Whitesel, and C. Willis. 2006. Revised viability criteria for salmon and steelhead in the Willamette and Lower Columbia basins. Review Draft. Willamette/Lower Columbia Technical Recovery Team and Oregon Department of Fish and Wildlife.

McElhany, P., M. Chilcote, J. Myers, and R. Beamesderfer. 2007. Viability status of Oregon salmon and steelhead populations in the Willamette and Lower Columbia Basins. Prepared for Oregon Department of Fish and Wildlife and National Marine Fisheries Service, Portland, Oregon.

Neff, J.M. 1985. Polycyclic aromatic hydrocarbons. Pages 416-454 *in* G.M. Rand and S.R. Petrocelli, editors. Fundamentals of aquatic toxicology, Hemisphere Publishing, Washington D.C.

NMFS (National Marine Fisheries Service). 1996. Making Endangered Species Act determinations of effect for individual and grouped actions at the watershed scale. The National Marine Fisheries Service Environmental and Technical Services Division, Habitat Conservation Branch, Seattle, WA. Available at:
http://www.nwr.noaa.gov/Publications/Reference-Documents/upload/matrix_1996.pdf

NMFS (National Marine Fisheries Service). 2000. Guidelines for Electrofishing Waters Containing Salmonids Listed Under the Endangered Species Act. June.

NMFS (National Marine Fisheries Service). 2005. NOAA Fisheries' Critical Habitat Analytical Review Teams for 12 Evolutionarily Significant Units of West Coast Salmon and Steelhead. Appendix J - CHART Assessment for the Middle Columbia River Steelhead ESU. Protected Resources Division, Portland, Oregon. 76 p.

NMFS. 2007. 2007 Report to Congress: Pacific Coastal Salmon Recovery Fund, FY 2000-2006. U.S. Department of Commerce, NOAA, National Marine Fisheries Service. Washington, D.C.

NMFS. 2009. Middle Columbia River steelhead distinct population segment ESA recovery plan. November 30. http://www.nwr.noaa.gov/Salmon-Recovery-Planning/Recovery-Domains/Interior-Columbia/Mid-Columbia/Mid-Col-Plan.cfm.

NMFS (National Marine Fisheries Service). NMFS. 2011. Pacific Coastal Salmon Recovery Fund FY 2000-2010.Available at www.nwr.noaa.gov

NMFS (National Marine Fisheries Service). 2011a. Anadromous Salmonid Passage Facility Design. NMFS, Northwest Region, Portland, Oregon.

NMFS. 2011b. 5-year review: summary and evaluation of Snake River sockeye, Snake River spring-summer Chinook, Snake River fall-run Chinook, Snake River Basin steelhead. National Marine Fisheries Service, Portland, Oregon.

NMFS (National Marine Fisheries Service). 2011c. 2011 Report to Congress: Pacific Coastal Salmon Recovery Fund FY 2000 – 2010. National Marine Fisheries Service, Northwest Region. Portland, Oregon.

NOAA Fisheries. 2005. Assessment of NOAA Fisheries' critical habitat analytical review teams for 12 evolutionarily significant units of West Coast salmon and steelhead. National Oceanic and Atmospheric Administration, NMFS-Protected Resources Division. Portland, Oregon.

NOAA Fisheries. 2011. Biennial report to Congress on the recovery program for threatened and endangered species October 1, 2008 – September 30, 2010. NOAA-National Marine Fisheries Service. Washington, D.C.

NPCC (Northwest Power and Conservation Council). 2004. Umatilla and Willow Rivers Subbasin Plan. Prepared by Confederated Tribes of the Umatilla Indian Reservation, Morrow Soil and Water Conservation District, Oregon Department of Fish and Wildlife, Umatilla County Soil and Water Conservation District, Umatilla Basin Irrigation Districts Association, Umatilla Basin Watershed Council. May 28. 382 p. plus appendix.

NRC. 1995. Science and the Endangered Species Act. Committee on Scientific Issues in the Endangered Species Act, Board on Environmental Studies and Toxicology, Commission on Life Sciences. National Research Council, National Academy Press. Washington, D.C.

NWPCC (Northwest Power and Conservation Council). 2012. The State of the Columbia River Basin. Northwest Power and Conservation Council. Portland, Oregon

PFMC (Pacific Fishery Management Council). 1999. Amendment 14 to the Pacific Coast Salmon Plan. Appendix A: Description and identification of essential fish habitat, adverse impacts and recommended conservation measures for salmon. Pacific Fishery Management Council, Portland, Oregon. March.

ODEQ (Oregon Department of Environmental Quality). 2006. Oregon's 2004/2006 Integrated Report. Portland, Oregon.

ODFW (Oregon Department of Fish and Wildlife) and CTUIR (Confederated Tribes of Umatilla Indian Reservation). 2006. Five-Year Action Plan for the Development and Maintenance of Habitat Improvement Projects in the Umatilla Subbasin: 2006-2010. Prepared/ funded for U.S. Department of Energy Bonneville Power Administration. March.

ODFW (Oregon Department of Fish and Wildlife). 2008. Oregon guidelines for timing of in-water work to protect fish and wildlife resources. Salem.

OWEB (Oregon Watershed Improvement Board). 2011. The Oregon Plan for Salmon and Watersheds: Biennial Report Executive Summary. Oregon Watershed Enhancement Board. Salem, Oregon. Revised January 24, 2011.

Reed, D.H., J.J. O'Grady, J.D. Ballou, and R. Frankham. 2003. The frequency and severity of catastrophic die-offs in vertebrates. Animal Conservation 6:109-114.

Sand, O., P.S. Enger, H.E. Karlsen, F. Knudsen and T. Kvernstuen. 2000. Avoidance responses to infrasound in downstream migrating European silver eels, *Anguilla anguilla*. Environmental Biology of Fishes. 57:327-336.

Scholik, A.R., and H.Y. Yan. 2002. Effects of boat engine noise on the auditory sensitivity of the fathead minnow, Pimephales promelas. Environmental Biology of Fishes 63:203-209.

Scheuerell, M.D., and J.G. Williams. 2005. Forecasting climate-induced changes in the survival of Snake River spring/summer Chinook salmon (*Oncorhynchus tshawytscha*). Fisheries Oceanography 14:448-457.

Servizi, J. A., and D. W. Martens. 1991. Effects of temperature, season, and fish size on acute lethality of suspended sediments to Coho Salmon. Canadian Journal of Fisheries and Aquatic Sciences 49:1389-1395.

Sigler, J.W. 1988. Effects of chronic turbidity on anadromous salmonids: recent studies and assessment techniques perspective. Pages 26-37. C. A. Simenstad. Effects of dredging on anadromous Pacific coast fishes. Washington Sea Grant Program. Washington State University. Seattle, Washington.

Spence, B.C., G.A. Lomnicky, R.M. Hughes, and R.P. Novitzki. 1996. An Ecosystem Approach to Salmonid Conservation. TR-4501-96-6057. ManTech Environmental Research Services Corp., Corvallis, Oregon. December. http://www.nwr.noaa.gov/1habcon/habweb/habguide/ManTech/front.htm

Stadler, J.F. and D.P. Woodbury. 2009. Assessing the effects to fish from pile driving: Application of new hydroacoustic criteria. Presented to InterNoise 2009 conference: Innovations in practical noise control. August 23-26, 2009. Ottowa, Canada

U.S. Department of Commerce. 2006. U.S. Census Bureau, State and County Quickfacts. Available at http://quickfacts.census.gov/qfd/states/41/41059.html.

UCSRB. 2007. Upper Columbia spring Chinook salmon and steelhead recovery plan. Upper Columbia Salmon Recovery Board. http://www.nwr.noaa.gov/Salmon-Recovery-Planning/Recovery-Domains/Interior-Columbia/Upper-Columbia/upload/UC_Plan.pdf

USGCRP (U.S. Global Change Research Program). 2009. Global Climate Change Impacts in the United States. Cambridge University Press, New York. http://waterwebster.org/documents/climate-impacts-report.pdf.

Wainwright, T.C., M.W. Chilcote, P.W. Lawson, T.E. Nickelson, C.W. Huntington, J.S. Mills, K.M.S. Moore, G.H. Reeves, H.A. Stout, and L.A. Weitkamp. 2008. Biological recovery criteria for the Oregon Coast coho salmon evolutionarily significant unit. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service. NOAA Technical Memorandum NMFS-NWFSC-91. Seattle. http://docs.lib.noaa.gov/noaa_documents/NMFS/NWFSC/TM_NMFS_NWFSC/TM_NMFS_NWFSC_91.pdf

Waples, R.S. 1991. Definition of 'species' under the Endangered Species Act: Application to Pacific salmon. U.S. Department of Commerce, National Marine Fisheries Service, Northwest Fisheries Science Center, NOAA Technical Memorandum NMFS- F/NWC-194.

Wissmar, R.C., J.E. Smith, B.A. McIntosh, H.W. Li, G.H. Reeves, and J.R. Sedell. 1994. Ecological health of river basins in forested regions of eastern Washington and Oregon. General Technical Report PNW-GTR-326, U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Portland, Oregon. http://www.fs.fed.us/pnw/publications/gtr326/pnw_gtr326a.pdf.

Wursig B., C. R. Greene and T. A. Jefferson. 2000. Development of an Air Bubble Curtain to Reduce Underwater Noise from Percussive Piling. Marine Environmental Research. 49: 19-93.

Zabel, R.W., M.D. Scheuerell, M./M. McClure, and J.G. Williams. 2006. The interplay between climate variability and density dependence in the population viability of Chinook salmon. Conservation Biology 20:190-200.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Oregon Fish and Wildlife Office
2600 SE 98th Avenue, Suite 100
Portland, Oregon 97266
Phone: (503)231-6179FAX: (503)231-6195

Reply To: 8330.F0003(13)
File Name: Stahl JSH Farms BO.docx
TS Number: TS IJ-7 – –
TAILS: OIEOFW00-2013-F-0003
Doc Type: Final

JAN -3 2013

Michael Turaski
Acting Chief, Regulatory Branch
Department of the Army
Corps of Engineers, Portland District
P.O. Box 2946
Portland, Oregon 97208-2946

Subject: Formal Consultation for the Stahl H.B. and JSH Farm River Pumping Station: Fish Screening and Intake Modification Project Middle Columbia-Lake Wallula, Umatilla County, Oregon

Dear Mr. Turaski:

This is in response to your request for formal consultation that was in a letter dated September 20, 2012, transmitting your evaluation of the effects to the threatened Columbia River population of bull trout *(Salvelinus conjl.uentus)* and bull trout critical habitat, from the Stahl H.B. and JSH Farm River Pumping Station: Fish Screening and Intake Modification Project Middle Columbia-Lake Wallula, Umatilla County, Oregon. This document transmits the Fish and Wildlife Service's (Service) biological opinion (BO) based on our review of the above-mentioned project and its effects on bull trout and bull trout critical habitat in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.)*.

After reviewing the current status of bull trout, bull trout critical habitat, environmental baseline for the action area, and effects of the proposed action, it is the Service's opinion that the above-mentioned project is not likely to jeopardize the continued existence of bull trout and is not likely to destroy or adversely modify bull trout critical habitat. This BO is based on information provided in the September 11, 2012 biological assessment for the project addressing Columbia River bull trout and bull trout critical habitat. A complete administrative record of this consultation is on file at the Oregon Fish and Wildlife Office, Portland, Oregon.

If you have any questions or concerns regarding this BO, please contact Dan Perritt at (503) 231-6179.

Sincerely,

f&<v–tate Supervisor

Endangered Species Act-Section 7 Consultation

Biological Opinion

U.S. Fish and Wildlife Service
TAILS No: OIEOFW00-2013-F-0003

Stahl H.B. and JSH Farm River Pumping Station:
Fish Screening and Intake Modification Project
Middle Columbia-Lake Wallula, Umatilla County, Oregon

Agency: Department of the Army, Corps of Engineers, Portland District

1-3-13

Paul Henson, Ph.D.
(tl- State Supervisor

Date

Introduction

After reviewing the current status of bull trout *(Salvelinus conjluentus),* bull trout critical habitat, environmental baseline for the action area, effects of the proposed action, and anticipated cumulative effects, it is the Service's opinion that the Stahl H.B. and JSH Farm River Pumping Station: Fish Screening and Intake Modification Project is not likely to jeopardize the continued existence of bull trout and is not likely to destroy or adversely modify bull trout critical habitat. This BOis based on information provided in the biological assessment (BA) (Campbell and Van Staveren 2012) dated September 11, 2012 for the proposed action addressing bull trout and bull trout critical habitat.

Consultation History

This BOis based on correspondence and discussions with Pacific Habitat Services. Inc. (Wilsonville, Oregon), Corps of Engineers (COE), National Marine Fisheries Service (NMFS), and the Fish and Wildlife Service (Service).

A brief history of the consultation is included below:

- July 17, 2012- The Service received a draft copy of the BA for the Stahl H.B. and JSH Farm River Pumping Station: Fish Screening and Intake Modification Project.
- August 2012- The Service provided comments on the draft BA to Eric Campbell, Pacific Habitat Services, Inc.
- September 24, 2012 - A request for formal Section 7 consultation along with the final BA was received from the COE at the Service's La Grande Field Office.
- October 10, 2012 - Formal Section 7 consultation was initiated for the proposed action at the Service's Oregon Fish and Wildlife Office (OFWO), Portland, Oregon.

Biological Opinion

The COE made a determination of *"may affect, likely to adversely affect"* for the threatened bull trout and *"adverse/beneficial affect without adverse modification"* for bull trout critical habitat.

Proposed Action Description

The purpose and need for the proposed action is three-fold: 1) to remove (dredge) accumulated sediments in front of and underneath the Stahl H.B. Farm pumping station, 2) modify and extend the Stahl H.B. and JSH Farm water intakes, and 3) update the fish screening facilities at both pumping stations to current NMFS criteria. All of these activities are proposed to be completed in 2013 during the Oregon Department ofFish and Wildlife (ODFW) preferred in-water work period between January 1 and February 28. Normal operation of the pumping facilities occurs from April through October.

Dredging Activities. To complete proposed modifications at the Stahl H.B. Farm pumping station, a suction dredge operating from a floating barge will remove approximately 300 cubic yards of accumulated sediment in front of and underneath the pumping station. Accumulated sediments consist of coarse to very coarse sand, as determined through sediment sampling. Removed dredge materials will be returned back to the Columbia River channel approximately 300 feet north of the pumping station at a channel depth of approximately 40 feet. Conditions associated with the Oregon Department of Environmental Quality's 401 Water Quality Certification will be followed during dredging activities. After the removal of dredged materials, a sheet pile wall that extends approximately 35 feet into the active river channel will be removed at the west end of the pumping station.

Water Intake Activities. New 72-inch and 60-inch diameter intake pipes will be installed at the Stahl H.B. and JSH pumping stations, respectively. Intake pipes will extend into deeper water approximately 180 feet out into the Columbia River channel from the pumping stations. Steel piles will be installed in the river bottom with a vibrating hammer to construct the intake pipe cradle supports. Steel manifolds will be attached to the intake pipes. Steel connecting pipes will be installed between the manifolds and each pump unit. Detailed engineered drawings are included in the BA.

Fish Screening Activities. Four new pump cans will be installed on the channel ends of the intake pipes for both pumping stations. Each can will be fitted with NMFS approved slotted fish screens. These screens will improve upon the intake velocity and meet NMFS fish screen criteria to prevent entrainment or impingement of juvenile salmonids during pumping operations. Detailed engineered drawings are included in the BA.

Site Restoration. Site restoration is not anticipated, but if upland areas are disturbed during project staging or access, the areas will be restored with appropriate methods (e.g., grading, hydro-seeding, and/or native plantings).

Action Area

Action area is defined as all areas affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). For the purposes of this consultation, the action area is defined as an area 300 feet around and 500 feet downstream and upstream of the proposed in-water dredging and disposal operation and intake pipe/fish screen installations. The project site is located at river mile 301.6 on the Columbia River, near Hermiston, Oregon in Umatilla County. This action area will encompass any temporary, short-term, or long- term effects of the proposed action to the bull trout and bull trout critical habitat.

Analytical Framework for the Jeopardy and Adverse Modification Determinations

Jeopardy determination

In accordance with policy and regulation, the jeopardy analysis in this BO relies on four components: (1) the Status ofthe Species, which evaluates range-wide conditions, the factors responsible for that condition, and survival and recovery needs for the species covered under the BO; (2) the Environmental Baseline, which evaluates the condition of the species in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the covered species; (3) the Effects of the Proposed Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the covered species; and (4) Cumulative Effects, which evaluates the effects of future, non-Federal activities in the action area on the covered species.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the current status of the species covered under the BO, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the covered species in the wild by reducing the reproduction, numbers, or distribution of the species.

