US Army Corps
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ST. HILAIRE BROTHERS AND EAST IMPROVEMENT DISTRICT: COLUMBIA RIVER PUMPING STATION AND INTAKE PROJECT

Federal Natural Resources Law Compliance
and
Biological Assessment

ADMINISTRATIVE RECORD – DO NOT DESTROY

FILE NUMBER: PM-EC-2018-0043

January 2018

SUMMARY

This biological assessment (BA) is prepared pursuant to section 7(a)(2) of the Endangered Species Act (ESA) to evaluate effects of proposed St. Hilaire Brothers and East Improvement District: Columbia River Pumping Station and Intake Project, on listed species under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS).

The Corps concludes that the proposed activities “may affect, but are not likely to adversely affect” bull trout or their critical habitat in the project area. The Corps also concludes that the project “may affect, and is likely to adversely affect” Upper Columbia River spring Chinook salmon, Snake River spring/summer Chinook salmon, Snake River fall Chinook salmon, Snake River sockeye salmon, Upper Columbia River steelhead, Middle Columbia River steelhead, and Snake River steelhead. In addition, this document analyzes the project's likely effects on essential fish habitat (EFH) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA). The Corps has also determined that the proposed project would result in no take of species listed under the Migratory Bird Treaty Act (MBTA), and no disturbance or take under the Bald and Golden Eagle Protection Act (BGEPA).

If additional information regarding this document is required, please contact John Hook, Environmental Resource Specialist in the Environmental Compliance Section of the U.S. Army Corps of Engineers, Walla Walla District, at (509) 527-7239, or by email at john.d.hook@usace.army.mil. Other correspondence can be mailed to:

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Contents

ACRONYMS

BA	Biological Assessment
BGEPA	Bald and Golden Eagle Protection Act
BO	Biological Opinion
Corps	Walla Walla District, U.S. Army Corps of Engineers
dB	Decibels
DPS	Distinct Population Segment
EFH	Essential Fish Habitat
EID	East Improvement District
ESA	Endangered Species Act of 1973, as amended
FCRPS	Federal Columbia River Power System
FR	Federal Register
FWCA	Fish and Wildlife Coordination Act
HUC	Hydrologic Unit Code
LPIP	Larger Private Irrigation Project
MBTA	Migratory Bird Treaty Act
MPI	Matrix of Pathway Indicators
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NMFS	National Marine Fisheries Service
OHWM	Ordinary High Water Mark
OWRD	Oregon Water Resource Department
PBF	Physical and Biological Features
RM	River Mile
RPA	Reasonable and Prudent Alternative
SPL	Sound Pressure Level
SRB	Snake River Basin
μPa	Micro-Pascal
USFWS	U.S. Fish and Wildlife Service

1. Federal Action

1.1. INTRODUCTION

The U.S. Army Corps of Engineers, Walla Walla District (Corps), as the lead federal agency, has prepared this Biological Assessment on behalf of itself and the U.S. Fish and Wildlife Service (USFWS) to initiate consultation on proposed federal permits/approvals necessary for an expansion of the St. Hilaire Brothers Hermiston Farm, LLC (St. Hilaire or JSH Farms) pumping station, and construction of a new East Improvement District (EID) pumping station, on the middle Columbia River (Lake Wallula), Umatilla County, Oregon. (Figure 1).

Figure 1. Project location.

1.2. BACKGROUND INFORMATION

St. Hilaire currently owns and operates an existing irrigation pumping station located at River Mile 301.7 on the middle Columbia River (Lake Wallula). Their pumping station consists of seven pumps and a 30-inch diameter cement-mortar lined steel pipeline with a total water withdrawal capacity around 61.4 cfs. The main booster station currently has two 400 horsepower and four 250 horsepower pumps. The existing pumping station provides irrigation water to JSH Farms, which includes about 4,200 acres of farmland in Umatilla County. The Corps issued an amendment in 2013 to expand the original easement area by approximately 0.32 acres (submerged area) and to extend the irrigation water intake pipeline and its appurtenant facilities 180 feet further into the Columbia River. The total area in the St. Hilaire Brothers easement is currently 0.6 acre. The proposed action would not include any additional lands, but rather an amendment to construct and operate within the existing easement. A new easement would be issued to the EID. The new, adjacent pumping station would be owned and operated by EID, which is comprised of nine farms that own over 28,000 acres of farmland.

Over the last decade, the State of Oregon has given support and committed resources to addressing the water shortage issue in the Lower Umatilla Basin, and specifically in the critical groundwater areas. Over the last decade, only around a third of the permitted groundwater has been allowed to be pumped by the Oregon Water Resource Department (OWRD) in the critical groundwater areas. This has resulted in thousands of acres left fallow each year. The latest effort supported by the Governor's office and state legislature, and partially funded through grant monies from OWRD, would be to bring water from the Columbia River to those areas and farmlands impacted by the water shortage. This would be accomplished through the transfer of existing, and issuance of new, mitigated Columbia River water rights.

1.3. PURPOSE AND NEED

The purpose of the proposed action is to consolidate the transfer of existing, and issuance of new "mitigated" Columbia River water rights to a centralized point of diversion, where water from the Columbia River can be distributed to nearby farmlands. The project is needed due to an ongoing and critical groundwater shortage issue in the Lower Umatilla Basin, which is proving detrimental to farming practices.

1.4. DESCRIPTION OF THE PROPOSED ACTION

This consultation involves a number of federal actions (approvals/permits) associated with a proposed expansion of the St. Hilaire pumping station, and construction of a new EID pumping station, on the Middle Columbia River (Lake Wallula), as described in detail below and shown in (Figure 2). This effort would be funded through EID and grant monies from OWRD.

The Corps is proposing to amend St. Hilaire's existing pump station easement, to allow for the proposed expansion project, and issue EID a new easement for the proposed new pump station, within St. Hilaire's existing easement area. The Corps also intends to issue St. Hilaire and EID a Clean Water Act (Section 404), and a River and Harbor Act (Section 10), permit for in-water actions associated with expansion and construction of the pump stations, as well as a short-term real estate license for the removal of a section of old Highway 30 in Boardman, Oregon as compensatory mitigation associated with the issuance of such Regulatory permits. The USFWS is proposing to issue St. Hilaire and EID separate rights-of-way for pipelines associated with the pump stations, where such pipelines will cross through/over the McNary Wildlife Refuge at two (2) locations.

The proposed expansion of the existing St. Hilaire Brothers pumping station will include installation of three new pumps and a new 42-inch diameter discharge pipe, which will increase the station's withdrawal capacity from 61.4 cfs to 100 cfs. The new pumps will be housed in 42-inch diameter "cans" connected to the existing 60-inch diameter intake pipe via three 26-inch diameter steel "pup" pipes. The new section of 42-inch discharge pipe will then be connected to the pump can "pups" via a manifold. The new discharge pipe will extend south toward the shoreline and will be supported above the water on two pipe cradles, each secured to the river bed by a pair of 12.75-inch diameter steel piles (Figure 3).

At each new pump can location, a 60-inch diameter by 7.5-foot long section of sleeve pipe will be positioned vertically and driven a foot into the river bed using a vibratory hammer. The river bed material inside of these sleeve pipes will be suctioned out. As material is removed the pipe will be driven further down until the desired depths are achieved. Utilizing this approach will limit the total required volume of excavation to around 16 cubic yards while minimizing the impact to the existing structures. The suctioned bed material will then be side cast back into the river within the existing easement.

In order to accommodate the new pump cans, the existing station deck will be expanded approximately 15 feet to the east. The expanded portion of the station deck will be constructed using metal grates placed over a steel frame, and will be supported over the water by 16 new steel 10" H-piles. An air-burst system will also be installed to facilitate the cleaning of the existing intake screens. This system will consist of a compressor (housed in the existing upland control building), air vessel, steel air lines, control valves, and a monitoring and control system. The total overwater area covered by the expanded station deck and new discharge pipe will be approximately 538 square feet (0.012 acres),

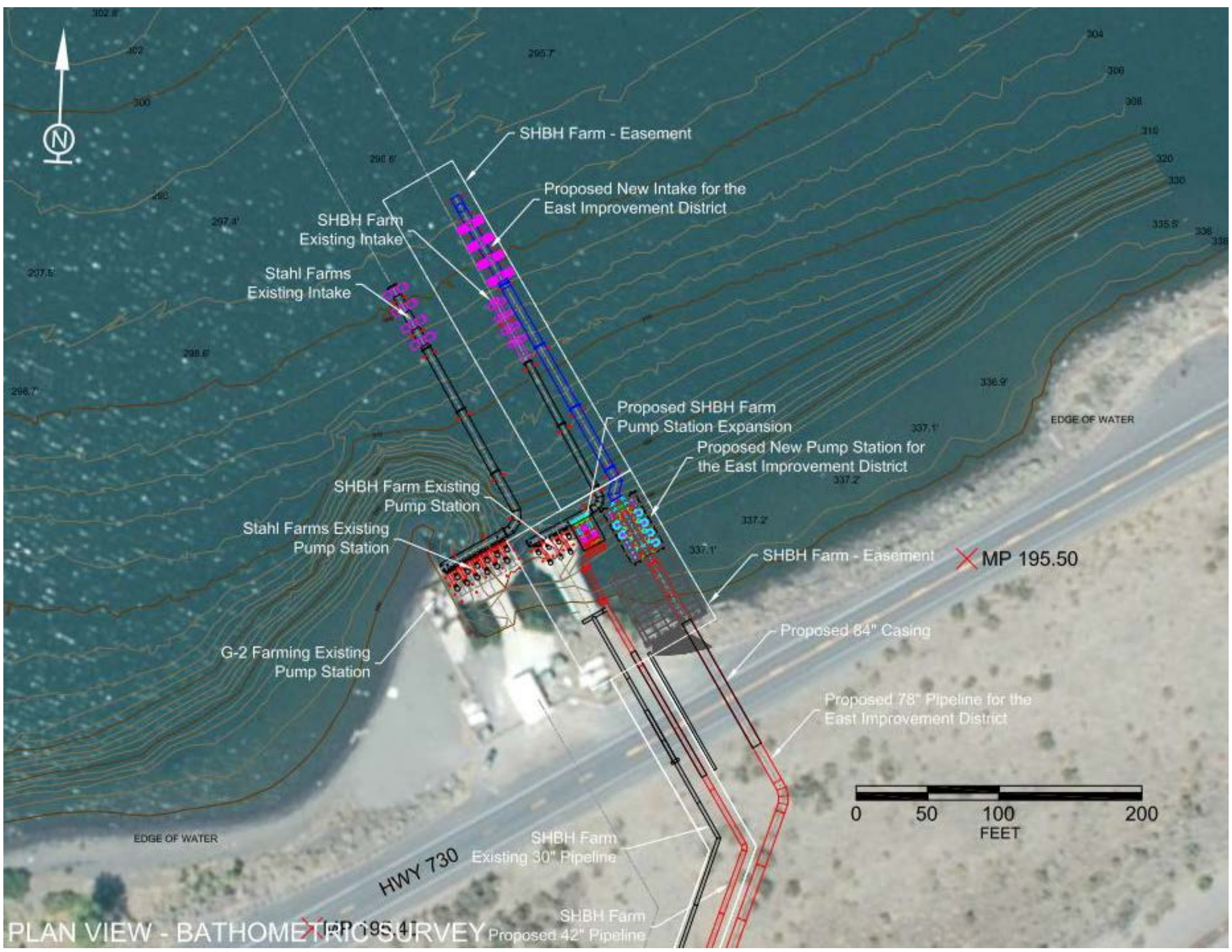

Figure 2. Project overview.

of which, approximately 404 square feet (0.009 acre) will be grated to allow for 60 percent light penetration. All new steel pilings and H piles will be installed 20 feet (or to refusal) into the substrate with a vibratory hammer. It is anticipated that each pile will require approximately 15 to 30 minutes of vibratory hammer use. The proposed 42-inch diameter discharge pipe will be trenched underground through upland as it leaves the project site, and will eventually tie into an existing irrigation pipe approximately 0.5 miles to the south. The new EID pumping station will include a new station deck, ten new pumps, a new intake pipe, four new intake screens, and a new discharge pipe (Figure 4). It will be designed for a withdrawal capacity of up to 200 cfs. The new pumping station and intake will extend approximately 350 feet out from the shoreline of the Columbia River. Each of the four new intake screens will measure 5 feet in diameter by approximately 19 feet in length, and will be affixed with NMFS-approved slotted fish screen (0.069 inch openings) to insure juvenile salmonids are not impinged or entrained in the intake. The intake screens will also be equipped with an air-burst system to facilitate the cleaning of the screens and maintain the appropriate approach velocity in compliance with NMFS criteria. This air-burst system will include a compressor, an air vessel, stainless steel lines to each screen, control valves, and a monitoring and control system.

The new intake screens will be mounted on a 78-inch diameter by 70-foot long steel manifold. The manifold will be supported on five cradles, each secured to the river bed by a pair of 12.75- inch diameter steel piles (Figure 5). The manifold will then transition to an 84-inch diameter by 170-foot long section of intake pipe that will be supported on another four cradles, each secured by a pair of steel piles. The intake pipe will then continue another 38 feet as a second manifold. This manifold will be supported on an additional five cradles, secured between pairs of steel H-piles (W10 x 54). The manifold will connect to ten pump cans, five on each side of the manifold, through 30-inch diameter “pup” pipes. Each pump can will be 42 inches in diameter by 21 feet.

All of the proposed new discharge pipes (St. Hilaire’s and EID’s) would be trenched underground through upland as they leave the project site, and would cross through two sections of the McNary National Wildlife Refuge (Figure 6) administered by the U. S. Fish and Wildlife Service (USFWS). To construct the new upland segments of discharge pipe, the St. Hilaire Brothers and EID are requesting right-of-way (ROW) from the USFWS. The discharge pipes would cross the USFWS McNary Wildlife Refuge for the first half mile. The Corps limited the scope of the proposed action area of the Federal undertaking (issuing the amendment and new easement) to the southern boundary of the USFWS McNary Wildlife Refuge given the minimal level of Federal control over the much larger non-Federal project. Once the discharge pipes leave federally managed land they would continue south on private property (Figure 7).

Included in the project is the removal of approximately 3,000 square feet of existing concrete and asphalt debris associated with the old Highway 30 in Boardman, Oregon (located approximately 33 miles downstream) from below the OHWM of the Middle Columbia River (Figure 8). The removal of the existing concrete/asphalt debris would increase the available substrate area below the OHWM, therefore providing viable shallow water habitat beneficial for salmonids near the shoreline and is being conducted as a requirement for compensatory mitigation associated with the issuance of the Corps’ Regulatory permits described above. Removal of the concrete/asphalt debris will be conducted using an excavator operating from the roadway. The excavator will start at the far end of the proposed mitigation area and work backwards toward the shoreline, where the debris will be transferred to a dump truck and carried offsite to an appropriate upland disposal location. Water depths within the area range between 1 to 4 feet.

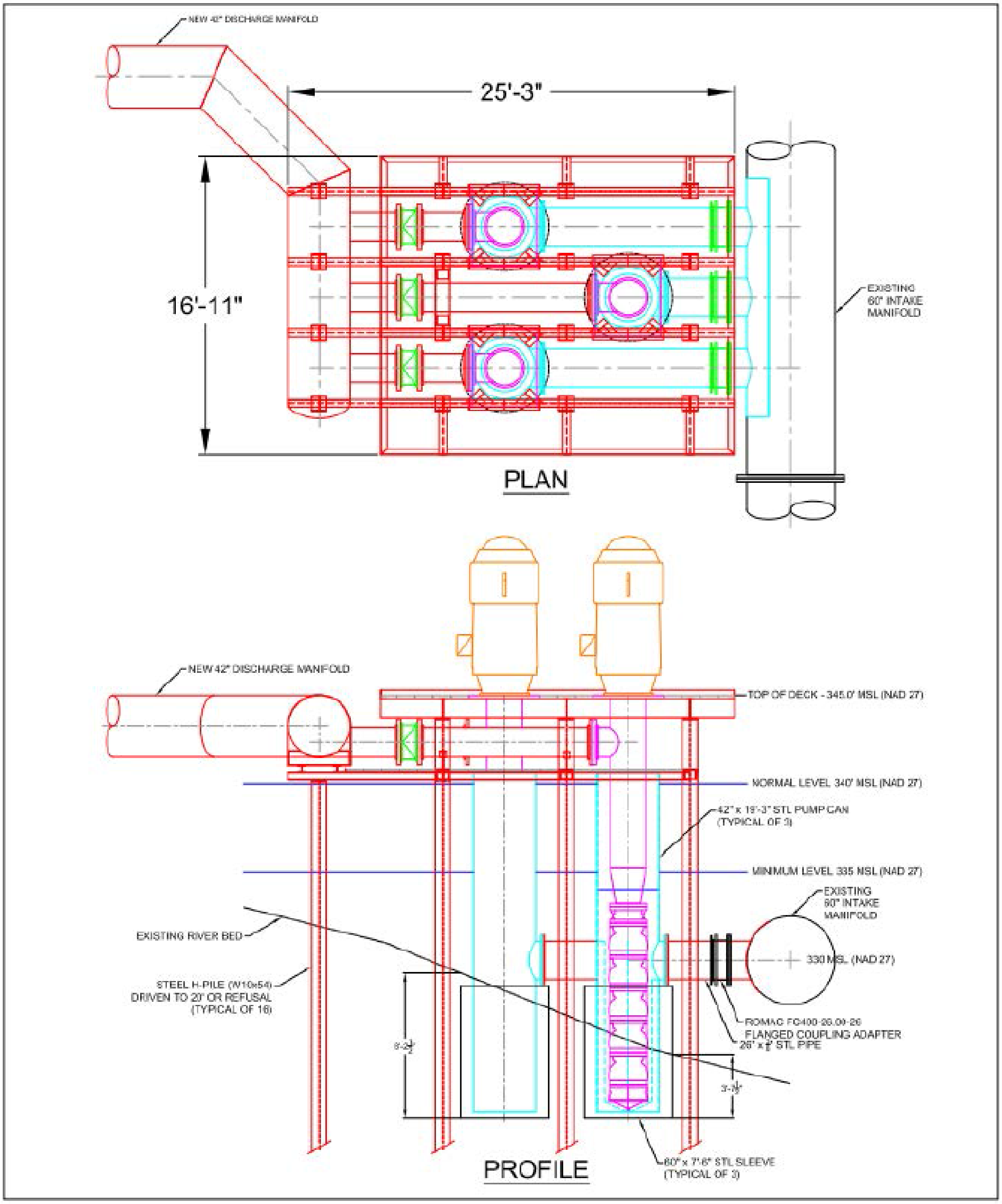

Figure 3. St. Hilaire Brothers pump station expansion plan and profile.

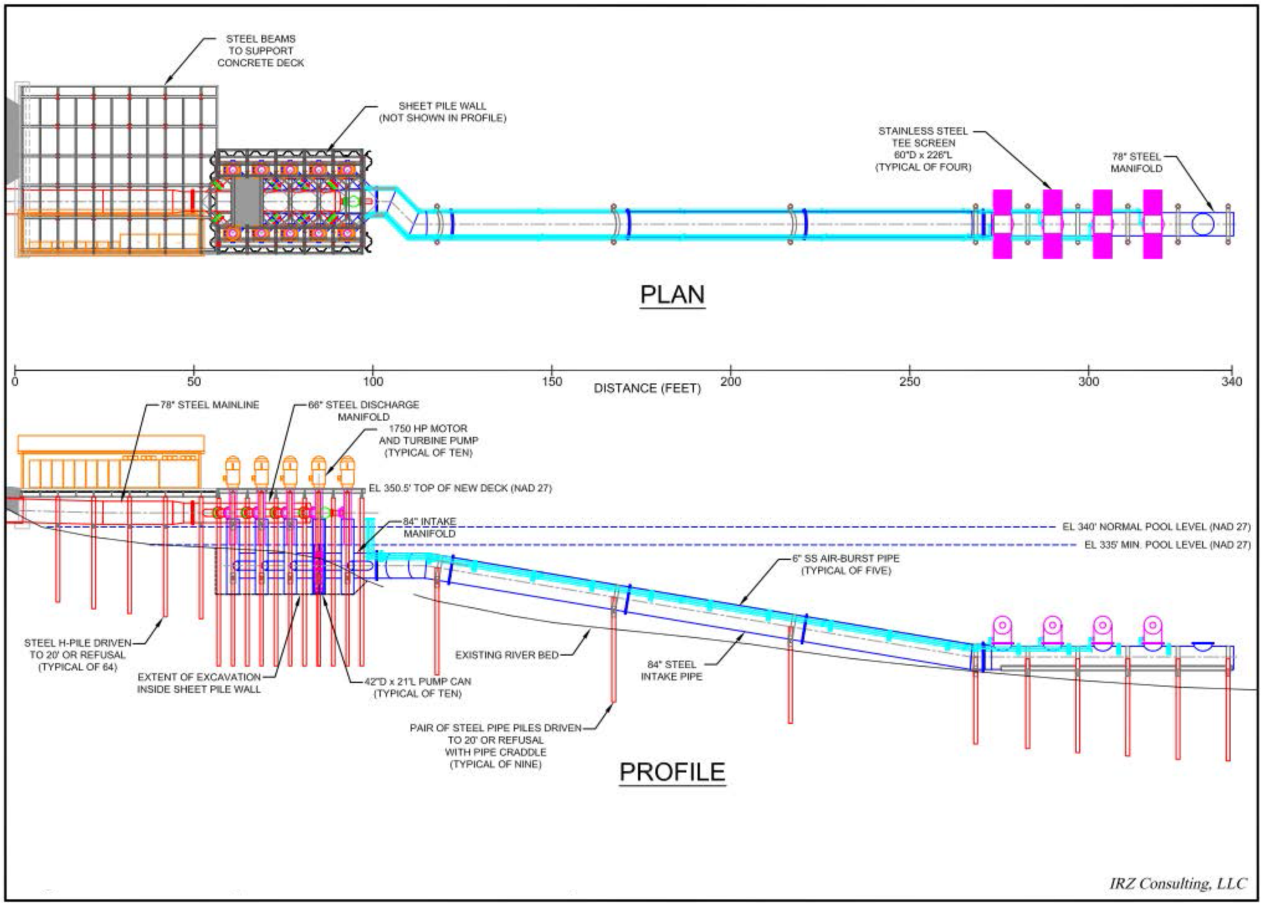

Figure 4. New EID pump station plan and profile.

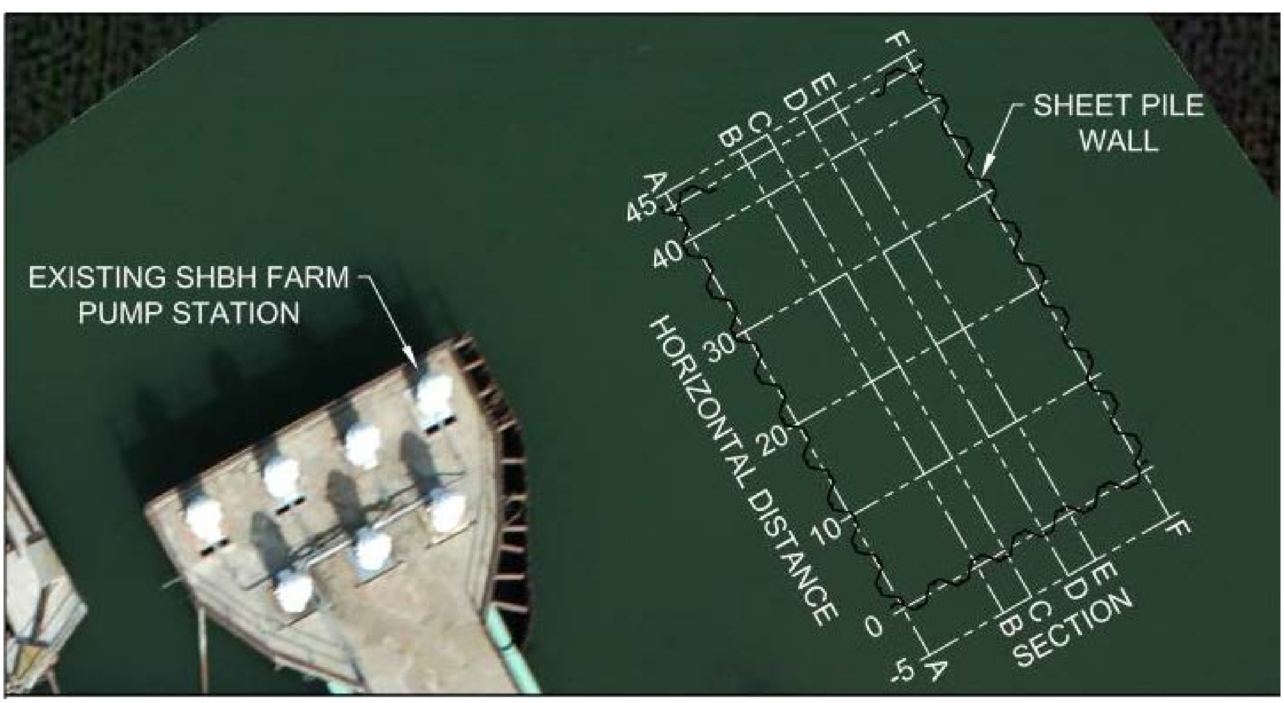

Figure 5. New EID pump station cross section.

