# Federal Support for the Phase 2 Implementation Plan Testing Feasibility of Salmon Reintroduction in the Upper Columbia River Basin

# Biological Assessment

**Co-lead Agencies:**
**Bureau of Reclamation – Columbia-Pacific Northwest Region (CPN-EA-2024-02)**
**U.S. Army Corps of Engineers – Northwestern Division (PEAX-202-00-G7P-1728386878)**
**Bonneville Power Administration (DOE/EA-2250)**

**November 2024**

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# Acronyms and Abbreviations

| | Full Phrase |
|---|---|
| BiOp | Biological Opinion |
| Bonneville | Bonneville Power Administration |
| °C | Celsius |
| CFR | Code of Federal Regulations |
| CJD | Chief Joseph Dam |
| CJH | Chief Joseph Hatchery |
| CTCR | Confederated Tribes of the Colville Reservation |
| DPS | distinct population segment |
| eDNA | environmental DeoxyriboNucleicAcid |
| EPM | environmental protection measure |
| ESA | Endangered Species Act |
| ESU | evolutionarily significant unit |
| GHZ | gigahertz |
| HGMP | Hatchery and Genetic Management Plan |
| HOR | hatchery-origin-retained |
| ISAB | Independent Scientific Advisory Board |
| JSATS | juvenile salmon acoustic telemetry system transmitters |
| ITS | Incidental Take Statement |
| LCM | life cycle model |
| NEPA | National Environmental Policy Act |
| NMFS | National Marine Fisheries Service |
| NTIA | National Telecommunications and Information Administration |
| P2IP | Phase 2 Implementation Plan: Testing Feasibility of Reintroducing Salmon in the Upper Columbia River Basin |
| PEA | programmatic environmental assessment |
| PIT | passive integrated transponder |
| Reclamation | Bureau of Reclamation |
| RM&E | Research Monitoring and Evaluation |
| RNA | research needs area |
| TRMP | Tribal Resource Management Plan |
| WDFW | Washington Department of Fish and Wildlife |
| UCR | Upper Columbia River |

| | |
|---|---|
| UCUT | Upper Columbia United Tribes |
| U.S. | United States |
| USACE | United States Army Corps of Engineers |
| USC | United States Code |
| USFWS | U.S. Fish and Wildlife Service |

# Chapter 1. Introduction

## 1.1 Purpose and Need

The Phase 2 Implementation Plan *(P2IP): Testing Feasibility of Reintroducing Salmon in the Upper Columbia River Basin* is a proposal developed by the Confederated Tribes of the Colville Reservation (CTCR), Spokane Tribe of Indians, and Coeur d'Alene Tribe, through and with the assistance from the Upper Columbia United Tribes (UCUT) and are collectively referred to as the "Project Proponents." The Bureau of Reclamation (Reclamation), Bonneville Power Administration (Bonneville), and United States Army Corps of Engineers (USACE), collectively the "Co-lead Agencies," have committed to certain federal actions to support the Project Proponents' P2IP and have to comply with applicable laws, regulations, and authorities for those federal actions.

Reclamation is a U.S. Department of the Interior agency that oversees water resource management and power generation related to the operation of diversion, delivery, and storage projects throughout the western United States (U.S.). Its actions are governed by the 1939 Reclamation Project Act (43 U.S. Code [USC] § 485 *et seq.*); individual project-authorizing statutes, particularly those for Grand Coulee Dam; and other statutes. Bonneville is a power marketing administration within the U.S. Department of Energy. Bonneville's actions are governed by several statutes, including the Pacific Northwest Electric Power Planning and Conservation Act of 1980 (16 USC § 839 *et seq.*), the Bonneville Project Act (16 USC § 832 *et seq.*), and the Federal Columbia River Transmission System Act (16 USC § 838 *et seq.*).

The USACE is designated as a Direct Reporting Unit by the Secretary of the Army with three primary mission areas: engineer regiment, military construction, and civil works. In the Columbia River Basin, the USACE is responsible for system-wide flood risk management and for operating individual projects for power production, fish and wildlife conservation, navigation, water supply, and recreation, consistent with the 1944 Flood Control Act (33 USC § 701 *et seq.*) and individual project-authorizing statutes, including the River and Harbor Acts of 1946 and 1948, Section 404 of the Clean Water Act, and Section 10 of the Rivers and Harbors Act of 1899.

The P2IP entails testing the feasibility of restoring salmon in the Upper Columbia River Basin upstream of Chief Joseph and Grand Coulee dams. In late 2023, the Project Proponents and the federal government signed the *Memorandum of Understanding and Mediated Settlement Agreement* to pursue a proactive, collaborative, and science-based approach to implementing the P2IP. This agreement outlines funding and implementation commitments through 2043, including the following:

- Bonneville would provide certain funding for implementation of the P2IP projects for reintroducing specific non-federally protected salmonid stocks[1] above Chief Joseph and Grand Coulee dams in the Upper Columbia River Basin, consistent with Bonneville's Administrator's settlement authority under 16 USC § 832a(f). The Bonneville funding shall not cover costs associated with activities at privately owned dams on the Spokane River. As individual projects are scheduled to be implemented, the action agencies would check in with the Services

[1] References to salmon in descriptions of P2IP activities that are funded under the September 20, 2023, memorandum of understanding and mediated settlement agreement are limited to salmon that are neither federally listed under the Endangered Species Act (ESA) as threatened or endangered nor a proposed species for listing under the ESA, whether or not specifically stated.

(USFWS/NMFS) to see whether those actions are consistent with the programmatic framework. Consistent with the memorandum of understanding, Reclamation, the USACE, the U.S. Fish and Wildlife Service (USFWS), and the National Marine Fisheries Service (NMFS) would work with the Project Proponents and Bonneville to identify additional funding needs for implementation of the P2IP activities and seek additional funding, as necessary and appropriate, to ensure full funding of P2IP activities during the 20-year implementation period. However, the project would not use National Oceanic and Atmospheric Administration funding for activities that may cause take of any ESA-listed individuals that are not covered under an existing biological opinion.

- The Project Proponents would utilize existing federal hatchery facilities for activities related to P2IP implementation.
- The USFWS will provide surplus fertilized eggs and juvenile salmon of non-listed stock from federal hatchery facilities to support the study and testing of reintroduction.

The agreement also establishes a mutual understanding that the Parties do not intend for P2IP implementation to require any material changes in the operation, maintenance or configuration of any Columbia River System dams or reservoirs and would be subject to the completion of requisite statutory or environmental compliance.

In meeting the need for action, the federal government seeks to achieve the following purposes:

- Support efforts to study and test the feasibility of reintroducing specific non-federally protected summer/fall Chinook and sockeye salmon stocks above Chief Joseph and Grand Coulee dams in the Upper Columbia River Basin consistent with the P2IP agreement.
- Continue to provide adequate, efficient, economical, and reliable power supply.
- Continue to deliver reliable water supplies, manage flood risk, and provide reliable navigation and recreational opportunities.
- Minimize environmental impacts.

## 1.2 Background and Location

Before non-Indigenous settlement, millions of salmon returned to the Columbia River Basin, sustaining Tribal communities for thousands of years and serving a vital role in a healthy ecosystem. The construction of Chief Joseph and Grand Coulee dams on the Upper Columbia River, and Little Falls, Nine Mile, and Long Lake dams on the Spokane River halted anadromous[2] fish passage, creating a "blocked area" upriver from Chief Joseph Dam. The dams severely restricted or eliminated Tribal access to salmon and, thus, traditional and cultural practices related to salmon; currently, these dams continue to do so. In 2013, a coalition of Columbia Basin Tribes and Canadian Indigenous Nations jointly developed a phased approach to guide salmon reintroduction efforts and develop fish passage facilities in the Upper Columbia River Basin. A similar phased approach was formally adopted by the Northwest Power and Conservation Council and included as a priority in the 2014 amendments and 2020 addendum to the Columbia River Basin Fish and Wildlife Program (NPCC 2014, 2020).

In May 2019, the Project Proponents completed the Fish Passage and Reintroduction Phase 1 Report: Investigations *U*pstream of Chief Joseph and Grand Coulee dams (UCUT 2019). The report confirmed the achievability of Tribal goals to restore Chinook and sockeye salmon into the Upper

[2] Anadromous fish are those that migrate inland from the ocean to spawn in fresh water.

Columbia River Basin, above Chief Joseph and Grand Coulee dams, to meet Native peoples' cultural and spiritual values and increase ceremonial, subsistence, sport, and commercial fish harvest opportunities for all communities along the Columbia River in the U.S. and Canada, where possible. The Project Proponents considered these goals in relation to the current dam operations, existing riverine and reservoir habitat conditions, donor stock availability, risks to resident fish species, and effectiveness of available fish passage technologies. Results of modeled management scenarios from Phase 1 found that the reintroduction of salmon to the blocked area could result in the production of approximately 76,000 adult sockeye salmon and 44,000 adult summer-run/fall-run Chinook salmon, given the current habitat conditions, available stocks of fish, and construction of effective fish passage systems at existing dams (UCUT 2019).

The Northwest Power and Conservation Council's Independent Scientific Advisory Board (ISAB) reviewed the Phase 1 report following publication. The ISAB found it reasonable that the reintroduction of salmon to the blocked area could be successful; however, the ISAB noted considerable uncertainty around dam passage and reservoir survival, the resulting number of adult salmon that would return, and the type of management required to sustain salmon. The ISAB recommended developing a strategic implementation plan with an adaptive management process to address uncertainties (ISAB 2019).

The P2IP describes the research needed to resolve uncertainties identified in the Phase 1 report and noted by the ISAB and to develop and test strategies to guide the long-term reintroduction planning. The P2IP identifies a stepwise approach to monitoring and evaluation that provides for adjustments to the research approaches over the next 20 years. Step 1 focuses on collecting baseline information and developing support programs and facilities. Step 2 focuses on the incremental design, build, and testing of interim fish passage facilities at five individual dams in the Project Area (Chief Joseph Dam [operated by the USACE], Grand Coulee Dam [operated by Reclamation], and the three Spokane River dams operated by Avista Corporation) (UCUT 2022).

The P2IP would inform the development of a long-term plan for the reintroduction of salmon in the Upper Columbia River Basin that would ultimately serve the following goals:

- Restore Tribal traditional and cultural practices related to salmon in the region.
- Restore access to salmon for Tribal and non-Tribal communities in the blocked area.
- Return salmon to their historical habitats in the Upper Columbia River to increase the abundance and distribution of salmon in the Columbia River Basin.
- Restore ecosystem function in blocked area habitats because these areas relate to the cycling of marine-derived nutrients that anadromous salmon provide.

The Project Area of the P2IP project activities includes the Upper Columbia River Basin within the U.S., defined as the Columbia River upstream of Beebe Bridge (about 12 miles downstream of Wells Dam), the lower Okanogan River, and all major tributaries upstream of Chief Joseph Dam (see **Figure 1** below). Existing activities would not be expanded. Adult salmon would be collected downstream of Chief Joseph Dam would be tagged, transported, and released in the blocked area. The juvenile and adult salmon studies would also use currently permitted programs at existing facilities (such as hatcheries, fishways at dams, passive integrated transponders [PITs] tags, and juvenile salmon acoustic telemetry system transmitters [JSATS or acoustic tag receivers]) within the Columbia River Basin to the Pacific Ocean.

## 1.3 Consultation History

The Co-lead Agencies have worked closely with the Project Proponents on development of the programmatic environmental assessment (PEA) and biological assessment. The Co-lead Agencies would continue to coordinate with the Project Proponents through future environmental compliance processes. The consultation and coordination with agencies are described in Chapter 4 of the PEA.

The proposed action would employ a combination of new, existing, and expanded facilities and activities, some of which have an ESA consultation history. Existing facilities that would not change structurally or operationally as a result of the P2IP action are described here to provide context; however, they are not part of the action because they were already considered in prior ESA consultations. None of the following facilities are being reevaluated for effects on ESA-listed species because the facilities and associated operations have already undergone ESA consultation. The P2IP proposed action herein would not change how the following facilities operate or alter their configurations: Entiat National Fish Hatchery, Chelan Falls Hatchery, Rocky Reach Juvenile Fish Bypass, Priest Rapids Hatchery, Ringold Springs Hatchery, Wells Dam Hatchery, Tumwater Dam, and the Wenatchee River Hatchery. These facilities relate to the P2IP action because they would all be potential sources of fish for sponsors to release in the blocked area (**Appendix D**). Only surplus hatchery-origin adults would potentially be provided to the sponsors for release to the blocked areas.

In 2006, the CTCR, Bonneville, and the USACE submitted a Biological Assessment on the Construction & Operation of Chief Joseph Hatchery (CJH) with the Services (USFWS/NMFS). The USFWS issued a concurrence letter agreeing with the action agencies determinations Not Likely to Adversely Effect on bull trout. USFWS concurrence included several recommendations for developing a better understanding of bull trout use in the Columbia and Okanogan Rivers. The 2008 NMFS Biological Opinion (BiOp) included an Incidental Take Statement (ITS) for handling of Upper Columbia River spring Chinook salmon and Upper Columbia River steelhead (NMFS 2008). The 2008 NMFS BiOp and ITS was superseded in 2017.

In 2012, the CTCR submitted a revision to the 2008 CJH Hatchery and Genetic Management Plan (HGMP) that addressed changes to the existing spring Chinook integrated conservation program. The changes to the approved 2008 HGMP included in the revised 2012 HGMP related to the source population (specifically marked Methow Composite stock instead of Leavenworth stock) and release location (Okanogan mainstem instead of both the Okanogan mainstem and Omak Creek). The NMFS responded by designating a nonessential experimental population of Upper Columbia River spring-run Chinook salmon 10(j) population in the Okanogan River subbasin (NMFS 2013).

On October 27, 2014, NMFS issued a Section 10 permit (18928) authorizing the take of adult and juvenile Upper Columbia River spring Chinook salmon through brood stock collection activities, hatchery operations, juvenile fish releases, and monitoring and evaluation activities associated with the CJH Okanogan Spring Chinook Program. ESA coverage for Activities covered under Section 10 Permit 18928 were superseded by the 2017 Tribal Resource Management Plan (TRMP) BiOp.

In February 2014, the CTCR completed their TRMP that included their tribal fisheries and the CJH programs. The CTCR TRMP was submitted to NMFS who then issued a Tribal 4(d) Rule Determination for TRMP associated activities on February 27, 2017) (NMFS 2017c). Following the 4(d) determination NMFS issued their TRMP BiOp for the authorization and funding actions of NMFS and the BPA and the activities undertaken by the CTCR under its TRMP (NMFS 2017d).

Sponsors harvest salmon and steelhead in the Action Area, annually. Their catch of Upper Columbia River summer Chinook salmon is counted as part of the total allowed non-treaty Upper Columbia River summer harvest under the *U.S. v. Oregon* Management Agreement. The 2008–2017 *U.S. v. Oregon* Management Agreement provides the current framework for managing 12 fisheries and hatchery programs in much of the Columbia River Basin (NMFS 2018). Anadromous and resident fish harvest is not part of the P2IP action. **Table 1** provides a comparison between CJH actions covered by the 2017 TRMP BiOp actions and P2IP actions.