The jeopardy analysis in this BO places an emphasis on consideration of the range-wide survival and recovery needs of the species covered under the BO and the role of the action area in the survival and recovery of the covered species as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Adverse modification determination

This BO does not rely on the regulatory definition of"destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the Endangered Species Act (ESA) to complete the following analysis with respect to critical habitat.

In accordance with policy and regulation, the adverse modification analysis in this BO relies on four components: (1) the Status of Critical Habitat, which evaluates the range-wide condition of designated critical habitats for the species covered under the BO in terms of primary constituent elements (PCEs), the factors responsible for that condition, and the intended recovery function of the critical habitat overall; (2) the Environmental Baseline, which evaluates the condition of the critical habitat in the action area, the factors responsible for that condition, and the recovery role of the critical habitat in the action area; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the PCEs and how that will influence the recovery role of affected critical habitat units; and (4) Cumulative Effects, which evaluates the effects of future, non-Federal activities in the action area on the PCEs and how that will influence the recovery role of affected critical habitat units.

For purposes of the adverse modification determination, the effects of the proposed Federal action on critical habitats for the species covered under the BO are evaluated in the context of the range- wide condition of the critical habitat, taking into account any cumulative effects, to determine if the critical habitat range-wide would remain functional (or would retain the current ability for the PCEs to be functionally established in areas of currently unsuitable but capable habitat) to serve its intended recovery role for the covered species.

The analysis in this BO places an emphasis on using the intended range-wide recovery function of critical habitats for the species covered under the BO and the role of the action area relative to that intended function as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the adverse modification determination.

Status of the Species

Listing History. The coterminous United States population of the bull trout (Salvelinus confluentus) was listed as threatened on November 1, 1999 (64 FR 58910). The final designation of critical habitat for bull trout in the coterminous United States was completed in 2010 (75 FR 63898).

Distribution. The historical range of bull trout in the coterminous United States extended from the Canadian border south to the Jarbidge River in northern Nevada and from the Pacific Ocean inland to the Clark Fork River in western Montana and the Little Lost River in central Idaho. Genetic analyses have shown that bull trout in the coterminous United States are divided into major genetically differentiated *(e.g.,* evolutionary) groups or lineages (Spruell *et al.* 2003, Ardren *et al.* 2010, Taylor *eta/.* 1999). At a coarse scale, these assessments have identified the existence of distinct "coastal" and "interior" lineages. The "coastal" lineage includes the Deschutes River and all of the Columbia River drainage downstream (including the Willamette Basin), as well as coastal streams in Washington, Oregon, and British Columbia. The "interior" lineage includes tributaries of the Columbia River upstream from the John Day River, including major river basins in northeastern Oregon, eastern Washington, Idaho, and northwestern Montana.

Life History. Bull trout exhibit both resident and migratory life-history strategies (Rieman and Mcintyre 1993). Resident bull trout complete their entire life cycle in the tributary (or nearby) streams in which they spawn and rear. Migratory bull trout spawn in tributary streams where juvenile fish rear one to four years before migrating to either a lake (adfluvial form), river (fluvial form) (Fraley and Shepard 1989, Goetz 1989), or in certain coastal areas, to saltwater (anadromous) (Cavender 1978, McPhail and Baxter 1996, WDFW 1997). Resident and migratory life-history forms may be found together, but it is unknown if they represent a single population or separate populations (Rieman and Mcintyre 1993). Either form may give rise to offspring exhibiting either resident or migratory behavior (Rieman and Mcintyre 1993). The multiple life-history strategies found in bull trout populations represent important diversity (both spatial and genetic) that help protect these populations from environmental stochasticity.

The size and age of bull trout at maturity depends upon the life history strategy and habitat limitations. Resident fish tend to be smaller than migratory fish at maturity and produce fewer eggs (Fraley and Shepard 1989, Goetz 1989). Resident adults usually range from 150-300 millimeters (mm) (6-12 inches) total length (TL). Migratory adults however, having lived for several years in larger rivers or lakes and feeding on other fish, grow to a much larger size and commonly reach 600 millimeters (24 inches) TL or more (Pratt 1985, Goetz 1989). The largest verified bull trout was a 14.6 kilogram (32 pound) adfluvial fish caught in Lake Pend Oreille, Idaho, in 1949 (Simpson and Wallace 1982). Size differs little between life history forms during their first years of life in headwater streams, but diverges as migratory fish move into larger and more productive waters (Rieman and Mcintyre 1993).

Ratliff(1992) reported that bull trout under 100 nun (4 inches) in length were generally only found in the vicinity of spawning areas, and that fish over 100 nun were found downstream in larger channels and reservoirs in the Metolius River Basin. Juvenile migrants in the Umatilla River were primarily 100-200 mm long (4-8 inches) in the spring and 200-300 nun long (8-12 inches) in October (Buchanan *et al.* 1997). The age at migration for juveniles is variable. Ratliff (1992) reported that most juveniles reached a size to migrate downstream at age 2. Pratt (1992) had similar findings for age-at-migration of juvenile bull trout from tributaries of the Flathead River. The seasonal timing of juvenile downstream migration appears similarly variable.

Bull trout normally reach sexual maturity in 4-7 years and may live longer than 12 years. The species is iteroparous *(i.e.,* can spawn multiple times in their lifetime) and adults may spawn each year or in alternate years (Batt 1996). Repeat spawning frequency and post spawning mortality are not well documented (Leathe and Graham 1982, Fraley and Shepard 1989, Pratt 1992, Rieman and Mcintyre 1996), but post spawning survival rates are believed to be high.

Bull trout typically spawn from late August-November during periods of decreasing water temperatures *(i.e.,* below 9 °C/48 °F). Redds are often constructed in stream reaches fed by springs or near other sources of cold groundwater (Goetz 1989, Pratt 1992, Rieman and Mcintyre 1996). Migratory bull trout frequently begin spawning migrations as early as April and have been known to move upstream as far as 250 kilometers (km) (155 miles) to spawning grounds in Montana (Fraley and Shepard 1989, Swanberg 1997). In Idaho, bull trout moved 109 km (67.5 miles) from Arrowrock Reservoir to spawning areas in the headwaters ofthe Boise River (Flatter 1998). In the Blackfoot River, Montana, bull trout began spring spawning migrations in response to increasing temperatures (Swanberg 1997). Depending on water temperature, egg incubation is normally 100-145 days (Pratt 1992), and after hatching, juveniles remain in the substrate. Time from egg deposition to emergence of fry may surpass 220 days. Fry normally emerge from early April through May, depending on water temperatures and increasing stream flows (Pratt 1992, Ratliff and Howell1992).

Bull trout are opportunistic feeders, with food habits primarily a function of size and life history strategy. Resident and juvenile migratory bull trout prey on terrestrial and aquatic insects, macro-zooplankton, and small fish (Boag 1987, Goetz 1989, Donald and Alger 1993). Adult migratory bull trout feed on various fish species (Leathe and Graham 1982, Fraley and Shepard 1989, Brown 1992, Donald and Alger 1993). In coastal areas of western Washington, bull trout feed on Pacific herring *(Clupea pallasi),* Pacific sand lance *(Ammodytes hexapterus),* and surf smelt *(Hypomesus pretiosus)* in the ocean (WDFW 1997).

Population Dynamics. Although bull trout are widely distributed over a large geographic area, they exhibit a patchy distribution, even in pristine habitats (Rieman and Mcintyre 1993). Increased habitat fragmentation reduces the amount of available habitat and increases isolation from other populations of the same species (Saunders *et al.* 1991). Burkey (1989) concluded that when species are isolated by fragmented habitats, low rates of population growth are typical in local populations and their probability of extinction is directly related to the degree of isolation and fragmentation. Without sufficient immigration, growth for local populations may be low and probability of extinction high (Burkey 1989, Burkey 1995).

Metapopulation concepts of conservation biology theory have been suggested relative to the distribution and characteristics of bull trout, although empirical evidence is relatively scant (Rieman and Mcintyre 1993, Dunham and Rieman 1999, Rieman and Dunham 2000). A metapopulation is an interacting network of local populations with varying frequencies of migration and gene flow among them (Meffe and Carroll1994). For inland bull trout, metapopulation theory is most likely applicable at the watershed scale where habitat consists of discrete patches or collections of habitat capable of supporting local populations; local populations are for the most part independent and represent discrete reproductive units; and long-term, low-rate dispersal patterns among component populations influences the persistence of at least some of the local populations (Rieman and Dunham 2000).

Ideally, multiple local populations distributed throughout a watershed provide a mechanism for spreading risk because the simultaneous loss of all local populations is unlikely. However, habitat alteration, primarily through the construction of impoundments, dams, and water diversions has fragmented habitats, eliminated migratory corridors, and in many cases isolated bull trout in the headwaters of tributaries (Rieman *eta/.* 1997, Dunham and Rieman 1999, Spruell *eta/.* 1999, Rieman and Dunham 2000). Accordingly, human-induced factors as well as natural factors affecting bull trout distribution have likely limited the expression of the metapopulation concept for bull trout to patches of habitat within the overall distribution ofthe species (Dunham and Rieman 1999).

However, despite the theoretical fit, the relatively recent and brief time period during which bull trout investigations have taken place does not provide certainty as to whether a metapopulation dynamic is occurring *(e.g.,* a balance between local extirpations and recolonizations) across the range of bull trout or whether the persistence of bull trout in large or closely interconnected habitat patches (Dunham and Rieman 1999) is simply reflective of a general deterministic trend towards extinction of the species where the larger or interconnected patches are relics of historically wider distribution (Rieman and Dunham 2000). Recent research (Whiteley *eta/.* 2003) does, however, provide stronger genetic evidence for the presence of a metapopulation process for bull trout, at least in the Boise River basin of Idaho.

Reasons for Listing. Bull trout distribution, abundance, and habitat quality have declined rangewide (Bond 1992, Schill 1992, Thomas 1992, Ziller 1992, Rieman and Mcintyre 1993, Newton and Pribyl 1994, IDFG *in /itt.* 1995, McPhail and Baxter 1996). Several local extirpations have been documented, beginning in the 1950's (Rode 1990, Ratliff and Howell 1992, Donald and Alger 1993, Goetz 1994, Newton and Pribyl 1994, Berg and Priest 1995, Light *eta/.* 1996, Buchanan *eta/.* 1997, WDFW 1998). Bull trout were extirpated from the southernmost portion of their historic range, the McCloud River in California, around 1975 (Moyle 1976, Rode 1990). Bull trout have been functionally extirpated *(i.e.,* few individuals may occur there, but do not constitute a viable population) in the Coeur d'Alene River basin in Idaho and in the Lake Chelan and Okanogan River basins in Washington (64 FR 58910).

These declines result from the combined effects of habitat degradation and fragmentation, the blockage of migratory corridors; poor water quality, angler harvest and poaching, entrainment into diversion channels and dams, and introduced nonnative species. Specific land and water management activities that depress bull trout populations and degrade habitat include dams and other diversion structures, forest management practices, livestock grazing, agriculture, agricultural diversions, road construction and maintenance, mining, and urban and rural development (Beschta *eta/.* 1987, Chamberlain *eta/.* 1991, Furniss *eta/.* 1991, Meehan 1991, Nehlsen *eta/.* 1991, Sedell and Everest 1991, Craig and Wissmar 1993, Henjum *eta/.* 1994, Mcintosh *eta/.* 1994, Wissmar *et a/.* 1994, MBTSG 1995a-e, MBTSG 1996a-b, Light *eta/.* 1996, USDA 1995).

Rangewide Trend In the rules listing bull trout as threatened, the Service identified subpopulations *(i.e.,* isolated groups ofbull trout thought to lack two-way exchange of individuals), for which status, distribution, and threats to bull trout were evaluated. Because habitat fragmentation and barriers have isolated bull trout throughout their current range, a subpopulation was considered a reproductively isolated group of bull trout that spawns within a particular river or area of a river system. Overall, 187 subpopulations were identified in the 5 distinct population segments, 7 in the Klamath River, 141 in the Columbia River, 1 in the Jarbidge River, 34 in the Coastal-Puget Sound, and 4 in the St. Mary-Belly River populations. No new subpopulations have been identified and no subpopulations have been lost since listing.

Critical Habitat. Over the past several years, the Service has published several proposed and final critical habitat rules for bull trout populations. The latest final bull trout critical habitat rule was completed and published on October 18, 2010 for bull trout in the coterminous United States (75 FR 63898).

Primary Constituent Elements of Critical Habitat. The Service used the best scientific and commercial data available to designate critical habitat, giving consideration to those physical and biological features that are essential to bull trout survival. Within the critical habitat areas, the primary constituent elements (PCEs) for bull trout are those habitat components that are essential for the primary biological needs of foraging, reproducing, rearing of young, dispersal, genetic exchange, or sheltering. In the 2010 final bull trout critical habitat rule (75 FR 63898), the Service listed the following PCEs.

1. Springs, seeps, groundwater sources, and subsurface water connectivity (hyporehic flows) to contribute to water quality and quantity and provide thermal refugia.
2. Migratory habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.
3. An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.
4. Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes with features such as large wood, side channels, pools, undercut banks and substrates, to provide a variety of depths, gradients, velocities, and structure.
5. Water temperatures ranging from 2-15 °C (36-59 °F), with adequate thermal refugia available for temperatures at the upper end of this range. Specific temperatures within this range will vary depending on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shade, such as that provided by riparian habitat; and local groundwater influence.
6. Substrates of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal

amount *(e.g.,* less than 12%) of fine substrate less than 0.85 mm (0.03 inches) in diameter and minimal embeddedness of these fines in larger substrates are characteristic of these conditions.

7. A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, they minimize departures from a natural hydrograph.
8. Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.
9. Few or no nonnative predatory *(e.g.,* lake trout *(Salve/inus namaycush),* walleye *(Stizostedion vitreum),* northern pike *(Esox lucius),* smallmouth bass *(Micropterus dolomieui);* inbreeding *(e.g.,* brook trout); or competitive *(e.g.,* brown trout *(Salvelinus trutta))* species present.

Bull trout critical habitat PCEs in the remaining portion of this BO will reference the PCEs by the above numbers.

Conservation Strategy and Objectives. The Service's primary objective in designating critical habitat was to identify key components of bull trout habitat across the range that supported essential life history stages and contributed to addressing the goals and objectives outlined in the draft recovery plan chapters for the species. Recovery of bull trout will require reducing threats to the long-term persistence of populations, maintaining multiple interconnected populations of bull trout across the diverse habitats of their native range, and preserving the diversity of bull trout life history strategies *(e.g.,* resident or migratory forms, emigration age, spawning frequency, local habitat adaptations). To do this, recovery objectives for all areas were identified as follows: 1) maintain current distribution of bull trout within core areas as described in recovery unit chapters and restore distribution where recommended in recovery unit chapters; 2) maintain stable or increasing trend in abundance of bull trout; 3) restore and maintain suitable habitat conditions for all bull trout life history stages and strategies; and 4) conserve genetic diversity and provide opportunity for genetic exchange.

Important considerations in selecting areas for critical habitat designation included factors specific to each river system, such as size *(e.g.,* stream order), gradient, channel morphology, connectivity to other aquatic habitats, and habitat complexity and diversity, as well as rangewide recovery considerations. The Service took into account preferred habitat for bull trout which ranges from small headwater streams used largely for spawning and rearing, to downstream mainstem portions of river networks used for rearing and foraging, migratory, and overwintering (FMO) habitat. It is essential for the conservation of bull trout to protect those features that define the remaining essential habitat, through appropriate management, from irreversible threats and habitat conversion. Within each area designated as critical habitat, the physical and biological features essential for the conservation of the bull trout may require some level of management and/or protection to avoid destruction or adverse modification of habitat essential to its conservation (70 FR 56212). Maintenance or establishment of functional PCEs throughout all core areas is essential to the conservation of bull trout because: 1) genetic diversity enhances long-term survival of a species by increasing the likelihood that the species is able to survive changing environmental conditions; 2) maintaining multiple bull trout core areas distributed and interconnected throughout their current range will provide a mechanism for spreading the risk of extinction from stochastic events; 3) maintaining core areas with multiple local populations will address potential negative implications associated with low effective population levels; and 4) core areas provide connectivity between areas of high quality habitat and contain important migration corridors for migratory bull trout.