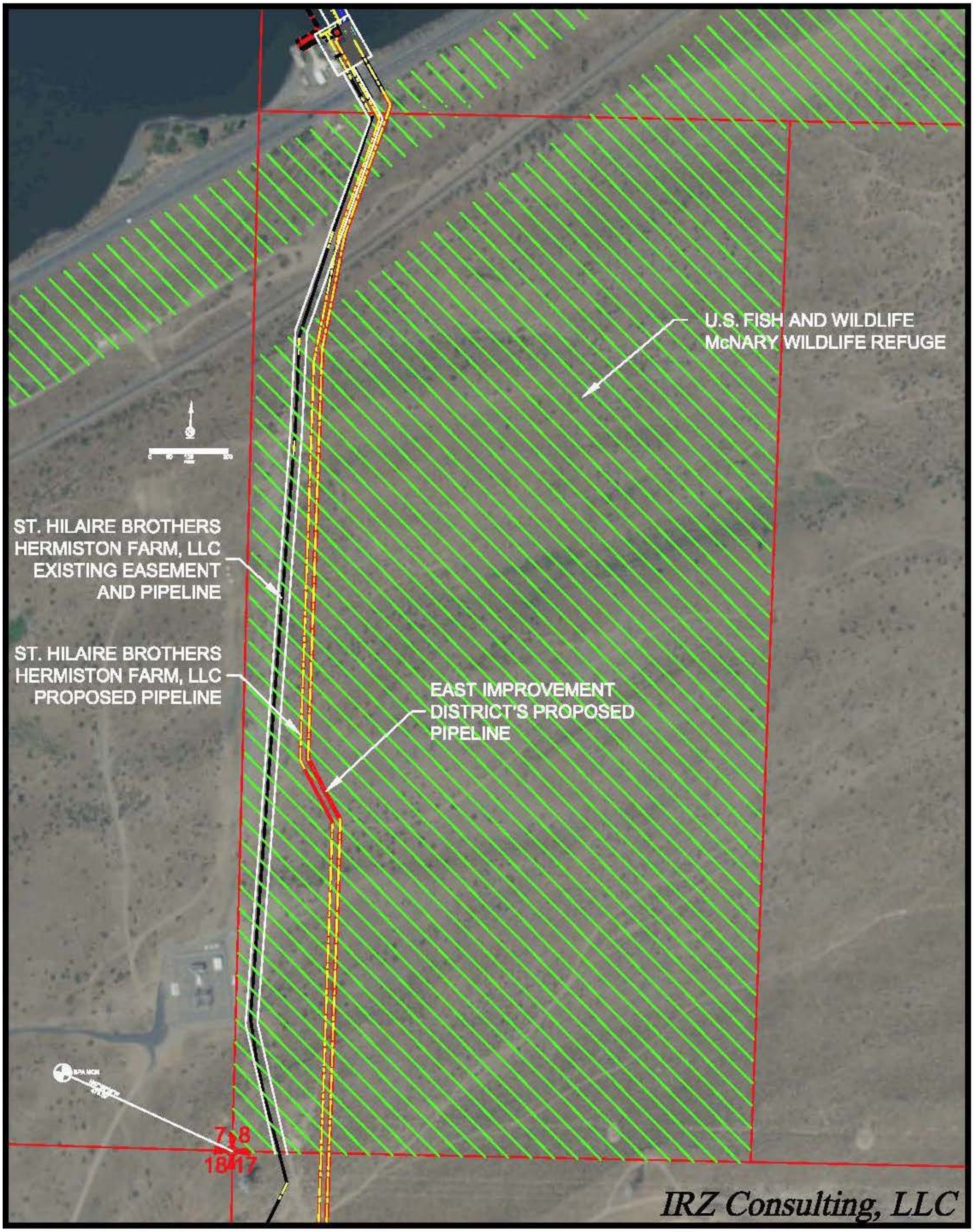

Figure 6. Proposed pipeline route across McNary National Wildlife Refuge.

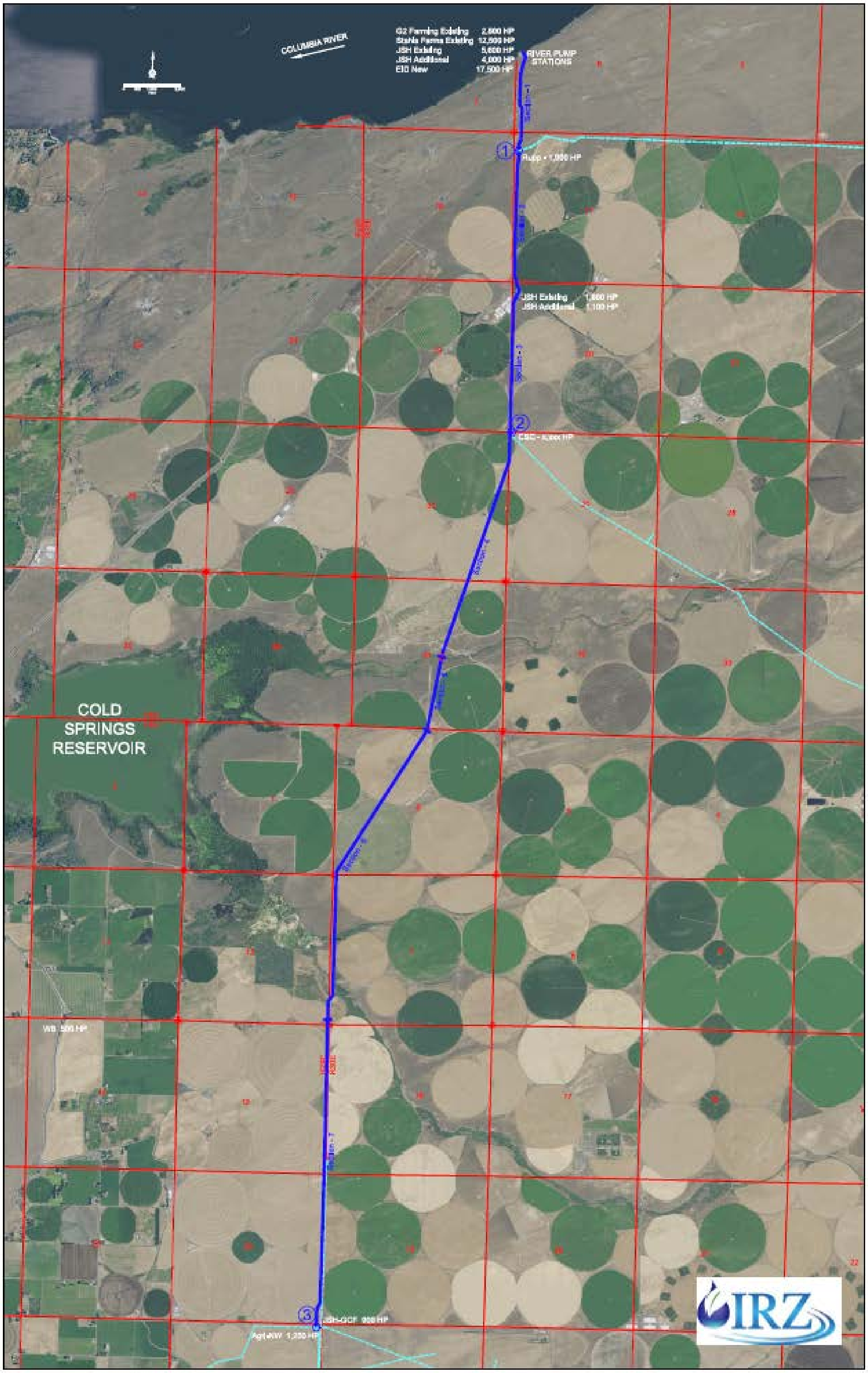

Figure 7. Path of irrigation pipelines across privately held lands in Northeastern Oregon.

Figure 8. Proposed site of concrete removal.

1.5. SCOPE OF THE PROPOSED FEDERAL ACTION

Although the ESA consultation requirement is triggered *only* by federal agency actions (*See*, 16 U.S.C. § 1536(a)), a federal agency must consider "the direct and indirect effects of [its] action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action . . ." (50 C.F.R. § 402.02).

This BA does not assess potential effects associated with water intake withdrawals. Such effects are, however, considered in the cumulative effects analysis (Section 4.4). The Corps and USFWS are not granting St. Hilaire/EID any right to use/withdraw water from the Columbia River. The State of Oregon decides where (and for what purpose) water within the state will be put to beneficial use, not the Corps or USFWS. St. Hilaire/EID's right to withdraw water is the result of state issued/recognized water rights. If St. Hilaire/EID was unable to withdraw such water at the proposed location, it is reasonable to believe they would find an alternative withdrawal site/source, or the state would designate a different beneficial use for such water elsewhere (consumptive or in-stream). Additionally, the proposed federal actions will not increase water withdrawals, as the intent of the St. Hilaire pump station expansion, and construction of the EID pump station, is to consolidate the transfer of existing and new "mitigated" (bucket-for-bucket) Columbia River water rights to a single point of diversion. All proposed new water withdrawal for both stations (38.6 cfs for St. Hilaire Brothers and 200 cfs for EID) will be procured through the transfer of existing irrigation water rights totaling 200.00 cfs, and the issuance of 94.11 cfs of new mitigated water rights. The 55.51 cfs of additional available water rights (i.e., beyond the 238.6 cfs withdrawal capacity) will allow the station owners flexibility in transferring water rights based on seasonal use.

The federal action ("Project") described above is associated with a larger private irrigation project (LPIP) owned and operated by EID and St. Hilaire, which is comprised of nine farms that collectively own over 28,000 acres. The new pumping station will also be able to provide water to an additional 29 farms representing an additional 19,000 acres. Except for the first half mile where the River Pump Station is on U.S. Army Corps of Engineers' property and the pipeline crosses U.S. Fish and Wildlife Services' property, all new infrastructure, both EID's and the private systems, will be located on properties owned by the members. The pipeline will cross both State and County roads, a set of Northern Pacific Railroad tracks, BPA and Pacific Corp transmission power lines, and a set of gas pipelines. Permits have been or are in the process of being obtained for all of these crossings. Umatilla Electric Cooperative, the sole utility serving all of the area involved, is addressing the required upgrades to their grid to handle all of these new loads

The duty to consult on the ***direct effects*** of an agency action is triggered only if (1) the agency action is affirmatively authorized, funded, or carried out by a federal agency and (2) in which there is discretionary Federal involvement or control. The LPIP is not being funded, authorized, or constructed by any federal agency – i.e., there is no discretionary federal agency involvement or control over any part of the LPIP that could result in any benefit to a protected species..

An ***indirect effect*** of an agency action is one that (1) is caused by the action, (2) is later in time than the action, and (3) is reasonably likely to occur. Indirect effects are "attenuated" consequences of the agency action. In this case, it cannot be fairly said that the proposed federal Project will cause the LPIP to occur. Alternatives for accessing and withdrawing water to support the LPIP are technically feasible (e.g., a pumping station at Cold Springs Reservoir or use of a combination of surface and groundwater sources), even if such alternatives are ultimately determined not to be the most practical/feasible. Causation associated with indirect effects is also closely related to the analysis for interrelated/interdependent activities (see below). It is reasonable, therefore, to believe that the LPIP would occur (in whole/part) without the proposed federal Project.

An ***interrelated activity*** is an activity that is part of the proposed action and depends on the proposed action for its justification. An ***interdependent activity*** is an activity that has no independent utility apart from the action under consultation. (50 C.F.R. § 402.02). As a practical matter, the analysis of whether other activities are interrelated to, or interdependent with, the proposed action under consultation should be conducted by applying a "but for" test – i.e., but for the federal project the other activity would not occur. As indicated above, it is reasonable to believe St. Hilaire/EID would find a way to exercise their water rights (to support the LPIP – in whole/part) from a different location/source (e.g., Cold Springs Reservoir/groundwater) if the proposed federal Project did not occur. Additionally, the federal Project lacks a close causal connection with the LPIP (i.e., proximate causation). The LPIP is dependent upon numerous non-federal actions/decisions (e.g., real estate grants, financing, state/local permits, etc.), which are necessary for the LPIP to occur, but which are unrelated to the proposed federal Project. For example, the State of Oregon (not the Corps or USFWS) decides where and for what purpose water within the state will be put to beneficial use. St. Hilaire/EID is also free to modify the LPIP *at will* depending on the outcome of non-federal actions/decisions. The

LPIP is, therefore, not an interrelated/interdependent action associated with the federal Project.

1.6. PROJECT TIMELINE

All work conducted below the OHWM of the Columbia River will occur between December 1 and February 28 of the ODFW–preferred in-water work window for the Middle Columbia River (December 1 – March 31).

1.7. PROPOSED CONSERVATION MEASURES

The Corps proposes the following conservation measures as part of the proposed action.

1. All heavy equipment (i.e., crane and excavator) will access the project site via existing roadways, parking areas, disturbed upland areas, and/or floating barges.

2. All steel piles will be installed with a vibratory hammer, therefore reducing potential hydroacoustic impacts to fish. No impact hammer pile driving will be required.

3. The contractor will initiate daily "soft-start" procedures to provide a warning and/or give animals near piling installation and removal activities a chance to leave the area prior to a vibratory hammer operating at full capacity; thereby, exposing fewer animals to loud underwater and airborne sounds.

4. The contractor will initiate noise from vibratory hammers for 15 seconds at reduced energy followed by a 30-second waiting period. The procedure shall be repeated two additional times.

5. All excavated/dredged materials will be suitable and approved for in- water disposal based on the Sediment Evaluation Framework.

6. A Pollution Control Plan (PCP) will be prepared by the Contractor and carried out commensurate with the scope of the project that includes the following:
    - BMPs to confine, remove, and dispose of construction waste.
    - Procedures to contain and control a spill of any hazardous material.
    - Steps to cease work under high flow conditions.

7. All conditions of ODEQ's 401 Water Quality Certification will be followed.

8. Only enough supplies and equipment to complete the project will be stored on site.

9. All equipment will be inspected daily for fluid leaks, any leaks detected will be repaired before operation is resumed.

10. Before operations begin, and as often as necessary during operation, all equipment that will be used below the OHWM will be steam cleaned until all visible oil, grease, mud, and other visible contaminates are removed.

11. Stationary power equipment operated within 150 feet of the Columbia River will be diapered to prevent leaks.

12. New pump station intake screens 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 feet per second (fps), in compliance with NMFS criteria.

13. New pump station intake screens will be placed more than 20 feet below the OHWM, therefore reducing potential impacts to migrating juvenile salmonids.

14. Approximately 0.037 acre (64 percent) of the new overwater station decks will be grated to allow for 60 percent light penetration.

15. Waterproof lighting equipped with a daylight sensor will be installed under the overwater portions of the new concrete deck (0.046 acre) at the new EID pumping station to provide under deck lighting during the daytime to detract salmonid predators.

2. Listed Species

2.1. SPECIES LISTED FOR THE PROJECT AREA

The Corps reviewed the list of threatened and endangered species that pertain to the action area under the jurisdiction of the USFWS on 18 December, 2017 [USFWS Ref# 01EOFW00-2018-SLI-0144 (Table 1)].

Table 1. Federal Register (FR) notices for final rules that list threatened and endangered species or designate critical habitats.

Species	Listing Status and Reference	Critical Habitat
NMFS		
Chinook Salmon (*Oncorhynchus tshawytscha*)		
Upper Columbia spring run ESU	E: 06/28/05; 70 FR 37160	Yes: 09/02/2005; 70 FR 52630
Snake River spring/summer Run ESU	T: 6/28/05; 70 FR 37160	Yes: 12/28/93; 58 FR 68543
Snake River fall run ESU	T: 6/28/05; 70 FR 37160	Yes: 12/28/93; 58 FR 68543
Sockeye Salmon (*Oncorhynchus nerka)*		
Snake River ESU	E 6/28/05; 70 FR 37160	Yes: 12/28/93; 58 FR 68543
Steelhead (*Oncorhynchus mykiss*)		
Upper Columbia River DPS	T:01/05/06; 71 FR 834	Yes: 09/02/2005; 70 FR 52630
Middle Columbia River DPS	T:01/05/06; 71 FR 834	Yes: 07/10/00; 65 FR 42422
Snake River DPS	T:01/05/06; 71 FR 834	Yes: 07/10/00; 65 FR 42422
USFWS		
Gray Wolf (*Canis lupus*)	E: 03/09/1978; 43 FR 9607 9615	Yes: 03/09/1978; 43 FR 9607 9615
Columbia River Bull Trout (*Salvelinus confluentus*)		
Columbia River DPS	T: 06/10/98; 63 FR 31647	Yes: 09/02/05; 70 FR 56211; 10/18/10; 75 FR 63898

2.2. SPECIES STATUS

2.2.1 Anadromous Species

2.2.1.1 Upper Columbia River Spring Chinook Salmon

Listing History

The Upper Columbia River spring Chinook salmon were listed as an endangered species on March 24, 1999 and their endangered status was reaffirmed on June 28, 2005.

Distribution

The Upper Columbia River spring-run chinook Evolutionarily Significant Unit (ESU) includes all natural-origin, stream-type Chinook salmon originating from Columbia River tributaries upstream of Rock Island Dam and downstream of Chief Joseph Dam, excluding the Okanogan River subbasin (Figure 9). Six artificial supplementation programs also contribute to the Upper Columbia River spring Chinook salmon ESU: the

Twisp River Program; Chewuch River Program; Methow Program; Winthrop National Fish Hatchery Program; Chiwawa River Program; and the White River (NMFS 2016a).

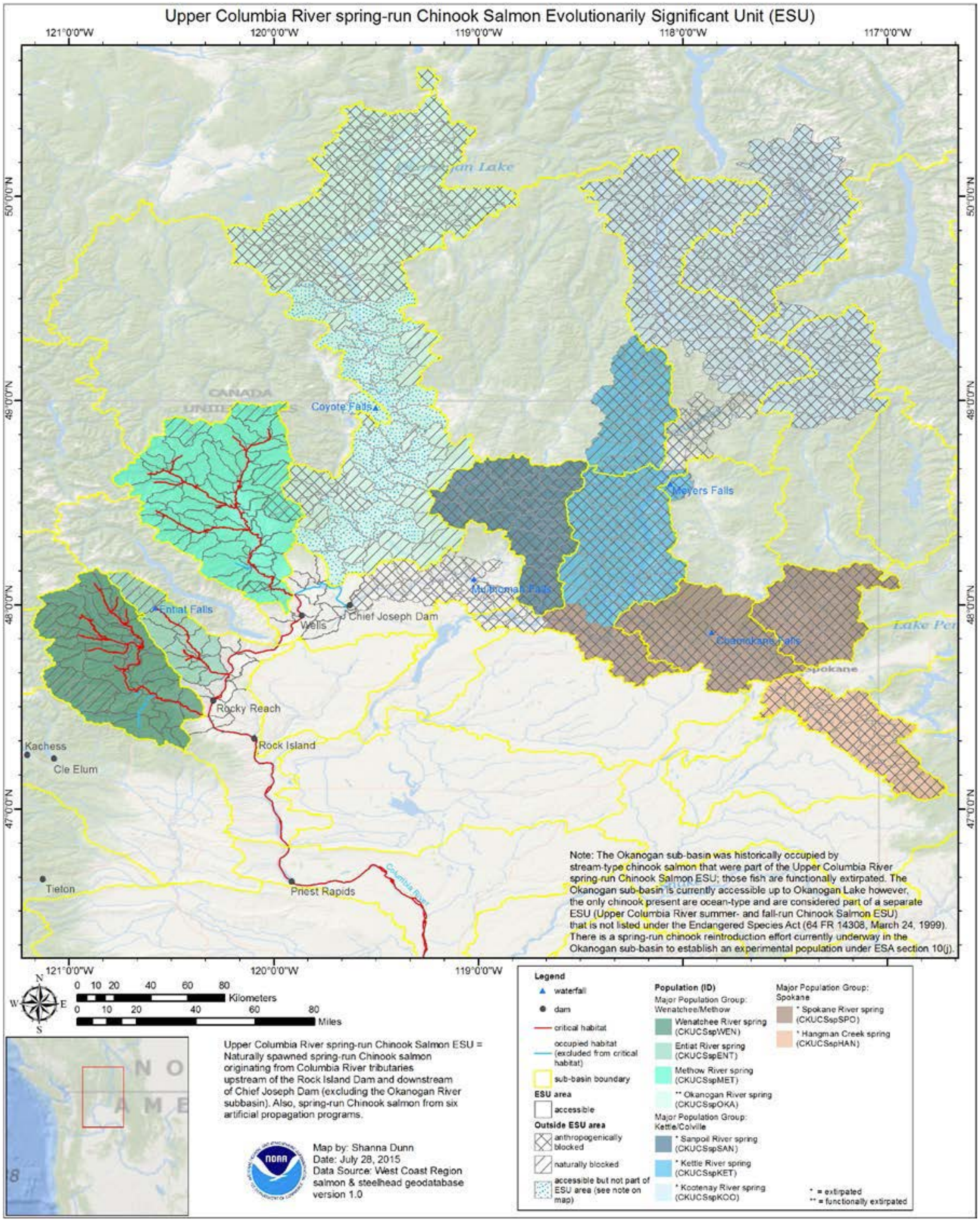

Figure 9. Upper Columbia River spring chinook ESU distribution.

Life History and Biological Requirements

Several different strains of Chinook salmon can be found in Lake Wallula during part of the year. Unlisted upper Columbia River fall Chinook salmon are the most common. However, Upper Columbia River spring Chinook, Snake River spring/summer Chinook salmon, and Snake River fall Chinook salmon are also present. Migration timing and life stage development can be different between the strains as they migrate through and use the lake. Upper Columbia River spring Chinook salmon biological requirements include food; high quality, flowing water; clean spawning substrate, resting habitat and unimpeded migratory access to and from spawning and rearing areas.

Adults enter the rivers from mid-April through July, and hold in deep pools with cover until spawning, with spawning occurring from late July through September (Bugert et al. 1998). Spawning occurs in the Wenatchee, Entiat, and Methow watersheds at elevations from 500 to 1,500 meters (Myers et al. 1998). Spawners return to the Wenatchee River from late April through June, and to the Methow and Entiat Rivers from late May through July (Bugert et al. 1998). Adults would be passing the action area from mid-April to mid-June (Chelan County PUD No. 1 1998).

In the Wenatchee, Entiat, and Methow watersheds, fry emergence occurs from late March through early May, and juveniles usually remain in the subbasins through the summer (Bugert et al. 1998). The majority of juveniles out-migrate in their second spring, with the peak occurring from late April through May (Bugert et al. 1998). Multiple life-history strategies have been observed in the Methow and Wenatchee watersheds, ranging from spawning, rearing, and overwintering in the upper watershed, to spawning and rearing in the upper watershed and out-migrating (to the Columbia River) in fall/winter (Bugert et al. 1998). Although fewer than in the Methow and Wenatchee Rivers, multiple life-history strategies (five) have also been observed in the Entiat River. The pertinence of the multiple life-history strategy information to the proposed project is that juvenile Upper Columbia River spring Chinook could be in the Columbia River from winter through June, although it is highly improbable that they would be in the action area as pre-smolts.

