BUREAU OF INDIAN AFFAIRS

BIOLOGICAL ASSESSMENT
AND ESSENTIAL FISH HABITAT ASSESSMENT
FOR THE
WAPATO HEADWORKS REHABILITATION PROJECT
UNION GAP, WASHINGTON

SUBMITTED TO THE
NATIONAL MARINE FISHERIES SERVICE
INTERIOR COLUMBIA BASIN OFFICE

AND THE
U.S. FISH AND WILDLIFE SERVICE
CENTRAL WASHINGTON FIELD OFFICE

SUBMITTED BY
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ACRONYMS AND ABBREVIATIONS

°	Degrees
BA	Biological Assessment
BIA	U.S. Bureau of Indian Affairs
BMP	Best Management Practice
BOR	U.S. Bureau of Reclamation
cfs	Cubic Feet Per Second
DPS	Distinct Population Segment
EFH	Essential Fish Habitat
ESA	Endangered Species Act
km	Kilometer
MCR	Middle Columbia River
MSA	Magnuson Stevens Fishery and Conservation and Management Act
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
PCEs	Primary Constituent Elements
Project	Wapato Headworks Rehabilitation Project
USFWS	U.S. Fish and Wildlife Service
YN	Yakama Nation
WSDOT	Washington State Department of Transportation

1.0 INTRODUCTION

This Biological Assessment (BA) assesses the potential impacts on listed species and critical habitat from the Wapato Headworks Rehabilitation Project (Project). The Project is an effort by the Bureau of Indian Affairs (BIA) to perform repairs to the irrigation headworks and to conduct an inspection for future repair efforts. A temporary cofferdam is required in the west channel of the Yakima River upstream of the Wapato Diversion Dam to dewater the headworks for these repairs. A cofferdam will also be installed in the east channel of the Yakima River in order to inspect the dam for future repairs or replacement. While these sections of the river are dewatered, the Project will include geotechnical borings, structural concrete cores, and ground survey.

Section 7 of the Endangered Species Act (ESA) requires federal agencies to consult with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) prior to authorization of major construction projects to ensure that federally authorized actions are not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of their critical habitat (50 CFR 402). The federal action triggering the Section 7 consultation is funding from the BIA. This BA describes the proposed action and its potential effects on listed species and critical habitat managed by NMFS and USFWS. Figure 1 shows the Project vicinity.

This document also serves to fulfill the requirements of the Magnuson Stevens Fishery and Conservation and Management Act (MSA) for BIA to consult with NMFS. The MSA directs federal agencies to consult with NMFS when their activities may have an adverse effect on essential fish habitat (EFH). A component of this process is the preparation and submittal of an EFH assessment.

The Project will allow BIA and YN to rehabilitate and repair the diversion structures, inspect the existing diversion dams, and design long-term rehabilitation or replacement options for the headworks and diversion facilities to address the ongoing operational, structural, and environmental issues of the facilities. Construction of these long-term changes to the facilities is planned to occur several years after the initial repairs to the headworks and will require another Section 7 consultation and EFH assessment. At that time, an Environmental Assessment will be prepared by the BIA to consider alternatives to dam changes under the National Environmental Policy Act (NEPA).

2.0 CONSULTATION AND EVALUATION HISTORY

In 2015, the BIA received a Biological Opinion NMFS (NMFS 2015), which concluded that dredging just upstream of the west channel Wapato Diversion Dam was likely to adversely affect but not likely to jeopardize Middle Columbia River Steelhead or adversely modify their critical habitat. In that consultation, the proposed action was somewhat similar to the current Project and occurred in the same area. However, in the current project, no dredging will occur. In 2015, the BIA also received a letter from USFWS concurring that dredging just upstream of the west channel Wapato Diversion Dam may affect but was not likely to adversely affect bull trout and its designated critical habitat.

3.0 PROJECT DESCRIPTION AND ACTION AREA

3.1 Definition of the Action Area

The action area, as defined by the ESA, is the area directly or indirectly affected by the Project (50 CFR 402.02) and generally extends outside the Project footprint to the point where there are no measurable effects from Project activities. The Project's action area is the Yakima River, from just upstream of the Century Landing boat launch facility at river mile ~107 through a point approximately one mile downstream of the diversion structure. This area encompasses both the east and west channels of the river from the upstream tip of the island to the downstream tip. The action area is the area that will potentially be dewatered by the proposed cofferdam (Figure 2).

Figure 1: Wapato Headworks Rehabilitation Project Vicinity

Figure 2: Wapato Headworks Rehabilitation Project Action Area

3.2 Proposed Action

3.2.1 Background

The Wapato Diversion Dam on the Yakima River was originally constructed in 1916 by the BIA and includes two ogee-shaped diversion structures spanning the east and west channels of the Yakima River south of Union Gap, Washington. This structure allows diversion of roughly 2,040 cubic feet per second (cfs) into the Main Canal of the Wapato Irrigation Project. Fish passage retrofits (vertical slot fishways) were constructed by the U.S. Bureau of Reclamation (BOR) in 1985. More recently, stability and tailwater modifications were constructed downstream of both the diversion structures by the BIA and YN in 2004. BIA has now partnered with YN to perform short-term repairs on the Main Canal Headworks structure adjacent the diversion while design of a more permanent solution is developed addressing the ongoing operational, structural, and environmental issues of the facility.