Table 1. Provides a comparison between CJH actions covered by the 2017 TRMP BiOp actions and P2IP actions.

| ***Ongoing Action*** | ***Location of Ongoing Activity*** | ***Purpose of Ongoing Action*** | ***Relationship to P2IP Action*** |
|---|---|---|---|
| **CJH Operations** | | | |
| Operate CJH trap 4/15-6/30 | CJH ladder | Collect 640 hatchery-origin-retained (HOR) spring chinook adults by means of trap, net, hook, or set line for: broodstock; HGMP (BiOp[1] §1.2.1.4) | None – these ongoing activities have no overlap with P2IP implementation. |
| Live-capture in 4/1-6/30 | Okanogan & Columbia River mainstem from Chief Joseph Dam (CJD) tailrace to mouth | | |
| Operate trap at CJH 7/1-11/15 | CJH ladder | Collect up to 550 HOR (segregated) and up to 656 NOR summer/ fall chinook adults for broodstock; (BiOp[1] §1.2.1.4) | Live trapping adult sockeye and summer/ fall Chinook for transport to blocked area. |
| Operate purse seine and Okanogan River Weir & use live capture 7/1-11/15 | Okanogan & Columbia River | | |
| Operate the Okanogan and Omak Creek. weirs, hook and line 2/15-6/1 | Okanogan River & Omak Creek. | Collect 58 NOR Steelhead for broodstock; HGMP | None – these ongoing activities have no overlap with P2IP implementation. |
| Operate the Salmon & Wildhorse Spring Ck. Weirs 3/15-6/1 | Okanogan Basin | | |
| Remove HOR spring Chinook from the CJH by using live capture (e.g., hoop, dip, and tangle nets) | CJH | HGMP | |
| Run tributary weirs to remove spring Chinook HORs | Okanogan Basin | HGMP | |
| **CJH Research, Monitoring and Evaluation (RM&E)** | | | |
| Operate weir on mainstem Okanogan water temps < 22.5 °C | Okanogan River ~1 km Downstream of Malott, WA | CJH RM&E | Live trapping adult sockeye and summer/ fall Chinook for transport to blocked area |
| Beach seining operations to collect juvenile salmon. | Columbia River mainstem from Chief Joe Dam to mouth of Okanogan River. | RM&E to PIT tag juvenile summer/fall Chinook | Collect juvenile salmon for tagging studies and transport to the blocked area. No change in # or duration of seining events for juveniles. P2IP action is transport and release of juveniles into blocked area that would otherwise be tagged and released at capture site. |

| *Ongoing Action* | *Location of Ongoing Activity* | *Purpose of Ongoing Action* | *Relationship to P2IP Action* |
|---|---|---|---|
| **TRMP Fisheries** | | | |
| Tribal & recreational harvest – Spring Chinook; Summer Chinook, sockeye, and steelhead, pursuant to USA v. Oregon and an agreement between the WDFW and the CTCR (2007) | Columbia River mainstem above Priest Rapids Dam. | Tribal subsistence and Recreation | No change in harvest # or seasons. Some communally harvested sockeye and summer/ fall adult could be transported to blocked are rather than distributed for food. |

## 1.4 P2IP Action Area

The P2IP Action Area is defined as all areas that the federal action would affect directly or indirectly and not merely the immediate area involved in the action (50 Code of Federal Regulations [CFR] § 402.02). In delineating the Project Area, the farthest-reaching physical, chemical, and biotic effects of the action on the environment were evaluated.

The Action Area (**Figure 1**) includes the Columbia River from Beebe Bridge (about 12 miles downstream of Wells Dam) the lower Okanogan River, and all major tributaries upstream of Chief Joseph Dam in the U.S. One location, the Penticton Hatchery, is in Penticton, British Columbia, Canada. Those aquatic environments include a connected network of streams and reservoir where fish passage, trap and transport activities, and research activities, such as telemetry installations, fish releases, net pen installations, and fish collections, would occur (see Figure B-7, B-8, and B-9 in the PEA for fish-rearing facilities). The Action Area also includes areas adjacent to the aquatic environments, up to 1.5 miles from stream and reservoir centerlines. The 1.5-mile buffer accounts for the direct and indirect effects of activities that would occur during the project, including transportation routes, fish-rearing facilities, off-channel acclimation sites, geotechnical investigations, and job-box operation and maintenance for telemetry and antenna arrays. The Action Area captures all areas where the direct and indirect effects of the action have the potential to be measurable and observable for the subject species and habitats. The action's effects on the subject species and habitats would not be measurable or observable beyond the Action Area. See **Appendix D** for the P2IP activities table and associated maps activity locations.

The lower Okanogan River is included here because juvenile trapping activities originally permitted as part of the TRMP RM&E, could result in added handling of non-target ESA-listed fish. For example, some juveniles collected for RM&E purposes as part of the TRMP RM&E action would be transported into the blocked area to facilitate P2IP activities. Trapping extents, durations, or methods permitted under the TRMP will not change, only the release locations of some trapped juveniles would be different under this action. Listed Species and Critical Habitats
A list of federally listed, proposed, and candidate species and designated and proposed critical habitat in the Action Area was obtained from the USFWS Information for Planning and Consultation website on May 8, 2024 (USFWS 2024). **Table 2**, below, shows the list. In addition, **Table 2** summarizes the effects of the action.

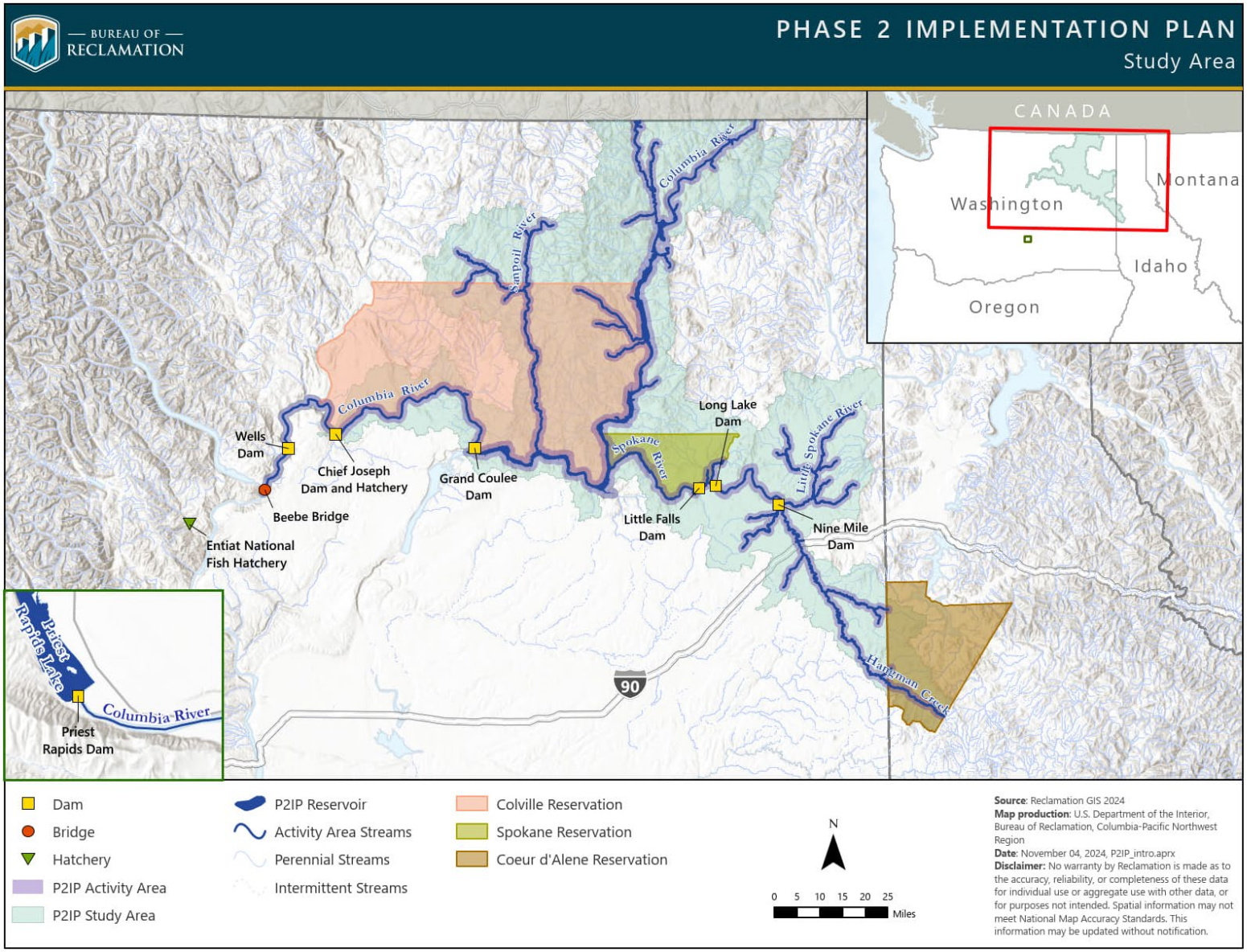


Figure 1. P2IP Project Area Map

Table 2. Threatened, Endangered, Proposed, and Candidate Species and Designated and Proposed Critical Habitat in the P2IP Action Area

| Species Common and Scientific Name | Status[1] | Critical Habitat in the Action Area | Determination of Effects | Determination of Effects – Critical Habitat |
|---|---|---|---|---|
| **MAMMALS** | | | | |
| Canada lynx (*Lynx canadensis*) | T | No | No effect | Does not occur within the Action Area |
| Gray wolf (*Canis lupus*) | E | No | No effect | Does not occur within the Action Area |
| Grizzly bear (*Ursus arctos horribilis*) | T | Proposed | No effect | Does not occur within the Action Area |
| North American wolverine (*Gulo gulo luscus*) | T | No | No effect | Does not occur within the Action Area |
| **BIRDS** | | | | |
| Yellow-billed cuckoo (*Coccyzus americanus*) | T | No | No effect | Does not occur within the Action Area |
| **INSECTS** | | | | |
| Monarch butterfly (*Danaus plexippus*) | C | No | No effect | Does not occur within the Action Area |
| **FISH** | | | | |
| Bull trout (*Salvelinus confluentus*) | T | Yes | May affect, likely to adversely affect | Not likely to adversely affect |
| **Sockeye salmon** (*Oncorhynchus nerka*) | | | | |
| Snake River sockeye salmon | E | No | May affect, likely to adversely affect | Not likely to adversely affect |
| **Chinook salmon** (*Oncorhynchus tshawytscha*) | | | | |
| Snake River fall-run Chinook | T | No | May affect, likely to adversely affect | Not likely to adversely affect |
| Snake River spring/summer-run Chinook | T | No | May affect, likely to adversely affect | Not likely to adversely affect |
| Upper Columbia River spring-run Chinook | E | No | May affect, likely to adversely affect | Not likely to adversely affect |
| **Steelhead** (*Oncorhynchus mykiss*) | | | | |
| Snake River steelhead | T | No | May affect, likely to adversely affect | Not likely to adversely affect |
| Upper Columbia River steelhead | T | Yes | May affect, likely to adversely affect | Not likely to adversely affect |
| **PLANTS** | | | | |
| Spalding's catchfly (*Silene spaldingii*) | T | Proposed | No effect | Does not occur within the Action Area |
| Ute ladies'-tresses (*Spiranthes diluvialis*) | T | No | May affect, not likely to adversely affect | Occurs within the Action Area |
| Whitebark pine (*Pinus albicaulis*) | T | No | No effect | Does not occur within the Action Area |

Sources: USFWS 2024; NMFS 2024

[1] **Status codes**: E = federally listed endangered; T = federally listed threatened; C = federal candidate for listing

# Chapter 2. Description of the Proposed Action

## 2.1 Proposed Action

The Proposed Action is the federal funding and authorizations by the USACE, Reclamation, Bonneville, the USFWS, and the NMFS to support a 20-year study to test the feasibility of reintroducing salmon in the blocked area through juvenile and adult salmon research studies; the development and operation of fish-holding, fish-rearing, and acclimation facilities; and the development, testing, and operation of interim fish passage systems (see **Table 3**).

Federal actions include the following:

- Providing federal funding to support P2IP activities throughout the Project Area.
- Reviewing, approving, and issuing permits for actions including, but not limited to, data collection, installation of equipment, or construction of facilities (for example, interim passage and/or rearing facilities) on federally managed lands and facilities.
- Providing eggs, juveniles, and adult salmon from existing hatcheries.
- Participating in the planning, design, development, implementation, and feasibility assessments of interim passage facilities and guidance structures.

All federal actions that are a part of P2IP are being considered for potential impact on ESA-listed species. See **Table D-1** in **Appendix D** for a detailed table on the P2IP activities.

Table 3. Comparison of the Environmental Baseline and the Proposed Action

| | ***Environmental Baseline (No Action)*** | ***Proposed Action*** |
|---|---|---|
| ***Telemetry Receivers*** | | |
| *P2IP Telemetry Receivers* | 68 | 107+ |
| *Existing Resident Fish Receivers** | 0 | 94 |
| *Multi-dimensional Fish Tracking Receiver Array* | 0 | Up to 200 |
| ***Salmon collection facilities/locations*** | | |
| *Existing Hatcheries & Acclimation Facilities* | 3 | 12 |
| *Other Collection Methods (Seining, Fyke Netting, Hook-and-Line, Weirs, and Screw Traps)* | 3 | 5+ |
| ***Rearing & Acclimation Facilities*** | | |
| *Utilization of Existing Hatcheries* | 6 | 9 |
| *Land-based Acclimation Facilities^* | 1 | 4 |
| *Net Pen Sites* | 3 (8 pens) | 5 (12 pens) |
| *Tributary Streamside Incubation Boxes* | 0 | 3+ |
| *Data Collection to Inform Design of Land-based Acclimation Facilities* | 0 | 3+ |

| | ***Environmental Baseline (No Action)*** | ***Proposed Action*** |
|---|---|---|
| ***Salmon Release*** | | |
| *Release sites* | 22+ | 36+ |
| ***Interim Passage*** | | |
| *Trap and Transport* | Yes | Yes |
| *Data Collection to Inform Design of Upstream and Downstream Passage Facilities* | 0 | 10 sites |
| *Upstream Interim Passage (Construction, Testing, Operation)* ^ | 0 | 5 |
| *Downstream Interim Passage (Construction, Testing, Operation)* ^ | 0 | 5 |
| ***Salmon*** | | |
| *Juvenile Chinook salmon release*** | Up to 180,000 | Up to 250,000 + |
| *Juvenile sockeye salmon release*** | 0 | Up to 250,000++ |
| *Adult Chinook salmon annual release**** | Up to 2,000 | Up to 15,000+ |
| *Adult sockeye salmon annual release**** | Up to 500 | Up to 15,000++ |

*Buoys may be used to install P2IP telemetry equipment

**Number would be dependent on salmon availability annually

***Number would be dependent on salmon availability and research stock returns annually

^Site-specific future environmental compliance process

+ The Proposed Action may have up to 70,000 additional juvenile and 13,000 adult Chinook salmon released in the blocked area.

++ The Proposed Action may have up to 250,000 additional juvenile and 14,500 adult sockeye salmon released in the blocked area.