Factors for Decline

Current pressures on Upper Columbia River spring Chinook salmon include loss of quality habitat, predation, poor ocean conditions and limited fishing pressure. The limited amount of suitable habitat available, caused by habitat degradation and passage barriers is the main factor limiting recovery.

Local Empirical Information

Most juvenile Upper Columbia River spring Chinook migrate downstream through Lake Wallula from late April through early June. Most adults migrate upstream through Lake Wallula during the same timeframe and generally take four to seven days to get through the lake. Three important spawning populations have been identified within this ESU: the Wenatchee, Entiat and Methow populations.

Ten-year-average adult spring Chinook salmon passage at McNary is approximately 92,438 fish passing in a given year, although many of these salmon are not from the Upper Columbia spring Chinook ESU. Five –year median daily PIT tag observations of out-migrating juvenile Upper Columbia spring Chinook salmon peak at 213 a day in mid-May with the majority of spring Chinook salmon passing April – June (Figure 10). Virtually no spring Chinook salmon would be in the project area during the proposed work window.

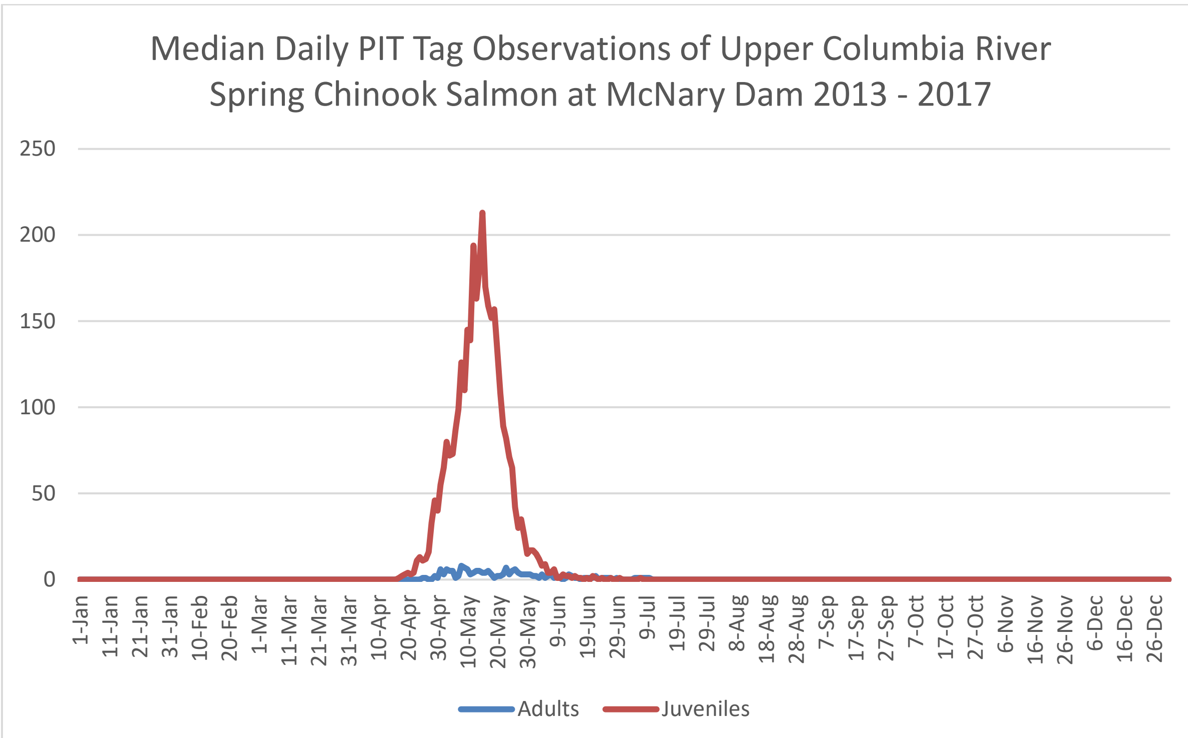

Figure 10. Passage timing and counts of adult and juvenile PIT-tagged Upper Columbia River spring Chinook salmon passing McNary Dam (DART 2018).

Ongoing Monitoring

Passage of adult and juvenile Chinook salmon is monitored at the Columbia and Snake River dams. There are also several other monitoring programs by other federal, state and tribal organizations throughout the watershed.

2.2.1.2 Snake River Spring/Summer Chinook Salmon

Listing History

The Snake River spring/summer Chinook salmon ESU was listed as threatened on April 22, 1992, (67 FR 14653) and reaffirmed in 2005 and 2012.

Distribution

The Snake River spring/summer Chinook salmon ESU includes all natural-origin populations in the Tucannon, Grande Ronde, Imnaha, Salmon, and mainstem Snake Rivers (Figure 11). Fish returning to fifteen hatchery programs are also listed, including those returning to the Tucannon River, Imnaha, and Grande Ronde River hatcheries and to the Sawtooth, Pahsimeroi, and McCall hatcheries on the Salmon River (NMFS 2016b).

Life History and Biological Requirements

In the Snake River, spring and summer Chinook salmon share key life history traits. Both are stream-type fish, with juveniles that migrate swiftly to sea as yearling smolts. Depending primarily on location within the basin (and not on run-type), adults tend to return after either 2 or 3 years in the ocean. Both spawn and rear in small, high elevation streams (Chapman et al. 1991), although where the two forms co-exist, spring Chinook salmon spawn earlier and at higher elevations than summer Chinook salmon.

Spring/summer Chinook salmon use smaller, higher elevation tributary systems for spawning and juvenile rearing compared to fall run fish, which spawn in the main stem of larger rivers. Spring/summer Chinook salmon normally spawn in late July–September using gravel bars in smaller river and tributary streams. As with most salmon, adults die after spawning, providing a large nutrient source for juvenile fish. Juvenile spring/summer Chinook salmon behave differently than fall Chinook in that they remain in headwater streams for a year and out–migrate the following spring. Optimal water temperatures range from 59–64°F (14–19°C) with temperatures exceeding 73°F (21°C) being lethal (Wydoski and Whitney 2003). Juvenile Chinook salmon feed on small aquatic invertebrates in both fresh and salt water, primarily arthropods in freshwater and crustaceans in marine environments. As they grow in saltwater, they quickly change to a fish diet (Quinn 2005).

Factors for Decline

Current pressures on Snake River spring/summer Chinook salmon include loss of quality habitat, predation, poor ocean conditions and limited fishing pressure. The limited amount of suitable habitat available, caused by habitat degradation and passage barriers is the main factor limiting recovery.

Local Empirical Information

Juvenile spring Chinook salmon have been documented as using the backwater areas of Lake Wallula for rearing. Although sampling has not occurred during the cooler water months in the lower Snake River, it is reasonable to assume that individuals of Snake River spring/summer Chinook salmon could use the backwater areas of lower Snake River reservoirs for periods of rearing or overwintering between July and March. Because this ESU is an upriver stock, no spawning habitat is present in the lower Snake River.

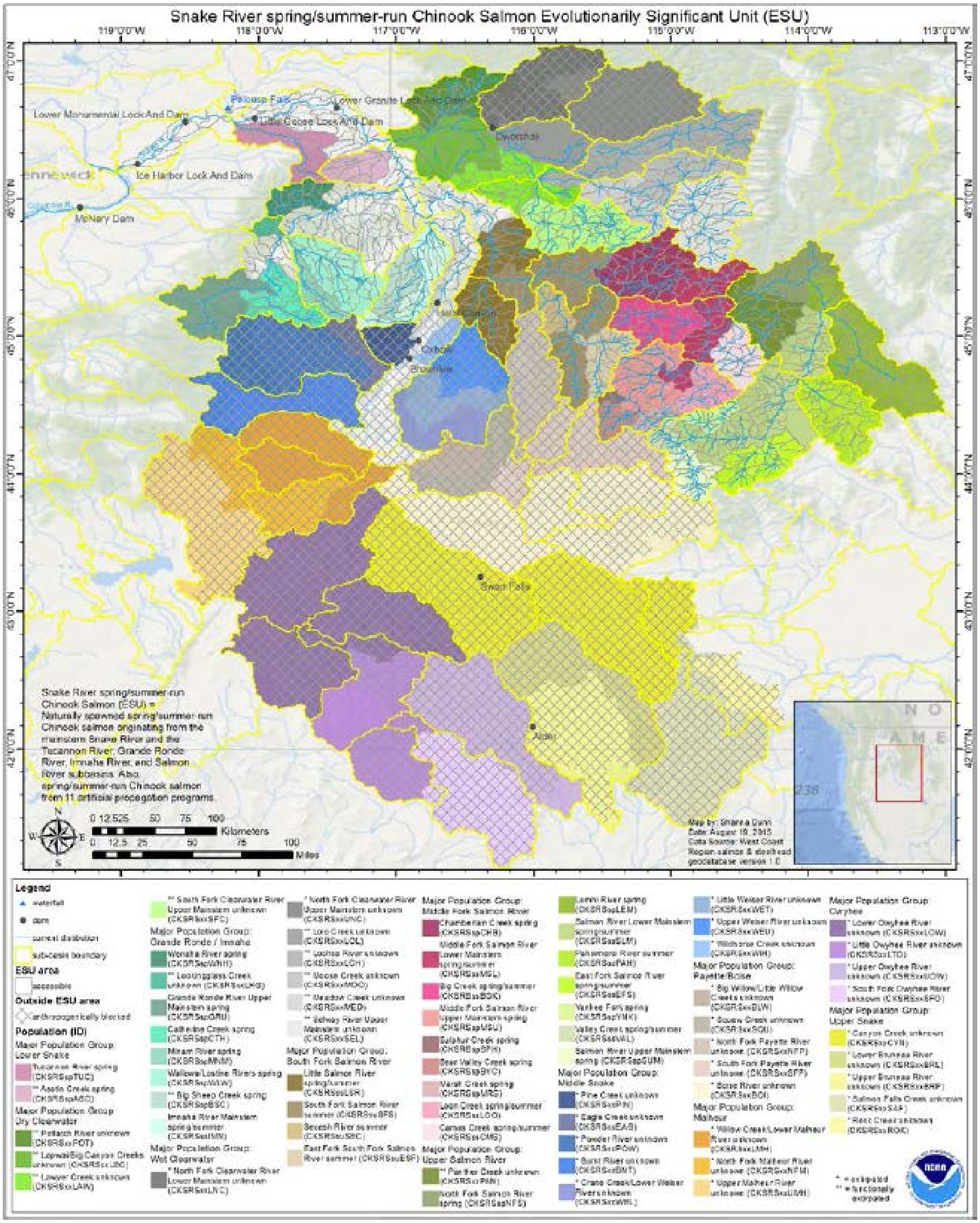

Figure 11. Snake River spring/summer Chinook ESU distribution.

Ten-year-average adult spring/summer Chinook salmon passage at McNary is approximately 163,187 fish passing in a given year, although many of these salmon are not from the Snake River spring/summer Chinook ESU. Five –year median daily PIT tag observations of out-migrating juvenile Snake River spring/summer Chinook salmon peak at 1,209 a day in mid-May with the majority of spring/summer Chinook juveniles passing April – May (Figure 12). Adult passage typically begins in early April and continues until the August transition to fall salmon. Virtually no spring Chinook salmon would be in the project area during the proposed work window.

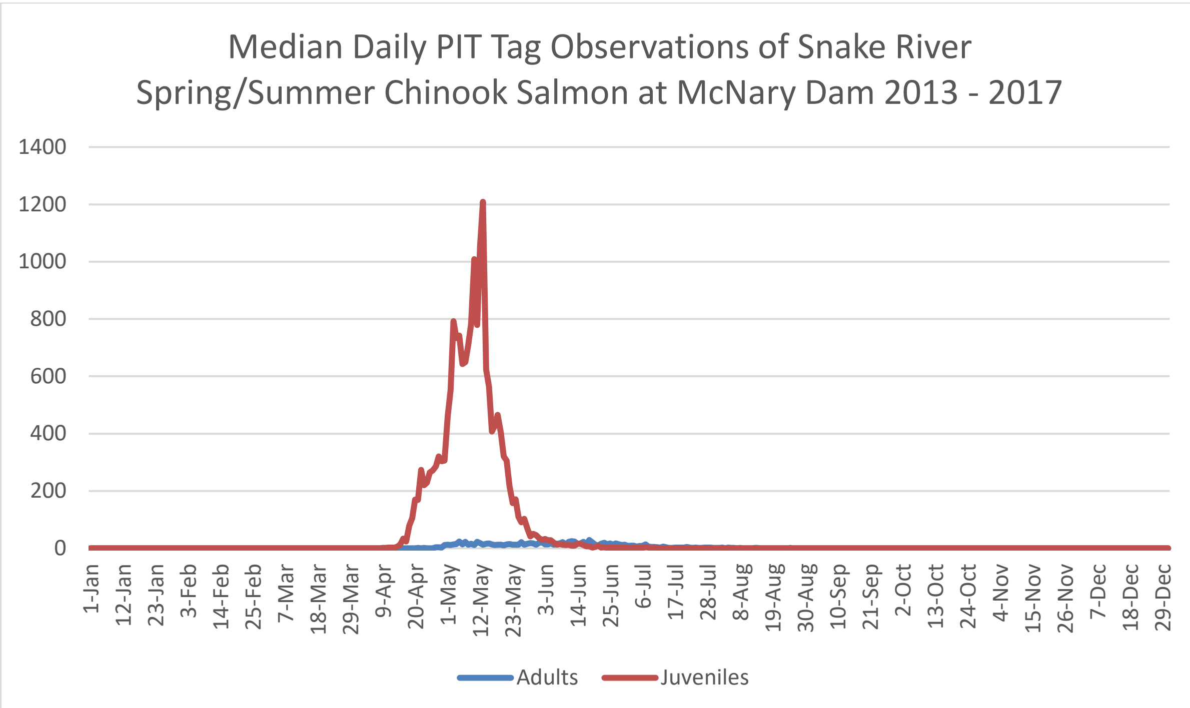

Figure 12. Passage timing and counts of adult and juvenile PIT-tagged Snake River spring/summer Chinook salmon passing McNary Dam (DART 2018).

Ongoing Monitoring

Passage of adult and juvenile Chinook salmon is monitored at the Columbia and Snake River dams. There are also several other monitoring programs by other federal, state and tribal organizations throughout the watershed.

2.2.1.3 Snake River fall Chinook Salmon

Listing History

NMFS listed Snake River fall Chinook salmon as threatened on April 22, 1992 (57 CFR 14653) and their threatened status was reaffirmed on June 28, 2005 (70 CFR 37160).

Distribution

The Snake River fall Chinook salmon ESU includes all natural-origin fall-run Chinook salmon from the mainstem Snake River below Hells Canyon Dam, and fall-run salmon from the Tucannon, Imnaha, Grande Ronde, Salmon, and Clearwater Rivers (Figure 13) (NMFS 2016b).

Life History and Biological Requirements

Fall Chinook salmon in this ESU are ocean-type. Adults return to the Snake River at ages 2 through 5, with age 4 most common at spawning (Waples et al. 1991). Spawning, which takes place in October through November, occurs in the mainstem and in the lower parts of major tributaries. Juveniles emerge from the gravels in March and April of the following year, moving downstream from natal spawning and early rearing areas from June through early fall. Juvenile fall Chinook salmon move seaward slowly as subyearlings, typically within several weeks of emergence (Waples et al. 1991).

Snake River fall Chinook salmon spawning and rearing occurs only in larger, mainstem rivers such as the Salmon, Snake, and Clearwater Rivers. Historically, the primary fall Chinook salmon spawning areas were located on the upper mainstem Snake River (Connor et al. 2005). A series of Snake River mainstem dams block access to the upper Snake River, which has significantly reduced spawning and rearing habitat for Snake River fall Chinook salmon. The vast majority of spawning today occurs upstream from the Lower Granite Dam, with the largest concentration of spawning sites in the Clearwater River, downstream from Lolo Creek. Currently, natural spawning is limited to the Snake River from the upper end of Lower Granite Reservoir to Hells Canyon Dam, the lower reaches of the Imnaha, Grande Ronde, Clearwater, Salmon, and Tucannon Rivers, and small areas in the tailraces of the lower Snake River hydroelectric dams (Good et al. 2005).

As a consequence of losing access to historic spawning and rearing sites in the upper Snake River, fall Chinook salmon now reside in waters that are generally cooler than the majority of historic spawning areas. In addition, alteration of the lower Snake River by hydroelectric dams has created a series of low-velocity pools in the Snake River that did not exist historically. Both of these habitat alterations have created obstacles to fall Chinook survival. Prior to alteration of the Snake River basin by dams, fall Chinook salmon exhibited a largely ocean-type life history, where they migrated downstream and reared in the mainstem Snake River during their first year. Today, fall Chinook salmon in the Snake River basin exhibit one of two life histories that Connor et al. (2005) have called ocean-type and reservoir-type. The reservoir-type life history is one where juveniles overwinter in the pools created by the dams, prior to migrating out of the Snake River. The reservoir-type life history is likely a response to early development in cooler temperatures, which prevents juveniles from reaching a suitable size to migrate out of the Snake River.

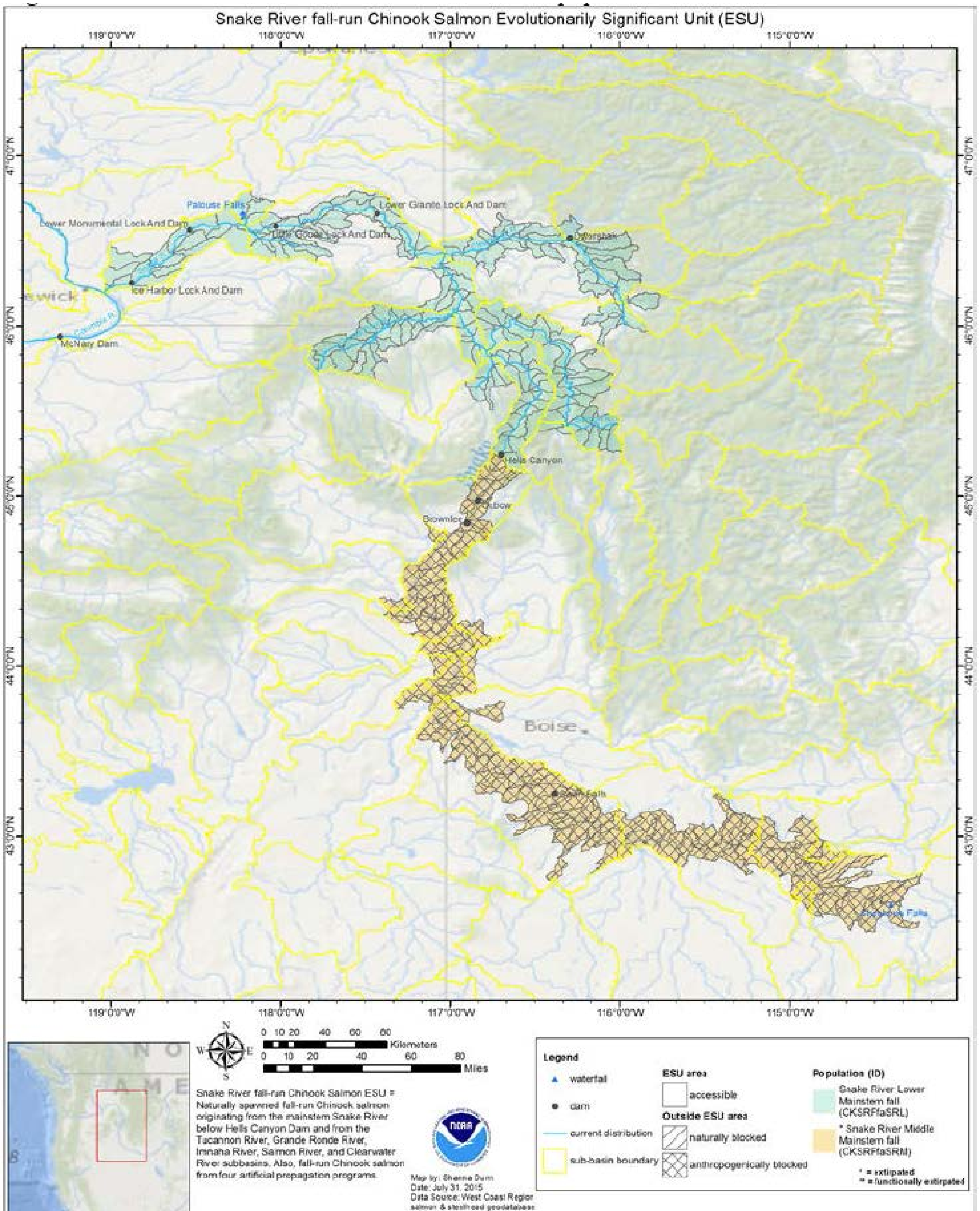

Figure 13. Snake River fall Chinook ESU distribution.

Factors for Decline

Current pressures on Snake River fall Chinook salmon include loss of quality habitat, predation, poor ocean conditions and limited fishing pressure. The limited amount of suitable habitat available, caused by habitat degradation and passage barriers is the main factor limiting recovery.

Local Empirical Information

The low velocity and relatively fine substrate along a high percentage of the reservoir shorelines of the Lower Snake River reservoirs preclude spawning in these areas. The limited spawning that does occur is in the tailrace areas below all of the lower Snake River dams, where water velocity is high and substrate size is relatively large. Surveys conducted in the tailraces of Lower Granite and Lower Monumental dams in December of 2002 and 2003 revealed no redds in the navigation channels or in areas where redds were found in the mid- to late-1990s. No redds have been located in other regions of the reservoirs, including shoreline areas that could be potentially affected by site development.

Salmon embryos, believed to be fall Chinook salmon, were discovered downstream of Lower Monumental Dam during dredging operations in February 1992. Spawning surveys found: 0 redds in 1993, with an estimated 9.1% of river bottom surveyed; 0 redds in 1994 (estimated 10.4% of river bottom surveyed); and 0 redds in 1996 (estimated 11.2% of river bottom surveyed) (Dauble et al. 1999). Other surveys (conducted in 1997, 2002, and from 2004-2007) also found no redds (Arnsberg et al. 2009).

Six redds were found downstream of Lower Monumental Dam in 2008 by the Pacific Northwest National Laboratory (Arnsberg et al. 2009). The redds were located approximately 98.4 feet (30 meters) downstream of the fish bypass pipe and adjacent to the fish loading dock on the north side of the river in water depths of 13 to 18 ft with near bottom water velocities of 1.2 to 1.5 feet per second (ft/s). This was the first time that redds were found at this location (Arnsberg et al. 2009).

Ten-year-average adult fall Chinook salmon passage at McNary is approximately 240,189 fish passing in a given year, although many of these salmon are not from the Snake River fall Chinook ESU. Five –year median daily PIT tag observations of out-migrating juvenile Snake River fall Chinook salmon show two peaks – one at mid-April corresponding to hatchery yearling production and a second in mid-June corresponding to hatchery subyearling production (Smith et al. 2016). Adult passage typically begins in early August and peaks in mid-September (Figure 14). Virtually no fall Chinook would be in the project area during the proposed work window.