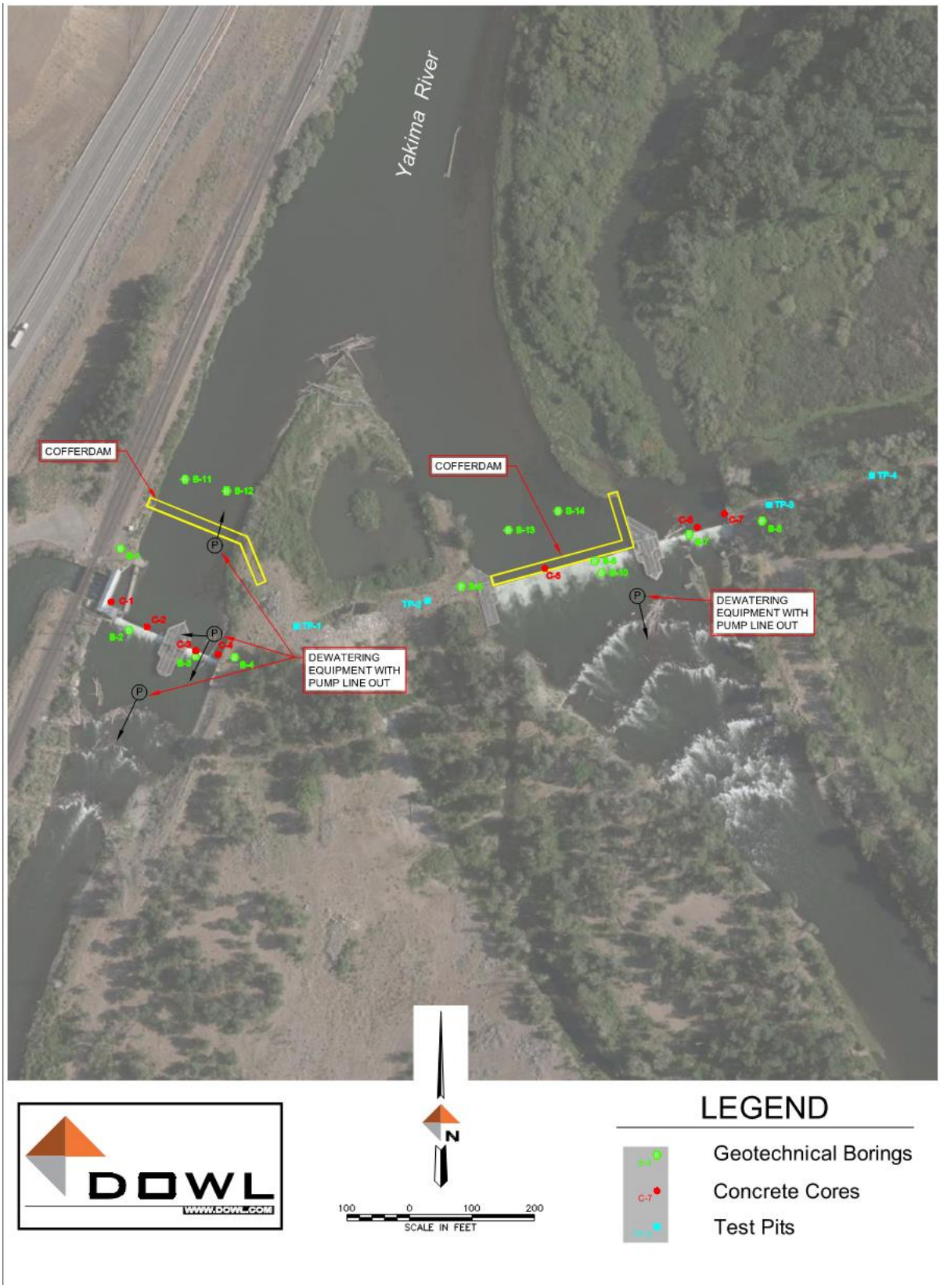
3.2.2 Cofferdam Project Description

The Project will install cofferdams in the Yakima River near the Wapato Diversion Dam during the fall of 2022 to facilitate repairs and a thorough structural inspection and geotechnical exploration of the Wapato Diversion Dam structures. Figure 3 shows details on the work to be completed for the cofferdam project. Once the area immediately upstream of the diversion dam is dewatered, the Project will replace the gate stems and electric actuators of the headworks, repair deteriorated concrete on the headworks structure, perform electrical and gate control repairs, and allow additional investigations and assessments of components of the facility that are typically not able to be dewatered. Age and structural deterioration prevent BIA from using the existing stop-log or bulkhead channels in the trash rack structure to dewater the headworks. Therefore, a cofferdam is required. Although several repairs (e.g., gate repairs, concrete repairs, and electrical upgrades) will be conducted under the Project, this BA is focused on Project actions (i.e., generally the dewatering and temporary cofferdam activities) that may affect MCR steelhead and Yakima River bull trout.

Two cofferdams will be installed. The first along the east channel diversion structures, and the second upstream of the west channel diversion structure. The east channel cofferdam will be installed first, directing Yakima River flows over the west channel diversion. Since the Wapato Main Canal headworks is located adjacent to the west diversion, performing the east cofferdam first will allow the cofferdam operations to start during the last few weeks of the irrigation season. The east channel cofferdam will be in place for several weeks, including installation and removal. The BIA will complete maintenance activities (i.e., inspections, geotechnical borings, and concrete cores) while the east channel cofferdam is in place. Once this work is complete, the east channel cofferdam will be removed, and the west channel cofferdam will be installed. The west channel cofferdam work will remain in place for approximately 60 days to accommodate maintenance and repairs of the headwork structure, inspection of the diversion structure and associated fishways, and exploratory excavations consisting of geotechnical borings and concrete cores. After these west diversion structure maintenance activities are complete, the west channel cofferdam will be removed, reestablishing river flow over both diversion structures.

The west channel cofferdam will be located in the first 400 feet upstream of the dam. The east channel cofferdam will be located along the upstream face of the diversion and center fish ladder (Figure 3). The cofferdams will be constructed using supersacks (i.e., large soil-filled bags, which typically hold approximately one cubic yard of material. Supersack material will be obtained from offsite commercial sources and will consist of clean gravel.

Figure 3: Wapato Diversion Cofferdam Details



3.2.2.1 Site access and materials staging

It is anticipated that cofferdam construction and maintenance materials will be staged at a boat ramp approximately one mile north of the project site and will be transported downstream to the site via barge. Using a barge will reduce the number of vehicle trips needed across the Yakima River to bring in materials and equipment for filling and moving supersacks. The barge will be delivered in sections by truck to the boat ramp and will be assembled on the water. The barge will be anchored at the boat ramp. The supersacks will be filled at the boat ramp and loaded onto the barge using an excavator, crane, or other equipment. The barge will then ferry the supersacks to the cofferdam location. Once anchored at the cofferdam location, an excavator, crane, or similar piece of equipment will construct the cofferdam. The use of a barge will limit the number of vehicle crossings through the Yakima River and will reduce or eliminate the need to cross the channel when flows are concentrated through the west diversion.