The importance of maintaining the migratory life-history form of bull trout, as well as the presence of migratory runs of other salmonids that may provide a forage base for bull trout, is repeatedly emphasized in the scientific literature, and was a foundational concern addressed during designation of bull trout critical habitat. The ability to migrate is important to the persistence of local bull trout subpopulations (Rieman and Mcintyre 1993, Gilpin 1996, Rieman and Clayton 1997, Rieman *eta/.* 1997). Bull trout rely on migratory corridors to move from spawning and rearing habitats to foraging and overwintering habitats and back. Migratory bull trout become much larger than resident fish in the more productive waters of larger streams and lakes, leading to increased reproductive potential (McPhail and Baxter 1996). Also, local populations that have been extirpated by catastrophic events may become reestablished as a result of movements by bull trout through migratory corridors (Rieman and Mcintyre 1993, MBTSG 1998). Activities that preclude the function of migratory corridors *(e.g.,* stream blockages) may adversely affect bull trout critical habitat.

Consulted-on Effects. Consulted-on effects are those effects that have been analyzed through section 7 consultation as reported in a BO. These effects are an important component of objectively characterizing the current condition of the species. To assess consulted-on effects to bull trout, we analyzed all of the BOs received by the Region 1 and Region 6 Offices, from the time of listing until August 2003; this added to 137 BOs. Of these, 124 BOs (91 percent) applied to activities affecting bull trout in the Columbia Basin DPS, 12 BOs (9 percent) applied to activities affecting bull trout in the Coastal-Puget Sound DPS, 7 BOs (5 percent) applied to activities affecting bull trout in the Klamath Basin DPS, and 1 BO (<1 percent) applied to activities affecting the Jarbidge and St. Mary Belly DPSs (Note: these percentages do not add to 100, because several BOs applied to more than one DPS). The geographic scale of these consultations varied from individual actions *(e.g.,* construction of a bridge or pipeline) within one basin to multiple project actions occurring across several basins.

Our analysis showed that we consulted on a wide array of actions which had varying level of effects. Many of the actions resulted in only short-term adverse effects and some with long-term beneficial effects. Some of the actions resulted in long-term adverse effects. No actions that have undergone consultation were found to appreciably reduce the likelihood of survival and recovery of the bull trout. Furthermore, no actions that have undergone consultation were anticipated to result in the loss of any subpopulations or local populations of bull trout. A more detailed analysis of consulted-on effects to the bull trout is available in our files and is hereby incorporated by reference.

<u>Environmental Baseline</u>

The number of bull trout that may be present in or near the action area during the timing of the proposed action is difficult to determine based on available data. High winter river flows in the Columbia River make the detection of bull trout very difficult. Bull trout are known to use the Columbia River as over wintering area (Nelson *eta/.* 2011), but prefer to over winter in tributaries to the Columbia River. Bull trout in the various tributary river basins along the Columbia River are primarily fluvial migrants that overwinter in the middle or lower mainstem sections of river basins (BioAnalysts, Inc. 2002, Nelson 2004, Starcevich *et al.* 2012). The closest known local bull trout populations to the action area occur in the North Fork Umatilla River and North Fork Meacham Creek (USFWS 2010). The mouth of the Umatilla River is located approximately 10 miles downstream of the action area below McNary Dam. Bull trout population and redd counts have been variable and show a declining trend in this river basin since the mid 1990's to the present (ODFW 2005, USFWS 2010). Additional bull trout populations occur approximately 20 miles upstream on the Columbia River in the Walla Walla River basin where bull trout population trends are increasing (ODFW 2005). Movement of bull trout population in both of these river basins is hindered by poor water quality and instream diversions and dams (ODFW 2005).

Bull Trout Critical Habitat in the Action Area

The action area is located within the bull trout Umatilla River critical habitat unit (Unit 13) in the mid-Columbia recovery unit. The Columbia River within this critical habitat unit is important foraging, migration, and over wintering habitat for juvenile and adult bull trout. The habitat conditions at the project site do not appear to support preferable habitat conditions for bull trout due to relatively shallow water depths, lack of in/over water structures, sandy substrates, and operational disturbance activities at the pumping stations. The shoreline at the project site consists of a steep, sparsely vegetated rip-rap streambank that provides little aquatic habitat complexity. The general topography within the area ranges from relatively level uplands to steep sloping streambanks along the river.

Effects of the Proposed Action

The effects of the proposed action include an analysis of direct and indirect effects. Direct effects are those impacts from the action that immediately affect federally-listed species or their habitat. Indirect effects are those impacts from the action that are later in time and may occur outside of the area directly affected by the action. Indirect effects must be reasonably certain to occur before they can be considered as an effect of the proposed action.

At times there are other activities that may be interrelated or interdependent with the proposed action under consideration that could result in additional effects to federally-listed species or their habitat that must be considered along with the action. An interrelated activity is an activity that is part of the proposed action and depends on the action for its justification. An interdependent activity is an activity that has no independent utility apart from the proposed action.

In determining whether the proposed action is likely to jeopardize the recovery and survival of a federally-listed species, the Service analyzes effects of the action and the effects of other activities that are interrelated or interdependent with the action in context with the environmental baseline. All activities under the proposed action are evaluated against and added to the environmental baseline.

During the remainder of this analysis, short-term project-related adverse effects to bull trout and bull trout critical habitat are effects usually lasting less than thirty days and long-term effects less than ninety days. Project-related long-term beneficial effects to the species and critical habitat are expected to last for many years.

Direct and Indirect Effects to Bull Trout

Project activities implemented near or below the water's edge can potentially cause the most direct and indirect effects to bull trout. Timing and construction activities can also cause potential effects to species from in-water work. Lethal and sub-lethal effects are often unavoidable where in-water work cannot be conducted at a time or in a manner when the species is not present.

Entrainment/Impingement

Entrainment may occur if bull trout are drawn into the suction dredge during proposed dredging activities. The potential for entrainment is largely dependent on the likelihood of fish occurring within the dredge prism, depth of dredging, surface area of the suction dredge, and life stage of the fish. However, the probability of entrainment is likely very low given the timing of in-water work (January 1 -February 28), the surface area of the suction dredge intake (8 inches in diameter), and depth that the dredge intake will remain buried in the substrate (up to a foot during dredging).

The new fish screens to be installed on the redesigned intake pipes will improve approach velocity, meet NMFS fish screen criteria, and reduce shoreline attraction flows to prevent entrainment or impingement of migrating juvenile bull trout during pumping operations. Extending the ends of the intake pipes further from the shoreline will lessen future entrainment and impingement of juvenile fish. If properly maintained, these redesigned intakes should be beneficial to salmonids in general during the life of the structures.

Hydro-acoustics

Pile driving activities increase underwater ambient noise, pressure, and water particle motion (Carlson *et al.* 2001, Popper and Hasting 2009). These increases may cause sub-lethal and/or lethal effects on bull trout in the immediate vicinity ofthis activity. A host of sub-lethal effects to fish have been documented under experimental conditions with pile driving activities (Carlson *et al.* 2001, Hastings and Popper 2005, Popper and Hastings 2009), including, but are not limited to, physical injury *(e.g.,* auditory damage, tissue/vessel damage, blood gases increases) and behavioral changes *(e.g.,* interference with migration/movement, foraging, predator avoidance). Lethal affects (immediate or delayed mortality) can also occur depending on the fish species/life stage and site specific activities. These effects will be dependent on several factors including the pile driving method, distance fish are from the site of the disturbance, and received level and duration of the sound exposure.

The two most common methods to drive piles are with a vibrating hammer or impact hammer. A vibrating hammer produces sound levels that are substantially less than an impact hammer. However, the total sound energy imparted by a vibrating hammer can be comparable to impact hammers since vibrating hammers are usually operated on a more continuous basis and requires more time in operation to drive an individual pile. During an Oregon study on the use of a vibrating hammer to drive 9-inch diameter x 60-foot long steel piles, Carlson et al. (2001) determined it was unlikely for this activity to cause avoidance response by juvenile salmonids beyond the immediate vicinity (approximately 20-30 feet) from the pile driving site. Carlson et al. (2001) further stated the amount of time sound is generated by this activity will be a very small amount for most projects in relation to a work day.

The proposed use of a vibratory hammer to install the 28 steel piles for the intake pipe cradle assemblies is anticipated to result in few, if any, sub-lethal and no lethal affects to bull trout. This is based on the low number of juveniles and adults that are expected to be within the action area during the in-water work period. Short-term displacement or disturbance of bull trout *(e.g.,* from foraging, resting, or moving through project area) may also due to other types of equipment and construction noise and/or human presence.

Water Quality

Short-term, localized project-related increases in background turbidity levels will likely occur as a result of activities associated with dredging and piling installation. Given the existing substrate conditions (coarse sand), proposed dredging (suction dredge) and disposal methods (into the river at a depth of approximately 40 feet), increases in background turbidity associated with dredging activities will be minimized and concentrated away from the shoreline. The implementation ofthe proposed action will also be occurring when higher winter flows are occurring in the Columbia River allowing for a greater dilution factor of dredged materials. In addition, it is anticipated that turbidity associated with vibratory hammer use during piling installation will be highly localized. Short-term, localized increases in background turbidity resulting from temporary work below the ordinary high water line are not expected to result in any net change in function of the instream habitat. Therefore, suspended turbidity levels from these operations will most likely be low enough and of a short enough duration to avoid any significant adverse effects to bull trout or its designated critical habitat in the action area.

Heavy equipment operating near and over the river channel within the action area represents potential sources of chemical contamination. There may be short-term chemical exposures from the use of this equipment and/or accidental spills *(e.g.,* diesel fuel, oil, hydraulic fluids, and antifreeze). The introduction of chemicals can be acute, occurring as a result of an equipment leak during construction activities, refueling spills, leaching, or run-off. Accidental spills of construction material or petroleum products would adversely affect water quality and potentially impact bull trout. Chemical exposures can alter fecundity, increase disease, shift biotic communities, and reduce the overall health of bull trout. The potential effects of chemical exposures may be lethal or sub-lethal and are generally correlated to the concentration of chemical contaminants within the species' habitat. If contamination levels are high enough, direct lethal effects are possible through the disruption of biological processes. Development and implementation of a Pollution Control Plan for the proposed action (to include containment measures and spill response for construction-related chemical hazards) will significantly reduce the likelihood for chemical releases within the action area. In addition, the Portland Sediment Evaluation Team granted a no-test exclusion for sediment samples collected within the dredging area based on the small volume of material to be dredged and the distance of the project area from potential sources of contamination.

Vegetation Disturbance

The temporal and spatial scales of vegetation removal under the proposed action are also factors to consider. The temporal nature of vegetation removal is typically related to the age of the vegetation being removed and the time required for the vegetation to re-establish. The adverse effect from vegetation alterations at the project location is considered relatively small. However, vegetation removal is likely to result in some degree of ground disturbance, generating the potential for soil erosion, and consequently resulting in turbidity and sedimentation on local levels. These effects are generally correlated to the concentration of sediments within the water column. The increased turbidity should decrease as it flows downstream and will likely be back to baseline levels well before reaching the end of the action area.

To minimize or eliminate the above-mentioned potential direct and indirect effects, conservation measures listed in the project BA (hereby incorporated by reference) will be implemented before, during and after project construction, as appropriate. It is expected that any adverse effects to juvenile or adult bull trout will be minimal in intensity and duration and sub-lethal in nature during the implementation of the proposed action.

Effects to Bull Trout Critical Habitat.

The Service has determined that the proposed action will not adversely modify bull trout critical habitat. The proposed action is expected to have a short-term, but limited, adverse effect on PCE 8 *(i.e.,* Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited) primarily during the dredging operation. The proposed action will have a more permanent beneficial effect on this PCE by eliminating the need for dredging activities to occur in the future at the project site.

Effects of Interrelated and interdependent Actions

Interrelated actions are those that are a part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Both interdependent and interrelated activities are assessed by applying the "but for" test, which asks whether any action and its associated impacts would occur "but for" the action. No effects of interrelated and/or interdependent actions are expected to result from the proposed action.

Summary of Effect Analysis

The Service does not expect significant adverse effects to bull trout or adverse modifications to bull trout critical habitat from implementing the proposed action. Adverse effects to bull trout and its critical habitat will be minimized or eliminated, to the extent possible, by implementing conservation measure as listed in the project BA. Table 1 shows the overall effects of the proposed action based on environmental factors.

Table 1. Checklist for documenting environmental baseline and effects of the proposed action on relevant indicators for ESA-listed fish species within the action area (Source: Campbell and Van Staveren 2012).

Pathways and Indicators	Environmental Baseline	Effects of the Proposed Action
Water Qnality		
Temperature	Not Properly Functioning	Maintain
Sediment/Turbidity	Not Properly Functioning	Maintain (-)
Chemical Contamination	Not Properly Functioning	Maintain
Habitat Access		
Physical Barriers	At Risk	Maintain(+)
Habitat Elements		
Substrate	Not Properly Functioning	Maintain (-)
Large Wood	Not Properly Functioning	Maintain
Pool Frequency	At Risk	Maintain
Pool Quality	At Risk	Maintain
Off-Channel Habitat	At Risk	Maintain
Refugia	Not Properly Functioning	Maintain
Channel Conditions and Dynamics		
Width/Depth Ratio	Not Properly Functioning	Maintain
Streambank Condition	At Risk	Maintain
Floodplain Connectivity	Not Properly Functioning	Maintain
Flow/H_ydrology		
Peak/Base Flows	Not Properly Functioning	Maintain
Drainage Network Increase	Not Properly Functioning	Maintain
Watershed Conditions		
Road Density/Location	At Risk	Maintain
Disturbance History	Not Properly Functioning	Maintain
Riparian Reserves	Not Properly Functioning	Maintain

Maintam = no localized, temporary, or system-wide effect
Maintain(-)= localized, temporary effect, no system-wide effect
Maintain(+)= localized benefit, no system-wide effect
Restore = system-wide benefit

Cumulative effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this BO. This includes all efforts completed by these entities in support of bull trout not related to the proposed action covered under this BO. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. The Service is unaware of any significant change in non-Federal activities that are reasonably certain to occur within the action area. The Service assumes that future non-Federal, state, and private activities will continue at similar intensities as in recent years.

Conclusion

After the reviewing the 1) current status of bull trout and bull trout designated critical habitat, 2) environmental baseline for bull trout within the action area, and 3) effects of the proposed action on bull trout and bull trout critical habitat, it is the Service's biological opinion that the proposed action is not likely to jeopardize the continued existence of bull trout and is not likely to destroy or adversely modify designated critical habitat for bull trout.

The Service's no jeopardy and no adverse modification determinations are also based on the following considerations.

- The conservation measures, as applied to the proposed action will:
    a. Minimize or eliminate the amount of harm and harassment to bull trout *(e.g.,* not expected to appreciably reduce either the surviva\ or recovery of the species, and will not result in a significant reduction in numbers or distribution of the species).
    b. Ensure that there will only be short-term adverse effects to aquatic and terrestrial habitats *(e.g.,* water quality, channel dynamics, and overall watershed conditions and functions), including bull trout critical habitat.
    c. Allow the scheduling of project activities to occur at times that are least sensitive to bull trout *(e.g.,* ODFW preferred in-water work period).

Incidental Take Statement

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service as an act that actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is further defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.

Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by COE so that they become binding conditions of any grant or permit issued to an applicant, as appropriate, for the exemption in section 7(o)(2) to apply. If COE: 1) fails to assume and implement the terms and conditions or 2) fails to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, COE must report the progress of the action and its impact on federally-listed species to the Service as specified in the incidental take statement (50 CFR 402.14(i)(3)).

Amount or extent of take

Although the Service anticipates a low number of bull trout may be incidentally harmed and harassed as a result of the proposed action, the amount of take is difficult to determine because the presence and number of bull trout is difficult to ascertain within the action area. Detecting an impaired or dead individual is highly unlikely in this area. For instance, an injured juvenile or adult fish would be extremely difficult to find in order to quantify incidental take. Therefore, even though incidental take is expected to occur, sufficient data are not available to enable the Service to determine an exact number of individuals that may be taken under the proposed action. However, the Service is quantifying incidental take in the form of a conservative estimate based on similar past actions.

The Service anticipates that bull trout may be incidentally taken as a result of the dredging operation and pile installation during project implementation. There is also potential for limited incidental take of bull trout from the implementation ofthe other project-related construction activities. This incidental take may result from short-term increases in hydro-acoustics, sedimentation, turbidity, and/or chemical contamination that may affect essential behavioral patterns and/or physiologic processes. Therefore, the amount of sub-lethal and lethal take for bull trout, regardless of the life stage *(i.e.*, juvenile, sub-adult, or adult) for all project-related activities is limited to ten individuals as sub-lethal take through harm and harassment and zero individuals through any manner of lethal take.