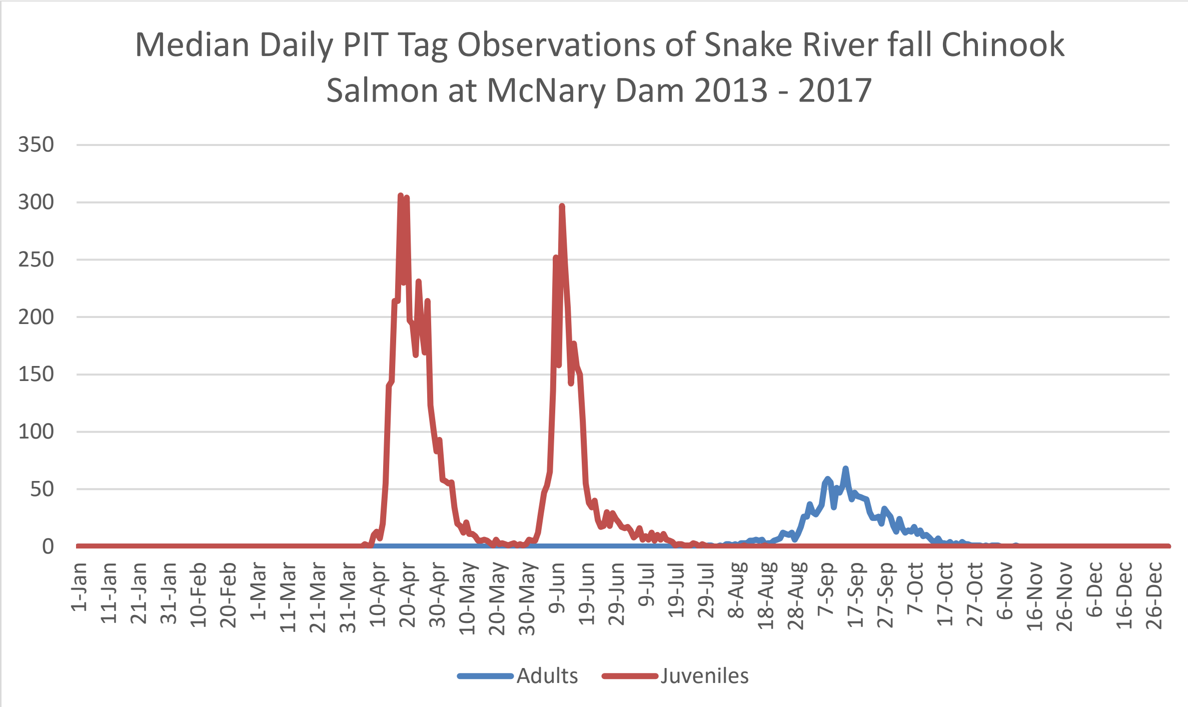

Figure 14. Passage timing and counts of adult and juvenile PIT-tagged Snake River fall Chinook salmon passing McNary Dam (DART 2018).

Ongoing Monitoring

Passage of adult and juvenile Chinook salmon is monitored at the Columbia and Snake River dams. There are also several other monitoring programs by other federal, state and tribal organizations throughout the watershed.

2.2.1.4 Snake River Sockeye Salmon

Listing History

NMFS listed Snake River sockeye salmon as endangered on April 22, 1992 (57 FR 14653) and their threatened status was reaffirmed on June 28, 2005 and 2013.

Distribution

The Snake River 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 broodstock program (Figure 15) (NMFS 2005).

Life History and Biological Requirements

Overall age of maturity in sockeye salmon ranges from 3 to 8 years. Male sockeye salmon are capable of maturing at any of 22 different combinations of freshwater and ocean ages, while female sockeye salmon may mature at any of 14 different age compositions (Healey 1986, 1987). For a given fish size, female sockeye salmon have the highest fecundity and the smallest egg size among the Pacific salmon (Burgner

1991). Average fecundity across the range of sockeye salmon is from 2,000 to 5,200, and from about 300 to slightly less than 2,000 for kokanee (Burgner 1991, Manzer and Miki 1985). Emerging fry possess heritable rheotactic and directional responses that allow fry from outlet tributaries to move upstream and fry from inlet tributaries to move downstream, in order to reach the nursery lake habitat (Raleigh 1967, Brannon 1972a, Burgner 1991). Adult body size may also be affected by variations in stock abundance. Based on fishery catch data, which tends to select for larger fish than are present in the total run, Snake River sockeye salmon average about 1.58 kg after two winters at sea (Gustafson et al. 1997).

Factors for Decline

Current pressures on Snake River sockeye salmon include loss of quality habitat, predation, poor ocean conditions and limited fishing pressure. The limited amount of suitable habitat available, caused by habitat degradation and passage barriers is the main factor limiting recovery.

Local Empirical Information

The Snake River sockeye salmon ESU currently consists of Redfish Lake stock in the captive broodstock program at Eagle and Beef Creek hatcheries, and the hatchery fish released from this program into Redfish Lake, Pettit Lake, Pettit Creek and Redfish Lake Creek; wild residual sockeye in Redfish Lake and their out-migrating progeny; any naturally-spawned progeny of broodstock adults released into Redfish Lake; and any adults returning to Redfish or Pettit Lake.

The population of Snake River sockeye salmon is extremely low, but has shown a substantial increase recently. Since 1962, the highest count of adults at Ice Harbor dam was 2,392 in 2014. Zero adults were counted at Ice Harbor Dam in 1994 (this may be somewhat misleading since in 1994, six were counted at Lower Monumental, 44 at Little Goose and 5 at Lower Granite). The latest 10-year average passing Lower Granite Dam (2008-2017) is 1132. The previous 10-year (1998-2007) average was 62. In 2017, 228 sockeye salmon were counted and in 2016, 816 were counted.

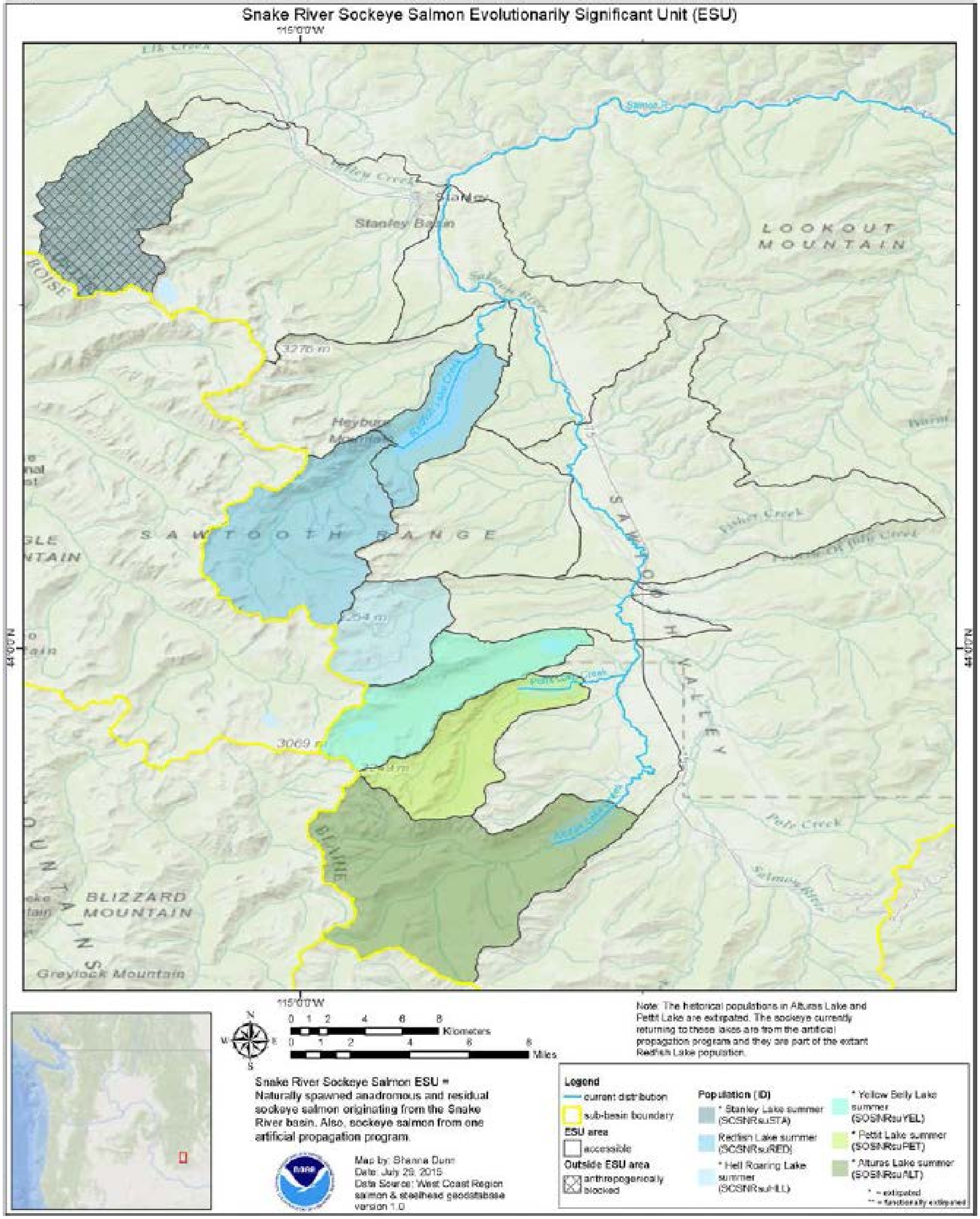

Figure 15. Snake River sockeye salmon ESU distribution.

Ten-year-average adult sockeye salmon passage at McNary Dam is approximately 226,532 fish passing in a given year, although the majority of these fish are hatchery production headed for the Upper Columbia River. Five –year median daily PIT tag observations of out-migrating juvenile Snake River sockeye peak at 178 a day in late May with the majority of sockeye juveniles passing May – June (Figure 16). Adult passage typically begins in early April and continues until the August transition to fall salmon. Virtually no Snake River sockeye Salmon would be in the project area during the proposed work window.

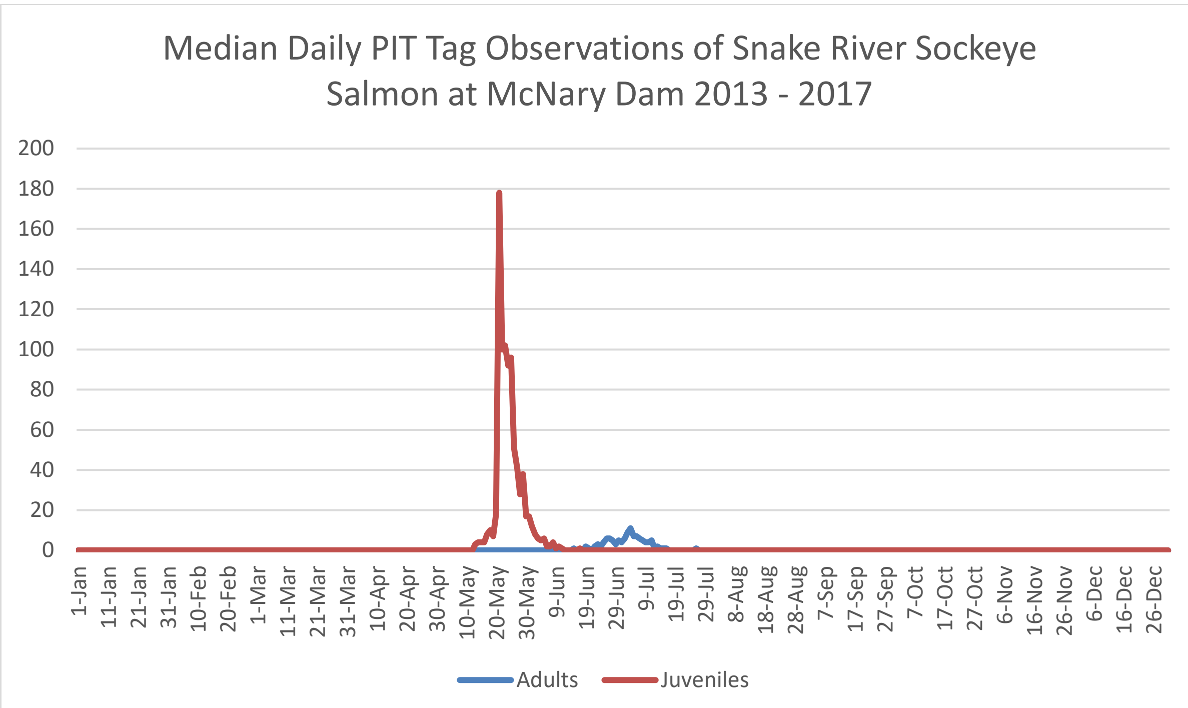

Figure 16. Passage timing and counts of adult and juvenile PIT-tagged Snake River sockeye salmon passing McNary Dam (DART 2018).

Ongoing Monitoring

Snake River sockeye salmon are counted at the Corps' Columbia and Snake River dams. Adults are counted as they move up through the ladders. Juveniles are sampled from the juvenile bypass systems and abundance estimates are made. Additional monitoring takes place in and near the lakes where sockeye spawn and rear.

2.2.1.5 Upper Columbia River Steelhead

Listing History

Upper Columbia River steelhead were listed as endangered in August 1997 and then changed to threatened in January 2006, then changed back to endangered by court decision in June 2007. This stock includes all naturally spawned populations of steelhead in streams in the Columbia River Basin upstream from the Yakima River to the U.S.-Canada border.

Distribution

The Upper Columbia River steelhead Distinct Population Segment (DPS) consists of naturally spawned anadromous steelhead produced in Columbia River tributary systems upstream of the Yakima River to the Canadian border (Figure 17). Also included are steelhead from six artificial propagation programs – the Wenatchee River, Wells Hatchery, Winthrop National Fish Hatchery, Omak Creek, and Ringold hatchery programs (NMS 2016a).

Life History and Biological Requirements

Range-wide, Upper Columbia River steelhead biological requirements include food, flowing water (quantity), high quality water (cool, free of pollutants, high dissolved oxygen concentrations, low sediment content), clean spawning substrate and unimpeded migratory access (with resting areas) to and from spawning and rearing areas. Steelhead use Lake Wallula mainly as a migration corridor. Habitat use in the mainstem Columbia River by steelhead is not well known. Unlike other salmonids, which tend to use a smaller portion of the available habitat at a higher density, steelhead tend to disperse widely throughout the available habitat.

Smolt outmigration past Rock Island Dam peaks in mid-May, but ranges from April to early July (Chelan County PUD No. 1 1998). Smolt outmigration past McNary Dam peaks in May, but ranges from April to early July (Griswold et al. 2005). However, periodically a juvenile UCR steelhead is observed passing McNary Dam as late as October (Griswold et al. 2005). Thus, smolt migration past the action area would generally range from April to early July.

Spawning in the Wenatchee, Entiat, and Methow Rivers occurs from late March through June, and fry emerge and disperse from late spring through August (Chelan County PUD No. 1 1998). As with Upper Columbia River spring chinook (above), steelhead in the Methow River exhibit a wide range of life history types. Juveniles spend two to seven years rearing in headwater streams and/or the mainstem of each river, and some juveniles from any year class would be almost continually out-migrating during this period (Chelan County PUD No. 1 1998). Most smolts emigrate at age 2+ or age 3+ years.

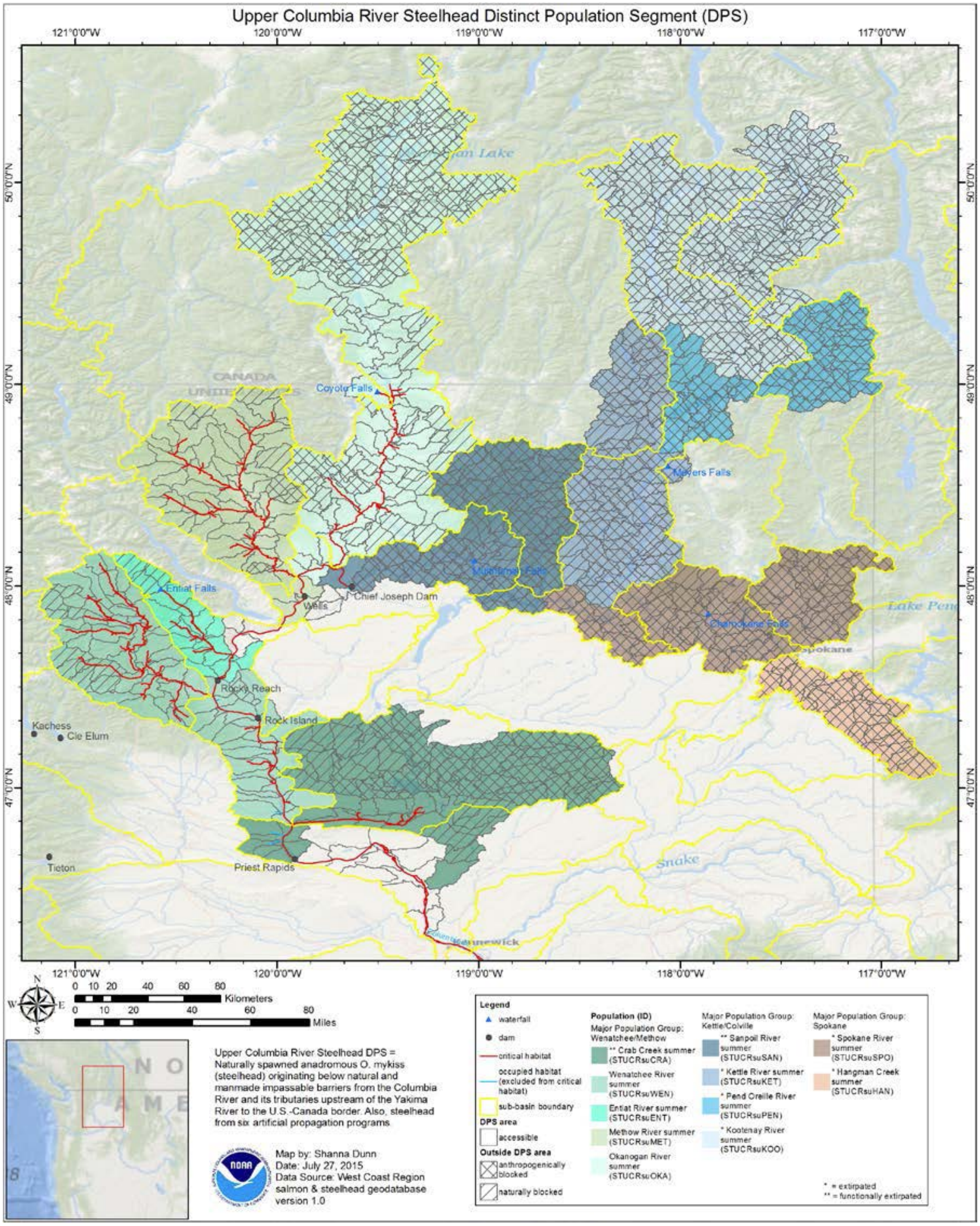

Figure 17. Upper Columbia River steelhead DPS distribution.

Factors for Decline

Historic fishing pressure began the decline of salmon populations over 100 years ago. Construction of dams, roads, railroads and levees/shoreline protection, as well as irrigation withdrawals has altered the rearing habitat of juvenile steelhead and the migratory habitat of juveniles and adults. Increased predation on juvenile salmonids due to the habitat changes is also a contributor to the declining salmonid population. Prior to the construction of McNary Dam, a large percentage of the shoreline consisted of shallow water with a small particle size substrate. Today, much of the shoreline consists of deeper water bordered by riprap. This change in habitat type is likely a factor in the decline of the Columbia Basin steelhead populations.

Current pressures on Upper Columbia River steelhead include loss of quality habitat, predation, poor ocean conditions and limited fishing pressure. The limited amount of suitable habitat available, caused by habitat degradation and passage barriers is the main factor limiting recovery.

Local Empirical Information

Based on limited data, steelhead from the Wenatchee and Entiat rivers return to freshwater after one year in salt water, whereas Methow River steelhead primarily return after two years in salt water. Similar to other inland Columbia River basin steelhead, adults typically return to the Columbia River between May and October and are considered summer steelhead. A significant proportion (approximately 93%) of adult steelhead that pass McNary do so between July 1st and October 31st (Figure 12), and a large portion of these fish overwinter in Lake Wallula (Keefer et al. 2016). Most Upper Columbia River steelhead migrate relatively quickly up the mainstem to their natal tributaries. A portion of the returning run overwinter in the mainstem reservoirs, passing over the upper mid-Columbia dams in April and May of the following year. Unlike Chinook salmon or sockeye salmon, some steelhead adults attempt to migrate back to the ocean. These fish are known as kelts, and those that survive may migrate from the ocean to spawn again.

Ten-year-average adult steelhead passage at McNary Dam is approximately 226,264 fish passing in a given year, although many of these fish are not from the Upper Columbia River steelhead DPS. Five –year median daily PIT tag observations of out-migrating juvenile Upper Columbia River steelhead peak at 131 a day in mid-May with the majority of juveniles passing April – June (Figure 18). Adult passage typically begins in earnest in early April and continues October, although steelhead pass McNary in small numbers at all times of the year.

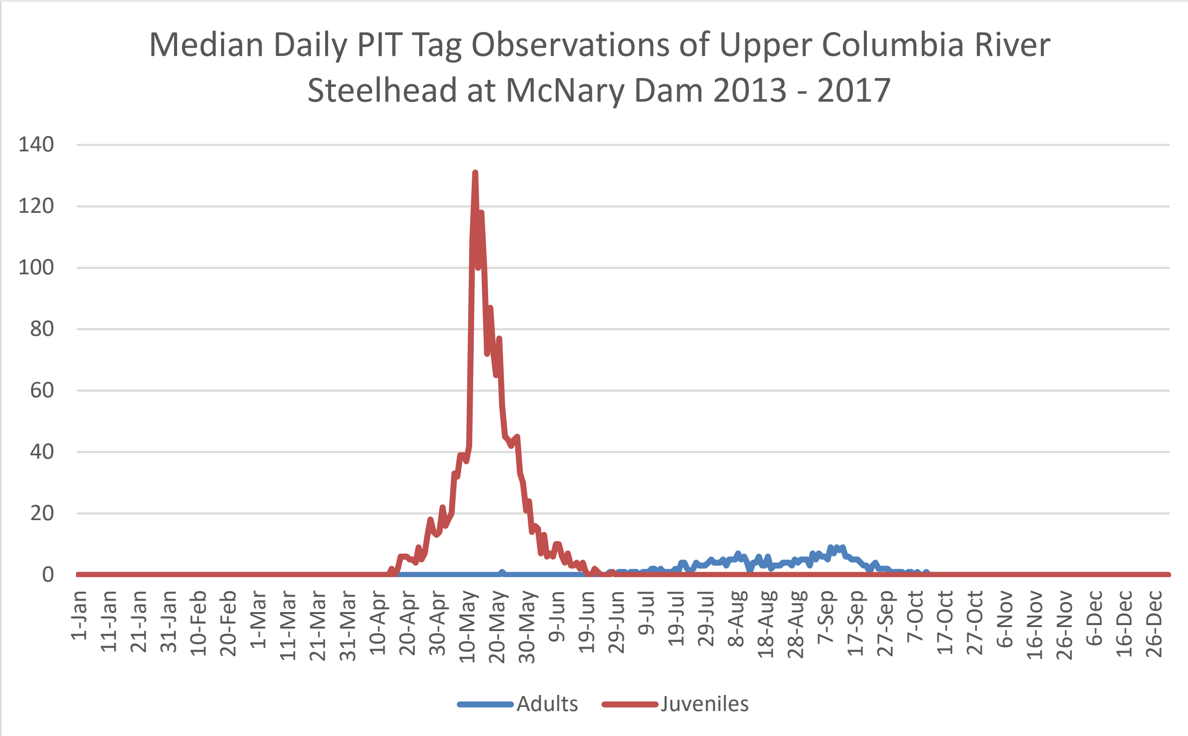

Figure 18. Passage timing and counts of adult and juvenile PIT-tagged Upper Columbia River steelhead passing McNary Dam (DART 2018).

Ongoing Monitoring

Passage of adult and juvenile steelhead is monitored at the Columbia and Snake River dams. There are also several other monitoring programs by other federal, state and tribal organizations throughout the watershed.

2.2.1.6 Middle Columbia River Steelhead

Listing History

Middle Columbia River steelhead were first listed as threatened on March 25, 1999 (64 FR 14517), and reaffirmed as threatened on January 5, 2006 (71 FR 834). Protective regulations were issued on June 28, 2005 (70 FR 37160), and critical habitat for this DPS was listed on September 5, 2005 (70 FR 52630).