Some materials and equipment will be staged on the island. The island staging site will be accessed primarily by barge and secondarily by driving across the west channel at a low water crossing point near the south end of the island (Figure 2). Vehicles crossing the west channel could include utility vehicles (e.g., pickups), dump trucks, or medium-sized equipment (e.g., backhoes and loaders). Approximately 10 trips across the channel will be required to complete the work. The west channel crossing location is at a riffle in the river consisting of gravel, cobbles, and boulders. Vehicles will enter and leave the crossing via existing low-cut bank sections. Efforts to reduce the number of river crossings, including construction of a temporary bridge, were investigated. It was determined that considerably more than 10 crossings would be required to construct a temporary bridge. Ten river crossings (i.e., 5 round trips) is the maximum number of trips the contractor is allowed.

3.2.2.2 Submerged Debris Removal

The barge will need to travel beneath the I-82 bridge over the Yakima River to reach the project site from the boat launch. Submerged metal debris in the river near the bridge will be removed in order to provide the clearance needed (e.g., both overhead clearance and below water clearance) for the barge to pass under the bridge. Managing the submerged debris will create temporary, localized turbidity in the river.

3.2.2.3 Dewatering the Channels and Placement of Supersacks

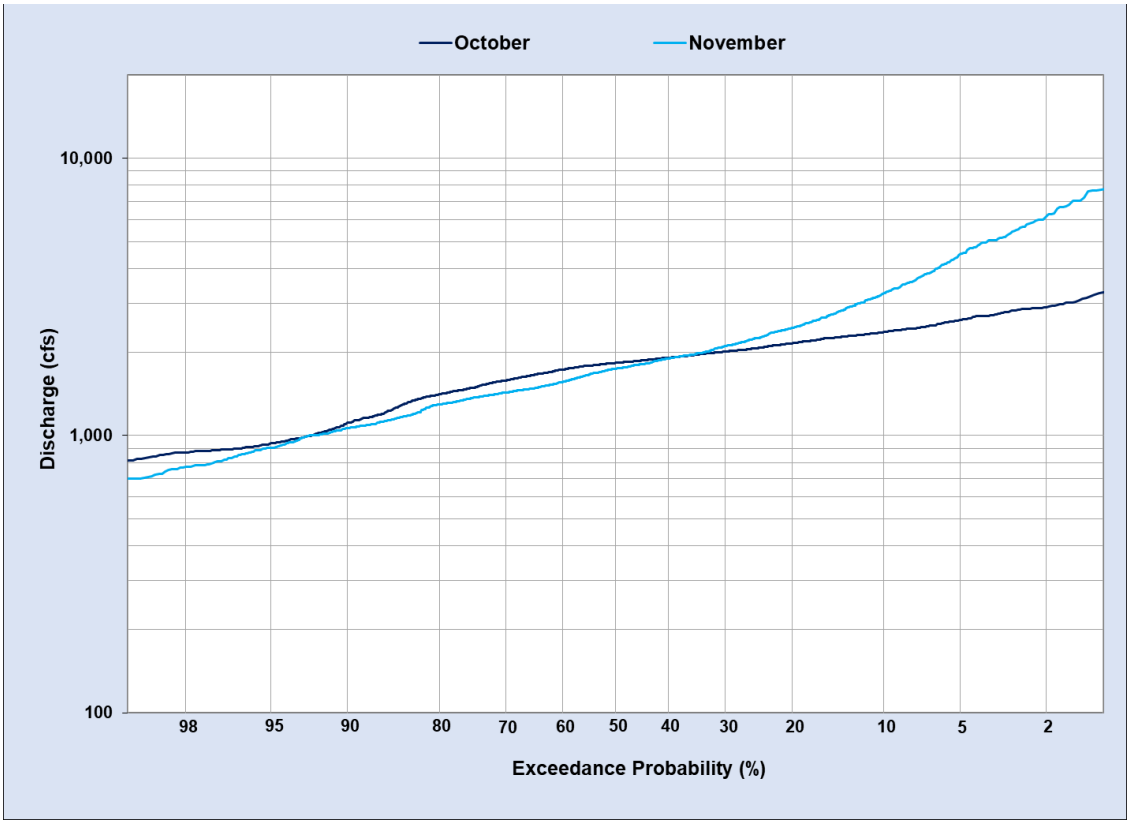
Approximately 250 feet of the river (78,000 square feet) will be dewatered in the east channel: the area from the cofferdam to the first rock weir downstream of the diversion dam. The area downstream of the east diversion dam to the south end of the island (approximately 0.5 miles long) will have some seepage flow, estimated to be at least 5 to 20 cfs during the period the work area is dewatered. Constructing the east diversion cofferdam will occur over a period of several weeks. Dewatering of the downstream area will be accomplished once the supersack cofferdam is constructed to its final elevation. Screened pumps will be employed downstream of the diversion to fully dewater the area once the cofferdam is completed. The dewatering effort will be carefully coordinated with the YN fish salvage crew so that the crew is on site and ready to rescue and remove fish as soon as the cofferdam is complete. The areas downstream of the east diversion will be dewatered for several days before reintroducing river flows. Approximately 350 feet of the river (50,000 SF) will be dewatered in the west channel: the area from the cofferdam to the first rock weir downstream of the diversion. Constructing the west diversion cofferdam and dewatering the downstream area will take at least one week. As described for the east diversion, dewatering of the area downstream of the west diversion will be accomplished once the cofferdam is constructed to its final elevation. Screened pumps will be used downstream of the diversion to fully dewater the area once the cofferdam is completed. The dewatering effort will be carefully coordinated with the YN fish salvage crew so that the crew is on site and ready to rescue and remove fish as soon as the cofferdam is complete. The area downstream of the west diversion will be dewatered for six weeks before reintroducing river flows. Similar to the east channel, some minor seepage will occur. The anticipated dewatered area is

shown in Figure 4. The cofferdams will be constructed via a barge anchored upstream of the point of cofferdam installation. A piece of heavy equipment (e.g., excavator or small crane) located on the barge will place supersacks into the river. An impermeable membrane placed among, and extending upstream of, the stacked supersacks will help prevent water from passing through the cofferdam. The cofferdam will be approximately four to five supersacks high to achieve the required elevation; however, this may vary slightly based on the bathymetry of the river.