### 2.1.1 P2IP Activities

The federal actions would support the P2IP to test key biological assumptions from the Fish Passage and Reintroduction Phase 1 Report: *Investigations Upstream of Chief Joseph and Grand Coulee dams* (UCUT 2019) that are considered to critically influence the success of the reintroduction effort. See **Table D-1** in **Appendix D** for a detailed table of P2IP activities.

The P2IP is proposed to be completed in a stepwise fashion. **Table 4** summarizes the activities proposed under each P2IP step.

Detailed descriptions of the P2IP activities are presented in Appendices A, B, and C of the P2IP PEA. These activities are summarized below.

### 2.1.2 Research Studies

Juvenile survival and behavioral studies would be performed for subyearling and yearling Chinook and sockeye salmon using biotelemetry, such as PIT tags, JSATS or acoustic, and coded-wire tags. Up to 250,000 juvenile Chinook and 250,000 juvenile sockeye salmon would be released annually to accommodate the tagging studies. The current research goals are to mark all released juveniles with PIT or coded-wire tags; a subset of juveniles would be marked with JSATS. Results from these studies would be used to evaluate migratory behavior and dam passage survival; estimate smolt-to-adult return rates; and provide returning-migrating salmon for subsequent adult behavioral and survival studies. Estimates from juvenile survival studies would be used to update life cycle model (LCM) inputs, adaptively manage research projects, and evaluate the program's success.

Table 4. Summary of P2IP Activities by Step

| **Step 1 – Research Studies: baseline studies and small-scale salmon production programs to support research studies** |
|---|
| • Juvenile and adult salmon research studies (ongoing and additional studies)<br>• Installation of research equipment<br>  o New telemetry receivers<br>• Development and installation of satellite rearing facilities<br>  o Net pens (expansion and new)<br>  o Land-based, temporary acclimation facilities<br>• Collection and transport of eggs, juvenile salmon, and adult salmon from existing hatcheries<br>• Fish-rearing activities<br>• Trap-and-transport operations for upstream passage of adult salmon[3]<br>• Data collection for design of new land-based acclimation facilities, fish collection, and interim passage facilities |
| **Step 2 – Ongoing research studies, interim passage activities, long-term production programs, and supporting studies** |
| • Ongoing juvenile and adult salmon research studies<br>• Design, modification, and testing of existing long-term[4] hatchery facilities*<br>• Design, modification, and testing of existing interim[5] fish passage |
| **Step 3 – Future Activities** |
| • Construction or installation of equipment to test upstream passage<br>• Construction or installation of long-term downstream passage structures (including testing similar to upstream passage)<br>• Construction and development of land-based acclimation facilities<br>• Ongoing installation of research equipment |

*The Project Proponents' site-specific designs would be submitted to the appropriate Co-lead Agency for design sufficiency review and acceptance.

Information from JSATS-tagged fish would inform the decision-making process for the need, design, and subsequent effectiveness testing (such as collection efficiency) of downstream passage facilities at each dam in the Action Area. PIT or JSATS tags, or both, would be installed, operated, and maintained throughout the Action Area, including at dams. Researchers would collect, compile, manage, and interpret the fish data.

System-wide Juvenile Survival

- This PIT-based study would examine assumptions made in the LCM about survival of juvenile summer/fall Chinook and sockeye salmon as they migrate through the Columbia River System to the Pacific Ocean.
- The number of juvenile Chinook salmon released into the blocked area would increase from 180,000 to 250,000 individuals, annually. Section 2.1.3 describes the origins and ongoing source of the juveniles for release.
- Up to 250,000 juvenile sockeye salmon would also be released into the blocked area annually. Section 2.1.3 describes the origins and ongoing sources of the juveniles for release.
- Researchers would collect, compile, manage, and interpret the fish data.

[3] See **Appendix D** for a detailed table of P2IP activities.
[4] Fish ladders
[5] Trap and transport activities

- Results from these studies would be used to estimate migratory survival and smolt-to-adult survival rates for fish released from the following general locations:
  - Kettle Falls
  - Sanpoil River
  - Little Falls Dam
  - Spokane River
  - Grand Coulee Dam or Lake Roosevelt
  - Chief Joseph Dam or Lake Rufus Woods
- Detections from existing PIT antennae at downstream Columbia River dams and other locations in the basin would be used to calculate survival estimates.
- Additional PIT antennae would be installed, operated, and maintained throughout the blocked area, including at dams and tributaries.
- Estimated survival rates would be used to update LCM inputs to adaptively manage research projects and evaluate the program's success.

Fish returning to the Columbia River as adult salmon would be used for subsequent upstream behavior and studies.

This study is expected to continue through 2043 with annual releases of juvenile fish.

Downstream Movement, Behavior, and Dam Passage of Juvenile Summer/Fall Chinook and Sockeye Salmon

- This JSAT-based study would examine assumptions made in the LCM about survival of juvenile summer/fall Chinook and sockeye salmon and their behavior, dam passage routing, and travel time in the following reaches:
  - Mouth of Sanpoil River to Grand Coulee Dam
  - Kettle Falls to Grand Coulee Dam
  - Little Falls Dam to Grand Coulee Dam
  - Long Lake Dam to Grand Coulee Dam
  - Nine Mile Dam to Grand Coulee Dam
  - Mouth of Hangman Creek to Grand Coulee Dam
  - Grand Coulee Dam to Chief Joseph Dam
  - Chief Joseph Dam to Chelan River/Beebe Bridge
- Up to 6,000 acoustic-tagged juveniles of each species, Chinook and sockeye salmon, would be released at the study sites annually to collect baseline data on downstream dam passage and survival through reservoirs in the blocked area.
- This study would use the deployed telemetry receivers described above to collect data from tagged fish.
- Acoustic tag detections would provide information on near-dam behavior and route-specific dam passage routing and survival at Grand Coulee Dam, Chief Joseph Dam, and the Spokane River dams (Little Falls, Long Lake, and Nine Mile dams).

Results would be used to inform planning and development of interim or permanent juvenile passage facilities at all five dams.

These multiyear studies are expected to begin early in the project and be repeated at strategic intervals through 2043 as fish passage facilities become operational.

Juvenile Sockeye Survival through Lake Roosevelt, Grand Coulee Dam, Rufus Woods Lake, and Chief Joseph Dam

- Juvenile behavior, movement, and survival would be evaluated through PIT tag, acoustic tag, and JSATS-based research studies.
- The studies would utilize existing deployed receivers and new receiver deployments, as described in Appendix A of the P2IP PEA, to collect data from tagged fish.
- Researchers would collect, compile, manage, and interpret fish data from these studies.
- These studies are expected to continue through 2043 and are designed to be performed repeatedly, but the acoustic studies may not occur annually.
- The PIT tag-based studies would examine assumptions made in the LCM about survival of juvenile summer/fall Chinook and sockeye salmon as they migrate through the Columbia River System to the Pacific Ocean and back to the Upper Columbia Basin as adults. Annual juvenile fish releases are expected to occur annually for the PIT tag studies.
- The acoustic studies would evaluate the LCM assumptions of rearing and outmigration specifically within the blocked area. The acoustic studies would occur throughout the 20-year study period but would likely not occur each year.

This JSATS-based study would examine assumptions made in the LCM about survival of juvenile summer/fall Chinook and sockeye salmon, behavior, dam passage routing, and travel time through Project Area reaches. The JSATS-based studies would provide critical information about near-dam behavior and route-specific dam passage and survival at each of the five dams in the Project Area. These multiyear studies are expected to begin early in the project and be repeated at strategic intervals through 2043.

Appendix A of the P2IP PEA provides a detailed description of the P2IP research activities (Reclamation 2024).

Adult Salmon Research Studies

Adult survival and behavior studies would be expanded for naive and local-origin Chinook and sockeye salmon. Project Proponents would transport up to 15,000 adult Chinook salmon and 15,000 adult sockeye from live-capture and regional hatchery operations with surplus salmon to various release locations within the blocked area. The number of adult salmon would vary annually depending on availability.

All adults transported would have a tissue sample collected for genetic analysis and parentage-based tagging before being moved. A subset of fish could be marked with a PIT tag and either an acoustic or radio telemetry transmitter, so the fish could be actively tracked by researchers throughout the Project Area. The parentage-based tagging information would be stored in a centralized genetics database currently used within the Columbia River Basin. Genetics results would be used to calculate the number of adults returning per spawner transported previously, a value termed AR/S. AR/S is a crucial performance metric that the Project Proponents would use when making decisions and evaluating the success of the project. Other elements of the proposed research are summarized below.

- Salmon research studies would examine factors that influence adult return rates to the blocked area and inform planning and development of interim adult passage facilities at all five dams. The adult plan, combined with studies designed to evaluate juvenile survival in the blocked area,

would provide much of the information necessary to evaluate the project and identify areas where more detailed studies are needed.

- Adult sockeye and summer/fall Chinook salmon would be collected at facilities downstream of Chief Joseph Dam permitted as part of the TRMP and marked with acoustic or radio tags. A subset of adults would be tagged and detected using existing acoustic tag receivers deployed for concurrent resident fish monitoring programs already in operation.
- Additional radio telemetry receivers would be installed near the dam tailraces and within blocked area tributaries to assess near-dam behavior and spawning escapement. Additional receiver sites may be necessary based on information obtained from the initial deployment, range testing, and fish distribution.
- Tagged and transported adult salmon would be hauled via truck transport from existing facilities, then released in various locations including dam tailraces and forebays, mid-reservoir reaches, tributaries, and the transboundary reach. (Collaboration with Canadian researchers may be necessary to fully understand and assess survival and behavior in the transboundary reach and the Kettle River.)
- Researchers would collect, compile, manage, and interpret data.
- Spawning would be documented with traditional spawning ground surveys on foot, deepwater redd surveys, or aerial drones.

Salmon research studies would be repeated through 2043.

### 2.1.3 Fish-Rearing and Acclimation Facilities

The Proposed Action would require a source of both summer/fall Chinook and sockeye for research studies. In Phase 1, CJH summer/fall Chinook and Okanogan sockeye salmon stocks were ranked highest for use in the reintroduction program and are the preferred stocks for use in P2IP efforts. Several other summer/fall Chinook salmon sources (such as Entiat National Fish Hatchery and Wells Fish Hatchery) were also identified as potential donor stocks. Appendix B of the P2IP PEA provides a detailed description of the P2IP fish-rearing activities, and the interim fish-rearing and acclimation facilities are summarized below.

- Project Proponents would collect summer/fall Chinook and sockeye salmon from a combination of regional hatcheries identified in Table A-1 of Appendix A of the P2IP PEA to be reared and released in the blocked area. If hatchery juvenile fish availability becomes limited, juveniles would be sourced from ongoing activities associated with TRMP RM&E actions. For example, juveniles trapped during beach seining activities in the mainstem Columbia River below Chief Joseph Dam or at the mouth of the Okanogan River would be tagged and transported for release into the blocked area. Similarly, juveniles trapped in the smolt trap operated for RM&E on the Okanogan River would also be tagged and transported to the blocked area as a back-up source of juvenile fish for the P2IP action. These back-up sources of juvenile fish would only occur in limited instances and without compromising ongoing TRMP RM&E programs in the Okanogan.
- Artificial production of Chinook and sockeye salmon needed for the Proposed Action would rely on either existing local land-based hatchery facilities or updated versions of these facilities, and new acclimation facilities. Additionally, the Project Proponents would work with the owner/operators of anadromous fish hatcheries downstream of Chief Joseph Dam to determine whether surplus fish production or rearing space is available. Opportunities to develop new acclimation facilities in the Spokane and Sanpoil watersheds are described in Appendix B of the P2IP PEA.

- Egg incubation and early rearing would be done using existing hatchery facilities or through an expansion or upgrade of existing facilities, or development of new acclimation facilities in the Sanpoil and Spokane River watersheds.
- Siting, design, and construction plans would need to be developed for new facilities. Related activities could include geotechnical studies, surveying, and well drilling to characterize site conditions and inform designs.
- Designs and plans for new or expanded incubation and early rearing sites would be submitted to the applicable Co-lead Agency or Agencies for design review and site-specific environmental compliance.
- Yearling production would require that subyearlings be transferred from hatcheries to new or existing net pens in reservoirs and to newly developed satellite acclimation sites.
- Net pen locations would include Sherman Creek (Kettle Falls), Two Rivers, Keller Ferry, Sanpoil Arm, and Rufus Woods Lake.
- Net pens would be similar in shape and dimension to those currently used by the Lake Roosevelt Artificial Production program for triploid rainbow trout (that is, approximately 20 feet square and 16 feet deep).
- New, expanded, or upgraded acclimation sites would occur in the Sanpoil and Spokane River watersheds.
- Siting of the acclimation facilities would be based on studies, existing infrastructure, and site conditions.
- Data collection may include geotechnical studies, surveying, and well drilling to characterize site conditions to inform the design process. These actions could occur at each potential site over a 20-year period.[6]

Subyearling production would not require acclimation sites, as these fish would be released directly from hatcheries to various locations within the blocked area. Subyearlings may be released in the spring (March–May) or in the fall (September–November). Release locations are detailed in the **Appendix D** maps.

### 2.1.4 Interim Fish Passage

Interim passage actions would focus on the study, design, installation, testing, and operation of fish passage systems. Data collection could include geotechnical studies and surveys, along with existing operational data, to characterize site conditions, inform hydrologic modeling, and aid in the design process. These actions could occur at each dam over the next 20 years.

A trap-and-transport program for naive and local-origin adults would be expanded early in the P2IP project. Fish could be collected from Wells Dam and Hatchery (**Figure D-23** in **Appendix D**), the CJH fish ladder in the Columbia River below Chief Joseph Dam, the Entiat National Fish Hatchery, and other fish collection operations in the basin; then fish would be transported and released upstream in the blocked area. Adult traps at existing facilities would not change configurations or operational periods to supply the P2IP action. Adult trapping will continue at those sites, per the terms of prior agreements, reviews, and ESA consultations specific to the respective hatchery programs and the TRMP. Only the transport and release of surplus adults from these facilities is part of the P2IP action. Adult salmon release sites could include Rufus Woods Reservoir, Lake Roosevelt, the Columbia River transboundary reach, Hangman Creek, the Sanpoil River, the

[6] The duration of the Proposed Action is 20 years and would be ongoing; however, consultation would be reinitiated on an as-need-basis, after the initial 15-year consultation period.

Spokane River, the Little Spokane River, and other spawning and rearing areas. See **Table D-1** in **Appendix D** for more information on the project activities.

Fish passage designs would be developed based on research studies, existing infrastructure, and site conditions. There is currently not sufficient information to provide a site-specific or implementation-level review of individual fish passage facility designs. The Project Proponents would employ fish passage experts to work with staff from Reclamation, the USACE, Avista Corporation, Bonneville, the National Oceanic and Atmospheric Administration, the USFWS, and Washington Department of Fish and Wildlife to develop fish passage alternatives. Interim fish passage designs, and construction plans related to any P2IP study activities (Appendix C of the PEA) would be submitted to the relevant owner/operator/agency for design review, site-specific (and as necessary) environmental compliance, and any other regulatory needs. The construction and operations of any long-term or permanent fish passage structures are not included in the P2IP and would require site-specific regulatory compliance with the relevant agencies.