Distribution

Middle Columbia River steelhead include all naturally spawning populations of steelhead in drainages upstream of the Wind River, Washington, and the Hood River, Oregon, up to, and including, the Yakima River, Washington. Major drainages in this DPS are the Deschutes, John Day, Umatilla, Walla Walla, Yakima, and Klickitat river systems (Figure 19). The Cascade Mountains form the western border of the plateau in both Oregon and Washington, while the Blue Mountains form the eastern edge. The southern border is marked by the divides that separate the upper Deschutes and John Day basins from the Oregon High Desert and drainages to the south. The Wenatchee

Mountains and Palouse areas of eastern Washington border the Middle Columbia on the north (NMFS 2016c).

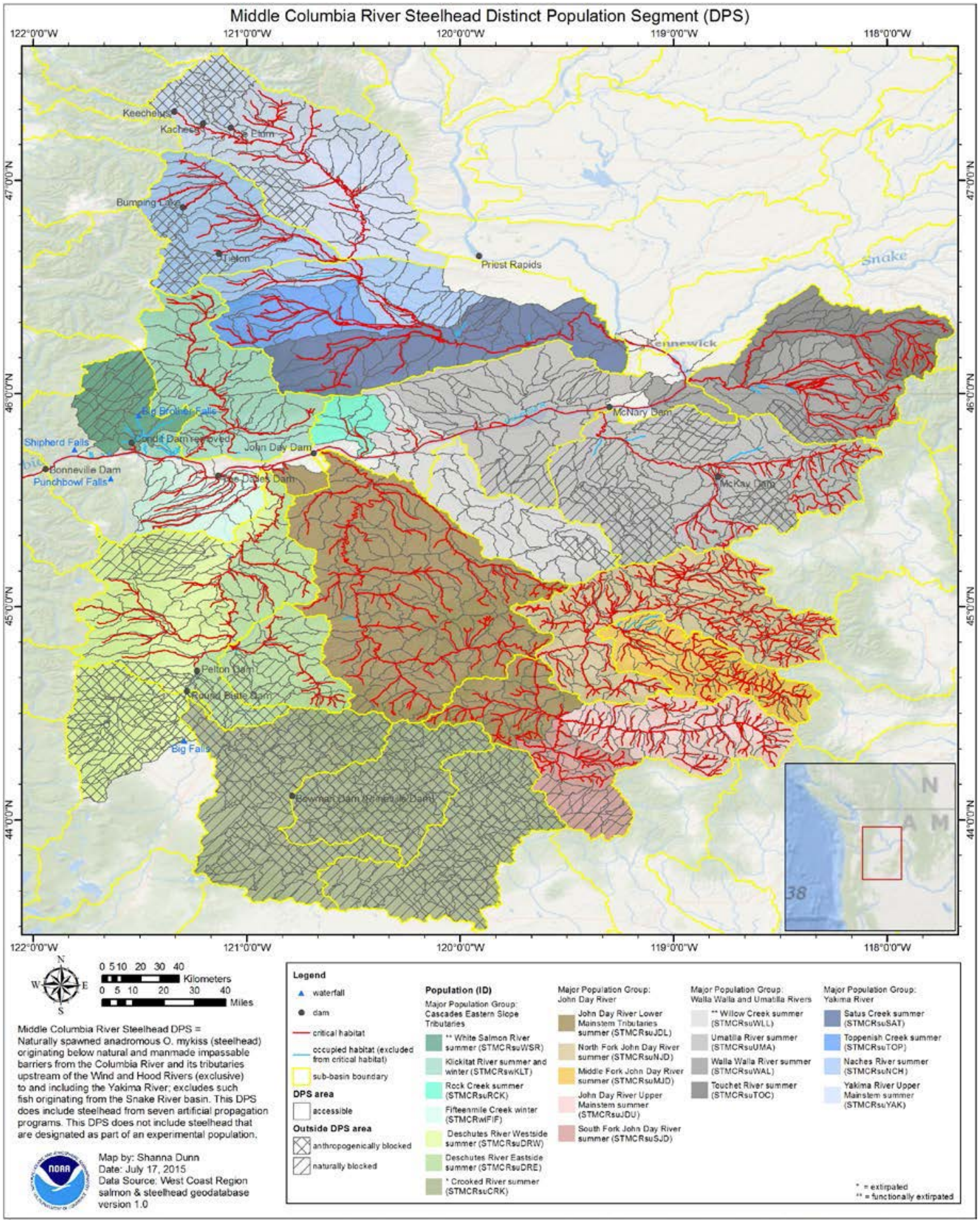

Figure 19. Middle Columbia River steelhead DPS distribution.

Life History/Biological Requirements

Steelhead exhibit one of the most complex groups of life history traits of any species of Pacific salmonid. These fish can be anadromous (migratory) or freshwater residents. Steelhead can also spawn more than once (iteroparous), whereas most other anadromous salmonids spawn once and then die (semelparous).

Within the range of West Coast steelhead, spawning migrations occur throughout the year, with seasonal peaks of activity. Most steelhead can be categorized as one of two run types, based on their sexual maturity when they re-enter freshwater and how far they go to spawn. In the Columbia River, summer steelhead enter freshwater between May and October and require several months to mature before spawning; winter steelhead enter freshwater between November and April with well-developed gonads and spawn shortly thereafter. Winter steelhead are called ocean-maturing or coastal type, and summer steelhead, stream-maturing or inland type. The Middle Columbia River steelhead DPS includes the only populations of inland winter steelhead in the United States in the Klickitat River, White Salmon River, Fifteenmile Creek, and possibly Rock Creek.

Steelhead spawn in clear, cool streams with suitable gravel size, depth, and current velocity. Productive steelhead habitat is characterized by complexity, primarily in the form of large and small woody structure. Steelhead may enter streams and arrive at spawning grounds weeks or even months before they spawn and are therefore vulnerable to disturbance and predation. They need cover, in the form of overhanging vegetation, undercut banks, submerged vegetation, submerged objects such as logs and rocks, floating debris, deep water, turbulence, and turbidity.

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). Most steelhead spend 2 years in the ocean before migrating back to their natal streams. Adults rarely eat or grow upon returning to freshwater.

Factors for Decline

All populations of Middle Columbia steelhead use the mainstem Columbia River to migrate to and from the ocean, and all are affected by the mainstem Federal dams, as well as by other forms of development that alter the river environment. Mainstem Columbia River conditions include impaired fish passage, altered water temperature and thermal refuges, and changes in mainstem nearshore habitat (NMFS 2009). In addition, changes in the Columbia River have altered the relationships between salmonids and other fish, bird, and pinniped species. Increases in competition with other fish species and predation from non-native fishes, birds, and pinnipeds continues to limit recovery of salmonid species in the Columbia River.

Current pressures on Upper Columbia River steelhead include loss of quality habitat, predation, poor ocean conditions and limited fishing pressure. The limited amount of suitable habitat available, caused by habitat degradation and passage barriers is the main factor limiting recovery.

Local Empirical Information

Middle Columbia River Basin steelhead utilize the project area for migration habitat. Adult steelhead have been regularly counted at McNary Dam fish ladders since the dam's completion. Presently, fish counters count fish in real time and review video of hours when no counters are present at the dam. Although stocks are indiscriminately counted as "steelhead", Passive Integrated Transponder tag passage information is presented for McNary Dam in Figure 18. A significant proportion (approximately 93%) of adult steelhead that pass McNary do so between July 1st and October 31st (Figure 18), and a large portion of these fish overwinter in Lake Wallula (Keefer et al. 2016).

Ten-year-average adult steelhead passage at McNary is approximately 226,264 fish passing in a given year, although many of these fish are not from the Middle Columbia River DPS. Five –year median daily PIT tag observations of out-migrating juvenile Middle Columbia River steelhead peak at 14 a day in May with the majority of juveniles passing April – June (Figure 20). Adult passage typically begins in April and continues October, although steelhead pass McNary in small numbers at all times of the year.

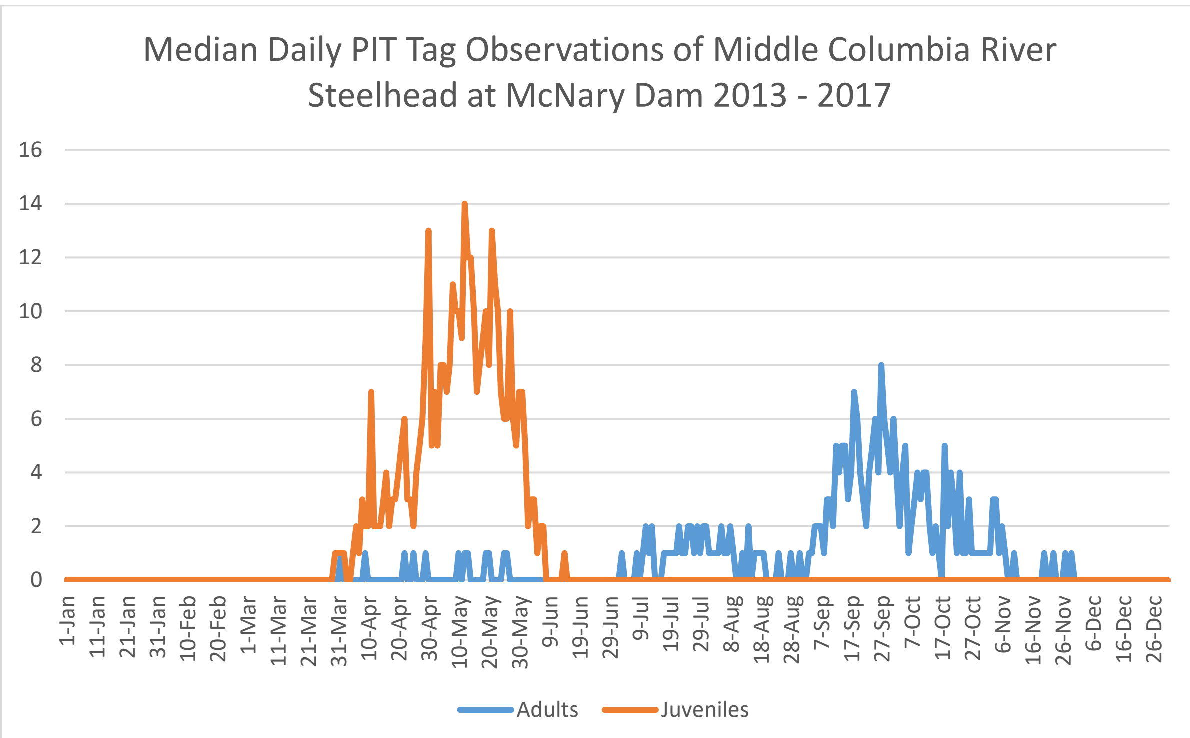

Figure 20. Passage timing and counts of adult and juvenile PIT-tagged Middle Columbia River steelhead passing McNary Dam (DART 2018).

Ongoing Monitoring

Passage of adult and juvenile steelhead is monitored at the Columbia and Snake River dams. There are also several other monitoring programs by other federal, state and tribal organizations throughout the watershed.

2.2.1.7 Snake River Steelhead

Listing History

Snake River steelhead were listed as a threatened on August 18, 1997 (62 FR 43937) and protective regulations were issued under section 4(d) of the ESA on July 10, 2000 (65 FR 42422). Their threatened status was reaffirmed on January 5, 2006 (71 FR 834) and again on April 14, 2014 (79 FR 20802).

Distribution

The DPS 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, as well as six artificial propagation programs: the Tucannon River, Dworshak National Fish Hatchery, Lolo Creek, North Fork Clearwater River, East Fork Salmon River, and the Little Sheep Creek/Imnaha River Hatchery steelhead hatchery programs (NMFS 2016c). The Snake River steelhead DPS is distributed throughout the Snake River drainage system, including tributaries in southwest Washington, eastern Oregon and north/central Idaho (Good et al. 2005). Snake River steelhead do not occur above Dworshak Dam (Figure 21).

The Interior Columbia Basin Technical Recovery Team (ICBTRT 2003) identified six major population groups in the DPS: (1) The Grande Ronde River system, (2) the Imnaha River drainage, (3) the Clearwater River drainage, (4) the Salmon River, (5) Hells Canyon, and (6) the lower Snake. The SR historically supported more than 55% of total natural-origin production of steelhead in the Columbia River Basin. It now has approximately 63% of the basin's natural production potential.

Life History and Biological Requirements

Snake River steelhead migrate a substantial distance from the ocean (up to 940 miles) and use high elevation tributaries (up to 6,562 feet above sea level) for spawning and juvenile rearing. Snake River steelhead occupy habitat that is considerably warmer and drier (on an annual basis) than other steelhead distinct population segments. Managers classify up-river summer steelhead runs into two groups based primarily on ocean age and adult size upon return to the Columbia River. A-run steelhead are predominately age-1-ocean fish while B-run steelhead are larger, predominated by age-2-ocean fish. Snake River steelhead are generally classified as summer run, based on their adult run timing pattern. Snake River steelhead enter fresh water from June to October, and, after holding over the winter, spawn during the following spring from March to May. SRB steelhead usually smolt as 2- or 3-year-olds. Outmigration occurs during the spring and early summer periods, coinciding with snowmelt in the upper drainages.

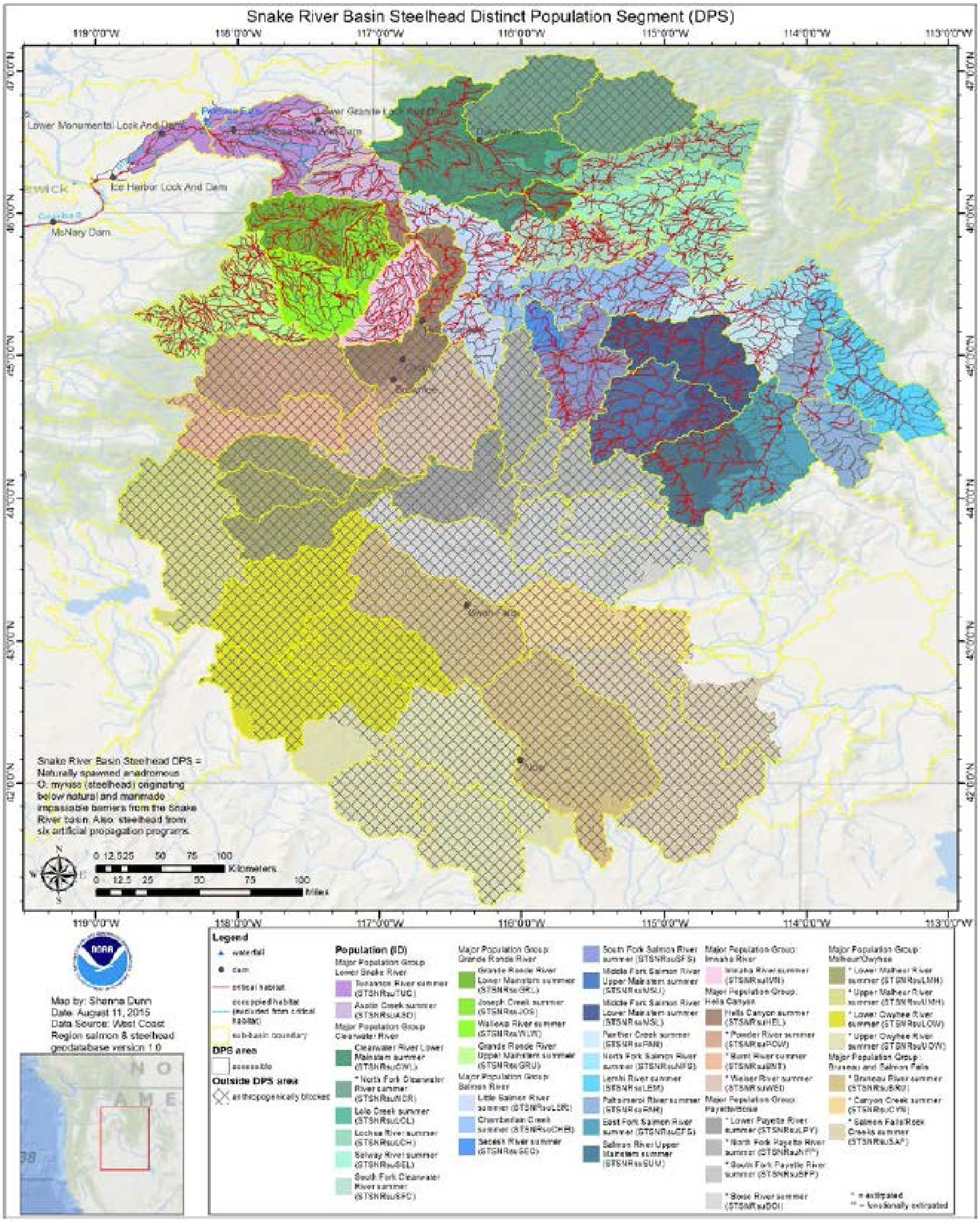

Figure 21. Snake River steelhead DPS distribution.

Median and 90% passage dates at Lower Granite Dam for PIT tagged groups from the Imnaha River were: wild steelhead trout - May 2 and May 9; and hatchery steelhead trout - May 31 and June 16. Hatchery steelhead trout displayed small peaks in arrival timing at Lower Granite and Little Goose Dams in mid-May to mid-June; however, the general trend at each dam was a long protracted emigration (Blenden et al. 1996).

A-run populations are found in the tributaries to the lower Clearwater River, the upper Salmon River and its tributaries, the lower Salmon River and its tributaries, the Grand Ronde River, Imnaha River, and possibly the SR's mainstem tributaries below Hells Canyon Dam. B-run steelhead occupy four major subbasins, including two on the Clearwater River (Lochsa and Selway) and two on the Salmon River (Middle Fork and South Fork Salmon); areas that are for the most part not occupied by A-run steelhead. Some natural B-run steelhead are also produced in parts of the mainstem Clearwater and its major tributaries. There are alternative escapement objectives of 10,000 (Columbia River Fisheries Management Plan) and 31,400 (Idaho) for B-run steelhead. B-run steelhead, therefore, represent at least one-third and as much as three-fifths of the production capacity of the DPS.

Steelhead adult migration preferred temperatures are between approximately 39.2 and 48.2°F (4 and 9°C) (Bell 1990). Steelhead preferred temperatures fall between 50 and 55.4°F (10 and 13°C), while the upper lethal limit for steelhead is 75°F (23.9 °C) (Spence et al. 1996).

Factors for Decline

All populations of Snake River steelhead use the mainstem Columbia River and Lower Snake River to migrate to and from the ocean, and all are affected by the mainstem Federal dams, as well as by other forms of development that alter the river environment. Snake River conditions include impaired fish passage, altered water temperature and thermal refuges, and changes in mainstem nearshore habitat (NMFS 2009). In addition, changes in the Columbia and Snake rivers have altered the relationships between salmonids and other fish, bird, and pinniped species. Increases in competition with other fish species and predation from non-native fishes, and birds continues to limit recovery of salmonid species in the Snake River. The limited amount of suitable habitat available, caused by habitat degradation and passage barriers is the main factor limiting recovery.

Local Empirical Information

Very little information is documented on near-shore habitat use by juvenile steelhead in the main stem Columbia and Snake Rivers. Juvenile steelhead are thought to utilize the deeper, higher velocity areas away from the shoreline to migrate. They could potentially use the shoreline area during the winter and spring for rearing.

Most wild adult steelhead typically migrate through the reach between June and August for the A-run and between late August and November for the B-run. Adults from this stock may be migrating in deeper water or individuals may be holding in mid-channel areas prior to moving upriver into tributaries for spawning in early spring.

Ten-year-average adult steelhead passage at McNary is approximately 226,264 fish passing in a given year, although many of these fish are not from the Snake River steelhead DPS. Five –year median daily PIT tag observations of out-migrating juvenile Snake River steelhead peak at 355 a day in late April with the majority of juveniles passing April – June (Figure 22). Adult passage typically begins in earnest in early April and continues October, although steelhead pass McNary in small numbers at all times of the year.

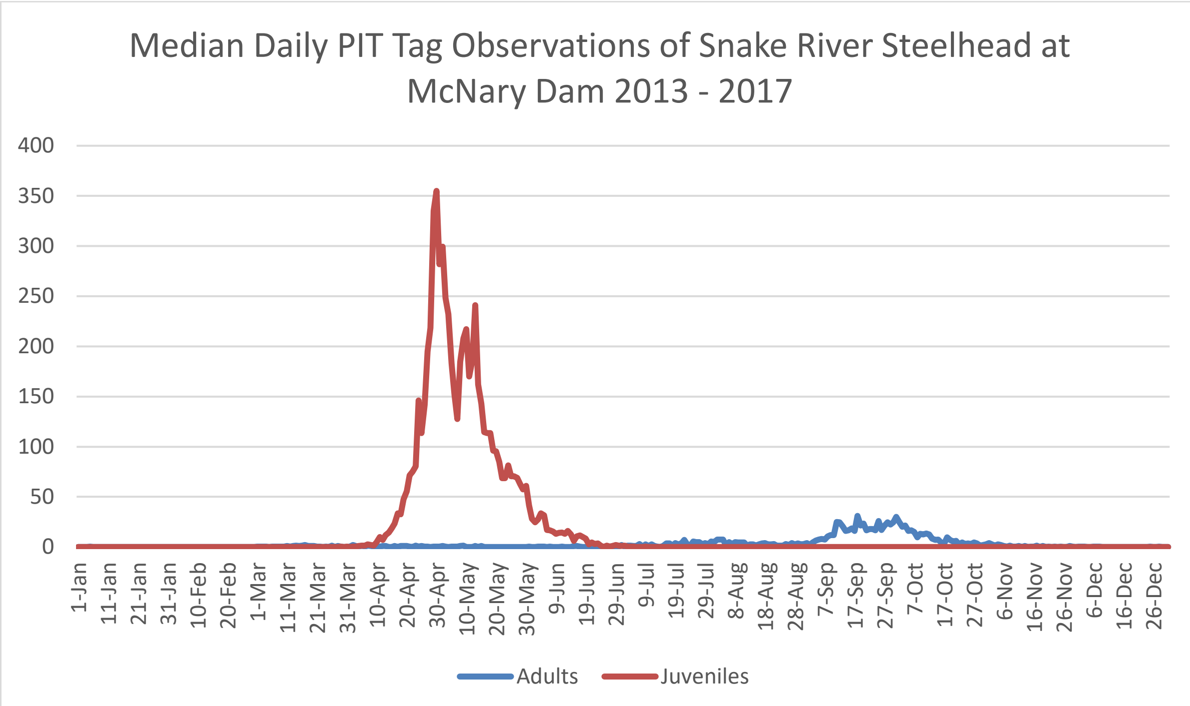

Figure 22. Passage timing and counts of adult and juvenile PIT-tagged Middle Snake River steelhead passing McNary Dam (DART 2018).

Ongoing Monitoring

Passage of adult and juvenile steelhead is monitored at the Snake River dams. There are also several other monitoring programs by other federal, state and tribal organizations throughout the watershed.

2.2.2 Bull Trout

Listing History

The USFWS issued a final rule listing the Columbia River population of bull trout as threatened on June 10, 1998 (63 FR 31647), while critical habitat for this species was listed on September 30, 2010. Bull trout are currently listed throughout their range in the United States as a threatened species.

Distribution

In the Columbia River Basin, bull trout historically were found in about 60% of the basin. They now occur in less than half of their historic range. Populations remain in portions of Oregon, Washington, Idaho, Montana, and Nevada (Figure 23).