Figure 4: Anticipated Dewatered Areas

Two USGS stream gages (USGS 12500450 Yakima River above Ahtanum Creek and USGS 12502500 Ahtanum Creek at Union Gap), located a short distance upstream of the diversion dams, were used to determine the anticipated river flow during the construction period of October through November. Flow duration curves were developed, showing anticipated flows and the probability that those flows will occur during each month (Figure 5).

Figure 5: Yakima River Flow Exceedance Curve



BIA evaluated the possibility of routing diverted water from the cofferdam between the two diversion dams but found this to be infeasible due to the presence of a sheet-pile wall across the island, spanning the entire distance between the east and west diversion structures. Additionally, the flow area through the island was too small to divert the requisite flow volume. Similarly, routing flow to the west, around the west diversion, would be infeasible due to the presence of the railroad tracks, the headworks, and the canal. Routing flow to the east around the east diversion would require cutting a channel through wetlands to the embankment, which would result in substantially more impacts.

3.2.2.4 Fish Salvage

Fish will be removed from the area to be dewatered during the dewatering process. Fish salvage will be supervised on-site by YN fisheries biologists following procedures similar to those outlined in WSDOT Fish Exclusion Protocols and Standards (2016) and assisted by a crew of up to six YN fisheries technicians, as deemed necessary by the supervising biologists, all of whom are experienced with seining, electrofishing and relocation of juvenile and adult salmonids. The dewatering process will be gradual and under the guidance of the supervising biologists, to provide the greatest opportunity for fish to escape or be herded with seines from dewatering areas above and below the diversion structures. Fish that remain isolated in pools will be collected and moved to the free-flowing reach directly downstream.

While the cofferdam is in place, BIA, BOR, and YN will perform maintenance and inspections on the diversion structures, fish ladders, and channels.

3.2.2.5 Rock Weir Adjustment

While the area is dewatered, several other maintenance and inspection activities will occur. Portions of the rock weirs downstream of the diversion dams may be adjusted to allow the pools downstream of the diversions to be drained for inspection and maintenance activities. These areas will be returned to the design condition prior to the end of maintenance and dewatering activities by returning rocks that were required to be adjusted to dewater the pools and returning rocks dislodged during high flow events to their originally intended locations, Additionally, geotechnical investigations will be completed to document the physical properties of adjacent soil material and foundations of the dams and structures. Some geotechnical borings will occur in dewatered areas. A limited number of borings will occur in inundated areas upstream of the cofferdams and will be performed from a barge. This data will be used to support future design efforts. Up to ten geotechnical borings will be completed (four of these will be conducted from a barge) and up to 12 concrete cores removed from the headworks, diversion dams, wingwalls, and fish ladders.

3.2.2.6 Rewatering the Channels

Rewatering of the east channel will occur in October and rewatering of the west channel will occur in late November or early December. Rewatering the channels will be completed by removing any dewatering pumps. The cofferdam will then be disassembled, allowing the water retained behind the cofferdam to flow into the dewatered portion of the channel. The channel downstream of the cofferdam will likely be rewatered to its normal water level prior to final removal of the cofferdam supersacks.

3.3 Avoidance and Minimization Measures

BIA will implement the following avoidance and minimization measures:

1. Stage and complete multiple inspections and maintenance activities concurrently while the channel is dewatered to avoid having to dewater for each task separately.
2. Complete fish salvage prior to dewatering. Coordinate fish salvage with YN and follow their BMPs to avoid and minimize effects to fish. Qualified personnel will conduct the salvage according to accepted protocols (see Section 3.2.2).
3. Use supersack cofferdam construction methods rather than uncontained earthen fill.
4. Screen water intake pumps for dewatering to avoid impingement and entrainment of fish.
5. Stage materials and machinery out of the channel.
6. River crossing alterations will be limited to only what is necessary to provide access to and from the project site for the work vehicles and equipment that cannot be moved to the site by barge.
7. Establish the access route to the work areas on the island to minimize damage to vegetation. The chosen route will be located along the interior of the island, using mostly barren areas with minimal vegetation or large wood; vegetated areas will be crossed by the shortest route practicable.
8. Minimize the number of vehicle trips across the west channel.
9. Refuel machinery on the island at least 100 feet from the river channels and the constructed channel on the island.
10. Supply portable refueling storage tanks with portable containment facilities equal to 100% of the fuel tanks they will contain. Spill kits will be available on site.
11. Prevent any petroleum products, hydraulic fluid, chemicals, or any other toxic materials from being released into the river. Biodegradable hydraulic fluid shall be used in equipment at the work site.

3.4 Schedule and Duration

The Project will begin in late September or early October of 2022 and in-channel work will be complete by the end of December 2022. The east channel will be dewatered first, for up to three weeks. The west channel will then be dewatered for up to 60 days. The BIA plans to use an incentive clause in their procurement contract to encourage the contractor to complete the work early (i.e., if the contractor completes the work early they will earn an early completion bonus).

4.0 DESCRIPTION OF THE SPECIES AND THEIR HABITAT

Table 1 summarizes the listed species and critical habitat that are addressed in this BA.

Table 1. Species and Critical Habitat that May Occur in the Action Area

Species	Endangered Species Act Status	Critical Habitat
Middle Columbia River Steelhead (*Oncorhynchus mykiss*)	Threatened	Yes
Bull Trout – Yakima River (*Salvelinus confluentus*)	Threatened	Yes

4.1 Middle Columbia River Steelhead

The Middle Columbia River (MCR) steelhead distinct population segment (DPS) includes all naturally spawning populations of steelhead using the Yakima River. The MCR steelhead DPS was listed as threatened on March 25, 1999 (64 FR 14517) and its threatened status was reaffirmed on June 28, 2005 (70 FR 37160) and August 15, 2011 (76 FR 50448). NMFS has defined DPSs of steelhead to include only the anadromous members of this species (70 FR 67130). Many steelhead populations along the U.S. West Coast co-occur with conspecific populations of resident rainbow trout. There may be situations where reproductive contributions from resident rainbow trout may mitigate short-term extinction risk for some steelhead DPSs (Good et al. 2005, 70 FR 67130). We assume that any benefits to an anadromous population resulting from the presence of a conspecific resident form will be reflected in direct measures of the current status of the anadromous form (Northwest Fisheries Science Center, 2015).