Fish passage design, installation, operation, and testing efforts have been sequenced for the dams as follows; however, adjustments could be made based on feasibility and on research study results.

1. Chief Joseph Upstream Passage
2. Grand Coulee Downstream Passage
3. Grand Coulee Upstream Passage
4. Spokane River Dams Upstream Passage
5. Chief Joseph Downstream Passage
6. Spokane River Dams Downstream Passage

### 2.1.5 Conservation Measures

The following is a list of environmental protection measures (EPMs) for the P2IP PEA and future environmental compliance, as required, to reduce or eliminate environmental impacts during the P2IP project. See **Appendix A** for the comprehensive list of EPMs.

Conservation measures for fish resources include:

- All existing fish hatchery program operations would continue to be implemented during the P2IP research.
- Utilize live-capture, selective fishing gear to collect Chinook and sockeye brood stock that would allow release of non-target species immediately, or as soon as practicable. Use live-capture, selective gear when and where incidental take of Upper Columbia River spring-run Chinook, steelhead, and bull trout could occur. Upper Columbia River steelhead are more likely to be captured during August through November brood stock collection.
- Release incidentally captured individuals, including any listed bull trout, salmon, or steelhead that might enter the hatchery ladder and adult holding facilities immediately or as soon as is practicable. Incidental captures would be sorted, tallied, and promptly released unharmed back into the Columbia River.
- The location for release would be identified prior to the transport activity. The release location would accommodate the transport truck and provide access to water. Releases should occur as early in the morning as possible. The fish monitoring log would be filled out with tempering information and release data.
- During trapping operations for brood stock or to manage hatchery fish on the spawning grounds, apply measures that minimize the risk of harm to listed salmon and steelhead,

including, but not limited to, limitations on the duration (hourly, daily, weekly) of trapping, limits on the duration of traps holding listed fish, and allowance for free passage of listed fish migrating through trapping sites in main stem and tributary river locations when those sites are not being actively operated.

- Sort and promptly release any listed steelhead that might enter the hatchery ladder and adult holding facilities.
- Continue to implement the Salmonid Disease Control Policy of the Fisheries Co-managers of Washington State and Pacific Northwest Fish Health Protection Committee (PNFHPC 2007) guidelines to minimize the risk of fish disease amplification or transfer and to ensure that artificially propagated fish are released in good health.
- Do not handle ESA-listed fish if the water temperature exceeds 69.8 degrees Fahrenheit at the capture site. Under these conditions, suspend collection until temperatures are lower.
- Internally tag (such as with coded-wire tag or PIT tag) at least a portion of each hatchery release group for monitoring and evaluation purposes.
- Seining operations
  - During purse and beach seine operations, release any non-target fish immediately (that is, within 60 seconds) or as soon as is practicable, including all ESA-listed fish (that is, bull trout, wild Chinook, or wild steelhead).
  - Sort by hand or by use of a knotless dip net. Sort and/or release all fish prior to removing the entire seine from the water. Do not dry sort.
  - Non-target fish would be sorted and removed as soon as practicable. For beach seine operations, the sorting time is defined as the elapsed time from when the outer towed end of the net first contacts the shore or block until the net is emptied of fish.
  - For purse seine operations, the sorting time is defined as the elapsed time from when all rings are pursed and out of the water until the net is emptied of fish.
- At a minimum, the collection and release sites' water temperatures would be retrieved and recorded 2 days before the event to allow for proper planning and tempering.
  - Temperature Threshold: No transport of fish would occur if either the loading or receiving water temperatures are greater than 21 degrees Celsius (°C). At release, the temperature difference between the receiving water and the tank shall be within 4°C; if greater, the tank water would be tempered at a rate of 0.5°C per 15 minutes. The tempering rate shall be recorded in the fish transport monitoring log.
- The transport tank would be filled with water to the recommended level, and the tank would be treated. Air stones would be turned on to ensure they are working. Once fish are loaded, the tank would be filled to the recommended maximum level, and aerators would be turned on. The fish transport monitoring log would be filled out with all relevant information, including the water treatment methods and products, water temperature, oxygen data, carrying capacity, and fish health-check data.
- Check net pens for mortalities at least once per week. Remove mortalities and recover PIT tags.
- Fyke net operations
  - Check nets daily. Release any non-target fish immediately, including all ESA-listed fish (that is, bull trout, wild Chinook, or steelhead).
- Hook and line capture
  - Scan all potential non-target fish for PIT tags. Release any non-target fish with PIT tags immediately, including all ESA-listed fish (that is, bull trout, wild Chinook, or steelhead) and report data to the PTAGIS annually.

  - Non-target ESA species captured would not be removed from the water, hook removed and released immediately.
  - Use only barbless hooks. Do not use treble hooks.
- Geotechnical investigations
  - Limit disturbance of riparian vegetation to the minimum necessary to achieve investigation objectives, minimizing habitat alteration and the effects of erosion and sedimentation.

Conservation measures for vegetation and wetlands include:

- Revegetate disturbed areas to conditions similar to prework conditions by spreading stockpiled native materials (for example, spoils, vegetation, rock, and woody debris), seeding, and/or planting with certified weed-free seed mixes or native cultivars.
- Avoid mapped wetlands during construction activities to the maximum extent practicable. Where practicable, ensure no ground-disturbing activities occur within a 50-foot buffer area of mapped wetlands.

# Chapter 3. Status of Species in the Action Area

This assessment examines the status of each species and each species' designated critical habitat that the Proposed Action may affect. The status is determined by the level of extinction risk that the listed species faces, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. The status informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' "reproduction, numbers, or distribution," as described in 50 CFR § 402.02. The assessment also examines the condition of critical habitat throughout the designated area.

## 3.1 Bull Trout (*Salvelinus confluentus*)

### *Listing Status and Distribution*

The coterminous U.S. population of the bull trout was listed as threatened on November 1, 1999 (64 *Federal Register* 58910).

Bull trout are currently known to occur in the Columbia and Snake River basins, the Puget Sound and Olympic Peninsula coastal basins, and the Saint Mary and Upper Klamath River basins. Bull trout can be migratory, moving throughout large river systems, lakes, and even the ocean in coastal populations, or they may be resident, remaining in the same stream their entire life (USFWS 2010).

The entire main stem Columbia River upstream to Chief Joseph Dam has been designated as critical habitat for bull trout (USFWS 2010). The main stem was designated as critical habitat for bull trout in recognition of its important role as foraging, migration, and overwintering habitat in the recovery of bull trout (USFWS 2010).

### *Life History and Habitat Requirements*

Migratory bull trout are typically larger than resident bull trout (USFWS 1999). Bull trout typically spawn between August and November when the water temperature is decreasing. After about 100 to 145 days, the fry hatch and remain in the substrate. Depending on the water temperature and increasing streamflow, the fry generally emerges between early April and May.

The bull trout diet varies with geography and the composition of benthic invertebrates. Foraging is usually constrained by temperature and availability of refugia from larger predators. By day, juvenile bull trout spend most time hiding from predators with feeding forays at night. Predators include other trout species, salmonids, and other adult bull trout. Large migratory bull trout are thought to be highly piscivorous, targeting juvenile salmon, among other species, as forage. It is thought that the widespread decline of salmon within the Columbia River Basin has contributed to the decline of bull trout. Releasing thousands of hatchery smolts into the Columbia River could increase the forage base for any large migratory bull trout that overwinter and forage in the main stem Columbia River.

The consequences of a migratory life history involve trade-offs between the benefits of increased growth and fecundity and the cost of lower survival (Schaller et al. 2014). Following metapopulation theory, relatively isolated, spatially distributed local populations of bull trout are bound together by the potential for dispersal between populations.

Bull trout have more specific habitat requirements than all native salmonids in the Pacific Northwest (USFWS 2015a). Bull trout require clean stream substrates; water temperatures often less than 54 degrees Fahrenheit; complex stream habitat containing deep pools, overhanging banks, and large woody debris; and connectivity between spawning and rearing areas and downstream foraging, migration, and overwintering habitats (USFWS 2015a). Water temperatures over approximately 50 degrees Fahrenheit are thought to limit their spawning. The bull trout spawns in streams with low-gradient reaches with loose, clean gravel and a water temperature between 38 and 41 degrees Fahrenheit (USFWS 2015b). These spawning areas are usually associated with groundwater infiltration, cold-water springs, and the coldest streams within the watershed (USFWS 2015b).

Chief Joseph Dam is where upstream fish passage terminates on the mid-Columbia River, and it represents a barrier to connectivity between downstream bull trout populations in the Methow, Entiat, and Wenatchee subbasins and upriver bull trout populations. Due to its relatively close proximity to the Methow River subbasin, migratory bull trout likely encounter Chief Joseph Dam, but this has not been specifically investigated or documented in related studies (such as BioAnalysts Inc. 2004, 2009). However, if movement patterns of bull trout from the Methow River subbasin are similar to bull trout movements from other subbasin populations (for example, Entiat, Walla Walla, and Tucannon), then bull trout may be in the vicinity of Chief Joseph Dam during all months. Douglas County Public Utility District detected 22 individual bull trout using the fish ladders at the Wells Hydroelectric Facility from January 1, 2024, through September 23, 2024 (Douglas County Public Utility District 2024).

Less than 25 bull trout have been documented at the mouths of tributaries to Lake Roosevelt or in Lake Roosevelt/Columbia River since 2011; they are usually found near the Canadian border (USFWS 2017). In Rufus Woods Lake (upstream of Chief Joseph Dam), bull trout accounted for less than 0.1 percent of the catch during a fish inventory of the lake in 1999 (USFWS 2020). The CTCR and the Northwest Power and Conservation Council concluded that bull trout use of Rufus Woods Lake was minimal (CCT 2000 in USFWS 2020). Although suitable spawning habitat is in several tributaries to Lake Roosevelt and Rufus Woods Lake, no known spawning occurs in the tributaries.

Within the Action Area, habitat is fragmented primarily by dams that prevent passage of bull trout. Chief Joseph Dam is where upstream fish passage terminates on the mid-Columbia River, and it represents a barrier to connectivity between downstream bull trout populations in the Methow, Entiat, and Wenatchee subbasins and upriver bull trout populations. Chief Joseph Dam serves as a barrier to bull trout movement due to the absence of fish passage facilities, effectively terminating their passage on the mid-Columbia River. Evidence suggests that migratory bull trout in the area interact with the dam, but their upstream migration in the mid-Columbia River is restricted (Barrows et al. 2016).

### *Threats*

Throughout the Action Area, the primary threats to bull trout habitat include those related to habitat, demographic concerns, and nonnative species interference in the Methow and Okanogan foraging, migration, and overwintering habitat. The threats associated in the Methow River include infrastructure development such as roads and facilities, which can negatively impact spawning and rearing habitats; altered water flows from main stem diversion dams; and climate change. The threats associated with the Okanogan River foraging, migration, and overwintering habitat include similar

threats. In this area, entrainment and fish passage can disrupt movement patterns for adult and juvenile fish. Efforts to recover salmon often result in high numbers of smolts, leading to competition for resources that may adversely affect the prey base for bull trout.

## 3.2 Snake River Sockeye Salmon (*Oncorhynchus nerka*)

### *Listing Status and Distribution*

The Snake River sockeye salmon was listed as endangered in 1991 and 2005 and updated in 2014 (79 *Federal Register* 20802). This species does not have designated critical habitat that overlaps the Action Area.

The evolutionarily significant unit (ESU)[7] does not typically use the Action Area. The Action Area is not thought to support any life cycle of the ESU, and the reasons that some fish stray into the Action Area are not well understood. However, those fish that do enter the Action Area are likely transient adults that only rarely use the Action Area during migration. This ESU typically enters the Upper Columbia River Basin during June and July and migrate back to the ocean, leaving their natal lake in Sawtooth Valley, from April to May (Bjornn et al. 1968). Like other salmon and trout species, sockeye salmon adults stop feeding during spawning migration.

### *Life History and Habitat Requirements*

This ESU includes all naturally spawned anadromous and resident sockeye (that is, kokanee) salmon originating from the Snake River Basin; it also includes sockeye salmon from the Redfish Lake Captive Broodstock Program and the Snake River Sockeye Salmon Hatchery Program (NMFS 2023a). Snake River sockeye salmon have the longest migration of any other sockeye salmon run entering the Columbia River.

Adult sockeye salmon in the Snake River ESU enter the Lower Columbia River in June and July, migrate upstream through the Snake and Salmon Rivers, and arrive at their natal lakes in August and September (NOAA 2015). Snake River sockeye salmon may stray into the Upper Columbia River during migration to natal lakes. Spawning peaks in October and occurs in lakeshore gravels outside the Action Area. Fry emerge in late April and May and move immediately to the open waters of the lakes where they feed on plankton for 1 to 3 years before migrating to the ocean. Juvenile sockeye generally depart Redfish Lake from late April through May and migrate to the Pacific Ocean. Snake River ESU sockeye salmon spend 2 to 3 years in the Pacific Ocean before returning to their natal lakes to spawn. Sockeye salmon predators include other trout and salmon species, as well as several bird species.

As sockeye salmon begin their return journey back to the Columbia River as adults, they can be impacted by temperatures, availability of prey, and predation. A lack of passage and connectivity can lengthen travel times back to spawning grounds. Adults return to Redfish Lake in the summer and fall, using lakeshore gravel or stream outlets to create redds. Adults are not known to use the Action Area for spawning, but a fraction of returning adults have been detected recently at the Wells Dam passage facilities. In 2023, 13 (10 percent) of the 123 Snake River sockeye adults detected at the McNary Dam adult fishways were also detected at the Wells Hydroelectric Facility fish passage facilities (Columbia River DART, Columbia Basin Research, University of Washington 2024a). Adult

[7] Under the ESA, an ESU is a population or group of populations that is substantially reproductively isolated from other populations of this species and represents an important component of the evolutionary legacy of the species.

detections at the Wells Hydroelectric Facility suggest a relatively small fraction of the total adult returns may use the Action Area each year. Juveniles are not known to occur in the Action Area.

### *Threats*

The Snake River ESU of sockeye salmon is extremely close to extinction. The NMFS concluded that the decline of the Snake River sockeye salmon ESU is the result of widespread habitat degradation, impaired mainstream and tributary passage, historical commercial fisheries, historical chemical treatment of Sawtooth Valley lakes in the 1950s and 1960s, and poor ocean conditions (NOAA 2015). The decline in the species' abundances has now become the major limiting factor and leaves the species vulnerable to catastrophic loss; it also creates risks to genetic diversity (NOAA 2015).

## 3.3 Chinook Salmon (*Oncorhynchus tshawytscha*)

### *Evolutionary Significant Units*

The Columbia River within the Action Area represents potential habitat for three ESUs of Chinook salmon: Snake River fall-run, Snake River spring/summer-run, and Upper Columbia River spring-run. Individual ESUs of Chinook salmon differ in their spatial and temporal distribution within the Action Area and are discussed in detail in the subsections below. In general, the portion of the Action Area that includes the project site represents documented migratory habitat for adult and juvenile Chinook salmon.