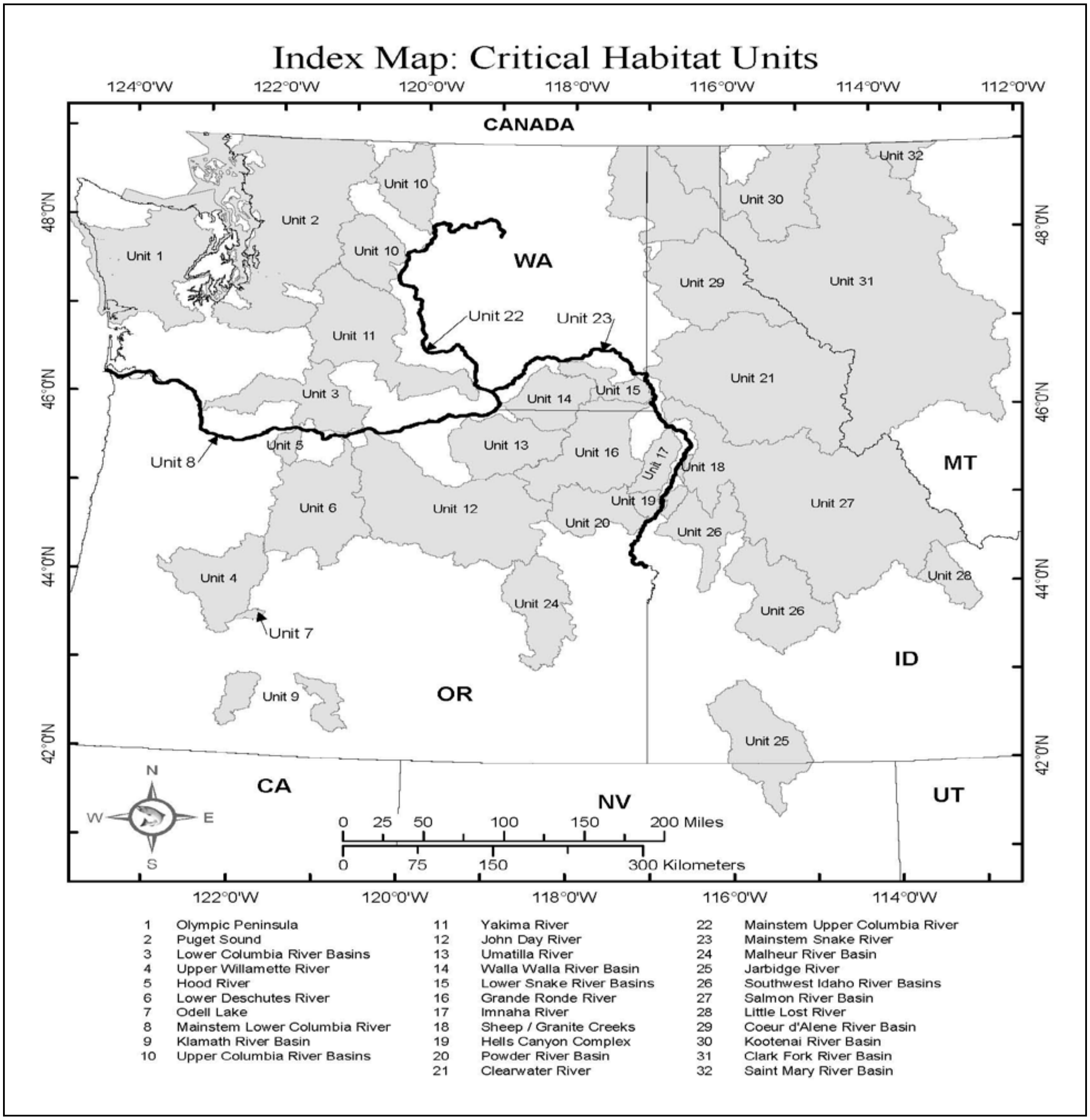

Figure 23. Distribution of bull trout in the Columbia River Basin.

Life History and Biological Requirements

Bull trout exhibit four distinct life history patterns: anadromous, adfluvial, fluvial, and resident. Anadromous populations spend the early portion of their life in streams, grow to adulthood in the ocean, and eventually return to the tributaries in which they were born to spawn. Adfluvial populations spend between one and four years growing in their natal stream and then migrate to lakes. Fluvial populations spend about the same amount of time in their natal streams as their adfluvial siblings, but migrate to larger rivers and streams instead of lakes (Fish 2004). Resident bull trout remain in the stream where they were spawned.

Bull trout eggs are buried in gravel. Incubation lasts approximately 220 days in water that is ideally between 35.6 and 39.2°F (2 and 4°C) (Table 2). Fry take approximately 65-90 days to absorb their yolk sacs. In warmer water, juvenile growth rates are significantly reduced (McPhail and Baxter 1996). After depleting their yolk sacs, the fry will spend up to three weeks developing parr marks and actively feeding on benthic and drifting aquatic insects before inflating their air bladder. Bull trout fry are very closely associated with cover and the riverbed, and they almost never feed on terrestrial insects (McPhail and Baxter 1996). The fry emerge from the stream bed at approximately 25-28mm total length and will continue to hold close to the bottom while foraging for benthic invertebrates during their acclimation to their new world. Rearing juveniles use a benthic microhabitat of very low velocity water in which the fry can move about while avoiding swift currents (Fish 2004). Adult migratory bull trout are a freshwater piscivore, an apex predator, and an opportunistic feeder. At all life history stages, they need access to an adequate prey base, which for adults necessitates habitats accessible through migratory corridors with suitable temperature, habitat complexity, and passage (USFWS 1998).

After 1 to 4 years in their natal stream, migratory smolt populations will travel downstream to the coast, a large river, or lake (depending on specific life history) to recruit to the adult stage. Adult individuals achieve sexual maturity at between four and seven years of age. Spawning is usually biennial, occurring only every other year or sometimes every three years, at which point the sexually mature adults fight the current back to the specific headwater in which they were produced to spawn. Several studies have shown a strong preference for spawning in small streams as opposed to larger rivers (Fish 2004).

Spawning begins when water temperatures drop below 48.2°F (9°C), typically 41-48.2°F (5-9°C) (Table 2). Spawning typically occurs between August and November. As with many salmonids, bull trout exhibit varying degrees of sexual dimorphism. Females do not exhibit significant changes during the spawn, but the males will develop bright red or orange sides and a kype (hooking of the lower jaw), although these distinctions vary from population to population (Fish 2004).

Bull trout are brood hiders, which means that their reproductive strategy is to hide their young from potential predators in the substrate (Breder and Rosen 1966). Once spawning commences the females will focus all of their time and energy into digging redds in the loose gravel substrate into which they will deposit their eggs. Bull trout prefer small gravel, usually digging their redds in areas dominated by substrate particles less than 20mm in diameter.

Redds can range in water depth from 10cm to over a meter, and range in size from less than a meter in diameter to over 2 meters (McPhail and Baxter 1996). While the females are digging redds, the males are trying to court the females while at the same time driving other competing males out of the area. Once the female is satisfied with her nest and her mate, she will release her eggs (up to 5,000) into the redd, closely followed by a male who will cover the eggs with his sperm. Once the eggs are fertilized, the female will sweep pebbles into the nest to cover the eggs by undulating her tail while keeping the caudle and anal fins in contact with the substrate.

Spawning seems to cease when water temperatures drop to about 41°F (5°C) (Allen 1987). Unlike salmon species, and like steelhead, bull trout have iteroparity (the ability to spawn multiple times), so after spawning the adults will drift back downstream to their winter homes. Spawning is thought to occur biannually due to the fact that the fish survive spawning and need a year or so to recover afterwards (Fish 2004).

Table 2. Bull trout general life history timing with associated temperatures.

Bull Trout	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Temp	Length	Lethal Limits
Upstream adult migration													10-12.2°C		22°C
Downstream Adult Migration															
Overwintering															
Adult spawning													4-14°C (12, 16)		
Egg incubation													1.2-5.4°C (16)	100-220 days (13)	
Alevin													3.9-4.4°C	60-90 days	
Fry emergence															
Juvenile rearing													3.9-10°C	1-4 years	21°C
Downstream juvenile migration													<12.2°C	At night	21°C

Factors for Decline

Bull trout are estimated to have occupied about 60 percent of the Columbia Basin and presently occur in only about 45 percent of their historic range. The decline of bull trout is primarily due to habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, past fisheries management practices and the introduction of non-native species. Declining salmon and steelhead populations could also negatively impact bull trout populations by reducing the number of juvenile salmon and steelhead available to bull trout for prey.

Local Empirical Information

The few remaining bull trout strongholds in the Columbia River Basin tend to be found in large areas of contiguous habitats 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. Populations also exist in the Yakima and Methow River watersheds. Numbers of bull trout captured at spawning stations throughout the basin are also regularly recorded. In addition, redd counts are conducted in southeast Washington on the Tucannon River, Butte Creek, and Asotin Creek.

Recent studies have also shown Walla Walla River subbasin bull trout migration to, from, and through Lake Wallula above McNary Dam, but very little is known about how many bull trout may migrate into or through the mainstem Columbia and Snake River throughout the year. Anglin et al. (2010) reported that bull trout dispersed into the mainstem Columbia River from the Walla Walla River, and at times, this dispersal included a relatively long migration upstream to Priest Rapids Dam and downstream to John Day Dam. This data suggests that migratory bull trout from the Walla Walla River subbasin may also utilize the lower Snake River as bull trout of unknown origin are occasionally documented in the Ice Harbor south shore fishway (Barrows et al. 2015). While there is clear evidence that migratory bull trout utilize the Middle Columbia River and interact with FCRPS dams, little is known about the number of bull trout within the project area at any given time.

Ongoing Monitoring

Fish passage including bull trout is monitored at Columbia and Lower Snake River dams between March and November, and for juveniles between April and October each year. Any bull trout observations are recorded, though few, if any, are generally seen in any year at McNary Dam.

2.3. STATUS OF CRITICAL HABITAT

2.3.1 Geographical Extent of Designated Critical Habitat

2.3.1.1 Upper Columbia River Spring Chinook Salmon

NMFS designated critical habitat for Upper Columbia River Chinook salmon in the Chief Joseph, Methow, Upper Columbia/Entiat, and Wenatchee subbasins, and the Columbia River migration corridor (NMFS 2005) (Figure 24). Essential elements of Upper Columbia River Chinook salmon critical habitat are found in Table 3.

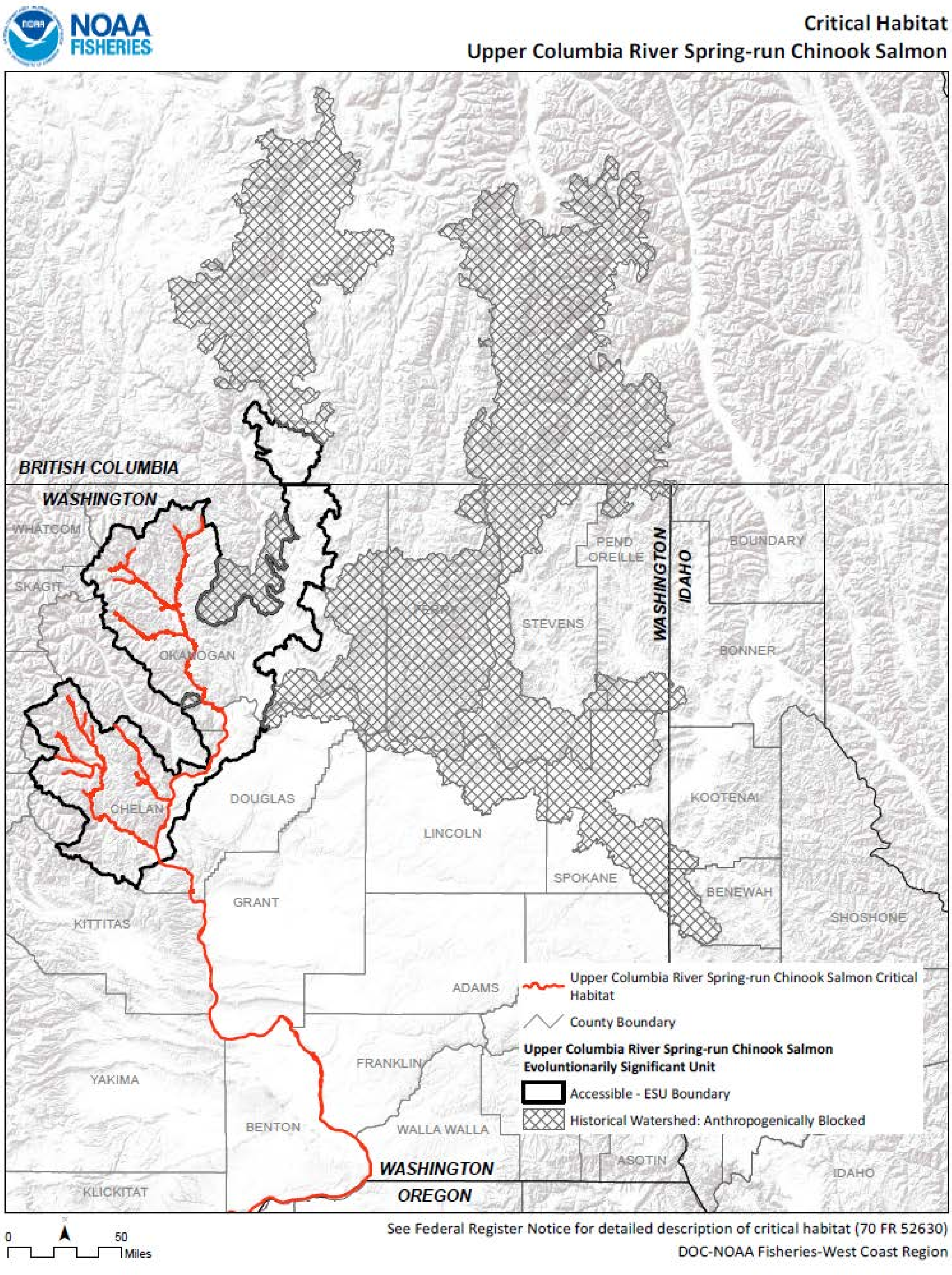

Figure 24. Upper Columbia spring Chinook salmon Critical Habitat. Not pictured is the Columbia River migration corridor which extends through the proposed action area to the estuary.

Table 3. Physical or biological feature (PBFs) of critical habitats designated for Pacific salmon and steelhead species and corresponding species life history events.

Site	Essential Physical and Biological Features	ESU/DPS Life Stage
Freshwater spawning	Substrate Water quality Water quantity	Adult spawning Embryo incubation Alevin development
Freshwater rearing	Floodplain connectivity Forage Natural cover Water quality Water quantity	Fry emergence Fry/parr growth and development
Freshwater migration	Free of artificial obstructions Natural cover Water quality Water quantity	Adult sexual maturation Adult upstream migration, holding Kelt (steelhead) seaward migration Fry/parr seaward migration
Estuarine areas	Forage Free of obstruction Natural cover Salinity Water quality Water quantity	Adult sexual maturation Adult "reverse smoltification" Adult upstream migration, holding Kelt (steelhead) seaward migration Fry/parr seaward migration Fry/parr smoltification Smolt growth and development Smolt seaward migration
Nearshore marine areas	Forage Free of obstruction Natural cover Water quantity Water quality	Adult sexual maturation Smolt/adult transition
Offshore marine areas	Forage	Adult growth and development

2.3.1.2 Snake River Spring/Summer Chinook Salmon

NMFS designated critical habitat for Snake River spring/summer Chinook salmon to include all presently or historically accessible stream reaches in the Hells Canyon, Imnaha, Lemhi, Little Salmon, Lower Grande Ronde, Lower Middle Fork Salmon, Lower Salmon, Lower Snake-Asotin, Lower Snake-Tucannon, Middle Salmon-Chamberlain, Middle Salmon-Panther, Pahsimeroi, South Fork Salmon, Upper Middle Fork Salmon, Upper Grande Ronde, Upper Salmon, Wallowa subbasins, and the Columbia River and Snake River migration corridor (NMFS 1999). A map of Snake River spring/summer Chinook salmon Critical Habitat is not currently available. Essential elements of Upper Columbia River Chinook salmon critical habitat are found in Table 3.

2.3.1.3 Snake River Fall Chinook Salmon

NMFS designated critical habitat for Snake River fall Chinook to include the Columbia River from a straight line connecting the west end of the Clatsop jetty (south jetty, Oregon side) and the west end of the Peacock jetty (north jetty, Washington side) and including all Columbia River estuarine areas and river reaches proceeding upstream to the confluence of the Columbia and Snake Rivers; the Snake River, all river reaches from the confluence of the Columbia River, upstream to Hells Canyon Dam; the Palouse River from its confluence with the Snake River upstream to Palouse Falls; the CR from its confluence with the Snake River upstream to its confluence with Lolo Creek; the NFCR from its confluence with the CR upstream to Dworshak Dam. Critical habitat also includes river reaches presently or historically accessible (except reaches above impassable natural falls, and Dworshak and Hells Canyon Dams) to Snake River fall Chinook salmon in the following hydrologic units; Clearwater, Hells Canyon, Imnaha, Lower Grande Ronde, Lower North Fork Clearwater, Lower Salmon, Lower Snake, Lower Snake-Asotin, Lower Snake-Tucannon, and Palouse. Critical habitat borders on or passes through the following counties in Oregon: Baker, Clatsop, Columbia, Gillium, Hood River, Morrow, Multnomah, Sherman, Umatilla, Wallowa, Wasco; the following counties in Washington: Adams, Asotin, Benton, Clark, Columbia, Cowlitz, Franklin, Garfield, Klickitat, Lincoln, Pacific, Skamania, Spokane, Wahkiakum, Walla Walla, Whitman; and the following counties in Idaho: Adams, Benewah, Clearwater, Idaho, Latah, Lewis, Nez Perce, Shoshone, Valley (Figure 25). Essential elements of Snake River fall Chinook are found in Table 3.

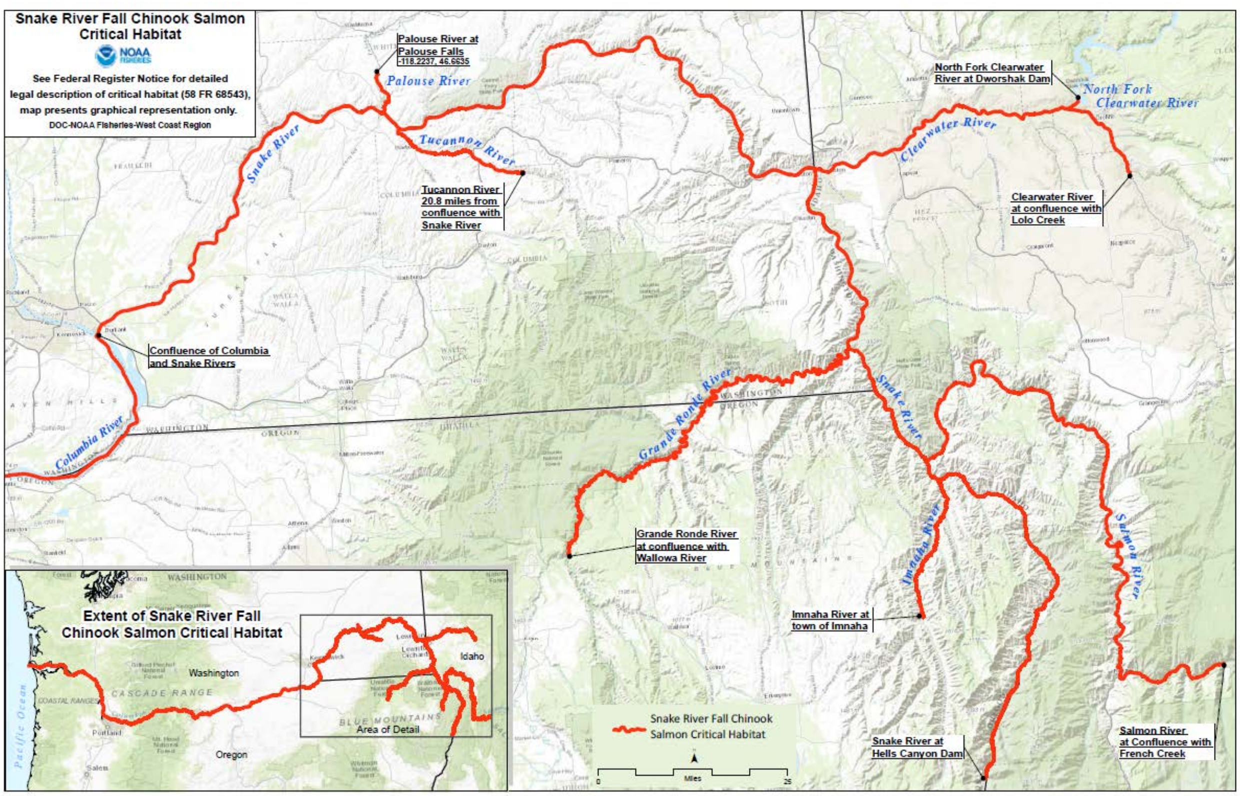

Figure 25. Snake River fall Chinook salmon Critical Habitat.

2.3.1.4 Snake River Sockeye Salmon

NMFS designated Critical Habitat for Snake River sockeye salmon to include all river lakes and reaches presently or historically accessible lakes and stream reaches in the Lower Salmon, Lower Snake, Lower Snake-Asotin, Lower Snake-Tucannon, Middle Salmon-Chamberlain, Middle Salmon-Panther, and Upper Salmon subbasins, as well as the migration corridor through the Salmon, Snake, and Columbia Rivers (NMFS 1993). A map of Snake River sockeye salmon Critical Habitat is not currently available. Essential elements of Snake River sockeye salmon critical habitat are found in Table 3.

2.3.1.5 Upper Columbia River Steelhead

NMFS designated critical habitat for Upper Columbia River steelhead in the Chief Joseph, Okanogan River, Similkameen, Methow, Upper Columbia/Entiat, Wenatchee, Lower Crab, and Upper Columbia/Priest subbasins, and the Columbia River migration corridor (NMFS 2005) (Figure 26). Essential elements of Snake River steelhead critical habitat are found in Table 3.

2.3.1.6 Middle Columbia River Steelhead

NMFS designated critical habitat for Middle Columbia River steelhead in the Upper Yakima, Naches, Lower Yakima, Middle Columbia/Lake Wallula, Walla Walla, Umatilla, Middle Columbia/Hood, Klickitat, Upper John Day, North Fork John Day, Middle Fork John Day, Lower John Day, Lower Deschutes, and Trout subbasins, and the Columbia River migration corridor (NMFS 2005) (Figure 27). Essential elements of Upper Columbia River Chinook salmon critical habitat are found in Table 3.

2.3.1.7 Snake River Steelhead

NMFS designated critical habitat for Snake River steelhead in the Hells Canyon, Imnaha River, Lower Snake/Asotin, Upper Grande Ronde River, Wallowa River, Lower Grande Ronde, Lower Snake/Tucannon, Upper Salmon, Pahsimeroi, Middle Salmon-Panther, Lemhi, Upper Middle Fork Salmon, Lower Middle Fork Salmon, Middle Salmon-Chamberlain, South Fork Salmon, Lower Salmon, Little Salmon, Upper Selway, Lower Selway, Lochsa, Middle Fork CR, South Fork CR, and CR subbasins, and the Lower Snake/Columbia River migration corridor (NMFS 2005a) (Figure 28). Essential elements of Snake River steelhead critical habitat are found in Table 3.

2.3.1.8 Bull trout

Bull trout critical habitat was designated in 2005. The USFWS revised the designation in 2010. A final rule was published on October 18, 2010, and took effect on November 17, 2010. A total of 19,729 miles of stream and 488,251 acres of reservoirs and lakes are designated as bull trout critical habitat. The Snake, Columbia, Yakima, and Walla Walla Rivers, which encompass the project area, are designated as bull trout critical habitat (Figure 29). Physical and Biological Features (PBF) for bull trout critical habitat are listed in Table 4.