NMFS has identified 17 extant populations in this DPS. The populations fall into four major population groups: the Yakima River basin (four extant populations; two of them—Naches and Upper Yakima--migrating past Wapato Dam), 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).

Life History. Young steelhead typically rear in streams for some time before migrating to the ocean as smolts. Steelhead smolts have been shown to migrate at ages ranging from 1 to 5 years throughout the Columbia Basin, but most steelhead generally smolt after 2 years in freshwater (Busby et al. 1996). Some juveniles move downstream to rear in larger tributaries and mainstem rivers.

Based on catch data, juvenile steelhead tend to migrate directly offshore during their first summer, rather than migrating nearer to the coast. Maturing Columbia River steelhead are found off the coast of Northern British Columbia and west into the North Pacific Ocean (Busby et al. 1996). Available fin-mark and coded-wire tag data suggest that winter steelhead tend to migrate farther offshore but not as far north into the Gulf of Alaska as summer steelhead (Burgner et al. 1992). At the time adults are (re-)entering

freshwater, tagging data indicate that immature Columbia River steelhead are out in the mid-North Pacific Ocean.

Most steelhead spend 2 years in the ocean (range 1 to 4 years) before migrating back to their natal streams (Shapovalov and Taft 1954; Ward and Slaney 1988). Once in the river, steelhead apparently rarely eat and grow little, if at all. These combined behaviors produce fish that range between 3 and 7 years of age at the time of spawning All steelhead upstream of The Dalles Dam (such as those in the action area) are summer-run fish that enter the Columbia River from June to August (Reisenbichler et al. 1992). Adult steelhead ascend mainstem rivers and their tributaries throughout the winter, spawning in the late winter through spring. Fry emergence typically occurs between May and August.

Limiting Factors. The major factors limiting recovery of the MCR steelhead DPS include: (1) Mainstem Columbia River hydropower system mortality, (2) reduced streamflow in tributaries, (3) impaired passage in tributaries, (4) excessive sediment, (5) degraded water quality, and (6) altered channel morphology (NMFS 2009.

4.1.1 Critical Habitat

Critical habitat for MCR steelhead has been designated in the Upper and Lower Yakima River migration corridor. Critical habitat includes the stream channels to the lateral extent defined by the ordinary high water mark (33 CFR 319.11). Only those habitats that are occupied and contain certain habitat attributes called "primary constituent elements" (PCEs) that are essential to support one or more life stages are designated critical habitat.

Many factors, both human-caused and natural, have contributed to the decline of the functional condition of the essential features of PCEs of designated critical habitat. Steelhead habitat has been altered through activities such as urban development, logging, grazing, power generation, and agriculture. These habitat alterations have resulted in the loss of important spawning and rearing habitat and the loss or degradation of migration corridors. The following are the major factors that impair the essential features of the PCEs within designated critical habitat for MCR steelhead:

1. Mainstem Columbia River hydropower system mortality (freshwater migration corridors without obstructions),
2. Reduced tributary stream flow (freshwater spawning sites with water quantity conditions supporting spawning, incubation, and larval development; freshwater rearing sites with water quantity to form and maintain physical habitat conditions that support juvenile growth and development),
3. Impaired passage in tributaries (freshwater rearing sites with water quantity to form and maintain physical habitat conditions that support juvenile growth and development; freshwater migration corridors with water quantity conditions supporting juvenile and adult mobility and survival),
4. Excessive sediment in tributaries (spawning sites with substrate to support egg incubation and larval growth and development; juvenile migration corridors and rearing sites with forage to support juvenile growth and development),
5. Degraded tributary water quality (spawning sites with water quality to support egg incubation and larval growth and development; juvenile rearing sites and migration corridors with water quality supporting juvenile growth and development),
6. Altered tributary channel morphology (freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development;

freshwater rearing sites with floodplain connectivity to form and maintain physical habitat conditions that support juvenile growth and development), and

7. Climate change is expected to alter critical habitat by generally increasing temperature and peak flows and decreasing base flows. Although changes will not be spatially homogenous, effects of climate change will generally decrease the capacity of critical habitat to support successful spawning, rearing, and migration.

4.2 Yakima River Bull Trout

The Yakima River Core Area is 1 of 24 core areas in eastern Washington, eastern Oregon, and portions of Idaho comprising the Mid-Columbia Recovery Unit for bull trout; this core area is within the Upper Mid-Columbia region, one of four regions in the recovery unit. The Mid-Columbia Recovery Unit is one of six recovery units that comprise the Coterminous United States Population of bull trout (*Salvelinus confluentus*), which was listed as threatened by the USFWS on November 1, 1999 (64 FR 58910).

Life History. Bull trout express both resident and migratory life history strategies (Rieman and McIntyre 1993, as cited in USFWS 2015a). Resident and migratory forms may be found together, and either form may give rise to offspring exhibiting either resident or migratory behavior (Rieman and McIntyre 1993, Brenkman *et al.* 2007, Homel *et al.* 2008, as cited in USFWS 2015a). The Yakima core area exhibits multiple life history patterns but is heavily impacted by fish passage barriers at irrigation storage dams in the upper basin, and populations are currently mostly adfluvial or resident forms (USFWS 2015b). Life history strategy impacts the size and age of bull trout at maturity. Resident fish tend to be smaller than migratory fish at maturity and produce fewer eggs (Fraley and Shepard 1989, Al-Chokhachy and Budy 2008, as cited in USFWS 2015a).

Bull trout typically reach sexual maturity in 4 to 7 years (Johnston *et al.* 2007, as cited in USFWS 2015a). Most populations spawn between mid-September and mid-October but several spawn between August and early September and late October to early November (USFWS 2015b). Redds are often constructed in stream reaches fed by springs or other cold groundwater sources (Goetz 1989; Pratt 1992; Rieman and McIntyre 1993, as cited in USFWS 2015a). Egg incubation typically lasts from 100 to 145 days, depending on water temperature (Pratt 1992, as cited in USFWS 2015a); young fry remain in the substrate after hatching and may not emerge for over 200 days after egg deposition. Depending on water temperatures and stream flows, fry typically emerge from early April through May (Pratt 1992; Ratliff and Howell 1992; McPhail and Baxter 1996, as cited in USFWS 2015a). Adfluvial forms rear for 1 to 4 years in tributary streams before migrating to a lake (Downs *et al* 2006, as cited in USFWS 2015a).