### *Description and Distribution*

Chinook salmon adults enter fresh water at varying times, depending on the run or ESU. They may spawn closer to tidal areas or closer to headwater streams; overall, however, they demonstrate the longest upstream migration of any other Pacific salmon species. Run timing has some genetic components, but Chinook salmon run timing can be flexible depending on environmental conditions, such as flow and temperatures upstream. Peak spawning can vary based on the run and distance from the ocean.

### *Life History and Habitat Requirements*

Chinook salmon, unlike steelhead, are iteroparous (that is, they complete a single spawn and die). Chinook salmon carcasses provide nutrient enrichment by releasing important oceanic nutrients as they decay. Females bury their eggs in clean gravel, 8 to 14 inches deep. Because of their large size, Chinook salmon can spawn in higher water velocities and use coarser substrates than other salmonid species.

Stream-type juveniles depend on freshwater ecosystems because of their extended residence in these areas. Their principal freshwater prey consists of larval and adult insects. The seaward migration of smolts is timed so that the smolts arrive in the estuary when food is plentiful and consists of epibenthic[8] organisms, insects, and zooplankton (Quinn 2005).

Chinook salmon adults at sea are highly piscivorous and distributed deeper in the water column than other species of Pacific salmon. While other species of salmon generally are surface oriented, primarily using the upper 65 feet (20 meters) of the water column, Chinook salmon tend to be at greater depths, ranging from 98 to 230 feet (30 to 70 meters). They typically remain at sea for 1 to 6 years before returning to their natal streams to spawn (Quinn 2005). Fish make up the largest

[8] Organisms that live on or above the bottom sediments of a body of water, such as the sea floor

component of the Chinook salmon diet at sea, although squid, pelagic amphipods, copepods, and euphausiids are also important prey species.

The length of freshwater and saltwater residency varies greatly (Myers et al. 1998). Like bull trout and steelhead, during the time that Chinook salmon inhabit fresh water, they require fast-flowing, cold, and gravel-bottomed streams with adequate dissolved oxygen and diverse habitat features, such as deep pools and woody debris. All three species typically grow and survive best in streams with temperatures lower than 59 degrees Fahrenheit in the summer and greater than 32 degrees Fahrenheit in the winter. Juvenile Chinook salmon are most often associated with streams that contain large woody debris and pools in low-gradient alluvial valleys.

#### *Threats*

Chinook salmon continue to face the impacts of historical habitat degradation and fragmentation from human development. As a thermally sensitive species, Chinook salmon are vulnerable to rising stream temperatures and shifting hydrologic regimes that have been linked to climate change (Crozier et al. 2019). Habitat degradation due to stream blockages, forest practices, urbanization, and agriculture is listed as the primary causes of decline.

Chinook salmon abundances have declined near the southern portion of their range (Washington, Oregon, Idaho, and California) due to increased urbanization and habitat degradation. Reliance on hatchery programs for supplementation has led to increased ecological interactions that also likely pose potential threats (NPFMC et al. 2021).

### 3.3.1 Snake River Fall-run Chinook Salmon

#### *Listing Status and Distribution*

Snake River fall-run Chinook salmon were listed as threatened under the ESA on April 22, 1992 (57 *Federal Register* 14653). This listing was updated April 14, 2014 (79 *Federal Register* 20802). There have been some improvements in its status since the final listing. In 2022, the NMFS concluded that the species should remain listed as threatened as a result of the agency's 5-year review (NMFS 2022).

The Snake River fall-run Chinook ESU includes all naturally spawned populations of fall-run Chinook salmon in the main stem Snake River below Hells Canyon Dam, and in the Tucannon River, Grande Ronde River, Imnaha River, Salmon River, and Clearwater River subbasins (70 *Federal Register* 37160; June 28, 2005). There are four artificial propagation programs for Chinook salmon in this ESU. This species does not have designated critical habitat that overlaps the Action Area; thus, it is unlikely to occur within the Action Area.

#### *Life History and Habitat Requirements*

Snake River fall-run Chinook salmon typically spend 2 to 5 years in the Pacific Ocean and return to the Columbia River in August and September (NOAA 2017a). Adults enter the Snake River between late August and early December, with the peak occurring in early September to mid-October. After reaching the Snake River, the species spawns in one of the five major spawning areas: Upper Hells Canyon, Lower Hells Canyon, the Tucannon River, the Grande Rone River, and the Clearwater River (NOAA 2017a). Females typically return to spawning grounds as 4 and 5 years old. Conversely, males return as 3-, 4-, and 5-year-olds, though the hatchery-origin fish age distribution is skewed toward younger ages at return (Connor et al. 2003).

Egg incubation, emergence timing, and early rearing of Snake River fall-run Chinook salmon are heavily influenced by water temperature. Similarly, juveniles exhibit different early life history timing and growth in different river reaches depending on the water temperature. The species emerges

from redds in later winter through early spring; then it migrates to the ocean before mid-summer (NOAA 2017a).

#### *Threats*

Primary threats to the Snake River fall-run Chinook salmon include hydropower development, water withdrawal and diversions, water storage, and inadequate regulatory mechanisms (NOAA 1992).

Data for the most recently published 10-year period (1994–2004) for this ESU show an average abundance of 1,273 returning adults; this number is below the 3,000 natural spawner average abundance threshold that has been identified as a minimum for recovery (NOAA 2017a). Total returns to Lower Granite Dam increased steadily from the mid-1990s to the present. Natural returns increased at approximately the same rate as hatchery-origin returns through run year 2000; since then, however, hatchery returns have increased disproportionately to natural-origin returns. On average, for full brood year returns from 1977 to 2004, the naturally spawned fish population has not replaced itself (NOAA 2017a). The quasi-extinction risk (that is, the probability of abundance falling below an identified demographic threshold within 100 years) for this ESU has been characterized as moderate to high (NOAA 2017a). This is primarily due to incomplete or lack of passage at federally and publicly owned dams authorized for hydropower and flood risk management. Snake River Chinook salmon are particularly sensitive to the availability of passage, temperatures in migration corridors, and transit times.

### 3.3.2 Snake River Spring/Summer-run Chinook Salmon

#### *Listing Status and Distribution*

The Snake River spring/summer-run Chinook salmon was listed as threatened in 1992 and 2005 and updated in 2014 (NMFS 2023d). This species does not have designated critical habitat that overlaps the Action Area; thus, it is unlikely to occur within the Action Area.

This ESU includes all naturally spawned populations of spring/summer-run Chinook salmon in the main stem Snake River and the Tucannon River, Grande Ronde River, Imnaha River, and Salmon River subbasins (70 *Federal Register* 37160). There are 15 artificial propagation programs for Chinook salmon in this ESU.

#### *Life History and Habitat Requirements*

Snake River spring/summer-run Chinook salmon exhibits a stream-type life history, which means it resides in fresh water for a year or more following emergence. Snake River spring-run Chinook salmon destined for the Snake River return to the Columbia River from the ocean in early spring and pass through Bonneville Dam beginning in early March and ending in late May (NOAA 2017b). Summer-run Chinook salmon return to the Columbia River from June to July.

Snake River spring/summer-run Chinook salmon stay in deep pools within the main stem Columbia and Snake Rivers and the lower ends of spawning tributaries until late summer (NOAA 2017b). Typically, Snake River spring-run Chinook salmon spawn between mid-August and late August with summer-run Chinook spawning approximately 1 month later (NOAA 2017b). Most juveniles migrate to the ocean as yearlings and disperse once entering the Northern California current. Females return to the spawning grounds as 4- and 5-year-olds with smaller proportions of 3- and 6-year-olds. Males return primarily as 3-, 4-, and 5-year-olds, though hatchery-origin males are skewed toward younger ocean ages (Connor et al. 2003).

### *Threats*

The current primary threats to the Snake River spring/summer-run Chinook salmon include degraded tributary habitat within many reaches, the influence of hatchery fish on the genetic integrity of natural-origin populations, hydropower systems, toxic contamination, increased predation by nonnative species, and effects due to climate change (NOAA 2017b). Past threats that led to the decline of the species include impacts from ocean and terminal fisheries, land use practices, effects from hatchery practices, and hydropower systems. Snake River spring/summer-run Chinook salmon are sensitive to summer temperatures, transit times, and incomplete or lack of passage to natal reaches (NOAA 2017b).

## 3.3.3 Upper Columbia River Spring-run Chinook Salmon

### *Listing Status and Distribution*

The Upper Columbia River spring-run Chinook salmon has been listed as endangered since March 14, 1999 (64 *Federal Register* 14308). This listing was last updated on April 14, 2014 (79 *Federal Register* 20802).

The ESU includes naturally spawned spring-run Chinook salmon originating from Columbia River tributaries downstream of Chief Joseph Dam, excluding the Okanogan River subbasin. Also comprising the ESU are spring-run Chinook salmon from the Chief Joseph Spring Chinook Hatchery Program (Okanogan release) and artificial propagation programs from the Methow Program (NMFS 2022).

On September 2, 2005, the NMFS issued a final rule designating critical habitat for 12 ESUs of West Coast salmon and steelhead, including the Upper Columbia River spring-run Chinook salmon (70 *Federal Register* 52629).

### *Life History and Habitat Requirements*

Adults begin returning from the ocean in the early spring, with the run into the Columbia River in mid-May. Spring Chinook salmon enter the Upper Columbia River tributaries from April through July, holding in tributaries until spawning in late summer. Spawning peaks in mid- to late August, and salmon die after spawning. Adults spawn by laying eggs in dug-out redds (gravel nests) on stream bottoms.

Spring Chinook juveniles spend a year in fresh water before migrating to the Pacific Ocean in the spring of their second year of life. Most Upper Columbia River spring Chinook salmon return as adults after 2 or 3 years in the ocean, though some males may return after one winter at sea. Some males have also been observed to sexually mature in fresh water without migrating to sea. Fecundity ranges from 4,200 to 5,900 eggs, depending on the age and size of the female (NMFS 2023c).

Like steelhead, spring Chinook salmon possess homing abilities that allow them to return to their natal grounds following years spent at sea (Keefer and Caudill 2013).

### *Threats*

Although conservation and restoration initiatives targeting the Upper Columbia River spring-run Chinook ESU have improved habitat conditions for salmon spawning, rearing, and migration, widespread areas of degraded habitat from historical and ongoing incompatible land uses persist. Degraded habitat conditions include simplified stream channels, disconnected floodplains, impaired instream flows, the loss of cold-water refugia, and other limiting factors. Existing dams and other barriers continue to impede access to spawning habitat for Upper Columbia River spring-run Chinook salmon (NMFS 2022c).

## 3.4 Steelhead (*Oncorhynchus mykiss*)

### *Evolutionary Significant Units*

The Action Area represents potential habitat for two distinct population segments (DPSs)[9] of steelhead: Snake River and Upper Columbia River.

### *Description and Distribution*

Steelhead can weigh up to 30 pounds and live for up to 8 years. Steelhead are characterized by a steely gray to blue color with pink cheeks and flanks, and it tends to appear longer and skinnier than coho or Chinook salmon. Males tend to lack a hook nose. Other defining characteristics include an all-white mouth and spots aligned in straight lines on both lobes. The steelhead's appearance may vary based on the life cycle stage, with individuals developing more colorful features after an extended period in fresh water (California Sea Grant, n.d.).

The distribution and abundance of steelhead are influenced by water temperature, stream size, flow, channel morphology, vegetation type and abundance, and channel substrate size and quality (LCFRB 2010). Steelhead are found in a number of habitats, including lakes, rivers, shallow tributaries, and estuaries in the North Pacific.

### *Life History and Habitat Requirements*

Steelhead are the most widely distributed anadromous salmonid. The steelhead's life history pattern can be complex, involving repeated spawning and continuous reversals of freshwater to ocean phases (LCFRB 2010). In the Upper Columbia River Basin, steelhead spawn and rear in a variety of habitats, including small tributaries, larger rivers, and occasionally in lake outlets. They require clean, cold water with gravelly riverbeds for spawning. As juveniles, steelhead feed primarily on zooplankton. Mature steelhead are predatory feeders; they consume a variety of organisms, including smaller fish, fish eggs, crustaceans, mollusks, and aquatic and terrestrial insects and their larvae (Merz 2002).

During the time that steelhead inhabit fresh water, they require fast-flowing, cold, and gravel-bottomed streams with adequate dissolved oxygen and diverse habitat features, such as deep pools and woody debris. All populations typically grow and survive best in streams with temperatures lower than 59 degrees Fahrenheit in the summer and greater than 32 degrees Fahrenheit in the winter. Adult steelhead can also overwinter in reservoirs and overshoot natal streams. Juvenile steelhead in higher-gradient fluvial canyons tend to rear in reaches containing large boulders that provide habitat complexity. Other factors comprising habitat suitability include pH and turbidity. Streams containing excessive sediment may smother fish or clog gills; reduce primary productivity; or draw more solar insulation, increasing the water temperatures (LCFRB 2010).

### *Threats*

Like other anadromous fish, the steelhead faces threats across the entirety of its life cycle, including migration toward freshwater spawning habitat, spawning and rearing, and smolting (migration to sea). Threats broadly include overfishing, loss of freshwater and estuarine habitat, hydropower development, and ocean warming and acidification. Water withdrawals result in reduced flows that impact spawning and rearing habitats and downstream migration and rearing corridors.

[9] The ESA defines a DPS as "a vertebrate population or group of populations that is discrete from other populations of the species and significant in relation to the entire species."

## 3.5 Snake River Steelhead

### *Listing Status and Distribution*

The Snake River Basin steelhead was originally listed as threatened on August 18, 1997 (62 *Federal Register* 43937) and on January 5, 2006 (71 *Federal Register* 833). The listing was last updated on April 14, 2014 (79 *Federal Register* 20802). This species does not have designated critical habitat that overlaps the Action Area; thus, it is unlikely to occur within the Action Area.

This ESU includes all naturally spawned anadromous *O. mykiss* (steelhead) originating below natural and human-made impassable barriers from the Snake River Basin. The ESU also includes steelhead from the following artificial propagation programs: the Tucannon River Program, Dworshak National Fish Hatchery Program, East Fork Salmon River Natural Program, Little Sheep Creek/Imnaha River Hatchery Program, Salmon River B-run Program, and South Fork Clearwater (Clearwater Hatchery) B-run Program (NMFS 2023e).

### *Life History and Habitat Requirements*

The Snake River steelhead expresses a similar migration strategy as the summer-run migration strategy; steelhead may enter freshwater during a given season but may overwinter or oversummer prior to reaching reproductive maturity and continuing to natal streams to spawn (NOAA 2017b). Adult Snake River steelhead generally return to the Columbia River between June and August. Once the fish enter the Columbia River estuary, their timing of upstream migration at Bonneville Dam varies with the fish's age, size, and distribution. Most wild fish pass through the dam earlier than the hatchery fish. Overall, the peak passage of the species has shifted by about 2 weeks from late July to early August, in response to warming temperatures and reduced river flows (NOAA 2017b).

Most fish arrive in the Snake River and tributaries in early fall. Adult steelhead also overwinter in reservoirs and overshoot natal streams. This ESU migrated from the ocean and uses the colder, high-elevation tributaries for spawning and rearing juveniles. This species is capable of spawning more than once before death. Following spawning and rearing, the species begins its migration back to the ocean. After leaving the Snake River estuary, Snake River steelhead can disperse in all directions once they reach the ocean. Snake River steelhead typically reside in marine water for 1 to 3 years before returning to their natal stream to spawn.