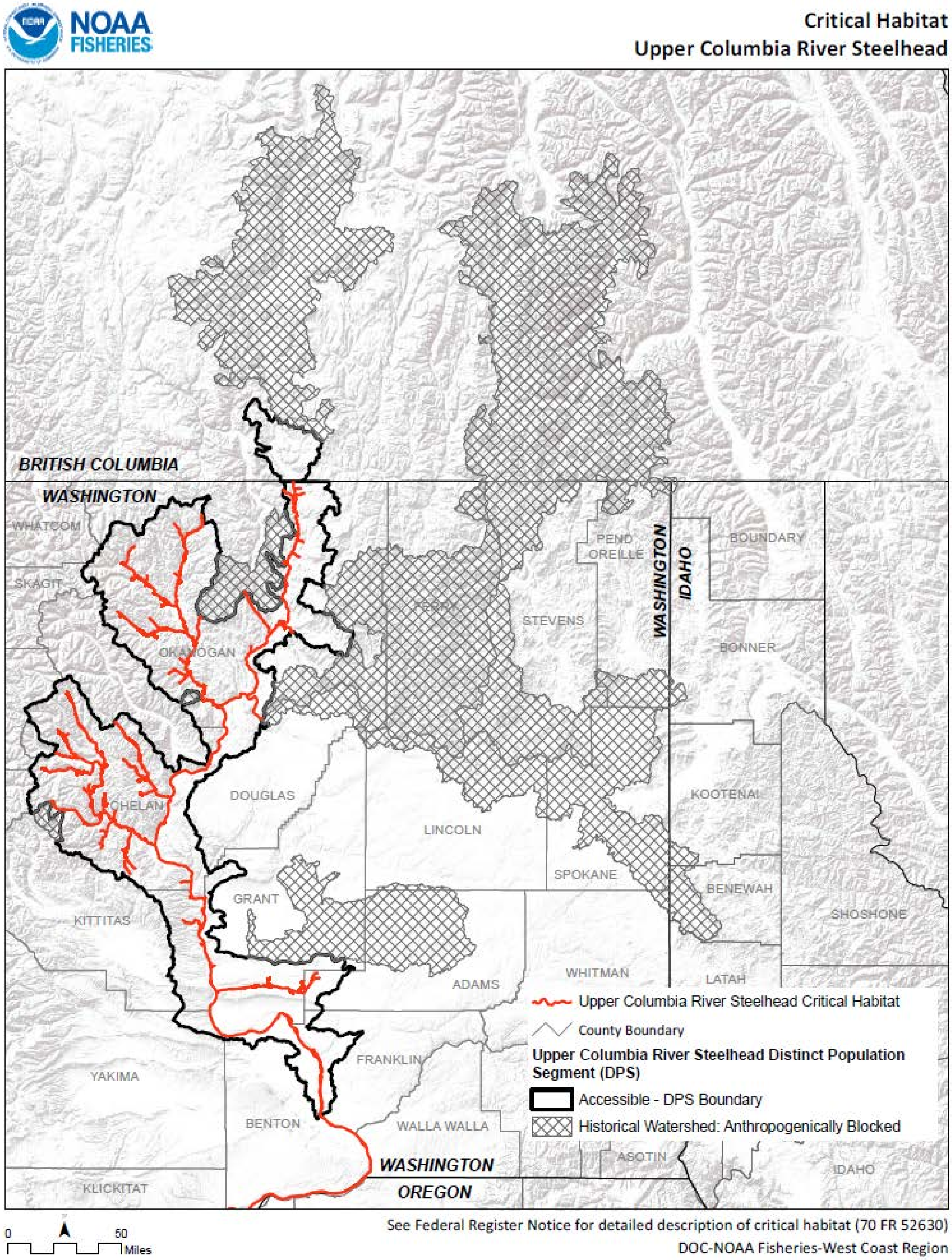

Figure 26. Upper Columbia spring steelhead Critical Habitat. Not pictured is the Columbia River migration corridor which extends through the proposed action area to the estuary.

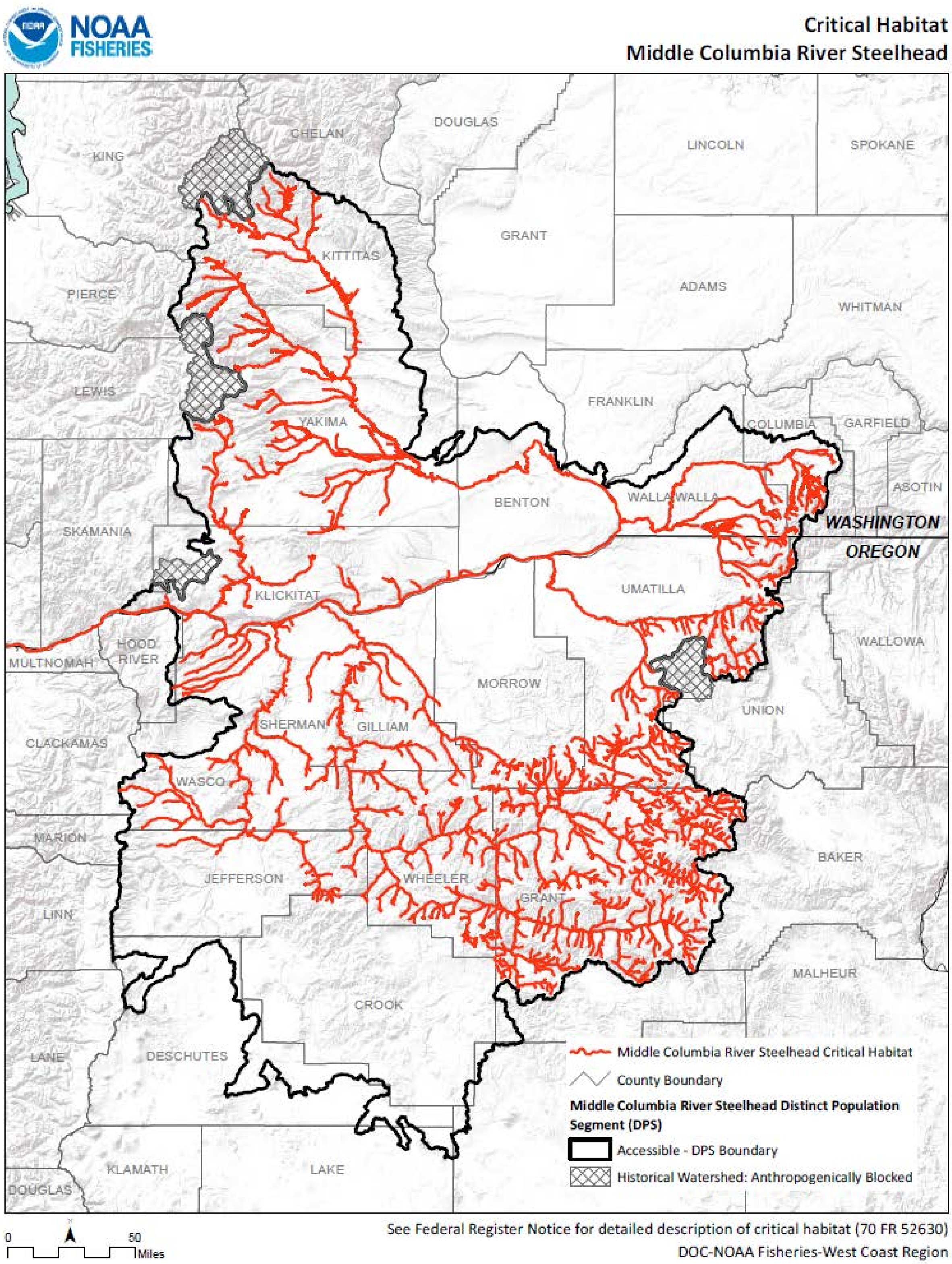

Figure 27. Middle Columbia steelhead Critical Habitat. Not pictured is the Columbia River migration corridor which extends to the estuary.

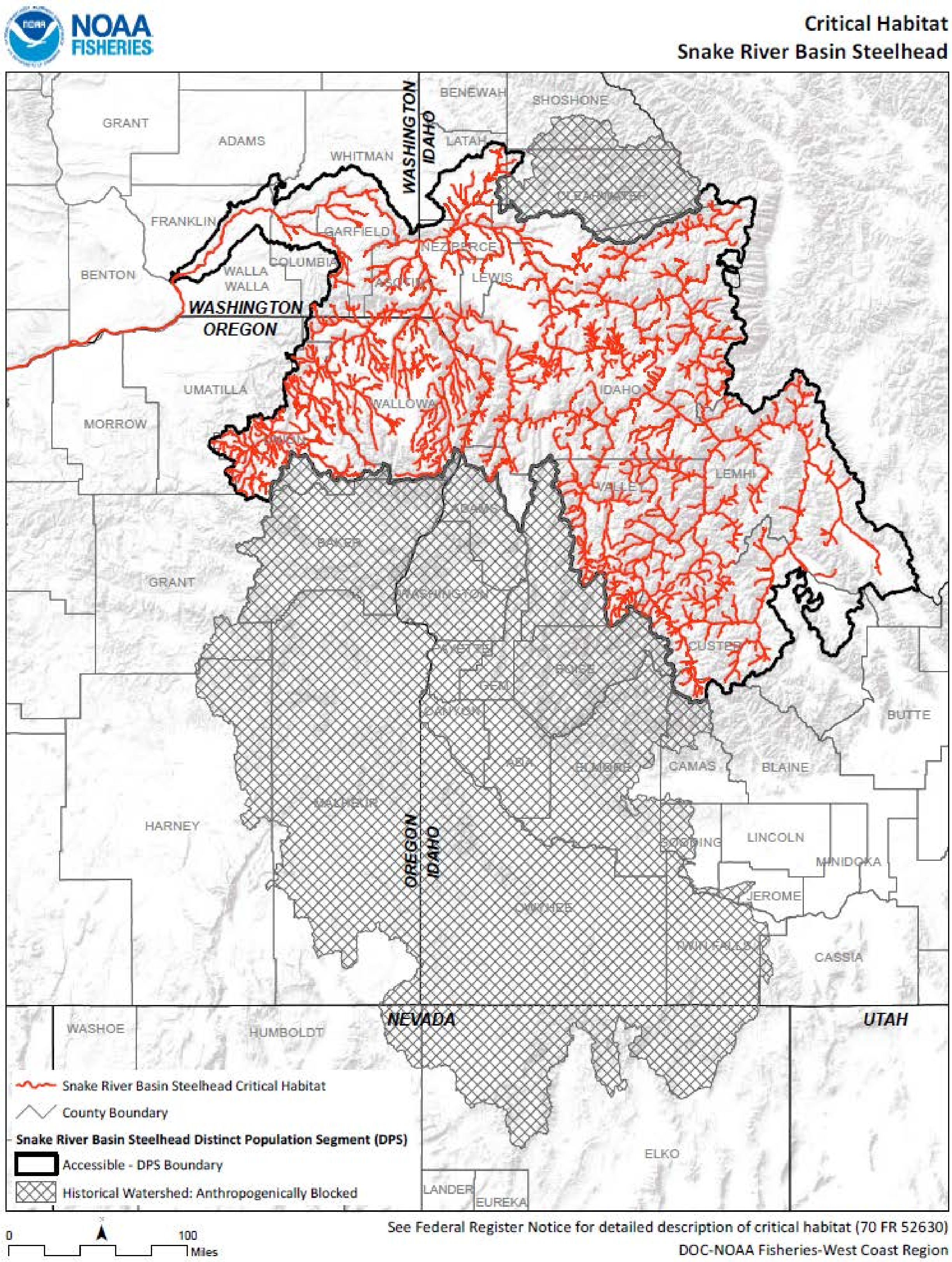

Figure 28. Snake River steelhead Critical Habitat. Not pictured is the Columbia River migration corridor which extends through the proposed action area to the estuary.

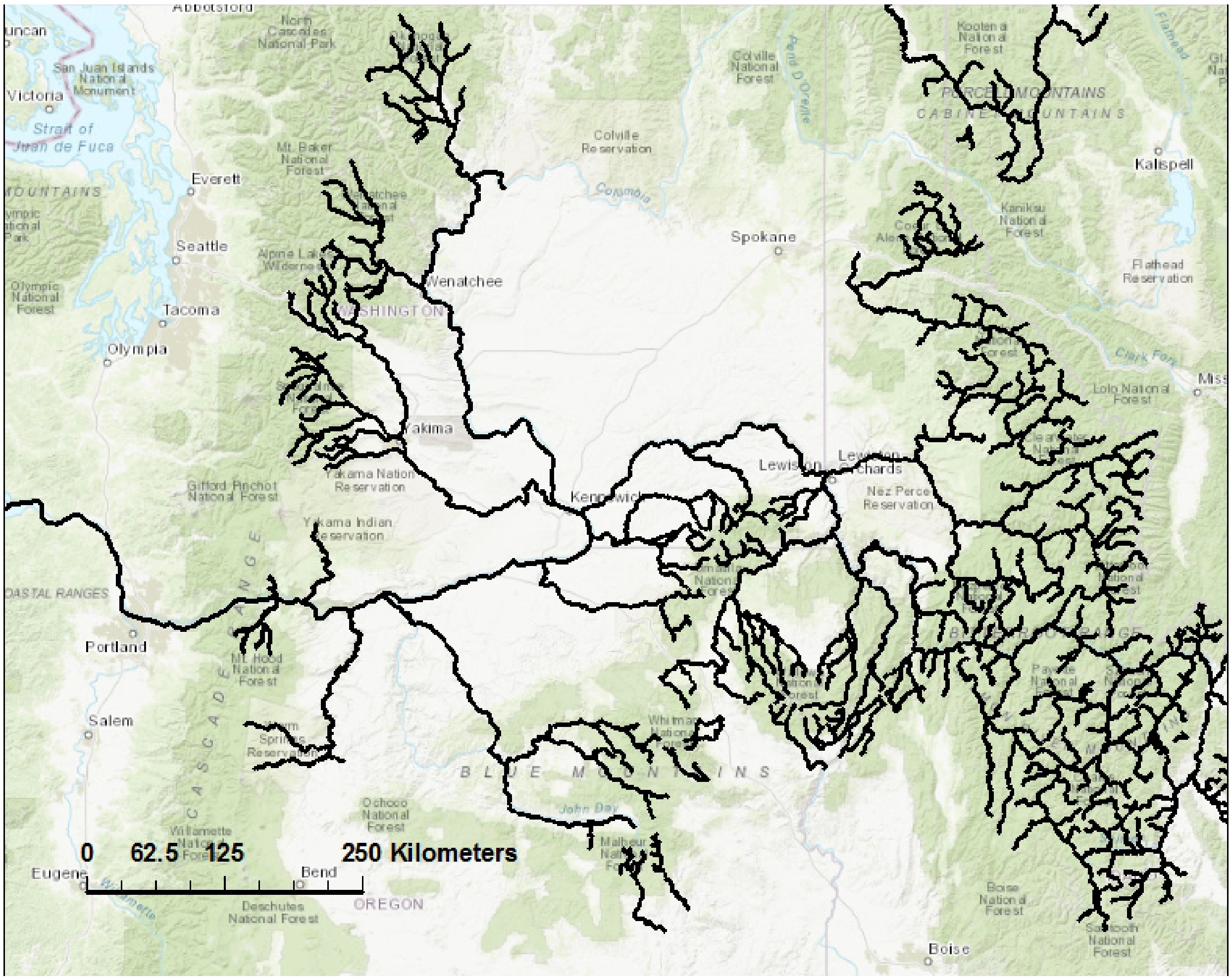

Figure 29. Bull trout critical habit near the action area.

Table 4. Physical and Biological Features of critical habitat designated for bull trout.

PBFs		
1	Water Quality	Springs, seeps, groundwater sources, and subsurface water connectivity (hyporehic flows) to contribute to water quality and quantity and provide thermal refugia.
2	Migration Habitat	Migration 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	Food Availability	An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.
4	Instream Habitat	Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these environments, with features such as large wood, side channels, pools, undercut banks and clean substrates, to provide a variety of depths, gradients, velocities, and structure.
5	Water Temperature	Water temperatures ranging from 2 to 15 °C (36 to 59 °F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.
6	Substrate Characteristics	In spawning and rearing areas, substrate 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 percent) of fine substrate less than 0.85 mm (0.03 in.) in diameter and minimal embeddedness of these fines in larger substrates are characteristic of these conditions.
7	Stream Flow	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	Water Quantity	Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.
9	Nonnative Species	Sufficiently low levels of occurrence of nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.

3. Environmental Baseline

This section is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat (including designated critical habitat), and ecosystem within the action area. The environmental baseline is a "snapshot" of a species' health at a specified point in time. It does not include the effects of the action under review in the consultation.

The baseline includes State, tribal, local, and private actions already affecting the species or that will occur contemporaneously with the consultation in progress. Unrelated Federal actions affecting the same species or critical habitat that have completed formal or informal consultation are also part of the environmental baseline, as are Federal and other actions within the action area that may benefit listed species or critical habitat.

3.1. HISTORIC CONDITIONS

The proposed project location historically may have been at the margins of the Columbia River, or may have been riparian area, as the construction of McNary Dam deepened and widened the river upstream. The river may have had a larger riparian area, likely with a small floodplain.

3.2. CURRENT CONDITIONS

Presently, Columbia River flows and depth are moderated by McNary Dam, as well as the other FCRPS projects. A pump station is located immediately downstream of the proposed action area with associated intakes and pumps. The shoreline is not heavily developed, but US Highway 730 passes just to the south of the river at the location of the proposed action.

3.3. MATRIX OF PATHWAYS AND INDICATORS

NMFS uses the "Matrix of Pathways and Indicators" (MPI) to summarize important environmental parameters and levels of condition for each. USFWS adopted a similar strategy in 1997 based on NMFS' matrix. The NMFS matrix is divided into six overall pathways (major rows in the matrix):

- Water Quality
- Channel Condition and Dynamics
- Habitat Access
- Flow/Hydrology
- Habitat Elements
- Watershed Conditions

Each represents a significant pathway by which actions can have potential effects on anadromous salmonids and their habitats, and could be used for analyzing bull trout habitat as well.

There has not been an on-site evaluation of current habitat indicators using the MPI within the action area for this project; however, after review of the description of the proposed action, and using the matrix to determine if the potential impacts of the proposed action, the Corps has determined that the proposed action will not restore or degrade the function of habitat indicators of the environmental baseline, but will maintain existing baseline conditions within the action area (Table 6). For the purposes of the MPI checklist, "maintain" means that the function of an indicator does not change (i.e., it applies to all indicators regardless of functional level). Each indicator will be discussed in the following section.

3.4. BASELINE CONDITION JUSTIFICATION

3.4.1 Water Quality

The *Temperature* parameter is “not properly functioning”. The Middle Columbia River within Lake Wallula is 303(d) listed for year round temperature exceedance (ODEQ 2017). This project would have no effect on river temperatures.

The *Sediment* parameter is “at risk”. Sediment deposition could occur within the action area as Lake Wallula is not subject to scouring flows from the mainstem Columbia River.

The *Chemical Contaminants/Nutrients* parameter is “not properly functioning”. The Middle Columbia River within Lake Wallula is 303(d) listed for year round temperature exceedance (ODEQ 2017). This project would have no effect on contaminant or nutrient levels.

3.4.2 Habitat Access

The *Physical Barriers* parameter is “at risk” within the Middle Columbia River. The Columbia River dams provide fish passage, but some migrants are delayed or are killed. This project would have no effect on physical barriers for either upriver migrating adults, downriver migrating juveniles.

3.4.3 Habitat Elements

The *Substrate* parameter is “not properly functioning”. Substrates within the project area consist almost entirely of sand. Upstream dams alter the movement of sediment through the action area, resulting in few accumulations of suitable spawning gravels.

The *Large Woody Debris* parameter is “not properly functioning”. The Snake and Columbia River dams prevent the transport and deposition of large woody debris. This project would have no effect of deposition of large woody debris in the Middle Columbia River.

Table 5. Checklist for Documenting Environmental Baseline and Effects of Proposed Action on Relevant Anadromous Salmonid Habitat Indicators.

Pathways	**Environmental Baseline**			**Effects of the Action**		
Indicators	Properly Functioning	At Risk	Not Properly Functioning	Restore	Maintain	Degrade
Water Quality						
Temperature			X		X	
Sediment		X			X	
Chemical Contamination or Nutrient Enrichment			X		X	
Habitat Access						
Physical Barriers		X			X	
Habitat Elements						
Substrate			X		X	
Large Woody Debris			X		X	
Pool Frequency\			X		X	
Pool Quality			X		X	
Off-Channel Habitat			X		X	
Refugia			X		X	
Channel Condition and Dynamics						
Width:Depth Ratio			X		X	
Streambank Condition		X			X	
Floodplain Connectivity			X		X	
Flow and Hydrology						
Peak/Base Flows			X		X	
Drainage Network Increase		X			X	
Watershed Conditions						
Road Density and Location		X			X	
Disturbance History			X		X	
Riparian Reserves			X		X	

The *Pool Frequency* parameter is “at risk”. While the Columbia River dams are run-of-river dams that generally pass the incoming river volume, the forebay pools act much like one large pool instead of multiple smaller pools with riffles or runs in between. This alters the characteristics of the river. This project would have no effect on pool frequency in the Columbia River.

The *Pool Quality* parameter is “at risk”. Pool characteristics have been greatly altered by the Columbia River dams. This project would have no effect on the pool quality of the river.

The *Off-Channel Habitat* parameter is “not properly functioning”. Little to no off channel habitats exist along the Columbia River. This project would have no effect on available off-channel habitat in the river.

The *Refugia* parameter is “at risk”. Refugia sources such as large woody debris are limited in the Columbia River. This project would have no effect on the available refugia in the river.

3.4.4 Channel Condition and Dynamics

The *Width to Depth Ratio* parameter is “not properly functioning”. The reservoir is much deeper and wider than the pre-impoundment Middle Columbia River. This project would have no effect on the river’s width to depth ratio.

The *Streambank Condition* parameter is “at risk”. There are areas of erosion sporadically along the shoreline. Generally, only a thin band of riparian vegetation exists along the river as the natural riparian and flood plain was inundated by the Columbia River dams. This project would have no effect on streambank condition.

The *Floodplain Connectivity* parameter is “not properly functioning”. The reservoir level is controlled by McNary Dam. In addition levees were constructed to confine the river, not allowing the river access to the floodplain. This project would have no effect on the river’s floodplain connectivity.

3.4.5 Flow and Hydrology

The *Peak/Base Flows* parameter is “not properly functioning”. The river is controlled somewhat by Snake and Columbia River Dams. The hydrograph has been modified from its historic condition. This project would have no effect on river flows.

The *Drainage Network Increase* parameter is “at risk”. Urban development with its impervious surfaces has increased local runoff in many areas along the Columbia River and the action area it located within a developed urban area. This project would not increase impervious surfaces, and would have no effect on the watershed’s drainage network.

3.4.6 Watershed Conditions

The *Road Density and Location* parameter is “at risk”. The road network within the Columbia River Basin has expanded greatly over the past century. This project does not require building any new roads. This project would have no effect on the road density of the watershed.

The *Disturbance History* parameter is “not properly functioning”. Columbia River basin has been significantly altered as a result of hydroelectric and agricultural development; greater than 15% equivalent clear-cut area within the Middle Columbia River watershed. The project would have no effect on the overall disturbance level of the basin.

The *Riparian Reserves* parameter is “not properly functioning”. In general there is only a thin band of riparian vegetation along the Columbia River. In many places no riparian trees are present, often replaced by levees and riprap. This project would have no effect on the riparian reserves of the river corridor.

4. Effects of the Action on Listed Species

This section includes an analysis of general project-related effects of the proposed action, as well as specific effects on the species and critical habitat PBFs. Again, as stated in Section 1.5 above, the Corps is not addressing potential effects associated with water withdrawals, or the larger private irrigation project (LPIP), as neither is a direct or indirect effect, or an interrelated/interdependent activity, of the proposed federal actions.

Because of the low number of anadromous salmonids and bull trout present in the Middle Columbia River near the action area during the work window the risk of harming a listed species during construction is low. If a fish were present near the work area, they would likely leave the area as work commenced.

4.1. DIRECT EFFECTS

Direct effects include all immediate impacts (adverse and beneficial) resulting from project related actions. Potential direct effects to ESA-listed species associated with the proposed project may include *entrainment* during excavation activities, temporary degraded *water quality* and minor *alteration of substrates* associated with excavation and piling installation, and potential *hydroacoustic impacts* associated with vibratory hammer use. A further detailed analysis of these potential effects is provided in the sections below.