Resident bull trout prey on terrestrial and aquatic insects, macro-zooplankton, and small fish (Goetz 1989; Donald and Alger 1993; as cited in USFWS 2015a). Adult migratory bull trout feed primarily on a wide variety of resident and anadromous fish species (Fraley and Shepard 1989; Brown 1992; Donald and Alger 1993; Guy *et al.* 2011; as cited in USFWS 2015a). Bull trout often live for 10 years and occasionally for 20 years or more (McPhail and Baxter 1996, Al-Chokhachy and Budy 2008, as cited in USFWS 2015a).

Limiting Factors. Bull trout have the most stringent habitat requirements of Pacific Northwest salmonids, including cold water temperatures, complex stream habitat with clean substrate, and connectivity between upstream spawning and rearing areas and downstream habitats for foraging, migration, and overwintering. Since the time of listing, several populations in the Yakima Basin are declining and/or have become functionally extirpated (USFWS 2015b) The major factors limiting recovery of the Mid-Columbia Recovery Unit within the Yakima River core area include: (1) upland/riparian land management, (2) instream impacts, (3) connectivity impairment, (4) fisheries management, (5) small population size, (6) forage fish availability, and (7) nonnative fishes (USFWS 2015b).

4.2.1 Critical Habitat

Critical habitat for bull trout within the coterminous United States was designated October 18, 2010 (75 FR 63898), including Unit 11, the Yakima River from its confluence with the Columbia River to Keechelus Dam. The USFWS identified the following PCEs as essential for the conservation of bull trout (USFWS 2010):

1. Springs, seeps, groundwater sources, and subsurface water connectivity to contribute to water quality and quantity and provide thermal refugia.
2. Migration habitats with minimal physical, biological, or water quality impediments.
3. An abundant food base.
4. Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks, and unembedded substrates.
5. Water temperatures ranging from 36 to 59 degrees Fahrenheit, which adequate thermal refugia available for temperatures that exceed the upper end of this range.
6. In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwintering survival, fry emergence, and young-of-the-year and juvenile survival.
7. A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph
8. Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.
9. Sufficiently low levels of occurrence of nonnative predatory; interbreeding; or competing species that, if present, are adequately temporally and spatially isolated from bull trout.

5.0 ENVIRONMENTAL BASELINE

The environmental baseline, as defined under the ESA, consists of past and present impacts of all federal, state, or private actions and other human activities in action areas; the anticipated impacts of all the proposed federal projects in an action area that have already undergone formal or early Section 7 consultation; and the impact of state or private actions that are contemporaneous with the consultation process (50 CFR 402.02).

The Yakima River flows approximately 214 miles to the Columbia River. River and floodplain morphology are dominated by single-thread and braided channels that occupy alluvial floodplains. Bedrock outcrops (e.g., Union Gap) and floodplain revetments largely control the vertical and horizontal position of the river. Anthropogenic activities in the floodplain, including existing railroads and highways, have leveed, armored, realigned, and shortened the historic channel, severely diminishing natural river-floodplain interactions. The primary land uses in the area are irrigated agriculture, gravel mining, and transportation infrastructure. Secondary land uses include recreation and grazing.

Middle Columbia River steelhead and their critical habitat are affected by a number of habitat modifications within the action area. The most prominent modifications are the result of flow regulation and irrigation activities, as well as development in floodplain, riparian, and upland areas.

Water quality in the action area can be poor due to irrigation runoff that enters the Yakima River upstream. In most years, beginning below the Wapato Canal, irrigation diversions diminish streamflow

and contribute to high temperatures that can impact native fish populations and produce instream conditions that invigorate nonnative predators.

Floodplain development and revetments, agricultural diversion structures, floodplain roads, armored streambanks, and floodplain gravel mines throughout the Yakima basin and action area have altered natural processes that served to (1) promote exchange of water and sediments between the rivers and their overbank habitats, (2) provide lateral habitat diversity for MCR steelhead, and (3) maintain riparian habitat communities dependent on natural streamflow dynamics.

Throughout the action area, riparian habitat has been degraded through a variety of activities. Among them, roadbuilding, farming, channel armoring, grazing, urban development, and floodplain revetments have had the greatest effect. These activities have removed canopy cover, reducing the widths of riparian zones, and altering the riparian species composition in favor of nonnative plants. For MCR steelhead, the lack of properly functioning riparian habitat contributes to instream temperatures that may seasonally exceed physiological tolerances and streambank erosion that increases sedimentation of spawning habitat.

MCR steelhead use the action area as a transition zone between upstream areas where fish are spawning in the spring and rearing year-round, and downstream areas where water temperatures are too high during the summer for rearing. By late fall, juvenile steelhead drift into the area and prepare for smolting and emigration. At the same time, MCR steelhead adults begin to migrate through the action area to spawning areas upstream. Both migrations continue through the following spring.

Bull trout are known to be present downstream from spawning and early rearing areas to the confluence of the Yakima and Naches rivers, and in the mainstem of Ahtanum Creek. The Naches River mainstem, the Ahtanum Creek lower forks and mainstem, and the Yakima River upstream (known presence) and downstream from the Naches River (presumed presence) are described as foraging, migration and overwintering habitat for fluvial bull trout (Reiss et al. 2012).

Mizell and Anderson listed three fluvial bull trout populations that spawn in tributaries of the Naches River and based on a tagging study, overwinter in the Naches River generally from November through March. The tagged bull trout became more active in April and May, ranging as far downstream as the lower Naches River in before returning to natal streams as the river warmed in summer. The Naches River joins the Yakima River 10 miles upstream from the project area.

In the same study, tagged resident bull trout in the Ahtanum Creek watershed were not observed to venture far below the North Fork/Middle Fork confluence about 35 miles upstream from the Yakima River. Bull trout believed to be residents along with a presumed fluvial or displaced adfluvial adult from another population have been observed in the Ahtanum Creek mainstem.