Effect of the take

In this BO, the Service determined that these levels of anticipated take are not likely to result in jeopardy to bull trout because very few bull trout are likely to occur in the action area during the ODFW preferred in-water work period between January 1 and February 28. Any take of bull trout will affect the local population and will not have species-wide population or critical habitat effects.

Reasonable and Prudent Measures

Regulations (50 CFR 402.02) implementing section 7 of the ESA define reasonable and prudent alternatives as alternative actions, identified during formal consultation, that: (1) can be implemented in a manner consistent with the intended purpose of the action, (2) can be implemented consistent with the scope of the action agency's legal authority and jurisdiction, (3) are economically and technologically feasible, and (4) would, the Service believes, avoid the likelihood of jeopardizing the continued existence of federally-listed species or resulting in the destruction or adverse modification of designated or proposed critical habitat. The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of the listed species covered under the BO.

1. Reduce potential project-related adverse impacts to bull trout and bull trout critical habitat.
2. To the extent possible, monitor any detectable adverse effects to bull trout during the proposed action.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, COE must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. Implementation of these terms and conditions will further reduce the risk of impacts to bull trout. These terms and conditions are non-discretionary.

1. Follow the conservation measures as described in the project BA, including the installation ofNMFS approved screens on the pump intake pipes.
2. During the dredging operation and pile installation, observe and document any adverse effects to fish that may have occurred from these activities. Contact the Service's OFWO immediately to report your observations, especially if they are related to bull trout. Any verbal communications with this office must be followed-up with a written communication describing the observations in detail within 3 business days of the observation(s).

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize or eliminate the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The COE must immediately provide an explanation of the causes of the taking, and review with the Service the need for possible modification of the project's reasonable and prudent measures.

Monitoring and Reporting Requirements

The following are monitoring and reporting requirements under this BO.

1. Monitor the overall extent of incidental take of bull trout to ensure the authorized amount of take for the species is not exceeded during the implementation of the proposed action.
2. All documented project inspection records, reports, and plans must be made available for review by the Service upon request.
3. Monitor the proposed action to ensure compliance with the conservation measures addressed in the BA and other requirements addressed in the BO.
4. Notify the Service's Division of Law Enforcement in Wilsonville, Oregon at 503-682-6131 when a federally-listed species is found dead, injured, or sick at the time when the proposed action, covered under the BO, is being implemented. Instructions for proper handling and disposition of the species will be issued by the Division of Law Enforcement. Care must be taken in handling: (A) sick or injured individuals to ensure effective treatment and care and (B) a dead specimen to preserve biological material in the best possible state. The OFWO has the responsibility to ensure that information relative to the date, time, location, and possible cause of injury or death of each individual is recorded and provided to the Division of Law Enforcement.

5. A final project report must be submitted 60 days after completion of the proposed action documenting any project-related affects to the bull trout and/or bull trout critical habitat. Send the report to the address below with the following reference number.

State Supervisor
Oregon Fish and Wildlife Office
2600 SE 98th Avenue, Suite 100
Portland, Oregon 97266
Reference Number: 8330.F0003(13)

Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or eliminate adverse effects of a project on federally-listed species or critical habitat, to help implement recovery plans, or to develop information. The Service does not have any conservation recommendations for the proposed action.

Reinitiation of Consultation

This concludes formal consultation for bull trout and bull trout critical habitat for the proposed action described in the BA. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect federally-listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Literature Cited

Ardren, W. R., P. W. DeHaan, C. T. Smith, E. B. Taylor, R. Leary, C. Kozfkay, L. Godfrey, M. Diggs, W. Fredenberg, J. Chan, C. W. Kilpatrick, M.P. Small, D. K. Hawkins. 2010. Genetic Structure, Evolutionary History, and Conservation Units of Bull Trout in the Coterminous United States.

Batt, P.E. 1996. State ofldaho bull trout conservation plan. Office ofthe Governor, Boise, ID. 20 pp.

Berg, R.K., and E.K. Priest. 1995. Appendix Table 1: A list of stream and lake fishery surveys conducted by U.S. Forest Service and Montana Fish, Wildlife and Parks fishery biologists in the Clark Fork River drainage upstream of the confluence of the Flathead River the 1950's to the present. Montana Fish, Wildlife, and Parks, Job Progress Report, Project F-78-R-1, Helena, Montana.

Beschta, R.L., R.E. Bilby, G.W. Brown, L.B. Holtby, and T.D. Hofstra. 1987. Stream temperature and aquatic habitat: fisheries and forestry interactions. Pages 191-232 *in* E.D. Salo and T.W. Cundy (eds). Streamside Management Forestry and Fisheries Interactions. Institute of Forest Resources, University of Washington, Seattle, Washington, Contribution No. 57.

Boag, T.D. 1987. Food habits of bull char *(Salvelinus conjluentus)*, and rainbow trout *(Salmo gairdneri)*, coexisting in the foothills stream in northern Alberta. Canadian Field-Naturalist 101(1): 56-62.

Bond, C.E. 1992. Notes on the nomenclature and distribution of the bull trout and the effects of human activity on the species. Pages *1-4In* P.J. Howell, and D.V. Buchanan, eds. Proceedings of the Gearhart Mountain bull trout workshop. Oregon Chapter of the American Fisheries Society, Corvallis, Oregon.

BioAnalysts, Inc. 2002. Movement of bull trout within the mid-Columbia River and tributaries 2001-2002 (Rocky Reach Hydroelectric Project FERC Project no. 2145). Prepared for the Public Utility District No. 1 of Chelan County Wenatchee, WA. 49 pp.

Brown, L.G. 1992. On the zoogeography and life history of Washington native charr Dolly Varden *(Salvelinus malma)* and bull trout *(Salvelinus conjluentus).* Washington Department of Wildlife, Fisheries Management Division Report. Olympia, Washington.

Buchanan, D.V., M.L. Hanson, and R.M. Hooton. 1997. Status of Oregon's bull trout, distribution, life history, limiting factors, management considerations, and status. Report to Bonneville Power Administration. (BPA Report DOE/BP-34342-5). Oregon Department of Fish and Wildlife, Portland, OR.

Burkey, T.V. 1989. Extinction in nature reserves: the effect of fragmentation and the importance ofmigration between reserve fragments. Oikos 55: 75-81.

Burkey, T.V. 1995. Extinction rates in archipelagoes: Implications for populations in fragmented habitats. Conservation Biology 9: 527-541.

Campbell, E. and J. Van Staveren. 2012. Biological Assessment – Stahl H.B. and JSH farm river pumping stations: fish screening and intake modification project (Umatilla County, Oregon, Middle Columbia- Lake Wallula) dated September 11, 2012. 30 pp plus appendices.

Carlson T.J., G. Ploskey, R.L. Johnson, R.P. Mueller, M.A. Weiland, and P.N. Johnson. 2001. Observations of the behavior and distribution of fish in relation to the Columbia River navigation channel and channel maintenance activities. Pacific Northwest National Laboratory. 114 pp.

Cavender, T.M. 1978. Taxonomy and distribution ofthe bull trout, *Salvelinus conjluentus* (Suckley), from the American northwest. California Fish and Game 64: 139-174.
Chamberlain, T. W., R. D. Harr, and F. H. Everest. 1991. Timber harvesting, silviculture and watershed processes. Pages 181-205 *In* W. R. Meehan (ed). Influences of forest and rangeland management on salmonid fishes and their habitats. American Fisheries Society Special Publication 19.
Craig, S.D. and R.C. Wissmar. 1993. Habitat conditions influencing a remnant bull trout spawning population, Gold Creek, Washington (draft report). Fisheries Research Institute, University of Washington. Seattle, Washington.
Donald, D.B. and D.J. Alger. 1993. Geographic distribution, species displacement, and niche Overlap or lake trout and bull trout in mountain lakes. Canadian Journal of Zoology. 71: 238 247.
Dunham, J.B. and B.E. Rieman. 1999. Metapopulation structure ofbull trout: Influences of physical, biotic, and geometrical landscape characteristics. Ecological Applications 9: 642-655.
Flatter, B. 1998. Life history and population status of migratory bull trout *(Salvelinus conjluentus)* in Arrowrock Reservoir, Idaho. Prepared for U.S. Bureau of Reclamation.
Fraley, J. J. and B. B. Shepard. 1989. Life History, Ecology, and Population Status ofMigratory Bull Trout *(Salvelinus conjluentus)* in the Flathead Lake River System, Montana. Northwest Science 63: 133-143.
Furniss, M.J., T.D. Roelofs, and C.S. Yee. 1991. Road Construction and Maintenance. Chapter 8 in Influences of Forest and Rangeland Management on Salmonid Fi hes and Their Habitats. American Fisheries Society Special Publication 19: 297-323.
Gilpin, M. 1996. Analysis towards a PVA for bull trout in western Montana: A progress report for the Montana Bull Trout Science Group (Draft). Bozeman, Montana.
Goetz, F. 1989. Biology ofthe bull trout, *Salvelinus conjluentus,* a literature review. Eugene, OR U.S. Department of Agriculture, Forest Service, Willamette National Forest. 53 pp.
Goetz, F. 1994. Distribution and juvenile ecology ofbull trout *(Salvelinus conjluentus)* in the Cascade Mountains. Master's Thesis, Oregon State University, Corvallis, OR.
Henjum, M.G., J.R. Karr, D.L. Bottom, D.A. Perry, J.C. Bednarz, S.G. Wright, S.A. Beckwitt, and E. Beckwitt. 1994. Interim protection for late-successional forests, fisheries, and watersheds. National forests east of the Cascade Crest, Oregon, and Washington. A report to the Congress and President of the United States Eastside Forests Scientific Society Panel. American Fisheries Society, American Ornithologists Union Incorporated, The Ecological Society of America, Society for Conservation Biology, and The Wildlife Society. The Wildlife Society Tech. Rev. 94-2.
Leathe, S.A. and P.J. Graham. 1982. Flathead Lake fish food habits study- Final Report. Montana Department of Fish, Wildlife and Parks. Kalispell, Montana.
Light, J., L. Herger, and M. Robinson. 1996. Upper Klamath basin bull trout conservation strategy, a conceptual framework for recovery. Part one. The Klamath Basin Bull Trout Working Group.
MBTSG (Montana Bull Trout Scientific Group). 1995a. Upper Clark Fork River drainage bull trout status report (including Rock Creek). Prepared for Montana Bull Trout Restoration Team. Helena, Montana.
MBTSG. 1995b. Bitterroot River drainage bull trout status report. Prepared for Montana Bull Trout Restoration Team. Helena, Montana.

MBTSG. 1995c. Blackfoot River drainage bull trout status report. Prepared for Montana Bull Trout Restoration Team. Helena, Montana.

MBTSG. 1995d. Flathead River drainage bull trout status report (including Flathead Lake, the North and Middle forks of the Flathead River and the Stillwater and Whitefish River). Prepared for Montana Bull Trout Restoration Team. Helena, Montana.

MBTSG. 1995e. South Fork Flathead River drainage bull trout status report (upstream of Hungry Horse Darn). Prepared for Montana Bull Trout Restoration Team. Helena, Montana.

MBTSG. 1996a. Lower Clark Fork drainage bull trout status report (Cabinet Gorge Darn to Thompson Falls). Montana Bull Trout Restoration Team, Helena Montana.

MBTSG. 1996b. Middle Clark Fork drainage bull trout status report (from Thompson Falls to Milltown, including the Lower Flathead River to Kerr Darn). Montana Bull Trout Restoration Team, Helena, Montana.

MBTSG. 1998. The relationship between land management activities and habitat requirements of bull trout. Report prepared for the Montana Bull trout Restoration Team, Helena, Montana.

Mcintosh, B.A., J.R. Sedell, J.E. Smith, R.C. Wissmar, S.E. Clarke, G.H. Reeves, and L.A. Brown. 1994. Management history of eastside ecosystems: Changes in fish habitat over 50 years, 1935 to 1992. U.S. Forest Service, Pacific Northwest Research Station, General Technical Report. PNW-GTR 321.

McPhail, J.D. and J. S. Baxter. 1996. A review of bull trout *(Salvelinus confluentus)* life-history and habitat use in relation to compensation and improvement opportunities. Dept. of Zoology, University of British Columbia. Fisheries Management Report No. 104. Vancouver, British Columbia, Canada.

Meehan, W.R. 1991. Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats. American Fisheries Society Special Publication 19.

Meffe, O.K. and C.R. Carroll. 1994. Principles of conservation biology. Sinauer Associate, Inc. Sunderland, Massachusetts.

Moyle, P.B. 1976. Inland Fishes of California. University of California Press, Berkeley, California.

Nehlsen, W., J. Williams, and J. Lichatowich. 1991. Pacific salmon at the crossroads: stocks at risk from California, Oregon, Idaho, and Washington. Fisheries 16: 4-21.

Nelson, M.C. 2004. Movements, habitat use, and mortality of adult fluvial bull trout isolated by seasonal subsurface flow in the Twisp River, WA. (Final Report-Mid-Columbia tributary bull trout radio-telemetry project). U.S. Fish and Wildlife Service, Leavenworth, WA.

Nelson, M.C, A. Johnsen, and R.D. Nelle. 2011. Seasonal movements of adult fluvial bull trout and redd surveys in Icicle Creek, 2009 Annual Report. U.S. Fish and Wildlife Service, Leavenworth WA.

Newton, J.A. and S. Pribyl. 1994. Bull trout population summary: Lower Deschutes River subbasin. Oregon Department of Fish and Wildlife, The Dalles, Oregon. Oregon administrative rules, proposed amendments to OAR 340-41-685 and OAR 340-41-026. January 11, 1996.

ODFW (Oregon Department ofFish and Wildlife). 2005. Oregon native fish status report. Accessed on 12/5/2012 at http://www.dfw.state.or.us/fish/ONFSR/report.asp.

Popper, A.N. and M.C. Hastings. 2009. The effects of anthropogenic sources of sound on fishes (Review paper). Journal ofFish biology 75:455-489.

Pratt, K.L. 1985. Pend Oreille trout and char life history study. Boise, ID: Idaho Department of Fish and Game. 105 pp.

Pratt, K.L. 1992. A review of bull trout life history. Pages 5-9 *In* Howell, P.J.; Buchanan, D.B., eds. Proceedings ofthe Gearhart Mountain bull trout workshop. Oregon Chapter of the American Fisheries Society, Corvallis, Oregon.

Ratliff, D.E. and P.J. Howell. 1992. The status ofbull trout populations in Oregon. Pages 10-17 *In* Howell, P.J.; Buchanan, D.B., eds. Proceedings of the Gearhart Mountain bull trout workshop. Oregon Chapter of the American Fisheries Society, Corvallis, Oregon.

Ratliff, D.E. 1992. Bull trout investigations in the Metolius River-Lake Billy Chinook system. Pages 10-17 *In* Howell, P.J. and D.V. Buchanan, eds., Proceedings ofthe Gearhart Mountain bull trout workshop. Oregon Chapter of the American Fisheries Society, Corvallis, Oregon.

Reiman, B. E. and J.D. Mcintyre. 1993. Demographic and Habitat Requirements for Conservation ofBull Trout. Gen. Tech. Rep. INT-302. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Boise, ID. 38 pp.

Reiman, B.E., and J. B. Dunham. 2000. Metapopulations and salmonids: A synthesis oflife history patterns and empirical observations. Ecology of Freshwater Fishes 9: 51-64.

Rieman, B. and J. Clayton. 1997. Wildfire and Native Fish: Issues of Forest Health and Conservation of Sensitive Species. Fisheries 22: 6-15.

Rieman, B.E. and J.D. Mcintyre. 1996. Spatial and temporal variability in bull trout redd counts. North American Journal of Fisheries Management 16: 132-141.

Rieman, B.E., D.C. Lee and R.F. Thurow. 1997. Distribution, status and likely future trends ofbull trout within the Columbia River and Klamath Basins. North American Journal of Fisheries Management 17: 1111-1125.

Rieman, B.E., D.C. Lee, and R.F. Thurow. 1997. Distribution, status, and likely future trends of bull trout within the Columbia River and Klamath River basins. North American Journal of Fisheries Management. 17:1111-1125.

Rode, M. 1990. Bull trout, *Salve/inus conjluentus suckley,* in the McCloud River: status and recovery recommendations. Administrative Report Number 90-15. California Department of Fish and Game, Sacramento, California.

Saunders, D.A., R.J. Hobbs, and C.R. Margules. 1991. Biological consequences of ecosystem fragmentation: A review. Conservation Biology 5: 18-32.

Schill, D.J. 1992. River and stream investigations. Job Performance Report, Project F-73-R-13. Idaho Department of Fish and Game, Boise, Idaho.