### *Threats*

The threats to the Snake River steelhead are the same as those for the Snake River spring/summer-run Chinook salmon. The current primary threats include degraded tributary habitat within many reaches, the influence of hatchery fish on the genetic integrity of natural-origin populations, hydropower systems, toxic contamination, increased predation by nonnative species, and effects due to climate change (NOAA 2017b). Past threats that led to the decline of the species include impacts from ocean and in-river fisheries, land use practices, hatchery practices, and hydropower systems.

## 3.6 Upper Columbia River Steelhead

### *Listing Status and Distribution*

The Upper Columbia River steelhead was originally listed as endangered on August 18, 1997 (62 *Federal Register* 43937). It was reclassified to threatened on January 5, 2006 (71 *Federal Register* 834) and August 24, 2009 (74 *Federal Register* 42605). The listing was last updated on April 14, 2014 (79 *Federal Register* 20802).

The Upper Columbia River steelhead is a DPS of steelhead, an anadromous fish species native to cold-water tributaries in northwestern North America. This DPS includes naturally spawned steelhead that originate below impassible barriers from the Columbia River. The DPS also includes steelhead from five artificial propagation programs: the Wenatchee River Program, Wells Complex Hatchery Program in the Methow River, Winthrop National Fish Hatchery Program, Ringold Hatchery Program, and Okanogan River Program (NMFS 2024; UCSRB 2007).

### *Life History and Habitat Requirements*

The Upper Columbia River steelhead returns to the Columbia River in the late summer and migrates upstream through October. A portion of the returning run overwinters in main stem Columbia River reservoirs, moving to tributaries approximately 500 miles from the river mouth to spawn through the late spring. Depending on the timing and temperature, fry emerge in the mid- to late summer; cooler temperatures at upper-elevation tributaries may cause fry to emerge as late as September. Migration timing is also related to the elevation and annual stream temperatures. Juvenile steelhead generally spend 1 to 3 years rearing in fresh water before migrating to the ocean. Most adult steelhead return to the Upper Columbia after 1 or 2 years at sea (NMFS 2024; UCSRB 2007).

Once in the ocean, the Upper Columbia River steelhead generally exhibits rapid westward movement. Steelhead are distinct from salmon in that they experience multiple spawning cycles. Steelhead possess homing abilities, which means they are able to locate their natal sites as they migrate from the ocean into the Columbia River. This ability allows steelhead populations to adapt to the unique conditions of their respective streams (Keefer and Caudill 2013). Steelhead that residualize (lose the ability to smolt) in tributaries and that do not migrate to the sea become resident rainbow trout (UCSRB 2007).

### *Threats*

Factors contributing to the decline of the steelhead DPS in the Columbia River include predation and competition, blocked access to historical habitat, habitat degradation, hatchery practices, and urbanization. Despite the ability of steelhead to use a diversity of habitats, very few healthy stocks remain within the Columbia River Basin (LCFRB 2010). During migration, steelhead face barriers from hydropower dams throughout the Columbia River Basin (UCSRB 2007).

## 3.7 Ute Ladies'-tresses

### *Listing Status and Distribution*

Ute ladies'-tresses was listed as a threatened species under the ESA on January 17, 1992. Known populations occur along the shore of Rocky Reach Reservoir, upriver from Beebe Bridge (shown in **Figure 2**).

### *Life History and Habitat Requirements*

Across its range Ute ladies'-tresses blooms from early July to late October. Flowering typically occurs earlier in sites that have an open canopy and later in well-shaded sites. Ute ladies'-tresses requires habitat that includes seasonally flooded river terraces, sub irrigated or spring-fed abandoned stream channels and valleys, and lakeshores. Over one-third of all known Ute ladies'-tresses populations are found on alluvial banks, point bars, floodplains, or oxbows associated with perennial streams (USFWS 2024a).

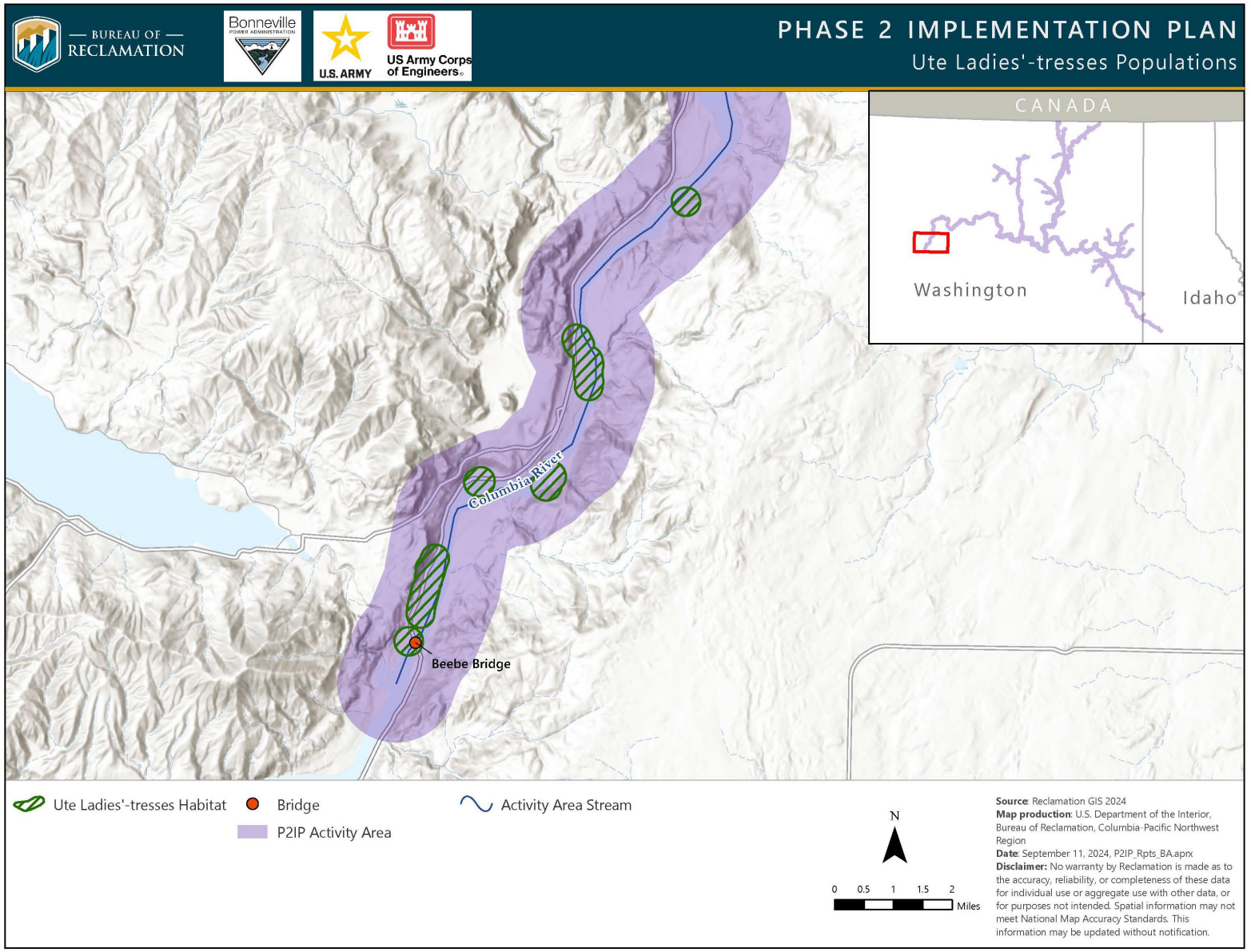


Figure 2. Ute Ladies'-tresses Populations in the Action Area

### *Threats*

Habitat loss and modification (through urbanization, water development, and conversion of wetlands to agriculture), overcollection, competition from exotic weeds, and herbicides were identified as the main potential threats to the long-term survival of Ute ladies'-tresses in 1992. Since then, other threats have been identified such as impacts from recreation; hydrology change (modification of wetland habitats through development, flood risk management, de-watering, and other changes to hydrology); herbivory by native wildlife (particularly voles); reduction in the number and diversity of insect pollinators; drought; and conflicting management with other rare species (USFWS 2024a).

# Chapter 4. Environmental Baseline

The "*environmental baseline* refers to the condition of the listed species or its designated critical habitat in the Action Area, without the consequences to the listed species or designated critical habitat caused by the Proposed Action. The environmental baseline includes the past and present impacts of all federal, state, and private actions and other human activities in the Action Area, the anticipated impacts of all proposed federal projects in the Action Area that have already undergone formal or early ESA Section 7 consultations; and the impacts of state and private actions that are contemporaneous with the consultation in process. The impacts to listed species or designated critical habitat from ongoing federal activities or existing federal facilities that are not within the Co-lead Agency's discretion to modify are part of the environmental baseline." 50 CFR § 402.02. This section, in combination with the previous section, defines the current status of the species and their habitats in the Action Area; it also provides a platform to assess the effects of the Proposed Action under consultation with the USFWS and the NMFS.

## 4.1 Current Condition of Species in the Action Area

### 4.1.1 Bull Trout

The Action Area is within the Mid-Columbia Recovery Unit for bull trout (USFWS 2015a). Below Chief Joseph Dam, several populations have been evaluated. Core habitat areas that overlap the Action Area include the Columbia River main stem, the Methow River confluence, and the Okanogan River confluence.

The main stem Columbia River below Chief Joseph Dam provides essential forage, migration, and overwintering habitat and connectivity to other subbasin core areas, including the Methow and Okanogan core areas. According to recent radio telemetry studies, one radio-tagged bull trout moved into the lower Okanogan River for a short period but moved back out and into the Methow River; one also moved into Libby Creek (WDNR n.d.).

Currently, 10 local populations of bull trout are found in tributaries or the upper main stem within the Methow core area. Most populations are stable, but a small percentage are in decline (WDNR n.d.). Douglas County Public Utility District detected 22 individual bull trout using the fish ladders at the Wells Hydroelectric Facility from January 1, 2024, through September 23, 2024; these fish were presumably destined for the Methow core area (Douglas County Public Utility District 2024). The Public Utility District in 2000–2005 and the USFWS in 2000–2004 conducted telemetry studies that indicated that tagged fish in the Methow core area were also using the main stem Columbia River for overwintering, feeding, and year-round use (WDNR n.d.).

Low water velocities and seasonally warm water temperatures in Columbia River reservoirs likely affect bull trout migration. A study found that radio-tagged bull trout that entered the Methow River upstream of Wells Dam did so during May and June, shortly following tagging at main stem dams (BioAnalysts, Inc. 2004 in Barrows et al. 2016). Adult upstream migrants appear to enter the Methow River prior to the onset of seasonally warm water temperature conditions in the main stem. The influence of seasonal reservoir conditions in Lake Pateros on downstream movement timing for adult-sized and subadult bull trout has not been thoroughly evaluated (Barrows et al. 2016). It is

likely that temperatures in the Columbia River main stem within the blocked area would also inhibit bull trout use during the summer months.

Chief Joseph Dam is a complete barrier to bull trout migration. A fish ladder at CJH is situated in the tailrace of the dam. The CJH ladder is permitted to be used May through November, with most of its operation occurring May through August and part of September. May and June are used for spring Chinook salmon; thus, the ladder would not be in operation for P2IP activities during that time, though it is anticipated the ladder would be in use for P2IP activities July through October. Bull trout have not been observed entering the trap; however, bull trout are observed in the vicinity of the tailrace and forebay areas, and it is believed they interact with the dam. However, there is no upstream passage at Chief Joseph Dam.

The blocked area above Chief Joseph Dam is known to support adult bull trout, although usage and population status are not well understood (Connor et al. 2003; USFWS 2015a; USFWS 2020). The USFWS (2015a) has designated the Northeastern Washington Research Needs Area (RNA) in the blocked area, which includes the main stem Upper Columbia River and its tributaries above Chief Joseph Dam upstream to the Canadian border. This designation also includes the Spokane River and tributaries upstream to Post Falls Dam. The entire Action Area upstream of Chief Joseph Dam is within the Northeastern Washington RNA. Bull trout are thought to have been extirpated in several rivers of the Northeast Washington RNA, including the Nespelem, Sanpoil, and Kettle Rivers (USFWS 2020).

There are currently no spawning populations within the Northeast Washington RNA, although there is suitable spawning habitat in several tributaries, including the Sanpoil River (USFWS 2015a). Several Lake Roosevelt tributaries with sufficient water and temperatures to support bull trout are also present in the RNA, including Big Sheep, Wilmont, Barnaby, Deep, Sherman, Onion, Ninemile, Stranger, and Hall Creeks (USFWS 2020; WDFW 2024). Accounts by the CTCR elders confirm historical presence of bull trout in several larger creeks that are direct tributaries to Lake Roosevelt, including Ninemile Creek, Wilmont Creek, Twin Lakes/Stranger Creek, Hall Creek, and Barnaby Creek (Hunner and Jones 1996 in USFWS 2020).

The upper Columbia River System, which includes Chief Joseph and Grand Coulee dams, has negatively altered bull trout habitat and populations. Some major negative impacts include loss of connectivity, increased barriers to movement, and increased interactions with nonnative species. A significant loss of range in northeast Washington and Canada, as well as connectivity between core areas throughout the Columbia River Basin, occurred with construction of these dams. Bull trout currently observed in the RNA are thought to be fish from local populations in the Coeur d' Alene/Spokane River or Pend Oreille River basins, or from tributaries to the Columbia River in Canada that have been entrained over dams (USFWS 2015a).

Fewer than 25 bull trout have been documented at the mouths of tributaries to Lake Roosevelt or in Lake Roosevelt/Columbia River since 2011; they are usually found near the Canadian border (USFWS 2017). In Rufus Woods Lake (upstream of Chief Joseph Dam), bull trout accounted for less than 0.1 percent of the catch during a fish inventory of the lake in 1999 (USFWS 2020). The CTCR and the Northwest Power and Conservation Council concluded that bull trout use of Rufus Woods Lake was minimal (CCT 2000 in USFWS 2020). Although suitable spawning habitat is in several tributaries to Lake Roosevelt and Rufus Woods Lake, no known spawning occurs in the tributaries. The U.S. Department of Agriculture and U.S. Forest Service have conducted environmental DNA (eDNA) sampling throughout the Pacific Northwest, including several

tributary streams to Lake Roosevelt. Presence of bull trout eDNA was not detected in any of the Lake Roosevelt tributaries sampled (Young et al. 2017).

### *Bull Trout Critical Habitat*

Bull trout have designated critical habitat in the Action Area downstream of Chief Joseph Dam. The USFWS published a final critical habitat designation for the coterminous U.S. population of the bull trout on October 18, 2010 (75 *Fed. Reg.* 63898); the rule became effective on November 17, 2010. Overall, 32 critical habitat units in 6 recovery units were designated.