There have been occasional observations of bull trout at mile 20 (April 1994 and July 2004) by WDFW and mile 1 (February 2003) of Ahtanum Creek (YN), and in the Yakima River as far downstream as the Sunnyside Canal 3 miles below the project area (unknown year), which diverts water from the Yakima River 3 miles downstream from Wapato Dam. An individual bull trout was captured by WDFW near Benton City in 1994, 28 miles above the mouth of the Yakima River (Mizell and Anderson 2015, Reiss et al. 2012). Based on the tagging study and these observations, bull trout may be present in the project area when river temperature is favorable from the end of the September spawning period for Ahtanum Creek and tributaries of the Naches River until the rise in river temperature in late spring. Records from 2000 through 2013 at the Bureau of Reclamation's Parker gage 3 miles downstream from the work area (the gage no longer records water temperature), water temperature in the action area is likely to decline to 50F during the last half of October. Cofferdam installation and dewatering will commence in October 2022, and bull trout could be in the area during the entire work period.

6.0 EFFECTS OF THE ACTION

Effects of the proposed action consist of the following, which are detailed in subsequent sections below:

- Localized habitat alteration from removal of riparian vegetation at boat launch to accommodate the work barge
- Potential disturbance, displacement, injury, or mortality from fish salvage
- Minor localized habitat alteration from barge assembly, barge anchoring, placement of supersacks for cofferdam, removal of supersacks
- Minor localized habitat alteration from vehicle traffic across the stream channel (southern end of west channel)
- Temporary, localized increased turbidity from barge launching and assembling activities, metal submerged debris removal activities at the I-82 bridge, and upon rewatering the channel

6.1 Barge Assembly

Removal or trimming of riparian vegetation from the Century Landing boat launch to accommodate launching of the barge and other equipment and materials including the supersacks and supersack fill materials will cause localized alteration and removal of habitat for MCR steelhead and Yakima River Bull Trout. Activity associated with barge launching and assembly on the shore and in the river at the boat launch will result in temporary localized increased turbidity.

6.2 Submerged Debris Removal

Activities associated with managing submerged metal debris will result in temporary localized increased turbidity. However, removal of debris (consisting primarily of abandoned car bodies) will likely provide a net, long-term benefit as it removes potential sources of pollution from the river.

6.3 Dewatering and Fish Salvage

Dewatering and fish salvage could disturb, displace, injure, or kill fish. Table 2 summarizes impacts to MCR steelhead and bull trout from the Project and the avoidance and minimization measures that will be implemented.

The east channel will be dewatered for approximately three weeks in September and October. The west channel will be dewatered for up to 60 days from October through early December. Either the east or the west branch channel of the Yakima River will remain flowing at all times. Adult fish that are moving upstream will be able to use the non-dewatered channel and existing fish ladders for migration. Juvenile fish will also be able to use the non-dewatered channel but will temporarily lose access to the dewatered channel. Approximately 250 to 350 feet (50,000 to 78,000 SF) of the Yakima River will be mostly dewatered, including the the area between the cofferdam and the diversion dam in each channel. The area downstream of the diversion dam to the southern end of the island will have some baseflow, estimated to be 5 to 20 cfs throughout the dewatered period.

Pumps used in dewatering will be screened at their intake to avoid fish impingement and entrainment.

The dewatered area will be isolated and fish salvage completed prior to dewatering. Fish salvage will be conducted by YN and will follow accepted protocols to minimize effects to fish (Also see Section 3.2.2.).

Table 2. Summary of Effects to Steelhead and Bull Trout

Project Component	Effect to steelhead and bull trout	Project Component Details
Barge assembly and disassembly	Localized habitat removal or alteration and temporary turbidity	Riparian vegetation at Century Landing will be removed or trimmed to accommodate large equipment Individual barge sections will be launched into the river from Century Landing; barge will be assembled on the river. Barge will be disassembled on the river and individual sections will be removed at Century Landing
Barge anchoring	Localized habitat alteration and temporary localized increased turbidity from placing and removing anchors	Barge will be secured at Century Landing at and the cofferdam locations either with anchors drilled into the river bottom substrate or with submerged weights.
Filling and subsequent emptying of supersacks	No effect unless loose material from supersacks inadvertently enters river; implementation of BMP's, including use of clean gravels as super sack fill, will prevent this	Excavator or crane will load filled supersacks onto the barge at Century Landing
Submerged debris removal	Localized habitat alteration and temporary localized increased turbidity	Car bodies will be picked up with an excavator, put on a barge and transported to the launch for disposal off site. If other debris requires removal, it will be either crushed, moved out of the way, or removed for offsite disposal.
Dewatering and fish salvage	Disturbance, displacement, injury, or mortality from dewatering, pumping of water, and fish handling	East channel will be dewatered for approximately three weeks, following completion of the east channel work, the west channel will be dewatered for approximately 60 days Water intake pumps will be screened to avoid impingement and entrainment of fish Fish salvage will be conducted by YN and will follow their best management practices (BMPs) and accepted protocols to avoid and minimize effects to fish.
Placement of cofferdams	Localized habitat alteration and temporary localized increased turbidity	Filled supersacks will be moved into place using an excavator located on a barge in the river
Adjustment of rock weir locations	Localized habitat alteration and temporary localized increased turbidity	Portions of the rock weirs downstream of the diversion dams may be adjusted to allow the pools downstream of the diversions to be drained for inspection and maintenance activities.
Diversion of water to opposite channel	No effect	Water levels will increase slightly, upstream of the cofferdam, which will increase water levels in portions of the upstream riparian wetlands.
Vehicle traffic across channel	Minor localized temporary habitat alteration from construction traffic traveling across the west stream channel (at downstream end of island)	Construction vehicles will access the cofferdam site by crossing the west channel at the downstream end of the island
Rewatering of channel	Temporary localized increased turbidity upon rewatering the channel	Rewatering of the east channel will occur in October and rewatering of the west channel will likely occur in December

6.4 Diversion of Water to Opposite Channel

The installation of the cofferdam in either channel will slightly increase water levels upstream of the cofferdam, which will inundate wetlands upstream, and on the island. This will have a beneficial effect on MCR steelhead and bull trout because it will provide temporary access to habitats that would not otherwise be inundated. Inundation of wetlands will likely be shallow; the extent and depth of the water level increase will depend on the flow rate in the river at the time the cofferdam is in place.