Seddell, J.R. and F.H. Everest 1991. Historic changes in pool habitat Columbia River Basin salmon under study for TES listing. Draft US Department of Agriculture Report. Pacific Northwest Research Station, Corvallis, Oregon.

Simpson, J.C. and R.L. Wallace. 1982. Fishes ofIdaho. University Press ofIdaho. Moscow, Society, Corvallis.

Spruell, P., A. A. Hemmingsen, P. J. Howell, N. Kanda, and F. W. Allendorf. 2003. Conservation genetics ofbull trout: Geographic distribution of variation at microsatellite loci. Conservation Genetics 4: 17-29.

Starcevich, S.J., P.J. Howell, S.E. Jacobs, and P.M. Sankovich. 2012. Seasonal movement and distribution of fluvial adult bull trout in selected watersheds in the mid-Columbia River and Snake River basins. PLoS ONE 7(5): e37257. doi:10.1371/journal.pone.0037257.

Swanberg, T. R. 1997. Movements of and habitat use by fluvial bull trout in the Blackfoot River, Montana. Transaction ofthe American Fisheries Society 126: 735-746.

Thomas, G. 1992. Status of bull trout in Montana. Report prepared for Montana Department of
Fish, Wildlife and Parks, Helena, Montana.

Taylor, E. B., S. Pollard, and D. Louie. 1999. Mitochondrial DNA variation in bull trout *(Salvelinus conjluentus)* from northwestern North America: Implications for zoogeography and conservation. Molecular Ecology 8: 1155-1170.

USDA (U.S. Department of Agriculture), and USDI (U.S. Department of the Interior). 1995.
Decision Notice/Decision Record Finding ofNo Significant Impact, Environmental Assessment for the Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon, and Washington, Idaho, and portions of California (PACFISH).

USFWS (U.S. Fish and Wildlife Service). 2010. Chapter 13- Mid-Columbia Recovery Unit Umatilla River Critical Habitat Unit. *In* U.S. Fish and Wildlife Service- Bull Trout Final Critical Habitat Justification. Portland, Oregon.

WDFW (Washington Department ofFish and Wildlife). 1997. Grandy Creek trout hatchery biological assessment. FishPro Inc., and Beak Consultants.

WDFW (Washington Department ofFish and Wildlife). 1998. Washington State Salmonid Stock Inventory: Bull Trout/Dolly Varden. Washington Department ofFish and Wildlife, Fish Management. 437 pp.

Whiteley, A. R., P. Spruell, and F.W. Allendorf. 2003. Population genetics of Boise Basin bull trout *(Salvelinus conjluentus).* Final report to Rocky Mountain Research Station, Contract:RMRS # 00-JV-1122014-561.

Wissmar, R.C., J.E. Smith, B.A. Mcintosh, H.W. Li, G.H. Reeves, and J.R. Sedell 1994. Ecological health ofriver basins in forested regions of eastern Washington and Oregon. Gen. Tech. Rep. PNW-GTR-326.

Ziller, J. S. 1992. Distribution and relative abundance of bull trout in the Sprague River subbasin, Oregon. Pages 18-29 *In* P.J. Howell, and D.V. Buchanan, eds. Proceedings of the
Gearhart Mountain Bull Trout Workshop. Oregon Chapter of the American Fisheries
Society, Corvallis, Oregon.

***In /itt.* References**

IDFG (Idaho Department ofFish and Game). 1995. List of streams compiled by IDFG where bull trout have been extirpated, fax from Bill Horton, IDFG.

Appendix B

Archaeological Review and Inventory

Reiss-Landreau Research
PO Box 2215, Yakima, WA 98907 (509) 952-5130
E-Mail: chrislandreau@charter.net

Paul Wattenberger
IRZ Consulting
505 East Main St
Hermiston, OR 97838

August 7, 2012

RE: JSH Farms and Stahls Pumping station projects 2012.

In February of 2010, Reiss-Landreau Research (RLR) completed an inventory of several proposed modifications to the existing JSH farms pumping station in a report entitled *A Section 106 Archaeological Review and Inventory of a Proposed Addition to the JSH Columbia River Irrigation Pumping Station Facility, Umatilla County, Oregon.* RLR applied for and received ARP Permit # W912EF-9-10-07 from the USACE Walla Walla District of the US Army Corps of Engineers on January 29, 2010.

> *The field survey consisted of a walkover visual reconnaissance of the entire .12 acre lot, as well as a set of two controlled shovel test probes to at least 70 cm. depths into sterile subsurface. After thorough review and reconnaissance RLR found no evidence of subsurface cultural resources at this locale, either in the cut bank, shoreline or during subsurface testing. Indeed, it is our assertion that the entire project area lays upon a disturbed ground surface, including an area of sandy soil with some sagebrush re-growth.*

In July 2012, IRZ consulting was contracted to make some additional in-water changes to the JSH Farms and Stahls pumping station (adjacent, see Figures 1 and 2). All activity will be confined to the existing disturbed footprint, with the exception of in-water activities which will include modifications to the intake pipes.

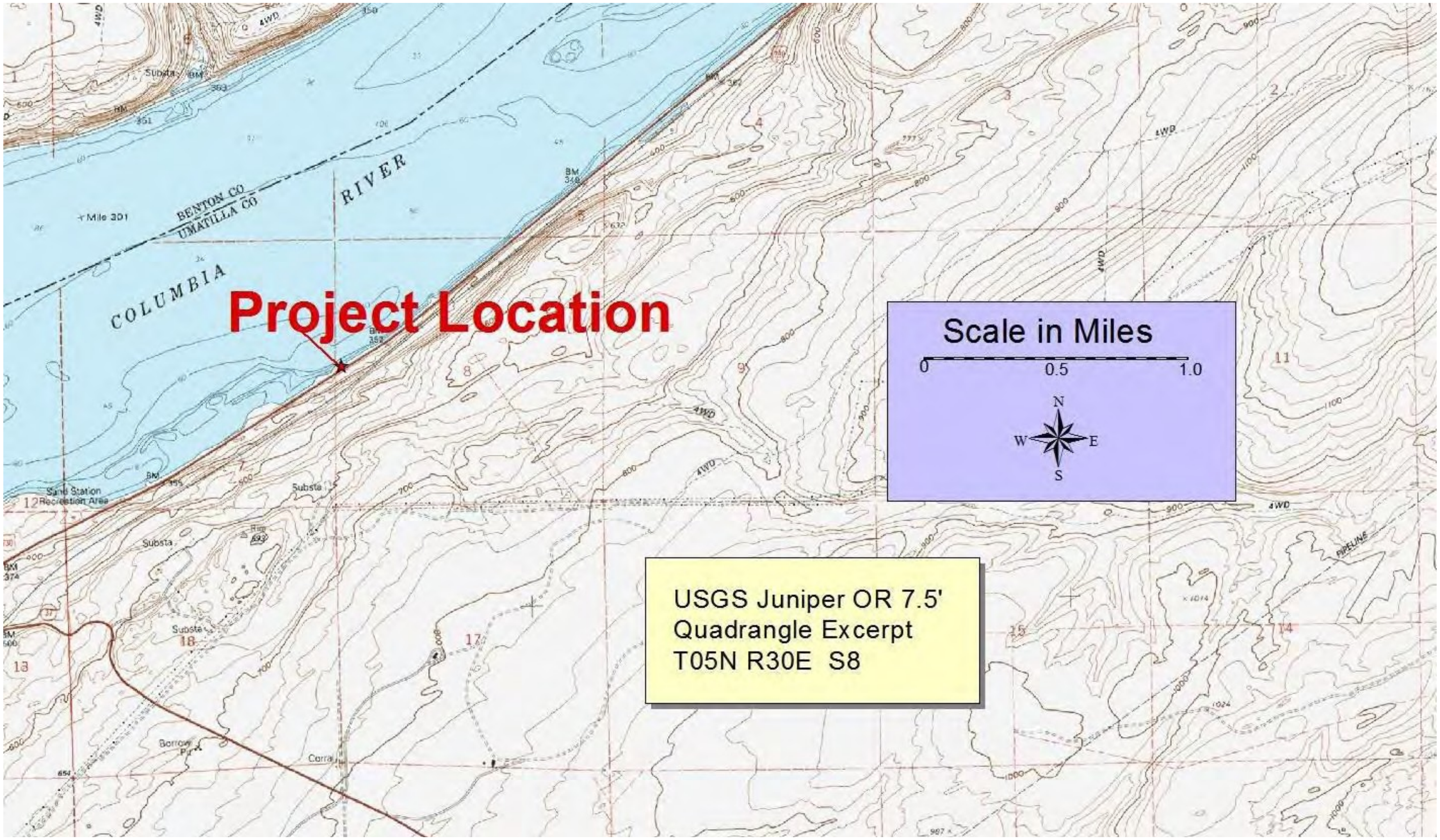
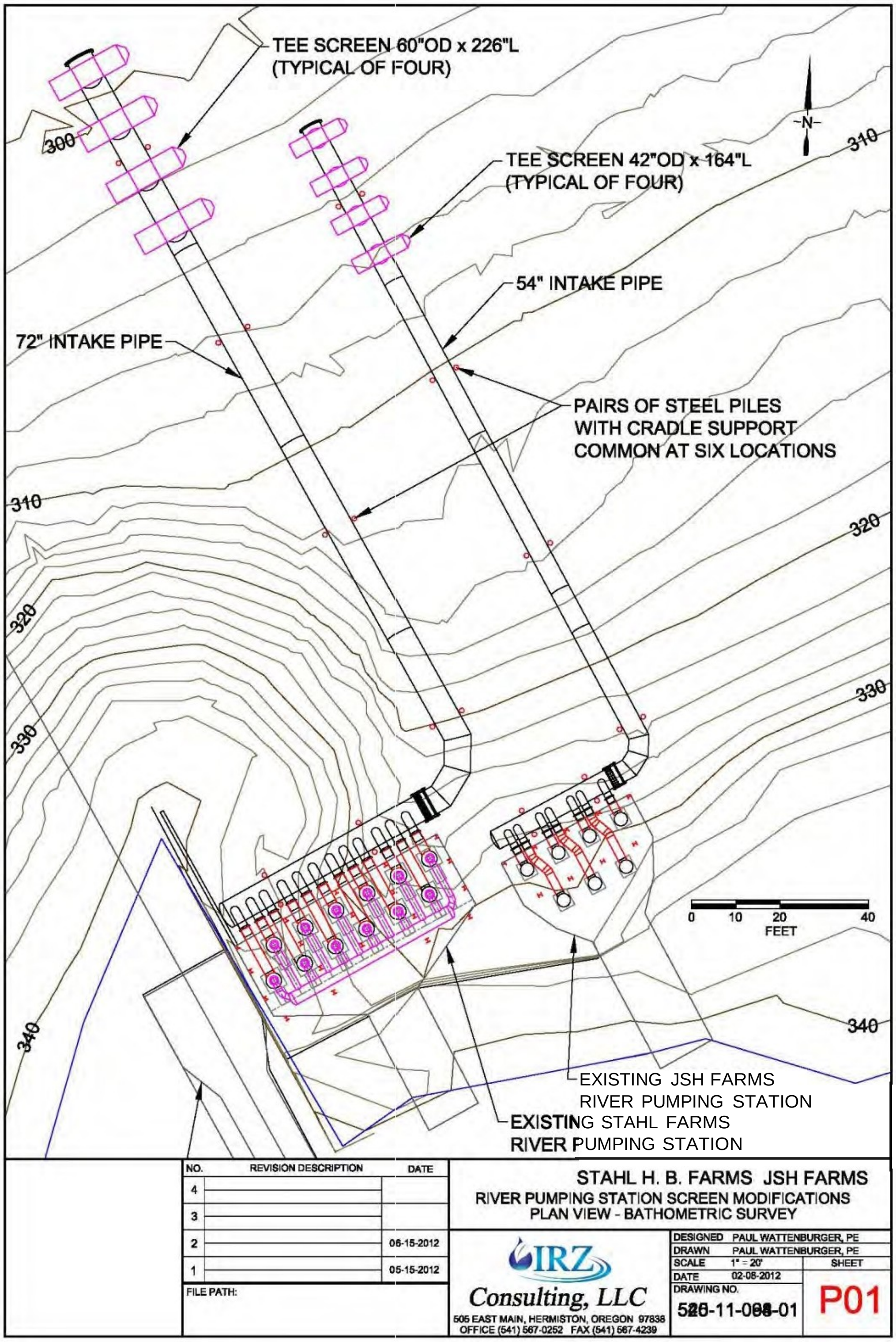


Figure 1: Topographic Map

Reiss-Landreau Research
PO Box 2215YakimaWA 98907 (509) 952-5130
E-Mail: chrislandreau@charter.net



Reiss-Landreau Research
PO Box 2215, Yakima, WA 98907 (509) 952-5130
E-Mail: chrislandreau@charter.net

Project Recommendations:

Archaeologically, the potential exists for disturbance to unknown sites under water in the Columbia River. However, we have no mechanism for observation or inventory of such sites without de-watering, or a prohibitively costly underwater examination. In a practical manner, the sediments around the existing intakes are currently disturbed, and it is not anticipated that we would be able to determine archaeological context within those disturbed sediments. Specifically, archaeologically, it is not possible to contribute any more data to this small disturbed station than was provided in the 2010 report for the proposed modification. Please refer to the original 2010 report for confirmation of this recommendation.

Thank You

Christopher Landreau
Principal Investigator
Reiss-Landreau Research

STATE OF OREGON
CULTURAL RESOURCES SURVEY COVER SHEET

Please submit reports unbound.

Author(s) Name: Last Landreau____ First Christopher
Title of Report: A Section 106 Archaeological Review and Inventory of a Proposed Addition to the JSH Columbia River Irrigation Pumping Station Facility, Umatilla County, Oregon
Date: 2/10/2010 District/Contractor: Reiss-Landreau Research
Agency/Client: IRZ Consulting Agency Report Number: ______

County (ies): Umatilla` Township: 5N/S Range: 30E/W Section: 8
Quad(s): ______ Project Acres: .05 Survey Acres: .06

CD Submitted? xYes ______No Does this replace a draft? ______Yes xNo

Project activity: Inventory Archaeological Permit No.: ______
Field note location: Disk Curation Location: None
Sites Found? ______Yes xNo Prehistoric #:______ Historic #:______
Historic Properties. Found? ______Yes xNo Historic Property #: ______
TCP(s) found? ______Yes xNo Isolates Found? ______Yes xNo Isolate #: ______

Keywords: ________________________

SHPO Trinomial #:	Temporary site #
______	______
______	______
______	______
______	______
______	______
______	______
______	______
______	______
______	______

REPORT CHECK LIST

Report should contain the following items:

- Location, legal description (T,R,S) with USGS map
- Clear objectives and methods
- A summary of the results of the survey
- A report of where the survey records and data are stored
- A research design that:
  - Details survey objectives
  - Details specific methods
  - Details expected results
  - Details area surveyed including map(s) and legal location information
  - Details how results will feedback in the planning process (i.e., recommendations, future work)

Please be sure that any electronic version of a report submitted to Oregon SHPO has its figures, appendices, attachments, correspondence, graphic elements, etc., compiled into one single PDF file.

Thank you!

A Section 106 Archaeological Review and Inventory of a Proposed Addition to the JSH Columbia River Irrigation Pumping Station Facility, Umatilla County, Oregon

January 11, 2009

RLR Report 2010-179-03

By
Christopher Landreau M.S., and Frank Stipe M.A.

REISS-LANDREAU RESEARCH
PO Box 2215, Yakima, WA 98902
PH 509 952-5130 Fax (509) 498-9818 E-Mail: chrislandreau@charter.net

Consultation Provided to: IRZ Consulting and St. Hillaire Bros. Hermiston Farm LLC

Executive Summary

Reiss-Landreau Research (RLR) conducted a thorough visual reconnaissance and controlled subsurface examination of a .12 acre section of extremely disturbed land on the shoreline of the Columbia River (Figures 1, and 2). The lot is located in Umatilla County, Oregon. St. Hilaire Bros. Hermiston Farm LLC runs an irrigation water pumping station at the site, constructed in stages within the last 20 years, and wishes to add additional electrical in a small building at the site. Two other farm pumping stations are adjacent, west of the project (Stahl and G2 Farm; Fig 3).

The project is located in an extremely culturally sensitive area along the Columbia River. The US Army Corps of Engineers (USACE), Portland district stipulated that an archaeological review and inventory must take place on the project area. On October 30, 2009 RLR applied for a federal Archaeological Resources permit (ARP) to allow very limited subsurface examination of the project area. The ARP Permit # W912EF-9-10-07 was received from the USACE Walla Walla District on January 29, 2010.