The Primary Constituent Elements (PCEs) of designated critical habitat are:

- Springs, seeps, groundwater sources, and subsurface water connectivity to contribute to water quality and quantity and provide thermal refugia.
- 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.
- An abundant food base, including terrestrial organisms from a riparian origin, aquatic macroinvertebrates, and forage fish.
- Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks, and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.
- Water temperatures ranging from 36 to 59 degrees Fahrenheit (where spawning typically takes place in waters 48 degrees or below), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range would depend on the 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.
- 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 of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrates is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout likely vary from system to system.
- A natural hydrograph, including peak, high, low, and base flows within historical and seasonal ranges, or, if flows are controlled, minimal flow departure from a natural hydrograph.
- Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.
- Sufficiently low levels of occurrence of nonnative predatory species (such as lake trout, walleye, northern pike, and smallmouth bass), interbreeding species (for example, brook trout), or competing species (such as brown trout) that, if present, they are adequately temporally and spatially isolated from bull trout.

The recovery plan for the coterminous U.S. population of bull trout *includes* the status of core populations within the Action Area (USFWS 2015a). Fish passage facilities at the main stem dams were designed for anadromous salmonids, so it is unknown whether these facilities are entirely suitable for migratory bull trout. They may delay or possibly discourage bull trout from freely moving throughout critical habitat in the main stem, and they may also impede bull trout dispersal between subbasins. The USFWS projected the effects from foreseeable actions four to ten generations into the future. Bull trout populations are generally stable, although some core area

populations are in decline. Core area populations in the Columbia Headwaters Recovery Unit are the least threatened, while the core areas in the Snake and Mid-Columbia Recovery Units are more vulnerable. Operations of the Federal Columbia River Power System and the Recovery Plan acknowledge the importance of connected main stem habitats for successful overwintering survival and dispersal among core areas specifically discuss the need for monitoring and research on bull trout use of foraging, migration and overwintering habitat in the Columbia and Snake Rivers. The main stem Columbia and lower Snake Rivers and a portion of their tributary subbasins were designated as critical habitat for bull trout in 2010 (USFWS 2010), and the designation included both foraging, migration, and overwintering and spawning/rearing habitat. The recovery plan identifies several impacts on bull trout and critical habitat.

Ongoing threats in the Action Area under the baseline include habitat degradation, demographic risks, and introduction of nonnative species. Few reach-specific data exist to fully describe current condition of bull trout critical habitat in the Action Area, except in cases where site-specific information exists. The following describes the anticipated conditions of and impacts on critical habitat in the Action Area.

The intensity and severity of wildfires are likely to increase in the future (Littell et al. 2009). Wetter winters likely contribute to a higher frequency of vegetation during the growing season that is later susceptible to fires during dryer summers. Wildfires can degrade riparian cover and increase sedimentation accumulation and deposition. Sedimentation may inhibit bull trout respiration, incubation, and rearing success (USFWS 2015a). The overall increase in the frequency of wildfires corresponds to climatic regime shifts (Trouet et al. 2006). These trends are expected to continue under the baseline condition.

Bull trout migratory opportunities are limited under the baseline condition. While migratory and nonmigratory populations exist, the lack of passage can hinder the expression of migratory forms and can contribute to population isolation (USFWS 2015a) on the Upper Columbia River. Wanapum, Rock Island, Rocky Reach, and Wells dams all have fish ladders. Chief Joseph and Hells Canyon dams lack fish passage structures and are impassable barriers to upstream movement of bull trout. Historically, bull trout populations upstream and downstream of these two dam sites were connected via the main stem. The current presence of migratory individuals in the vicinity of both dams suggests that they might "connect" with upstream populations in the absence of these impassable barriers.

Below Chief Joseph Dam, bull trout connectivity is limited, and they do not frequently enter the existing ladder below the dam (Douglas County Public Utility District 2024). Many bull trout use Rocky Reach Dam ladders.[10] Near the downstream extent of the Project Area, bull trout habitat is fragmented by the Wells Hydroelectric Facility, a dam with incomplete upstream and downstream passage facilities. A fish ladder allows for migrating adult fish to pass, but bull trout captures have been historically low as compared with other migratory species. Under the baseline condition, impaired connectivity continues to limit bull trout recovery units in the Action Area (USFWS 2015a).

Water temperatures in the Action Area during the summer months often exceed maximums for bull trout habitat. The Chelan River provides relatively cold water to the Action Area during the summer and early autumn, and the Chelan River confluence may provide a thermal refuge for resident bull trout. (USFWS 2015c).

[10] Personal communication from Chelan Public Utility District biological staff

### 4.1.2 Snake River Sockeye Salmon

The Snake River sockeye salmon ESU includes all naturally spawned anadromous and residual sockeye salmon originating from the Snake River Basin, and also sockeye salmon from the Redfish Lake Captive Brood Stock Program and the Snake River Sockeye Salmon Hatchery Program. The ESU does not frequently use the Project Area and primarily occurs in the Snake River Basin. In 2023, 13 (10 percent) of the 123 Snake River sockeye adults detected at the McNary Dam adult fishways were also detected at the Wells Hydroelectric Facility fish passage facilities (Columbia River DART, Columbia Basin Research, University of Washington 2024a). Adult detections at the Wells Facility Hydroelectric suggest a relatively small fraction of the total adult returns may use the Action Area each year. Juveniles are not known to use the Action Area.

Total adult returns of Snake River sockeye have increased from less than 10 individuals at the time of listing to nearly 1,600 in 2014 (NMFS 2015). While abundance has greatly increased, this is likely due to a single strong year class that returned in 2000. While Snake River sockeye salmon have demonstrated intermittent poor run years, these negative effects have been lessened by conservation efforts. These efforts include removing barriers that may hinder the salmon's migration, and overall, the population has had generally consistent escapement years (NMFS 2015).

Other limiting factors include poor ocean conditions, simplification of habitat and floodplain connectivity (NMFS 2023d), and predation by marine mammals. Two-thirds of adult Snake River sockeye salmon return to Redfish Lake, while most of the remaining migrants return to the Sawtooth Hatchery weir (NMFS 2015). Few measures of productivity exist for Snake River sockeye salmon; however, an evaluation of trends suggests improvements in ESU status since initial listing. Adult outplanting efforts into natal lakes have resulted in progeny returns that could improve escapement and productivity estimates (NMFS 2015). While abundance and productivity suggest positive trends, most returns are of hatchery origin, while natural-origin returns remain comparatively low. Therefore, Snake River sockeye salmon are characterized by low spatial diversity, which places the ESU at higher risk in listed areas.

### 4.1.3 Snake River Fall-run Chinook Salmon

Snake River fall-run Chinook salmon are not native spawners to the Action Area. Snake River fall-run Chinook salmon historically occupied primarily two habitat regions in the lower and middle Snake River. The middle Snake River includes the reaches from Auger Falls to the Burnt River (NMFS 2017a). The Lower Snake River is downstream of the Powder River and contains Hells Canyon (NMFS 2017a).

Most Snake River fall-run Chinook salmon spawning historically occurred upstream of Hells Canyon (NMFS 2006). Spring-fed water from the Eastern Snake River Plain Aquifer provided ideal conditions for spawning in the middle Snake River, with diminishing influence lower in the system (Evermann 1896). Spawning activity in these historical spawning grounds has diminished toward the downstream extent of the middle Snake River (Connor et al. 2016). Farther downstream in the Lower Snake River, spawning activity historically occurred within broadly connected floodplains, which have become more channelized with implementation of flood-control and hydroelectric projects (NMFS 2017a).

The Lower Snake River begins downstream of the Powder River. This region historically supported less fall-run Chinook salmon spawning due to channel configuration and a lack of habitat or environmental signals from the upstream aquifer, leaving incubating larvae vulnerable to colder-than-normal conditions (NMFS 2017a). Downstream, the habitat is characterized by arid high desert, where summers are too warm, and winters too are cold to support substantial productivity

(Connor et al. 2016). Today, most spawning and rearing activity occurs from downstream of Halls Canyon to the upper region of Lower Granite reservoir. Other spawning centers include some reaches near the tailrace of Ice Harbor, Lower Monumental, Little Goose, and Lower Granite dams (Dauble et al. 1999). Spawning has also been observed in the lower Clearwater River and lower reaches of the Tucannon, Grande Ronde, Salmon, and Imnaha Rivers (NMFS 2017).

The current population delineation under the baseline broadly assorts into the Lower Snake River population and the extirpated middle Snake River population (NMFS 2017). Snake River fall-run Chinook salmon do not occur Project Area above Chief Joseph and Grand Coulee dams; however, they experience the same stressors as other runs farther downstream in the main stem Columbia River as emigrating smolts or returning adults. Other limiting factors include poor ocean conditions, simplification of habitat and floodplain connectivity (NMFS 2023d), and predation by marine mammals.

### 4.1.4 Snake River Spring/Summer-run Chinook Salmon

The Snake River spring/summer-run Chinook salmon was listed as threatened on April 22, 1992 (57 *Federal Register* 14653), reaffirmed on June 28, 2005 (70 *Federal Register* 37159), and updated on April 14, 2014 (79 *Federal Register* 20802).

The Snake River spring/summer-run Chinook salmon ESU was at a historical low at the time of its initial listing (NMFS 2017b). Implementation of several hydroelectric complexes fragmented the upper most spawning reaches, contributing to a continued downward trend in projected abundance (NMFS 2023d). This ESU has also suffered from overall habitat degradation and the introduction of outside hatchery stocks (Good et al. 2005). Other limiting factors specific to this ESU include poor ocean conditions, simplification of habitat and floodplain connectivity (NMFS 2023d), and predation by marine mammals (NMFS 2022).

The Snake River spring/summer-run Chinook salmon ESU includes all naturally spawning populations within the main stem Snake River; the Tucannon, Grande Ronde, Imnaha, and Salmon Rivers; and all hatchery production spawning within the ESU's boundaries (NMFS 2023d). This ESU is currently limited by incomplete passage at Hells Canyon Dam, which blocks access to historical spawning habitat complexes at the upper extent of the species' range (NMFS 2023d). Spring/summer-run Chinook salmon were also precluded from the Clearwater River by Lewiston Dam. Although the dam was removed 50 years ago, the spawning complex that existed above Lewiston Dam was likely already extirpated by the time the dam was removed in the early 1970s (NMFS 2023d).

The Snake River spring/summer-run Chinook salmon ESU uses high-elevation, upper reaches for spawning. This ESU consists of spring- and summer-run Chinook salmon destined for high-elevation spawning complexes in the main stem Snake River that enter at the end of spring and beginning of summer. Adults reach spawning ground by mid-August (spring run) to late September (summer run), but the spawning areas overlap in space and time (Bourret et al. 2016). Larvae hatch during the winter and early spring months, and rear in their natal streams (that is, stream-type life history). Juveniles usually overwinter the following year and emigrate in the ensuing spring as yearlings (NMFS 2023d). As emigrating juveniles move farther downstream, they may adopt a diversity of rearing strategies, depending on downstream habitat conditions, and can remain to oversummer or overwinter, leaving fresh water as 2-year-olds (NMFS 2023d).

Unlike other species and ESUs, spring/summer-run Chinook salmon's spatial structure demonstrates lower viability risk. Several populations have been grouped into five major population groups, though abundance has varied dramatically in recent years (Ford 2022). Evidence since 2001

indicates continued steep declines for some major population groups, and productivity has remained below replacement (Nau et al. 2021). The genetic diversity risk is high due to the hatchery-origin influence on wild fish-spawning grounds (NMFS 2023d). Crozier et al. (2019) identified thermal limitations during spring and summer months that could lead to a further decline under the baseline and noted a general lack of climate change resiliency in combination with shrinking winter snowpack needed for downstream flows and cool temperatures.

### 4.1.5 Upper Columbia River Spring-run Chinook

The Upper Columbia River spring-run Chinook was first listed on March 24, 1999 (64 *Federal Register* 14308). The Upper Columbia River spring-run Chinook salmon ESU includes natural- and hatchery-origin spawners above Rock Island Dam (Ford et al. 2022). This ESU's boundaries include the Northern Cascade watershed, which includes the Methow, Entiat, and Wenatchee Rivers (Ford et al. 2022). The ESU's boundaries generally end below the Action Area. Upper Columbia River Chinook salmon populations have demonstrated stable trends since the species' 1999 listing. By 2010, marginal increases appeared promising, but higher abundances corresponded with only a few more recent brood years (Ford et al. 2022; Good et al. 2005). Recent information indicates that the ESU has maintained consistent abundance levels, but productivity metrics remain short of viability goals for the ESU (Ford et al. 2022).

Under baseline conditions, Upper Columbia River spring-run Chinook salmon have been subject to high commercial fishing pressure in the Lower Columbia River. Over time, effects from high harvest rates have been exacerbated by blocked passage, habitat fragmentation, and introductions of nonnative hatchery stocks. Land use practices have contributed to the oversimplification of historical spawning complexes, availability of rearing habitat, and altered flow and temperature regimes (UCSRB 2007). Abundance has been variable but has demonstrated a generally declining trend (less than 3,500 returning adults in 2015) coupled with poor productivity (Ford 2022). Recruit-per-spawner values indicate a decline (values less than 1.0) for the Entiat, Methow, and Wenatchee Rivers. In particular, the Methow River population demonstrates poor productivity (approximately 0.5) but a high smolt-to-adult return rate relative to the remaining populations in the Entiat and Wenatchee Rivers (Ford et al. 2022). This could indicate that a few productive lineages contribute to adult returns in these rivers.

While the Upper Columbia River spring Chinook salmon ESU has improved since critically low abundances were reported in the mid-1990s, at least two populations are sustained by conservation hatchery programs. The populations of this ESU remain at high extinction risk (Ford et al. 2022). Limiting factors include poor ocean conditions, simplification of habitat and floodplain connectivity (NMFS 2023d), and predation by marine mammals.

### 4.1.6 Snake River Steelhead

Snake River steelhead include all naturally spawning populations below natural and human-made barriers along the Snake River (NMFS 2023e). The Snake River steelhead listing does not include resident forms of *O. mykiss* (rainbow trout) occurring within the DPS boundaries. Only strays are likely to occur in the Action Area. Snake River steelhead have experienced degradation and simplification of their migratory corridor due to water management and hydroelectric dam implementation along the main stem Snake and Columbia Rivers (NMFS 2023e). Modification of streamflow throughout the Snake River Basin have constrained available and historical habitat (Good et al. 2005). Snake River steelhead have been impacted by ongoing hatchery practices and a particularly high proportion of hatchery-origin steelhead passed over Lower Granite Dam (Ford 2011).

Despite implementation of restoration projects, widespread areas of degraded habitat persist, and further habitat degradation continues across the basin. Simplified stream channels, disconnected floodplains, impaired instream flow, a lack of habitat complexity, and a lack of cold-water refugia continue to threaten this DPS's persistence (NMFS 2022). Other new or continuing threats include climate change, harvest and hatchery management, predation, and hydropower.

Snake River steelhead adult return timing is diffusely defined from June to October, but they generally enter fresh water in the summer. Adults hold for the winter before entering tributaries to spawn (NMFS 2023e). Larvae emerge from the gravel in spring and use nearshore habitat, particularly side channels. As they grow, steelhead occupy progressively deeper habitat. Juveniles may rear 1–3 years and may remain adfluvial (that is, rainbow trout) or leave the hydrosystem with spring freshets (NMFS 2023e). Adults remain at sea for 1–2 years but can remain oceanic for longer periods of time (NMFS 2023e). Steelhead have one of the longest oceanic migrations and are sensitive to ocean conditions (Wild Steelhead Coalition 2022).