4.1.1 Entrainment

Entrainment may occur if fish are trapped in the bucket of the excavator during excavation of in-water substrates at the action area and the proposed mitigation site. The potential for entrainment is largely dependent on the likelihood of fish occurring within the excavation area, the scope and scale of the excavation activity, and the life stage of the fish. Given the proposed timing of in-water work (December 1 – February 28), location of proposed excavation activities (i.e., near the shoreline), use of an open bucket excavator, and relatively slow speed of excavation; it is reasonably certain that the risk of injury or lethal take of juvenile ESA-listed fish species from proposed excavation activities will be minimal, although not discountable. Adult salmonids (if present) will likely avoid the excavation area.

4.1.2 Water Quality

<u>Sediment/Turbidity</u>
Short-term, localized project-related increases in background turbidity levels will likely occur as a result of proposed excavation and piling installation activities below the OHWM and during the removal of asphalt debris from the proposed mitigation site. In the short term, increases in turbidity can reduce forage quantity for salmonids, and disrupt behavioral patterns such as feeding and sheltering. Exposure duration is a critical determinant of physical or behavioral turbidity effects. Salmonids have evolved in

systems that periodically experience short-term pulses (days to weeks) of high suspended sediment loads, often associated with flood events, and are adapted to such seasonal high pulse exposures (NMFS 2011).

Given the existing substrate conditions (primarily sand), proposed side-casting of excavated substrates, timing of in-water work (December 1 – February 28), proposed excavation techniques, and use of a vibratory hammer for piling installation; it is anticipated the any project related increases in background turbidity will be very limited and highly localized. As such, short-term increases in background turbidity resulting from temporary work below the OHWM are not expected to result in long-term adverse effects to ESA-listed fish species, or significant net change in function of the in-stream habitat.

Chemical Contamination

Equipment operating near and over the river channel within the action area and proposed mitigation site represent potential sources of chemical contamination. Accidental spills of construction materials or petroleum products would adversely affect water quality and potentially impact ESA-listed species. Development and implementation of a Pollution Control Plan (PCP) that will 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, as discussed above, it is anticipated that the Portland Sediment Evaluation Team will grant a No-Test Exclusion for sediments based on the small volume of material to be excavated, the coarseness of the material (sand), and the distance of the project site from potential or known sources of contamination.

4.1.3 Alteration of Substrates

The proposed project will result in the alteration of in-water substrates associated with excavation and installation of the new pump cans and pilings. Proposed project activities at the pumping station will require approximately 1,028 cubic yards of permanent fill, and 398 cubic yards of permanent removal below the OHWM of the Columbia River, resulting in a net fill of 630 cubic yards (covering an area of 0.066 acre). Sediment (i.e., sand) removed during excavation activities will be side cast back into the river immediately adjacent to the excavation area. As discussed above, to offset the displacement of shallow water habitat along the shoreline, proposed mitigation activities will include the removal of approximately 0.069 acre of existing in-water concrete and asphalt debris from below the OHWM of Middle Columbia River. The resulting exposed substrates (sand and cobble) under the removed debris will be left in place.

In general, the environmental baseline with the project action area has been degraded by development and human activity, and provides very little habitat complexity for juvenile and adult salmonids. As such, given the existing baseline conditions and substrates (primarily course sand), proposed timing of in-water work (outside the peak migration stages), relative size of the action area, proposed excavation techniques, and use of a vibratory hammer for piling installation; it is reasonably certain that the proposed alteration of existing substrates will not result in long-term adverse effects to ESA-listed fish species or their designated Critical Habitat. Forage quantity for juvenile fish may be temporarily reduced within the immediate in-water work area as benthic organisms become disturbed by piling installation and excavation; however, recolonization of benthic organisms will likely occur within a month following project completion (NMFS 2009).

4.1.4 Hydroacoustics

Sound generated by pile driving can affect fish in several ways including behavioral modifications, physical injuries, and ultimately, mortality. These effects are dependent on the intensity of the sound, the distance to the fish, and the physical characteristics and mass of the individual fish (Hastings and Popper 2005).

Most fish, including salmonids, create and maintain buoyancy by inflating and deflating their swim bladders. When these swim bladders are exposed to high intensity sound pressure, fish are subject to potentially damaging or lethal injury. As a sound wave passes through a fish, gas in the swim bladder expands more than the surrounding tissue during periods of underpressure and contracts more than surrounding tissue during overpressure (Caltrans 2015). This can lead to rupture of the swim bladder and other internal organs, hearing loss, or death if a fish is within a critical range of the sound source (Hastings and Popper 2005).

As discussed above, the use of a vibratory hammer is proposed for the installation of all pilings. Compared to impact hammers, vibratory hammers produce sounds of lower intensity, with a rapid repetition rate and longer duration, and with more energy in the lower frequencies (15-26 Hertz) (Carlson et al. 2001, and Nedwell et al. 2003, as cited in NMFS 2008). NMFS's current pile driving thresholds for "physical injury" to fish include a peak pressure of 206 dB and an accumulated SEL of 187 dB for fish greater than 2 grams, and 183 dB for fish less than 2 grams. In addition, a 150 dB RMS "harassment" threshold is applied for potential behavioral effects. Peak sound levels associated with vibratory hammer use can exceed 150 decibels, however, the rise time is relatively slow and fish do not appear to habituate to these sounds (i.e., the sound elicits an avoidance response), even after repeated exposure (Dolat 1997, and Knudsen et al. 1997, as cited in NMFS 2008).

Average unattenuated sound pressures for vibratory driver installation of 12-inch steel pipe and H-type piles can be as much as 171 dB_{PEAK}, 155 RMS, and 150 SEL (Caltrans 2015). Using the NMFS Pile Driving Impacts Calculator, this results in no instantaneous impacts and Cumulative impacts to adult fish (2 grams or greater) within a 18 meter radius and juvenile fish (less than 2 grams) within a 22 meter radius of the pile being driven, assuming a full work day of continuous pile driving (Appendix A).

If fish were to be present in the action area during pile driving they would be subject to potential injury were they to remain within 22 meters of a pile being driven for sufficient time for cumulative effects to result. However, several authors have suggested that fish attempt to evade areas of high sound pressure (Engås et al, 1996, Engås and

Løkkeborg 2002, Slotte et al. 2004, all summarized in Hastings and Popper 2005) and fish that were present would not be expected to remain in the work area. Listed fish present in the action area may have adverse behavioral responses to the sounds of pile driving, including avoidance, but it would be unlikely that this responses would be sufficient to alter the fitness of any individual fish. As such, given the low frequencies and short-term and intermittent nature of the vibratory hammer use (likely up to 2 to 4 hours per day, over the course of an 8 to 10 hour day) and proposed conservation measures (i.e., timing of in-water work and daily "soft-start" procedures); it is reasonably certain that impacts to ESA-listed fish species resulting from vibratory hammer use during piling installation will not result in injury or adverse behavioral effects.

4.2. INDIRECT EFFECTS

Indirect effects of a proposed action are those impacts that are reasonably certain to occur later in time (after construction of the project is complete). Proposed expansion of the St. Hilaire Brothers pumping station and construction of the new EID pumping station may indirectly effect ESA-listed fish species by increasing the area of existing in-water and overwater structures; therefore potentially impacting *fish passage*, and potentially providing additional refuge for salmonid *predators*. Further analysis of these potential indirect effects is provided in the sections below.

4.2.1 Fish Passage

The proposed new EID pumping station will extend approximately 350 feet out from the shoreline of the Columbia River, and will include installation of an 84-inch diameter by 170-foot long section of intake pipe that will be affixed with four new intake screens (each measuring 5 feet in diameter by approximately 19 feet in length). The new intake pipe will be located along the bottom of the river channel and the new intake screens will be affixed with NMFS-approved slotted fish screen (0.069 inch openings) to insure juvenile salmonids are not impinged or entrained in the intake during pumping operations. The intake screens will also be equipped with an air-burst system to facilitate the cleaning of the screens and maintain the appropriate approach velocity in compliance with NMFS criteria. In addition, given that migrating juvenile salmonids prefer shoreline habitats less than 20 feet deep, the proposed distance of the intake screens from the shoreline (approximately 350 feet) should make it less likely to affect migrating juvenile salmonids by eliminating possible shoreline attraction flows.

Based on the proposed depth (greater than 20 feet) and design (in compliance with NMFS criteria) of the intake, and existing width of the Columbia River at the project site (approximately 1 mile wide); it is anticipated that while the effects of the proposed project on juvenile fish passage will be minimal, they may be likely to adversely affect anadromous salmonids. Juvenile bull trout would not be expected to occur within the proposed action area, therefore there would be no potential for impingement of bull trout.

4.2.2 Predation

Given the lack of complex habitat structure within the action area, introduction of the new in-water and over-water structures may provide overhead cover and velocity refuge that can attract salmonid predators such as northern pikeminnow (*Ptychocheilus oregonensis*), smallmouth bass (*Micropterus dolomieui*), largemouth bass (*M. salmoides*), and piscivorous birds. Proposed mitigation measures to offset the increased overwater cover will include grating approximately 0.037 acre (64 percent) of the new overwater station decks to allow for 60 percent light penetration, and installing waterproof lighting equipped with a daylight sensor under portions of the new concrete deck (0.046 acre) at the proposed EID station to detract salmonid predators.

As discussed above, the environmental baseline with the project action area has been degraded by development and human activity, and provides very little foraging and shoaling habitat for juvenile salmonids. Therefore, given the existing baseline conditions within the action area and the proposed mitigation measures, it is anticipated that while potential effects of the new in-water/ over-water structures on salmonid predation will be minimal, they may be likely to adversely affect anadromous salmonids. Juvenile bull trout would not be expected to occur within the proposed action area, therefore there would be no potential for increased predation on bull trout.

4.3. EFFECTS ON CRITICAL HABITAT

4.3.1 Anadromous Salmonids

Only freshwater rearing and migration Water Quality is expected to be affected by the proposed action (Table 6); therefore, no other PBF will be discussed further.

Water Quality: The proposed project would result in short-term, localized increases in background turbidity as a result of excavation and the driving of piles. Given the existing substrate conditions (primarily sand), proposed side-casting of excavated substrates, timing of in-water work (December 1 – February 28), proposed excavation techniques, and use of a vibratory hammer for piling installation; it is anticipated the any project related increases in background turbidity will be very limited and highly localized. ***Therefore, this project is not likely to adversely affect anadromous salmonid water quality***.

Table 6. Effects determinations for the proposed action to the PBFs of critical habitats designated for ESA listed anadromous salmonids.

Site	Essential Physical and Biological Features	Effect Determination
Freshwater spawning	Substrate	No effect
	Water quality	No effect
	Water quantity	No effect
Freshwater rearing	Floodplain connectivity	No effect
	Forage	No effect
	Natural cover	No effect
	Water quality	Not likely to adversely affect
	Water quantity	No effect
Freshwater migration	Free of artificial obstructions	No effect
	Natural cover	No effect
	Water quality	Not likely to adversely affect
	Water quantity	No effect
Estuarine areas	Forage	No effect
	Free of obstruction	No effect
	Natural cover	No effect
	Salinity	No effect
	Water quality	No effect
	Water quantity	No effect
		No effect
		No effect
Nearshore marine areas	Forage	No effect
	Free of obstruction	No effect
	Natural cover	No effect
	Water quantity	No effect
	Water quality	No effect
Offshore marine areas	Forage	No effect

4.3.2 Bull Trout

Only Water Quality, Migration Habitat, and Substrate Characteristics are expected to be affected by the proposed action (Table 7); therefore, no other PBF will be discussed further.

Water Quality: The proposed project would result in short-term, localized increases in background turbidity as a result of excavation and the driving of piles. Given the existing substrate conditions (primarily sand), proposed side-casting of excavated substrates, timing of in-water work (December 1 – February 28), proposed excavation techniques, and use of a vibratory hammer for piling installation; it is anticipated the any project related increases in background turbidity will be very limited and highly localized. ***Therefore, this project is not likely to adversely affect bull trout water quality***.

Migration Habitat: The proposed project would drive pipe, H-type, and sheets piles into the substrate of the Middle Columbia River. Noise from the driving of piles would create a temporary disturbance causing fish to avoid the work area. This disturbance would be temporary in nature, limited to the duration of the work window and the daily timing of construction activities and would be unlikely to pose an impediment to bull trout migration. ***Therefore, this project is not likely to adversely affect bull trout migration habitat.***

Substrate Characteristics: There will be short term disturbance of the substrate from the excavations and installation of new pump cans and piling, but this will be temporary in nature and would not be expected to permanently alter the character of the substrate in the Middle Columbia River. In general, the environmental baseline with the project action area has been degraded by development and human activity, and provides very little habitat complexity for juvenile and adult bull trout. As such, given the existing baseline conditions and substrates (primarily course sand), proposed timing of in-water work (outside the peak migration stages), relative size of the action area, proposed excavation techniques, and use of a vibratory hammer for piling installation; it is reasonably certain that the proposed alteration of existing substrates will not result in long-term adverse effects. ***Therefore, this project is not likely to adversely affect bull trout substrate characteristics.***

Table 7. Effects determinations for the proposed action to the PBFs of critical habitats designated for bull trout.

PBFs		
1	Water Quality	Not likely to adversely affect
2	Migration Habitat	Not likely to adversely affect
3	Food Availability	No Effect
4	Instream Habitat	No Effect
5	Water Temperature	No Effect
6	Substrate Characteristics	Not likely to adversely affect
7	Stream Flow	No Effect
8	Water Quantity	No Effect
9	Nonnative Species	No Effect

4.4. CUMULATIVE EFFECTS

The proposed action is located near the Tri-Cities community and the community of Umatilla, OR. Major effects to listed resources near the action area are primarily the result of urban development, the construction of the FCRPS, agriculture, and associated water diversion and water control activities. Additional effects to the Middle Columbia River would result from an increase in recreational and commercial use of the area. Recreation in the area includes fishing, hunting, boating, bird watching, and swimming, while commercial activities are dominated by year round barge traffic.

Water withdrawn from existing diversion/intake points are part of the environmental baseline, but their continued use in the future will have cumulative effects. There has not been a formal adjudication process for the Columbia River Basin, so a precise measurement of water withdrawn, whether by legal certificate or illegally, is not possible. It is unclear exactly how much water is withdrawn from, or discharged to, the Columbia River in the action area.

Minimum Columbia River flows within McNary pool have been developed to protect fish and other water-dependent resources. Table 8 shows the minimum flows for various periods through the year. The river has minimum instream flows that have been established under WAC 173-563-040(1). These instream flows place constraints on water rights and permits that have been issued with restrictions that limit use of the water. The lowest minimum instream flow is 50,000 cfs. Actual average minimum daily flow 80,440 cfs is higher than the required minimum flow.

Table 8. Minimum instantaneous flows for instream uses within the McNary pool. WAC 173-563-040(1).

Date	In-River CFS
April 1-15	50,000
April 16-25	70,000
April 26-30	70,000
May 1-31	70,000
June 1-15	70,000
June 16-30	50,000
July 1-15	50,000
July 16-31	50,000
August	50,000
September	50,000

There are hundreds of water withdrawal locations within Lake Wallula from both wells and from surface waters. A total accounting of all the withdrawals has not been completed for this analysis. The Washington Department of Ecology summarizes a total of about 5,708 cfs of diversionary flows with certificates, permits, claims or new applications which could be used as the upper limit of water withdrawn from the McNary pool. If this amount were being withdrawn, it would be 11.4% of the required total minimum instream flow (50,000 cfs). It is 7.1% of the minimum average daily flow (80,440 cfs). The EID's new intake would withdraw up to 94.11 cfs of new water which is 0.188% of the total required minimum instantaneous instream flow and 0.117% of the minimum average daily flow.

As discussed above, the purpose of the proposed project (i.e., expansion of the St. Hilaire Brothers existing pumping station, and construction of the new EID pumping station and intake) is to consolidate the transfer of existing and new, mitigated irrigation water rights to a centralized point of diversion. All proposed new water withdrawal for both stations (38.6 cfs for St. Hilaire Brothers and 200 cfs for EID) will be procured through the transfer of existing irrigation water rights totaling 200.00 cfs, and the issuance of 94.11 cfs of new mitigated water rights. The 55.51 cfs of additional available water rights (i.e., beyond the 238.6 cfs withdrawal capacity) will allow the station owners flexibility in transferring water rights based on seasonal use.

200 cfs of the proposed new water withdrawal will be transferred from the existing pumping stations located at the project site, and one pumping station located approximately 0.4 miles upstream. The proposed 94.11 cfs of new water rights will be mitigated "bucket-for-bucket" at or above the point of impact, as required through the OWRD water-use permit application process (OAR 690-033-0120) (see Section 3.3 above). Given that the additional water withdrawals will be transferred from existing pumping stations, and that the new water rights will be fully mitigated; it is anticipated that the proposed additional water withdrawals will have no adverse effects on ESA-listed fish species or their habitat.

Other actions that may contribute to cumulative effects would include additional residential development along the Columbia River, although the terrain, land ownership, and zoning may limit the extent of development. Increased impervious surfaces could add to runoff that may contribute additional oils, pesticides, fertilizers, and hazardous wastes to fish bearing waters. Snake and Columbia River reservoirs will continue to fluctuate based on available water and annual or emergency repairs and maintenance at the mainstem dams, and modifications to or construction of additional fish passage structures may occur at all Snake and Columbia River dams adding to habitat disturbance. These activities are reasonably certain to continue, and when considered with the proposed action will not result in measurable effects on ESA-listed species.

4.5. EFFECTS DETERMINATIONS

4.5.1 Listed Species

The Corps determined that the proposed action may affect, but is not likely to adversely affect bull trout. The project may affect, and is likely to adversely affect Upper Columbia River spring Chinook salmon, Snake River spring/summer Chinook salmon, Snake River fall Chinook salmon, Snake River sockeye salmon, Upper Columbia River steelhead, Middle Columbia River steelhead, and Snake River steelhead. Effects determinations for listed species are summarized in Table 9.

4.5.2 Critical Habitat

Because of the limits on the intensity, extent, and duration of the adverse effects on the environment, the PBFs of the critical habitat of ESA listed species in the action area are likely to remain functional, or retain their current ability to become functionally established, to serve the intended conservation role for the species. Therefore, the Corps has determined that the proposed action is not likely to adversely affect critical habitat.

Table 9. Effect determinations for listed species and critical habitat that may occur in the project area.

Species	Species Determination	Critical Habitat Determination
Upper Columbia River spring Chinook salmon	May Affect, Likely to Adversely Affect	Not Likely to Adversely Affect
Snake River spring/summer Chinook salmon	May Affect, Likely to Adversely Affect	Not Likely to Adversely Affect
Snake River fall Chinook salmon	May Affect, Likely to Adversely Affect	Not Likely to Adversely Affect
Snake River sockeye salmon	May Affect, Likely to Adversely Affect	Not Likely to Adversely Affect
Upper Columbia River steelhead	May Affect, Likely to Adversely Affect	Not Likely to Adversely Affect
Middle Columbia River steelhead	May Affect, Likely to Adversely Affect	Not Likely to Adversely Affect
Snake River Steelhead	May Affect, Likely to Adversely Affect	Not Likely to Adversely Affect
Bull Trout	May Affect, Not Likely to Adversely Affect	Not Likely to Adversely Affect

5. Magnuson-Stevens Act - Essential Fish Habitat

The consultation requirement of section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) directs Federal agencies to consult with NMFS on all actions, or proposed actions that may adversely affect Essential Fish Habitat (EFH). 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 to 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 may be taken by the action agency to conserve EFH.

Section 4 of this BA provides an analysis of effects to the habitat elements that make up EFH for anadromous salmonids. The conservation measures described in this BA (Section 1.6) are considered adequate to prevent/avoid potential adverse effects on EFH for Pacific salmon. As such, the Corps believes that the proposed action will not adversely affect EFH for Pacific salmon. ***Therefore, the Corps has determined there will be no adverse effects to EFH as a result of this project****.*

6. Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (FWCA) authorizes the USFWS to evaluate the impacts to fish and wildlife species from proposed Federal water resource development projects that could result in the control or modification of a stream or body of water that might have effects on the fish and wildlife resources that depend on that body of water or its associated habitats. ***The proposed action does not modify a body of water and therefore does not involve activities subject to the FWCA.***

7. Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (16 U.S.C. §§ 703-712, as amended) prohibits the taking of and commerce in migratory birds (live or dead), any parts of migratory birds, their feathers, or nests. Take is defined in the MBTA to include by any means or in any manner, any attempt at hunting, pursuing, wounding, killing, possessing or transporting any migratory bird, nest, egg, or part thereof. ***The proposed action would not result in take of migratory birds.***

8. Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (BGEPA) prohibits the taking or possession of and commerce in bald and golden eagles, with limited exceptions, primarily for Native

American Tribes. Take under the BGEPA includes both direct taking of individuals and take due to disturbance. Disturbance is further defined on 50 CFR 22.3.

Bald eagles are known to nest throughout Corps managed lands in the Walla Walla District. While all nest sites have not been documented in the District, locations of some are known. None are known to occur in or near the proposed action area.

Throughout most of the western United States golden eagles are year-long residents (Polite and Pratt 1999), breeding from late January through August with peak activity in March through July (Polite and Pratt 1999). They may also move down-slope for winter or upslope after the breeding season (Polite and Pratt 1999; Technology Associates 2009). No golden eagles are known to occur or nest in the project area.

There are no known eagle nests near the project area. ***Therefore, this action would have no effect or take (to include disturbance) of either bald or golden eagles.***

9. Effects Summary

The Corps has determined that this action, as proposed, *may affect*, but is *not likely to adversely affect* bull trout or bull trout critical habitat, and will have *no effect* on all other listed, proposed, and candidate species or their designated or proposed critical habitats (Table 10).

Table 10. Effect determinations for the listed species within the area potentially affected by this action.

Common Name	Species Determination	Critical Habitat Determination
Bull Trout	May Affect, Not Likely to Adversely Affect	May Affect, Not Likely to Adversely Affect
Gray Wolf	No Effect	No Effect
Upper Columbia River spring Chinook salmon	May Affect, Likely to Adversely Affect	May Affect, Not Likely to Adversely Affect
Snake River spring/summer Chinook salmon	May Affect, Likely to Adversely Affect	May Affect, Not Likely to Adversely Affect
Snake River fall Chinook salmon	May Affect, Likely to Adversely Affect	May Affect, Not Likely to Adversely Affect
Snake River sockeye salmon	May Affect, Likely to Adversely Affect	May Affect, Not Likely to Adversely Affect
Upper Columbia River steelhead	May Affect, Likely to Adversely Affect	May Affect, Not Likely to Adversely Affect
Middle Columbia River steelhead	May Affect, Likely to Adversely Affect	May Affect, Not Likely to Adversely Affect
Snake River Steelhead	May Affect, Likely to Adversely Affect	May Affect, Not Likely to Adversely Affect
MSA		
No Adverse Effects		
FWCA		
Not Applicable		
MBTA		
No Take		
BGEPA		
No Disturbance or Take		

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Appendix A. Pile Driving Impacts Calculator Table

St Hilaire Brothers and EID Pumping Station and Intake Project				
Pile information (size, type, number, pile strikes, etc.)	18 12.75" steel pipe piles, 84 12" H piles, 54 sheet piles			
Fill in green cells: estimated sound levels and distances at which they were measured, estimated number of pile strikes per day, and transmision loss constant.				
	Acoustic Metric			
	Peak	SEL	RMS	Effective Quiet
Measured single strike level (dB)	**171**	**155**	**150**	**150**
Distance (m)	**10**	**10**	**10**	
Estimated number of strikes	**3750**	<-- Preloaded default to left to simulate continuous nature of vibratory driving		
Cumulative SEL at measured distance				
190.74				
	Distance (m) to threshold			
	Onset of Physical Injury			Behavior
	Peak	Cumulative SEL dB**		RMS
	dB	Fish ≥ 2 g	Fish < 2 g	dB
Transmission loss constant (15 if unknown)	206	187	183	150
15	**0**	**18**	**22**	**10**
** This calculation assumes that single strike SELs < 150 dB do not accumulate to cause injury (Effective Quiet)				
Notes (source for estimates, etc.)				
Estimates from Caltrans 2015.				