The preliminary research conducted at the State of Oregon Archaeological archives in Salem revealed nine listed archaeological sites within two linear miles of the locus of this project. There have also been eight archaeological survey reports within two miles.

The field survey consisted of a walkover visual reconnaissance of the entire .12 acre lot, as well as a set of two controlled shovel test probes to at least 70 cm. depths into sterile subsurface. After thorough review and reconnaissance RLR found no evidence of subsurface cultural resources at this locale, either in the cut bank, shoreline or during subsurface testing. Indeed, it is our assertion that the entire project area lays upon a disturbed ground surface, including an area of sandy soil with some sagebrush re-growth. **Thus RLR recommends that the project proceed.**

Legal Information:

Umatilla County, Oregon
T:05N R: 30E Section 8 SW, NW

UTM
Zone 11 0337280 E, 5088376N

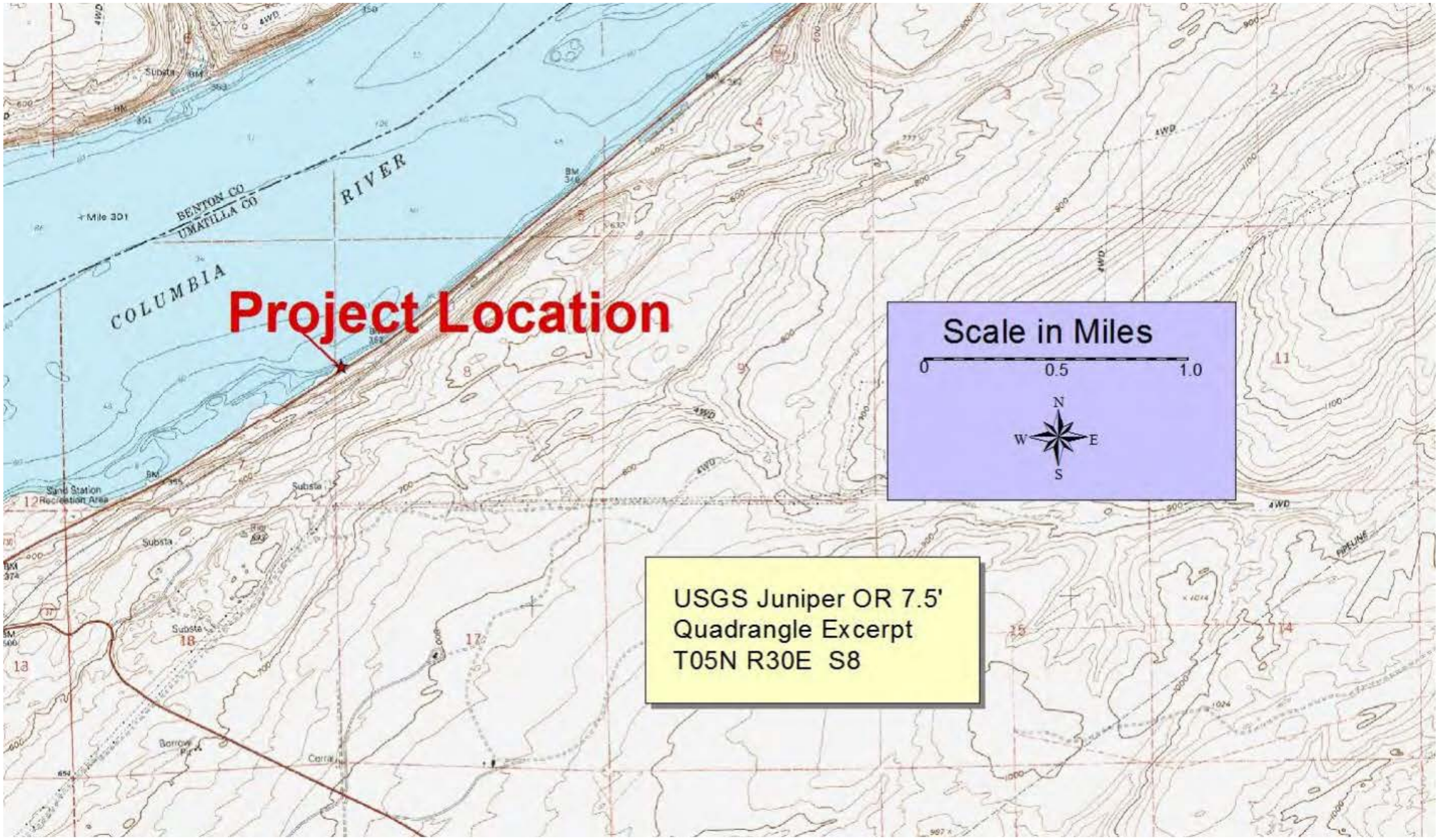


Figure 1: Topographic Map

Figure 2:Orthographic Map

Table of Contents

Project Description

A. Project Activities: The project proponent intends to construct a 16' by 10' (3meter x 2.5 meter) electrical service building with a slab floor and foundation (Figures 3 and 4).

B. The Area of Potential Effect: The building work footprint is proposed to be 18 feet long by 12 feet wide by 1 foot deep. Staging will occur on the graveled driveway access to the St Hilaire Brothers pumping station.

C. How the APE was determined: By the project proponents proposed scope of activities.

D. Size (in acres) of the survey area: .12 acres

E. Project proponent, property owner, agency and compliance action: St. Hilaire Bros. Hermiston Farm LLC for The US Army Corps of Engineers Federal Permit.

F. Regulatory: 36 CFR 800 Section 106: The Archaeological Resources (ARP) Permit # W912EF-9-10-07 was received from the USACE Walla Walla District on January 29, 2010.

G. Survey personnel: C. Landreau, K.Y. Reiss
H. What circumstances led to this survey: This project was a standard regulatory compliance project.

Figure 3: Project overview

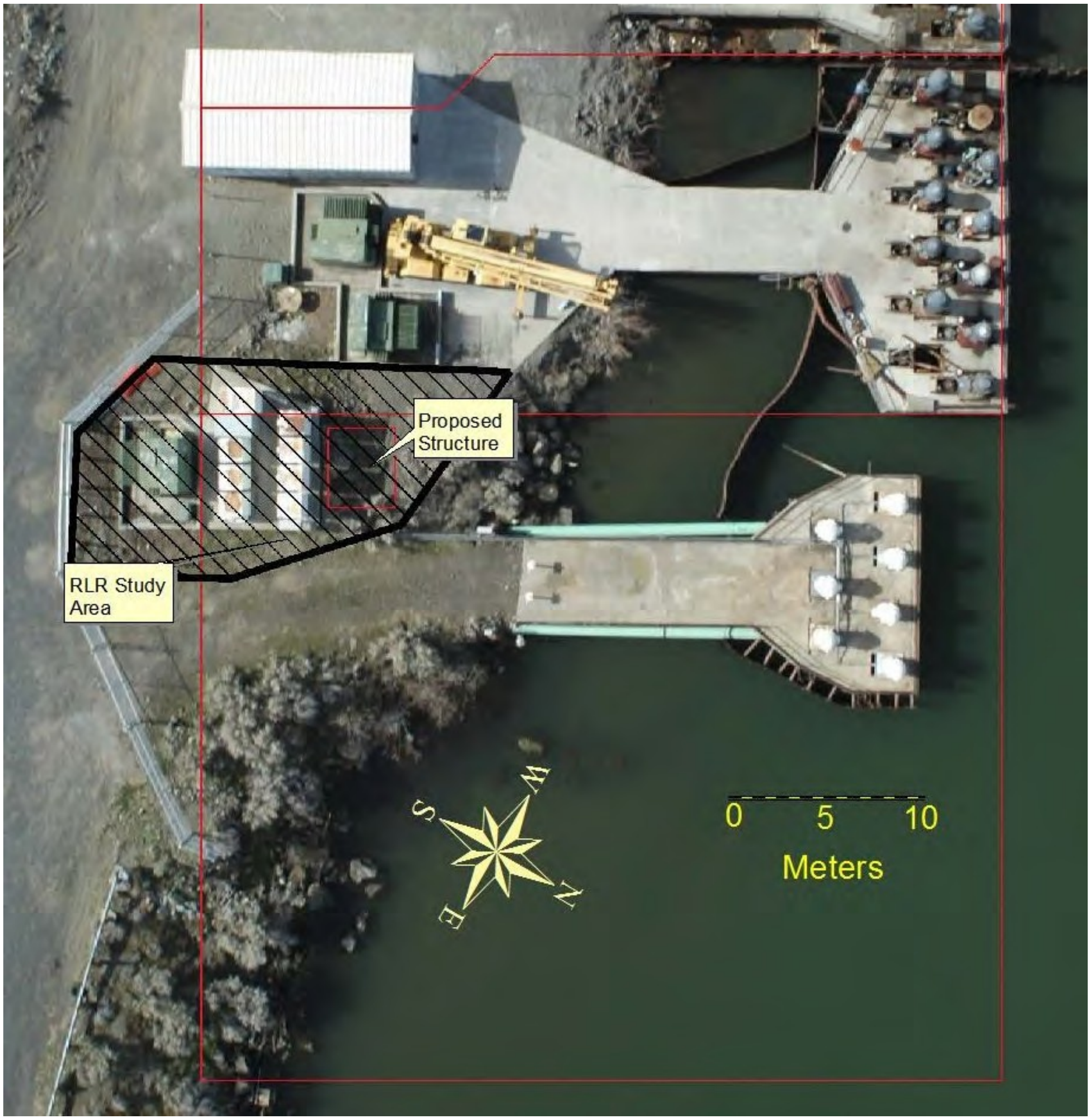


Figure 4: APE of Study Area

Environmental setting

Hermiston, Oregon lies squarely within the Columbia basin of northern Oregon. Its climate is shaped by its geographic location within the eastern rain shadow of the Cascade Mountains. This area is part of the Columbia Basin physiographic region (Lasmanis 1991:265). Importantly, the post glacial depositional forces in the region shape the soils that we see on the surface of the plateau today.

The geomorphology of the area was produced in part by Miocene Volcanism. The oldest basaltic and andesitic rocks in the area were laid down during the Eocene (54.8 to 33.7 mya), and volcanic activity in Oligocene (33.7 to 23.8 mya) led to the beginning of mountain building. However, it was during the latter Miocene (23.8 to 5.3 mya) that the Cascades were actually raised. Simultaneous with this uplifting, the ancient Columbia River started to crush a channel through the rock in the same basic location that it is found in today. Highly viscous basalt flows from the Columbia Basin to the east followed the course of that channel. Included among these flows were the Grande Ronde (16.5 to 15.6 Ma), the Frenchman Springs unit of the Wanapum (15.6 to 14.5 mya), and the Saddle Mountains (14.5 to 6 mya) basalts (The Geology of Washington, Southern Cascades).

The secondary geographic formative process in the area is the result of post glacial flooding, sediment deposition and sediment redistribution from both wind and water. Between 12,700 and 15,300 years B.P., cataclysmic floods raced down the Columbia gorge at a speed estimated at fifteen times greater than the combined flow of all the world's rivers today. The immense power and height of these floods caused great landslides, carved hanging valleys, and sculpting basalt outcrops high above present-day river levels into variously rounded shapes (The Geology of Washington).

Finally, The Columbia River itself continues to shape the landscape, even in its dammed condition. The results of continual adjustments in the height of the normal pool seasonally, and often daily, as well as concentrated wave action in some wind affected areas, have provided constant erosional and depositional areas along the bankshore. Locally, the area encompassed by this project is essentially a portion of the ancient Columbia River floodplain. Specific to this project, the site area sits on a small bank created by the modified and dammed normal pool of the McNary Dam. The project proposal has a limited above water and below roadway surface footprint for the installed station components. The soils appear to be modified with rip rapped boulders and deposited sandy elements.

Vegetation

Vegetation on-site is limited to a few sagebrush. Historically it would have been a classic sage-steppe, with an overstory largely comprised of sagebrush (Artemesia tridenta). Today it is completely disturbed through the construction of river pumping equipment.

Cultural Setting

The project area lies within the Columbia Plateau physiographic province as defined by Walker (1998). Ames et. al. (1998) further define the location of the project area as the southern plateau where their “South-central”, “Southeast” and “Southwest” regions converge near the present day location of McNary Dam.

Cultural history of this region begins with the Paleo-Indian period dating to 11,5000 years ago. The Richie-Roberts Clovis Cache is the only known site to contain intact cultural deposits of this age and was found approximately 100 miles NNW of the proposed project area near Wenatchee, WA (Mierendorf 1987). Numerous artifacts attributed to the Clovis period have been found across the landscape but are entirely limited to surface finds (Ames et. al. 1998) where chronological placement is limited to artifact typology association. The climate at this period was experiencing major changes as the cooler Pleistocene environment was transforming into the warmer Holocene environment, this period also represents the last major retreat of the glaciers and a transformation into the landscape that we generally see today (Chatters 1998).

Using the Cultural Chronology developed by Ames et al (1998) the next major technological shift (Period 1B) seen in the archaeological record dates to 11,000-5000/4400 B.C. and is characterized by people who utilized a broad-spectrum hunter-gatherer subsistence economy. These people would have moved across the landscape according to seasonal changes in low population densities that were highly adaptable (Ames et al 1998). No evidence of pit houses or permanent structures have been found, technology inferred from artifacts and features indicate that these people were highly mobile and likely had no use for a permanent structure. This period also predates the eruption of Mount Mazama in southern Oregon, a chronological marker used to date archaeological sites based on their position above or below the lens of ash.

After the eruption of Mount Mazama, Ames et al (1998) identifies the next major technological shift at 5000/4400-1900 B.C. This shift in technology is marked by the decline in frequency of projectile points and an increase in milling stone size and evidence of intensified natural resource exploitation including certain roots and salmon. This period also marks the first appearance of pit houses. The climate during this period also begins to cool relative to the climate observed during Period 1B. Timberlines are beginning to descend and moisture is increasing (Chatters 1998).

The next period of technological shift identified by Ames et al (1998) spans from 1900 B.C. to A.D. 1720. It is at the beginning of this period that the appearance of pit houses becomes widespread, evidence of a heavy reliance on fishing, storage and intensive exploitation of camas and the establishment of land use patterns observed by Euro-American explorers during their first arrivals. The period ends with the arrival of the horse and Europeans explorers. Within this period the climate continues to cool until around 800 B.C. when temperatures begin to warm and glaciers recede as a result (Chatters 1998). This fluctuation in temperature is reflected in the observable tree lines in the archaeological record. Between A.D. 1400 and 1850 a “Little Ice Age” occurred and while evident in the higher mountain ranges this event had little effect on the flora of the Northwest (Chatters 1998).

At the time of Euro-American contact Cayuse, Umatilla and Walla Walla tribal populations were found across the region of the project area. These people were made up of semi-sedentary tribes that set up temporary camps for fishing, hunting and gathering plant resources from spring through fall and would then establish a large village near a river where they would remain until the next spring (Stern 1998). Two concentrations of pit houses have been identified within 2 miles of the project area and may be the remnants of one of those winter villages. These concentrations are found near the confluence of Spring Wash and the Columbia River, a prime location for a winter village. This particular location of pit houses would have provided easy access to the uplands south of the Columbia River.

Lewis and Clark were likely the first Euro-Americans to visit the project area. Hat Rock was the first distinctive landmark passed by the Lewis and Clark Expedition on their journey down the Columbia, and is one of the few remaining sites not underwater (Coues 1965). In the 1860s and '70s the nearby city of Hermiston was known as Six Mile House, an Old West Hotel with a bar. Six Mile House was an overnight stop for trail-weary travelers and freighters.

With the arrival of the railroad and subsequent building, Hermiston was created and incorporated in 1907. Under administration of the Bureau of Reclamation, Cold Springs Reservoir was constructed east of Hermiston for storage of Umatilla River water. Approximately 800 people turned out to celebrate the formal opening of the head gate leading to the main canals on May 27, 1908. With this advent, irrigated farming was undertaken on a large scale.

This pumping station is a major water access point for regional farming, and with other similar stations, it represents contemporary agricultural landuse in an arid environment.

Literature Review

Sites on or adjacent to the APE (all sites are considered to be confidentially located). Files are found at the Oregon Parks and Recreation Department, Historic Preservation Office, Salem Oregon.

Cadastral Survey

A Review of BLM Cadastral Survey Records shows two prominent surveys with mapping of the area. One was conducted in 1861 by Dolphus S. Payne, and the second in 1914 by Joseph A. Ganong. The 1861 map shows a trail running through sections 7 and 8 along the south bank of a slough that has now been drowned out by the damming of the Columbia River (Fig 5). The land on the small island created by the slough and the Columbia River is described as "Rich Land" while those lands south of the project area above the steep cliffs is described as "Broken & Steep, poor land" (Payne 1861). The survey completed by Joseph A. Ganong shows greater detail of the nearby island of which only one now exists, these are described as "Meridith Island", simply "island" and "Switzler Island" which remains today (Fig 6).