6.5 Vehicle Traffic in Channel

Construction vehicles will access the cofferdam site by crossing the west channel at the downstream end of the island. The channel in the crossing location is approximately 180 feet wide and approximately 3 feet deep. The river bottom in this location is primarily gravel, cobbles, and boulders. BIA will minimize the number of vehicle trips needed to bring materials to the cofferdam site by moving supersacks into place via barge. Vehicles will temporarily alter habitat in the immediate footprint of the crossing, until flows and deposition return to the channel and reshape any sediment displaced by the crossing.

6.6 Vehicle Traffic on Island

Construction vehicles will access the island across a gravel riffle at the southwest corner of the island. The access path from the crossing site to the work area will avoid trees and shrubs to the greatest extent practicable.

6.7 Rewatering of Channel

Rewatering of the east channel will occur in October and rewatering of the west channel will likely occur in late November or early December. Rewatering will create temporary, localized increased turbidity and suspended sediment, which is expected to dissipate and settle out rapidly. Rewatering will occur by first removing dewatering pumps and then deconstructing the cofferdam, beginning with the top layer(s) of supersacks. This will cause water to begin flowing into the dewatered area beginning with small and then increasing discharge. Efforts taken as part of the Water Quality Monitoring and Protection plan will monitor increases in turbidity which may affect the rate of cofferdam deconstruction. The dewatered area will likely be completely rewatered well before cofferdam removal is complete.

6.8 Cumulative Effects

Cumulative effects in the context of ESA Section 7 are the effects of future state, tribal, local, or private actions, not including federal activities, that are reasonably certain to occur in the action area (50 CFR 402.02). Future federal actions that are unrelated to Project activity are not considered because such actions will require their own Section 7 consultation. Because the future dam rehabilitation or rebuild will have a federal nexus, this was not considered in the cumulative effects analysis. Nonfederal actions that are reasonably certain to occur include continued climate change, irrigation, established agricultural operations, and management and research actions by YN or Washington Department of Fish and Wildlife.

These actions could contribute to cumulative effects on MCR steelhead and bull trout in the action area including continued impairment of water quality (mainly water temperature) and water quantity. Overall, these cumulative effects will contribute to perpetuating the degraded condition of the action area at a level approximately equivalent to what is currently present.

7.0 DETERMINATION OF EFFECTS

7.1 Effect on Middle Columbia River Steelhead

The Project **is likely to adversely affect** MCR steelhead. Effects will be temporary and be minimized by use of BMPs and avoidance and minimization measures. Though the cofferdam will dewater one channel of the river, the other channel and its associated fish ladder(s) will remain flowing, so that there is one channel open at all times. Adult fish that are moving upstream will be able to use the non-dewatered channel and fish ladder for migration. Juvenile fish will also be able to use the non-dewatered channel but will temporarily lose access to the dewatered channel. The project is not likely to jeopardize the continued existence of MCR steelhead.

The Project will **not adversely modify critical habitat** of MCR steelhead because the actions affecting habitat will occur in a localized area that has already been altered by previous dredging, dam construction, and continued irrigation. The freshwater rearing PCE will be temporarily affected by degraded water quality from the work area downstream to the confluence of the east and west channels. The temporary nature of the degradation of water quality, combined with its limited magnitude and spatial extent, make the effects of the action on the freshwater PCE minor. Therefore, the proposed action will not significantly affect the conservation value of the freshwater rearing PCE in the action area.

7.2 Effect on Bull Trout

The Project **is likely to adversely affect** Yakima River bull trout. Effects will be temporary and be minimized by use of BMPs and avoidance and minimization measures. Though the cofferdam will dewater one channel of the river, the other channel and its associated fish ladder(s) will remain flowing, so that there is one channel open at all times. Fish that are moving upstream will be able to use the non-dewatered channel and fish ladder for migration. Foraging or overwintering fish will also be able to use the non-dewatered channel but will temporarily lose access to the dewatered channel. The project is not likely to jeopardize the continued existence of Yakima River bull trout.

The Project will **not adversely modify critical habitat** of Yakima River bull trout because the actions will occur in a localized area that has already been altered by previous dredging, dam construction, and continued irrigation.

8.0 ESSENTIAL FISH HABITAT ASSESSMENT

The MSA directs federal agencies to consult with NMFS when their activities may have an adverse effect on EFH, where adverse effects are defined as *any impact which reduces quality and/or quantity of EFH…adverse effects may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, or reduction in species' fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences*.

The MSA defines EFH as the waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. Where 'waters' include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; 'substrate' includes sediment, hard bottom, structures underlying the waters, and associated biological communities, 'necessary' means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and 'spawning, breeding, feeding, or growth to maturity' covers a species full life cycle.

8.1 Essential Fish Habitat in the Action Area

The action area is EFH for Chinook (*Oncorhynchus tshawytscha*) and coho (*O. kisutch*) salmon. Because coho are in the early phase of reintroduction to the action area, and EFH has not been described for steelhead, the analysis in this section is focused on the effects of the proposed action on Chinook salmon EFH.

8.2 Adverse Effects on Essential Fish Habitat in the Action Area

As described in Section 6.0, *Effects of the Action*, the Project will temporarily alter EFH by dewatering an approximately 0.1 mile stretch of the Yakima River at the Wapato Diversion Dam. It will also temporarily increase suspended sediment downstream of the dewatered areas upon rewatering of the channel. All of the effects described in Section 6.0, *Effects of the Action*, will also apply to Chinook salmon EFH.

8.3 Proposed Conservation Recommendations

BIA proposes the conservation measures described in Section 3.3, *Avoidance and Minimization Measures*.

8.4 Conclusion and Effects Determination

The Project will temporarily adversely affect EFH. All of the effects described in Section 6.0, *Effects of the Action*, will apply to Chinook salmon EFH. The Project will temporarily alter EFH by dewatering an approximately 0.1 mile stretch of the Yakima River at the Wapato Diversion Dam, and temporarily increasing suspended sediment downstream of those areas upon rewatering of the channel.

The functional physical or biological features of EFH for Chinook salmon will not be permanently altered or destroyed by the Project to the extent that the production and sustainability of the affected fisheries will be appreciably reduced.

9.0 REFERENCES

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