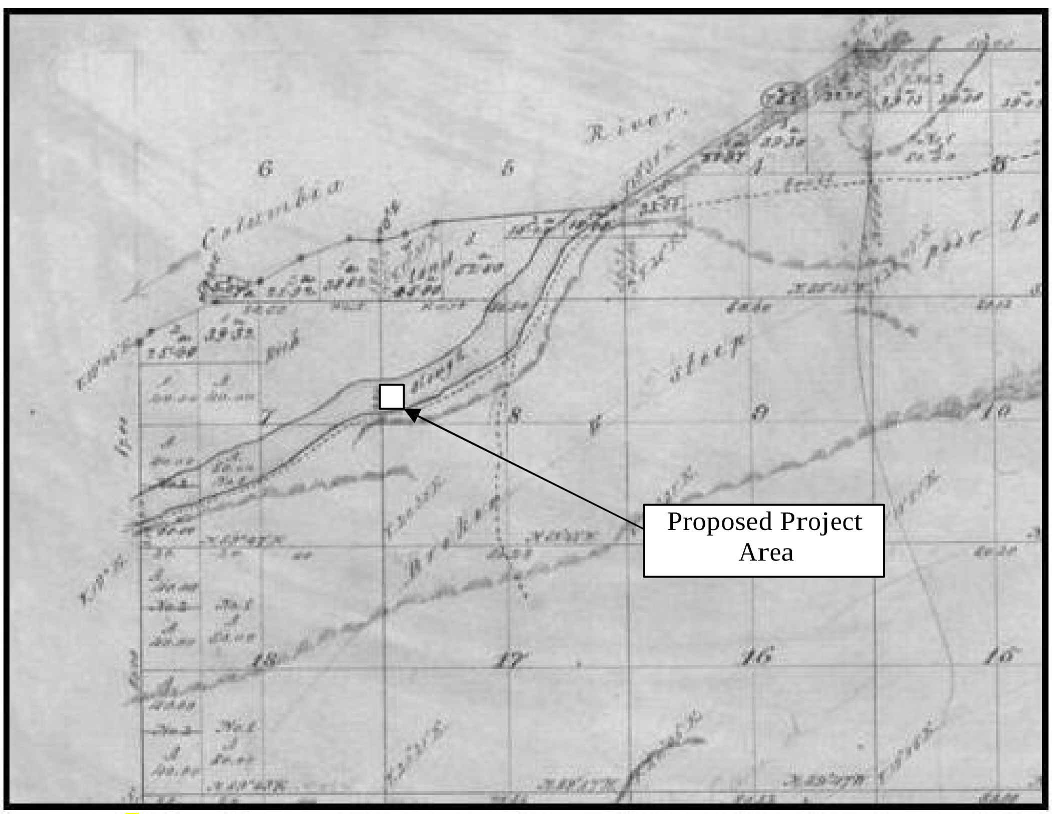


Figure 5: 1861 Cadastral Survey (Payne)

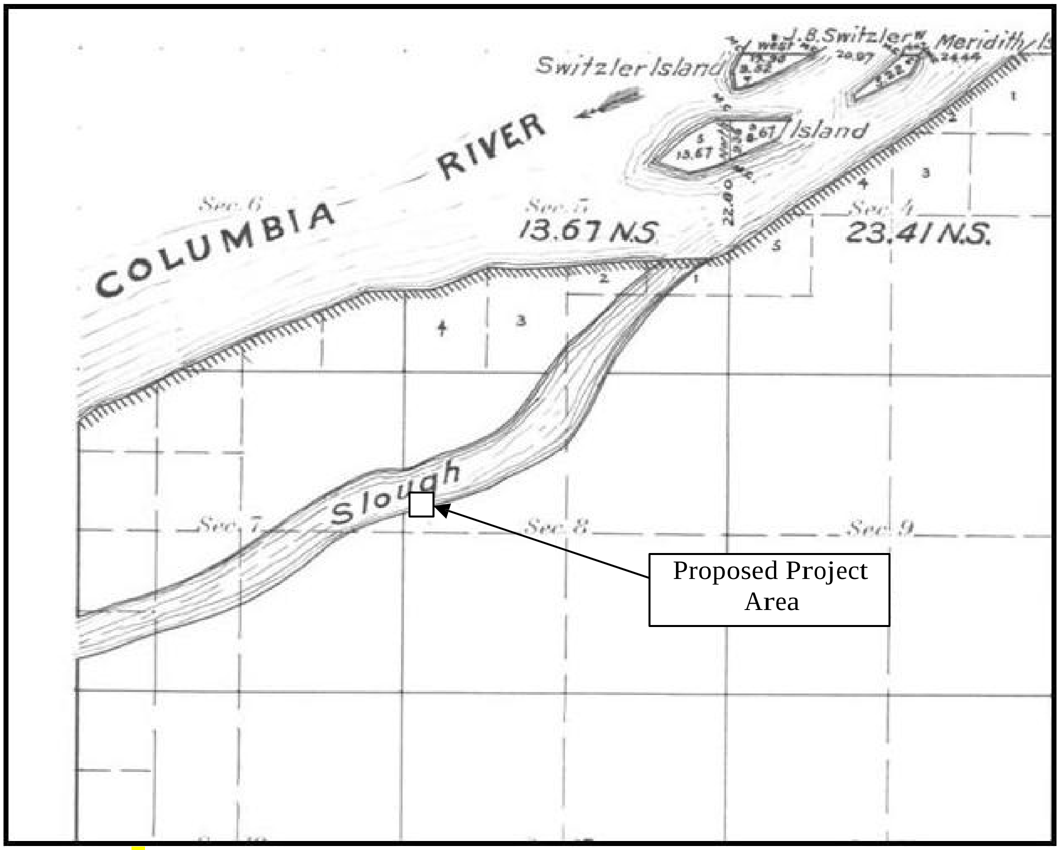


Figure 6: 1914 Cadastral Survey (Ganong)

Archival Research

A review of the Oregon Parks and Recreation Department records in the Historic Preservation Office revealed that eight archaeological surveys have been completed within 2 miles of the proposed project area. Nine archaeological resources are known to exist, or to have existed at one time within 2 miles of the proposed project area. No properties listed on or eligible for the National Register of Historic Places exists within 2 miles of the proposed project area.

Completed Archaeological Surveys

Eight archaeological surveys have been completed within 2 miles of the proposed project area and are described below.

Survey # 17010: McNary Reservoir Cultural Resource Inventory Survey Report. This survey report evaluated known archaeological resources impacted by the McNary Dam and identified new archaeological resources. The survey report was completed by Catherine E. Dickson of the Confederated Tribes of the Umatilla Reservation in 1999. No part of this survey took place over the proposed Columbia River Pumping Station project area and is found 1.25 miles west of the project area.

Evaluations were made according to the resources present including known burials, pit houses and concentrations of artifacts. A special focus is given to methods to be used to discourage looting activities. All sites within 2 miles of the proposed project area and within the survey boundaries of survey #17010 were previously recorded but re-evaluated by that report. Archaeological sites found within 2 miles of the proposed "Columbia River Pumping Station" and found within the survey boundaries of the McNary Dam Survey are described below. Site forms occasionally indicate that a site was not relocated; this is likely due to the construction of McNary Dam.

35UM007: "House Pit Village with 13 distinctly marked house pits visible on the surface", numerous lithic tools were also found on the surface, site originally recorded in 1947. The site was not relocated during the McNary Reservoir Survey.

35UM008: Lithic tools which were eroding out of a sand dune, site originally recorded in 1947. The site was not relocated during the McNary Reservoir Survey.

35UM009: Lithic tools found "on top of lava point", area used for a picnicking, site originally recorded in 1947. The site was not relocated during the McNary Reservoir Survey.

35UM010: Numerous lithic tools including ground stone found along a long axil in line with the Columbia River. The site was originally recorded in 1947. The site was not relocated during the McNary Reservoir Survey.

35UM017: Fourteen house depressions found on the northwestern tip of Techumtas Island, surface materials included "artifacts and chips." The site was re-visited during the McNary Reservoir Survey and recorded as "inundated."

Survey # 18187: Cultural Resources Technical Report for the Newport Northwest Transmission Line Project. This report gives the findings for an archaeological survey completed along the APE of a proposed transmission line that would stretch from a proposed Wallula Power substation to the McNary Substation, a distance of 34 miles. This survey did not identify any cultural resources within 2 miles of the proposed project area. The survey did identify 1 archaeological site along the proposed project APE.

The survey report was completed by Carrie Wills, Marcia Montgomery and Kimberly Demuth of Entrix in 2001. No part of this survey took place over the proposed Columbia River Pumping Station project area and is found 0.5 miles south of the proposed project area.

Survey # 14231: A Cultural Resources Survey of the Bonneville Power Administration's Umatilla Tap Project. This report gives the findings for an archaeological survey of a single pole transmission line to be built from the BPA Hat Rock Substation to the Umatilla Coop Sand Point Substation, a distance of 0.75 miles. No archaeological resources were identified during the survey.

The survey report was completed by Harvey S. Rice of Archaeological and Historical Services of Eastern Washington University in 1993. No part of this survey took place over the proposed Columbia River Pumping Station project area and is found 1 mile SW of the proposed project area.

Survey # 20284: Class I and Class III Cultural Resource Investigations for the Umatilla Basin Project, Phase II and for Safety of Dams Modifications to Cold Springs Dam. The survey completed a Class I and III cultural resources investigation of 525 acres comprising a right-of-way corridor and selected portions of Cold Springs National Wildlife Refuge. Pedestrian and selective subsurface testing was completed within the project area. Of those resources identified by survey # 20284 none were found to be eligible for the NRHP.

The survey report was completed by Michael S. Burney, Anna P. Harrison, Mary K. Lovejoy and Jeffery Van Pelt of the Confederated Tribes of the Umatilla Indian Reservation in 1994. No part of this survey took place over the proposed Columbia River Pumping Station project area and is found 1.1 mile SW of the proposed project area.

Survey # 19978: Cultural Resource Inventory Report No. 05-McNa-056: Sand Station Tree Planting. The survey completed an archaeological survey of 1 acre to identify cultural resources that might be impacted by proposed tree planting.

The cultural resource report was written by Ray L. Tracy in 2005. No cultural resources were identified during the survey. No part of this survey took place over the proposed Columbia River Pumping Station project area and is found 1.0 mile SW of the proposed Columbia River Pumping Station project area.

Survey # 20992: Cultural Resource Inventory Report for Sand Station Kiosk Installation. The survey completed an archaeological survey of 0.25 acres to identify cultural resources that might be impacted by Kiosk Installation.

The cultural resource report was written by Mary E. Keith in 2006. No cultural resources were identified during the survey. No part of this survey took place over the proposed Columbia River Pumping Station project area and is found 1.0 mile SW of the proposed project area.

Survey # 20897: A Cultural Resources Survey for the Hat Rock Tap Transmission Line Maintenance Project. The survey completed an archaeological survey of 0.2 acres to identify cultural resources that might be impacted by transmission pole stubbing. The proposed project would install shorter pole next to an existing transmission pole in order to reinforce the original pole without replacement.

The cultural resource report was written by Sunshine R. Clark in 2006. No cultural resources were identified during the survey. No part of this survey took place over the proposed Columbia River Pumping Station project area and is found 1.0 mile SSW of the proposed project area.

Survey # 22162: McNary-Walla Walla 230-kV Transmission Line Cultural Resources Investigation. The report summarizes an archaeological survey of 54.6 miles of proposed transmission line.

The cultural resource report was written by James J. Sharpe, James C. Bard and Raena Ballantyne of CH2MHILL. No part of this survey took place over the proposed Columbia River Pumping Station project area and is found 0.5 miles SE of the proposed project area.

Known Archaeological Sites within 2 miles of the proposed project area.

35UM007: "House Pit Village with 13 distinctly marked house pits visible on the surface", numerous lithic tools were also found on the surface, site originally recorded in 1947. The site was not relocated during the McNary Reservoir Survey.

35UM008: Lithic tools which were eroding out of a sand dune, site originally recorded in 1947. The site was not relocated during the McNary Reservoir Survey.

35UM009: Lithic tools found "on top of lava point", area used for a picnicking, site originally recorded in 1947. The site was not relocated during the McNary Reservoir Survey.

35UM010: Numerous lithic tools including ground stone found along a long axil in line with the Columbia River. The site was originally recorded in 1947. The site was not relocated during the McNary Reservoir Survey.

35UM016: "No evidence for a campsite, 2 artifacts-notched pebble net sinker and a perforated flat pebble net sinker."

35UM017: Fourteen house depressions found on the northwestern tip of Techumtas Island, surface materials included "artifacts and chips." The site was not relocated during the McNary Reservoir Survey.

35UM019: "Campsite was found." No further information is available.

35UM020: Artifacts and broken stones exposed in large blowout in sand dune and on adjacent beach. The site was not relocated during the McNary Reservoir Survey.

35UM021: Artifacts exposed along beach. Materials include sinkers, choppers, hammer stones, iron spike, chisels, axe blade, various lithic artifacts.

Research Design

Research Goals and questions

RLR developed a hypothesis for this project, based upon the goal of cultural resources management in a massively disturbed context in areas where there is little or no previous contextual work. The immediate goal is to evaluate the potential of this project area for the presence or absence of cultural resources.

Hypothesis: That the cultural survey will provide potential discovery of aspects of the built environment from the recent agricultural infrastructure use of the project area, with some minimal potential for historic agricultural features.

Expected Results

Given the level of disturbance, and the relatively young age of the pumping platforms at this locale, RLR has very minimal expectation for any type of historic or cultural discovery older than 20 years or so.

Inventory Methodology (Planning):

The survey methodology was determined by the surface visibility of the landscape, which was excellent throughout. Reiss-Landreau Research determined that a visual assessment, combined with limited (two probes) testing would provide enough information for a complete inventory here.

Shovel probes were 50 cm wide in the sand, and were excavated at least 40 cm into sterile subsurface (Fig 7).

Survey Results

A. Date of survey, Weather Conditions: 1/30/09, overcast

B. Field personnel: C. Landreau, K. Y. Reiss

C. Actual methodology employed: Visual reconnaisance and two shovel probes.

D. Shovel probes:

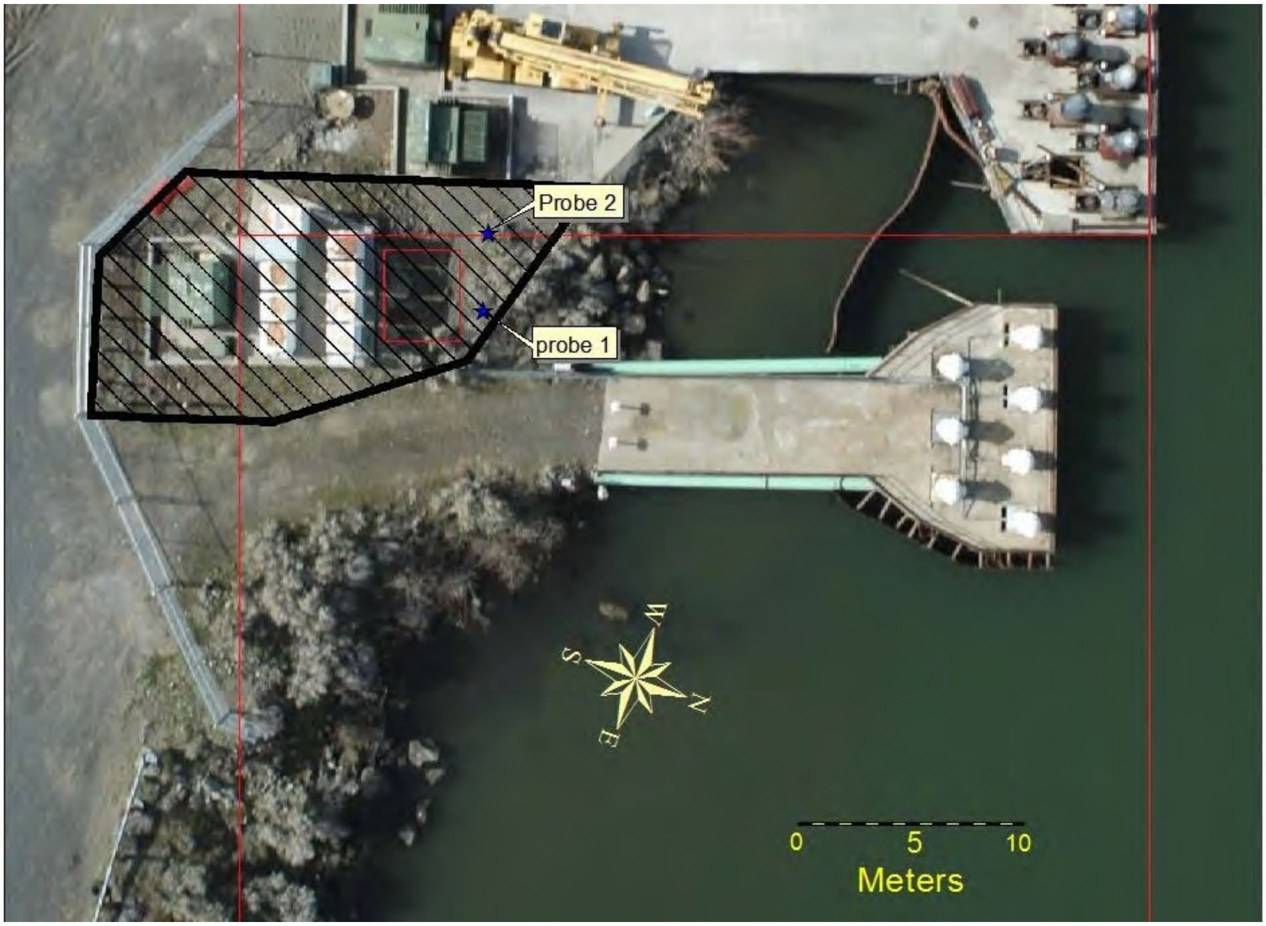


Figure 7: Location of the shovel probes

Location	Depth of test	soil type	Cultural Materials
STP1	40 cm to rip-rap	10yr 6/4 sand	Ø (modern 1 shell)
STP2	36 cm to rip-rap	10yr 6/4 sand	Ø (modern)

E. Depositional Environment: The soils were 10YR 6/4 sands with some industrial oil and some mixed 10Y4/3 loam, as well as plastic, aluminum, clear bottle glass and a small shell fragment (Fig 8). On-site photography revealed that the sandy surface with the sagebrush is likely underlain by engineered rip-rap boulders. It is likely that the entire project area is to some extent fill.

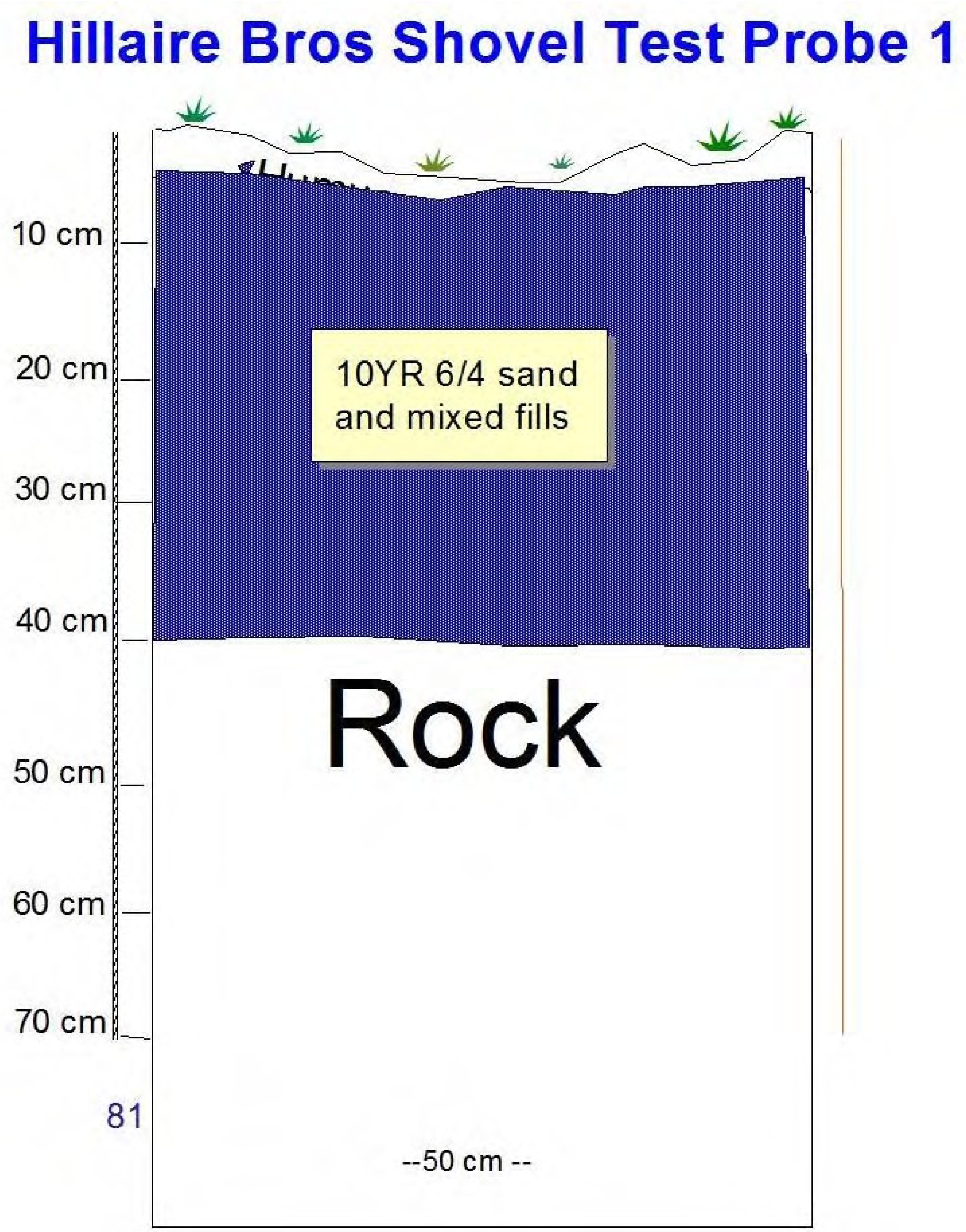


Figure 8: Shovel Probe 1

Project Recommendations:

RLR was unable to locate cultural resources within the .12 acre project area for this proposed development. The project has been subjected to tremendous disturbance within the APE. Indeed, visually, large engineered boulders appear to underlay the sandy sediments on the surface. It is extremely unlikely that buried cultural deposits exist at this locale. Reiss-Landreau Research can provide no empirical archaeological evidence that would allow this project to be impeded, and recommends that it be permitted to proceed.

Inadvertent Discovery Procedure.

If any archaeological resources are discovered or suspected during the course of the project, activity in the immediate area shall stop until a professional archaeologist can asses the discovery.

As the project is on administered federal land, thus all federal laws must be followed by the Walla Walla District such an inadvertent discovery of artifacts or bone occur during construction (e.g., Native American Graves Protection and Repatriation Act, the Archaeological Resources Protection Act as well as the National Historic Preservation Act).

If the inadvertent discovery is Archaeological material:

1. The project proponent and the US Army Corps of Engineers Walla Walla District will be contacted and work in that area will stop.

2. The archaeologist will contact Paul Shapine, Realty Division, (509) 527-7324

a. Upon notification from RLR of discovery of potential archaeological deposits, RLR will contact the consulting parties. Parties will be contacted by telephone.

b. The Corps of Engineers, the DAHP and the consulting tribes will be given the opportunity to view the artifacts within 48 hours after the discovery or at the earliest possible time thereafter. The discovery will be kept confidential. After halting construction, securing the site, and notifying the contractor, the archaeologist will conduct a brief in-field evaluation. The purpose of the evaluation is to determine whether the discovered resources have potential to answer research questions.

d. If parties agree that the artifacts are not significant, RLR will ask the construction representatives to resume construction.

e. If parties agree that the artifacts are significant, Umatilla County or the Army Corps of Engineers will issue a stop work order until further notice for all construction work in the area defined as a significant site.

Guidelines for the Discovery of Human Remains:
The Federal protocol "Inadvertent Discoveries on Federal Lands After November 16, 1990" will be followed, as outlined in Appendix B

Bibliography

Ames, Kenneth M., Dumond, Don E., Galm, Jerry R., Minor, Rick
1998 Prehistory of the Southern Plateau. Handbook of North American Indians. Plateau. Edited by Deward E. Walker Jr. Smithsonian Institution, Washington

Chaters, James C.
1998 Environment. Handbook of North American Indians. Plateau. Edited by Deward E. Walker Jr. Smithsonian Institution, Washington

Coues, Elliott
1965 Meriwether Lewis and William Clark: the History of Lewis and Clark Expedition. Volume II. Dover Publications, Inc. New York.

Dickson, Catherine E.
1999 McNary Reservoir Cultural resource Inventory Survey Report. Confederated Tribes of the Umatilla Indian reservation, Pendleton, Oregon. On-File at the Oregon Parks and recreation Department.

The Geology of Washington: Columbia Basin.
1991 The geology of Washington: Rocks and Minerals, v. 66, no. 4, p. 262-277. Adapted for the Washington State Department of Natural Resources. Division of Geology and Earth Resources. Last modified 12 Sep 2005. http://www.dnr.wa.gov/geology/geolofwa.htm.

Lasmanis, Raymond.
1991 "The geology of Washington: Rocks and Minerals, v. 66, no. 4, p. 262-277, 1991. Used with permission by Washington State Department of Natural Resources.

Mierendorf, R.R.
1987 East Wenatchee Clovis Site. Washington Archaeological Site Inventory Form. On File at the Washington Department of Archaeology and Historic Preservation.

Stern, Theodore
1998 Cayuse, Umatilla and Walla Walla. Handbook of North American Indians. Plateau. Edited by Deward E. Walker Jr. Smithsonian Institution, Washington

Walker Jr., Deward E.
1998 Introduction. Handbook of North American Indians. Plateau. Edited by Deward E. Walker Jr. Smithsonian Institution, Washington

Appendix A: Photography

Figure 9: Shovel Probe 1

Figure 10: Visible rip-rap under site

Figure 11: Shovel probe 2

Figure 12: Site area, note disturbance

Figure 13: Shoreline rip-rap foreground

Figure 14: Adjacent pumping station

Figure 15: Project area

Appendix B: Inadvertent discovery procedure (Federal)

Inadvertent Discoveries on Federal Lands After November 16, 1990

An *inadvertent* discovery is one for which no plan of action was developed prior to the discovery.

Notification

The person who makes the discovery must **immediately notify the responsible Federal official** by telephone and provide written confirmation to the responsible Federal official.

Stop Work

If the inadvertent discovery occurred in connection with an on-going activity, the person must **cease the activity** in the area of the inadvertent discovery and **make a reasonable effort to protect the human remains and other cultural items.**

Initiating Consultation

No later than three working days after receiving written confirmation of the notification, the responsible Federal agency official must **certify receipt of the notification**, and take immediate steps, if necessary, to **further secure and protect the human remains and other cultural items. NOTE:** activity that resulted in the discovery may resume thirty days after the Federal agency official certifies receipt of the notification.

The responsible Federal agency official must also **notify by telephone** (with written confirmation) and **initiate consultation** with **any known lineal descendant** and the **Indian tribes and Native Hawaiian organizations –**

- **who are or are likely to be culturally affiliated with the human remains and other cultural items;**
- **on whose aboriginal lands the remains and cultural items were discovered; and**
- **who are reasonably known to have a cultural relationship to the human remains and other cultural items.**

Consultation is initiated with a written notification. The written notification must propose a time and place for meetings or consultation.

During Consultation

The **purpose** of consultation is to **help the Federal agency determine who is entitled to custody** of the human remains and other cultural items under NAGPRA so that the disposition process can be completed, and **to discuss the Federal agency's proposed treatment** of the human remains and other cultural items pending disposition.

The Federal agency official must **provide in writing –**

- a list of all lineal descendants, Indian tribes, or Native Hawaiian organizations that are being, or have been, consulted; and
- an indication that additional documentation will provided on request.

The Federal agency official **must request, as appropriate –**

- names and addresses of the Indian tribe official who will act as the tribe's representative in consultation;
- names and appropriate methods to contact lineal descendants;
- recommendations on how consultation should be conducted; and
- the kinds of cultural items that are considered to be unassociated funerary objects, sacred objects, or objects of cultural patrimony.

After Consultation – Written Plan of Action

The Federal agency official must prepare, approve, and sign a written plan of action. The plan of action must document the kinds of objects to be considered as cultural items; the planned treatment, care, and handling, including traditional treatment, of human remains and other cultural items; the planned archeological recording of the human remains and other cultural items; the kinds of analysis planned for each kind of object; and the nature of reports to be prepared.

The written plan of action must also include --

- the **specific information used to determine custody** of the human remains and other cultural items; and
- the **planned disposition** of the human remains and other cultural items.

Custody must determined in accordance with 25 USC 3002 (a), "Priority of Ownership," and 43 CFR 10.6, "Priority of Custody."

(over)

Will the human remains and other cultural items be left in place?

Yes

The Federal agency secures the site of discovery, and the disposition process does not continue further.

OR

No

Excavation or removal of the human remains and other cultural items must take place following the requirements of the Archeological Resources Protection Act (ARPA) (16 U.S.C. 470aa et seq.) and its implementation regulations. This includes issuance of an excavation permit by the cognizant Federal agency where required by ARPA.

Prior to Disposition – Notice of Intended Disposition

At least 30 days prior to transferring the human remains and other cultural items to the claimant entitled to custody, the responsible Federal agency must first publish a **Notice of Intended Disposition**. The Notice must –

- be published two times (at least a week apart) in a newspaper of general circulation in the area in which the human remains and other cultural items were discovered;
- be published two times (at least a week apart) in a newspaper of general circulation in the area or areas in which the affiliated Indian tribes or Native Hawaiian organization members now reside;
- provide information as to the nature and affiliation of the human remains and other cultural items; and
- solicit further claims to custody.

The Federal agency official must send a copy of the notice and information on when and where it was published to the National NAGPRA program.

Disposition

Disposition is the formal transfer of Native American human remains and other cultural items excavated or inadvertently discovered on Federal or tribal lands after November 16, 1990, to the lineal descendants, Indian Tribes, or Native Hawaiian organizations that have been determined to be the legitimate claimants.

In completing the disposition, the claimant formally accepts custody (ownership). Disposition should be documented, must be consistent with 25 USC 3002 (a), “Priority of Ownership,” and 43 CFR 10.6, “Priority of Custody.” Physical transfer may take place 30 days after the publication of the second Notice of Intended Disposition, as agreed upon by the claimant and the Federal agency official.

Some Disposition Options

Claimant Takes Physical Custody

The legitimate claimant takes physical possession of the human remains and other cultural items. Where allowable, and upon agreement with the claimant, the Federal agency may provide temporary care until the claimant is able to take physical custody.

Reburial on Federal Land

The human remains and other cultural items may be reburied on Federal land, if the agency’s policies and procedures permit such activities.

Relinquishment

Under NAGPRA [25 USC 3002(e)], the governing body of an Indian tribe or Native Hawaiian organization may expressly relinquish control over any Native American human remains, or title to or control over any funerary object or sacred object.

Oregon
John A. Kitzhaber, MD, Governor

Parks and Recreation Department
State Historic Preservation Office
725 Summer St NE, Ste C
Salem, OR 97301-1266
(503) 986-0671
Fax (503) 986-0793
www.oregonheritage.org

Oregon State Parks
Nature
HISTORY
Discovery

November 30, 2012

Ms. Shelly Lynch
USACOE
PO Box 2946
Portland, OR 97208-2946

RE: SHPO Case No. 12-1470
APP0051922 & NWP-2012-329
FOE/removal-fill
DSL/COE/Stahl Hutterian Brethern/Hilaire
5N 30E 7, 8, Hermiston, Umatilla County

Dear Ms. Lynch:

Our office recently received your report about the project referenced above. I have reviewed your report and agree that the project will have no effect on any known cultural resources. No further archaeological research is needed with this project.

Please be aware, however, that if during development activities you or your staff encounters any cultural material (i.e., historic or prehistoric), all activities should cease immediately and an archaeologist should be contacted to evaluate the discovery. Under state law (ORS 358.905-955) it is a Class B misdemeanor to impact an archaeological site on public or private land in Oregon. Impacts to Native American graves and cultural items are considered a Class C felony (ORS 97.740-760). If you have any questions regarding any future discovery or my letter, feel free to contact our office at your convenience.

Sincerely,

Dennis Griffin

Dennis Griffin, Ph.D., RPA
State Archaeologist
(503) 986-0674
dennis.griffin@state.or.us