Although Snake River steelhead are broadly considered a summer-entry species, they express seasonal freshwater migration strategies throughout the year. Depending on the migration strategy, steelhead may mature at different rates within fresh water, depending on the temperature and flow conditions (that is, "stream-maturing" strategy). Steelhead that enter fresh water in November are fully mature and are considered "winter run." Steelhead were formally delineated by maturation strategy, with smaller, immature, earlier runs categorized as "A-run," and larger, fully mature, later-run steelhead were categorized as "B-run" (NMFS 2017a).

Snake River steelhead abundance had increased when censused in 2015, but it has declined to one-third of 2015 levels in subsequent years (Ford 2022). While productivity demonstrates population replacement, a census of spawner-to-spawner ratios in recent years shows declines, compounded by shrinking abundance (NMFS 2023e). With the exception of the populations of Grande Ronde, the Lower Snake River, and Panther Creek in the Salmon River, Snake River steelhead demonstrate low to moderate risk with respect to spatial diversity. The historical spawning complex above Hells Creek has been extirpated (NMFS 2023e). Limiting factors include poor ocean conditions, simplification of habitat and floodplain connectivity (NMFS 2023d), and predation by marine mammals. Conservation efforts to promote recovery are focused on land use practices, improving flows relative to pre-dam conditions, and reconnection of side and lateral channel habitats (2023e). Under the baseline condition, Snake River steelhead are vulnerable to climate change trends, particularly as winter snowpack diminishes (NMFS 2023e).

### 4.1.7 Upper Columbia River Steelhead

The Upper Columbia River steelhead DPS boundaries are similar to those of the Upper Columbia River spring-run Chinook, but the DPS includes Crab Creek, the Okanogan River, and historically blocked areas near Moses Lake. It is possible that Upper Columbia River steelhead may be present in the Action Area, particularly near Wells Dam.

None of the proposed passage actions or studies are aimed at restoring populations to historically accessible habitat, and there is likely low or no risk of unintended take for activities above the blocked area. Observed iteroparity[11] likely provides some mitigation for catastrophic events; the effects of repeat spawning on the population status are uncertain. Iteroparity rates generally decline with distance to the ocean (Matala et al. 2016).

[11] The life history of an organism that reproduces multiple times throughout its life

Similar to Upper Columbia River spring-run Chinook salmon, Upper Columbia River steelhead abundances temporarily increased due to the high productivity of a handful of brood years, yet productivity overall has remained poor (Ford et al. 2022). The Wenatchee population alone meets productivity and extinction criteria for viability, but the DPS overall remains at high risk (Ford et al. 2022). Likewise, the Wenatchee population demonstrates higher smolt-to-adult return performance but low productivity.

Ocean conditions for steelhead impact population success; this is likely due to the larger migratory range compared to other salmonids and the larger juvenile size at ocean entry (Ford et al. 2022). Steelhead are subject to a broader suite of mortality factors than most other salmonids due to their substantially larger migratory corridor. Ocean conditions can impact status; recent modeling work may indicate that poor ocean conditions may outstrip benefits from proposed passage implementation (Moore et al. 2021).

The populations of the Upper Columbia River steelhead DPS remain at high extinction risk and poor productivity. Limiting factors include poor ocean conditions, simplification of habitat and floodplain connectivity (NMFS 2023d), and predation by marine mammals. They also demonstrate poor genetic diversity, which is likely due to the simplification of genotypes with the introduction of conservation hatcheries (Ford et al. 2022).

### *Upper Columbia River Steelhead Critical Habitat*

On September 2, 2005, the NMFS issued a final rule designating critical habitat for 12 ESUs[12] of West Coast salmon and steelhead, including the Upper Columbia River steelhead (70 *Federal Register* 52629). Critical habitat is designated to include all river reaches accessible to listed steelhead in Columbia River tributaries upstream of the Yakima River and downstream of Chief Joseph Dam. Critical habitat also includes river reaches and estuarine areas in the Columbia River from a straight line connecting the west end of the Clatsop jetty and the west end of the Peacock jetty (50 CFR 226).

Upper Columbia River steelhead have designated critical habitat within the Action Area. Only rearing and mitigation apply to the Action Area. Identified primary chemical entities are as follows:

- Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development. These features are essential to conservation because without them, the species cannot successfully spawn and produce offspring (70 *Federal Register* 52630).
- Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks. These features are essential to conservation because without them, juveniles cannot access and use the areas needed to forage, grow, and develop behaviors (such as predator avoidance and competition) that help ensure their survival (70 *Federal Register* 52630).
- Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival. These features are essential to conservation because without them, juveniles cannot

[12] See 56 *Federal Register* 58612 for more details on the ESU policy for West Coast salmon.

> use the variety of habitats that allow them to avoid high flows, avoid predators, successfully compete, begin the behavioral and physiological changes needed for life in the ocean, and reach the ocean in a timely manner. Similarly, these features are essential for adults because they allow fish in a nonfeeding condition to successfully swim upstream, avoid predators, and reach spawning areas on limited energy stores (70 *Federal Register* 52630).

Wells Dam has upstream adult fish passage facilities, as well as a bypass system for downstream juvenile passage. The Phase I report (UCUT 2019) described habitat availability above Chief Joseph Dam. Between Chief Joseph and Grand Coulee dams, very few reaches would support steelhead life history needs, with the exception of existing side channels above Lake Rufus and near the Grand Coulee Dam tailrace. High-quality habitat was identified in the Sanpoil, the Upper Columbia, and the Spokane rivers (see Figure 5-3 in UCUT 2019). However, habitat along the Sanpoil and Upper Columbia Rivers is at least partially blocked by a human-made barrier. Upriver Dam is a hydroelectric project that blocks access to a majority of high-quality steelhead habitat on the Spokane River (UCUT 2019). However, habitats above Chief Joseph Dam would likely support a variety of life history types and migration strategies under baseline conditions, including access to deep, cold-water refugia and lateral side channels for rearing.

### 4.1.8 Ute Ladies'-tresses

The shorelines of the Rocky Reach Reservoir support the largest known occurrence of the species in the state of Washington (WANHP Database 2024). The entire distribution of Ute ladies'-tresses (*Spiranthes diluvialis*) in the Action Area is not known because presence/ absence surveys have not covered the entire area. In August 2000, three populations were discovered along the Chelan County shoreline of Rocky Reach Reservoir. Since 2000, the species range has grown with new population discoveries both upstream (2005) and downstream (2009) from the original documented locations. As a result, several metapopulations are known to occur in the Action Area (see **Figure 2** and **Table 5)**

Table 5. Summary of Ute Ladies'-tresses Monitoring on the Rocky Reach Reservoir, 2000–2020

| Year | Public Utility District | Gallagher Flat | Stocker | Bureau of Land Management | Washington Department of Fish and Wildlife (WDFW) | Public Utility District Beebe | Hendricks | Total |
|---|---|---|---|---|---|---|---|---|
| **2000** | 185 | 7 | 60 | — | — | — | — | **252** |
| **2001** | 71 | 0 | 0 | — | — | — | — | **71** |
| **2002** | 128 | 1 | 46 | — | — | — | — | **175** |
| **2003** | 178 | 19 | 58 | — | — | — | — | **255** |
| **2004** | 193 | 15 | 172 | — | — | — | — | **380** |
| **2005** | 217 | 29 | 72 | 20 | — | — | — | **318** |
| **2006** | 180 | 18 | 173 | 25 | — | — | — | **396** |
| **2007** | 177 | 48 | 398 | 336 | — | — | — | **959** |
| **2008** | 193 | 43 | 182 | 135 | — | — | — | **553** |
| **2009** | 145 | 29 | 220 | 235 | 42 | 1 | — | **672** |
| **2010** | 153 | 43 | 168 | 280 | 109 | 1 | — | **754** |
| **2011** | 149 | 92 | 320 | 247 | 8 | 0 | — | **816** |
| **2012** | 64 | 64 | 177 | 150 | 2 | 0 | — | **439** |

| Year | Public Utility District | Gallagher Flat | Stocker | Bureau of Land Management | Washington Department of Fish and Wildlife (WDFW) | Public Utility District Beebe | Hendricks | Total |
|---|---|---|---|---|---|---|---|---|
| **2013** | 46 | 65 | 299 | 138 | 6 | 0 | — | **554** |
| **2014** | 39 | 78 | 392 | 149 | 7 | 0 | — | **665** |
| **2015** | 16 | 0 | 5 | 14 | 0 | 0 | — | **35** |
| **2016** | 33 | 11 | 182 | 134 | 36 | 0 | — | **396** |
| **2017** | 15 | 0 | 14 | 20 | 23 | 0 | — | **72** |
| **2018** | 25 | 35 | 67 | 55 | 25 | 0 | 4 | **211** |
| **2019** | 59 | 2 | 16 | 98 | 69 | 0 | 5 | **249** |
| **2020** | 24 | 0 | 54 | 89 | 72 | 0 | 6 | **245** |
| **2000–20 Average** | 109 | 28 | 146 | 132 | 33 | 0 | 5 | **403** |

Source: Pope and Cordell 2020

*'—' indicates monitoring did not occur for that particular year and location.*

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# Chapter 5. Effects on Listed Species and Critical Habitat

The following section addresses direct, indirect, and cumulative effects of the Proposed Action on listed fish species and their critical habitats within the Action Area. Potential effects from other activities that are interrelated or interdependent to the Proposed Action have also been considered. Potential direct effects are identified as effects that "occur at or very close to the time of the action itself" (50 CFR 402.02). Indirect effects "are those that are caused by the proposed actions and are later in time, but still are reasonably certain to occur" (50 CFR 402.02).

Interrelated actions are those "that are part of a larger action and depend on the larger action for their justification" (50 CFR 402.02). Interdependent actions are defined as those "with no independent utility apart from the proposed action" (50 CFR 402.02). Cumulative impacts as defined by rule "are those effects of future State or private activities, not involving Federal activities, which are reasonably certain to occur within the action area of the Federal action subject to consultation" (50 CFR 402.02). In conducting a jeopardy analysis, the USFWS and NMFS determines "whether the action, taken together with cumulative effects, is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat" (50 CFR 402.14(g)(3) and (4)).

## 5.1 Effects Common to All Aquatic Species

### 5.1.1 Effects from Research Studies

Research studies funded by the Co-lead Agencies (that is, tagging, tracking, and data collection) would require minimal to no ground disturbance or other construction activity. Activities would include installation, operations, and maintenance of telemetry receivers; collection of eggs, juvenile salmon, and adult hatchery non-ESA-listed salmon; tagging and release of salmon; and spawning and carcass surveys. Information from tagged fish would inform decision-making on the need, design, and subsequent effectiveness testing (such as collection efficiency) of downstream passage facilities at each of the five individual dams in the Project Area. Telemetry equipment would be installed, operated, and maintained throughout the Action Area, including at the dams.

The placement of receivers would have little effect on ESA-listed fish species because this activity would require minimal to no ground disturbance or other construction activities. The installation and operation of receivers have the potential to cause limited initial disturbance and stress to fish from intermittent noise, boat traffic, the potential introduction of fuel or oil contaminants from boats, and sed disturbance and turbidity from buoys or in-water work. However, these would have little effect because most receivers would be affixed to existing infrastructure, which would reduce disturbance levels. The effects on fish from PIT tag array installation would be short term and minimal because many of the existing receivers would be used. Tagging of ESA-listed salmon, steelhead, and bull trout that may be incidentally captured to support other objectives would result in short-term impacts from stress and handling; these actions are covered under existing consultation documents. Any fish handling would adhere to approved protocols as described in **Appendix A** and the fish collection plan.

While tag mortality is a concern for salmonids, particularly for juveniles less than 2.6 inches (65 millimeters), research studies are proposed for yearling Chinook and sockeye salmon. Chinook yearlings, on average, are larger than 2.6 inches (65 millimeters). No subyearling salmonids would be affected.

Conversely, sockeye salmon may carry a slightly higher risk of tagging mortality than Chinook salmon due to their smaller size. Smaller fish that carry a higher risk of tagging mortality can also experience slower growth and longer downstream transit times. Recent technological tagging improvements have lowered these risks, and ongoing improvements to reduce the size of tags (that is, tag burden) may mitigate the direct effects. The magnitude of tagging mortality effects varies based on several environmental factors, species, and tagger experience. There is little potential for tag-induced mortality for research fish due to recent technological improvements (that is, transmitters are smaller today than those used in the early 2000s) and implementation of the Hatchery Genetic Management Plan EPMs.

Tagging activities would be consistent with standard tagging protocols. A minimum size criterion of 2.6 inches (65 millimeters) would be followed when pit tagging juveniles with full-size tags. The fish are tagged by Biomark at the rearing facilities (PSMFC 2016). Additionally, CTCR would continue to tag wild summer Chinook salmon in crew traps in the Sanpoil River as well as juveniles collected during seining operations. All protocols would be consistent with the PIT Tag Marking Procedures Manual (PSMFC 2016). Example site-specific tagging requirements include:

- If the water temperature is above 59 degrees Fahrenheit, the Project Proponents would not conduct tagging operations after 8 a.m.
- Project Proponents would not tag Chinook that are less than 2.6 inches (65 millimeters).

The realized impacts would be continuous for the life of the project.

With the widespread implementation of hatchery supplementation, the impacts of trap and transport have been thoroughly observed. Similarly, downstream barging of juveniles has been successfully implemented at Lower Granite Dam since 1981 (Marsh et al. 2004).

However, concerns remain over handling, crowding, and increased transit times associated with trap and transport of juvenile and adult salmonids. Some evidence suggests that transported juveniles miss critical juvenile imprinting opportunities and have increased fallback and stray rates as adults, as compared to in-river (that is, non-transported) fish (Keefer et al. 2008).

The use of acclimation sites for non-basin-introduced juveniles has demonstrated greater success rates over the release of juveniles to areas in which they are naive, by greatly reducing straying rates. Juvenile acclimation can have issues similar to those of fish artificial production facilities: disease transmission, predation, and naivete to predator avoidance and foraging strategies. Placement and management of acclimation sites require thoughtful consideration and implementation of EPMs to reduce mortality and the introduction of pathogens to native fish. Conservation measures would be implemented to reduce potential impacts; therefore, there would be little impact initially and for the life of the project.

### 5.1.2 Effects from Fish Hatchery and Acclimation Facilities

The Proposed Action would entail use of existing artificial production facilities and net pens, upgrades to existing facilities, development of new net pen locations, and two new acclimation facilities in Sanpoil River and Hangman Creek. The Proposed Action would implement an expansion to eight net pens located at Sherman Creek/Kettle Falls and Two Rivers in Lake

Roosevelt, and Pacific Aquaculture facilities in Lake Rufus Woods to rear Chinook salmon from fall parr to yearling smolts. At existing net pen sites, the additional net pens would be attached to existing or new infrastructure, such as docks, and managed similarly to the ongoing rainbow trout net pen programs. New sites could be developed in the Spokane River reservoirs that need acclimation sites but lack existing net pen infrastructure. New net pens are proposed for the Sanpoil Arm of Lake Roosevelt. Up to four net pens would be used for overwinter acclimation of salmon. Although the primary near-term need is for Chinook salmon, it is conceivable that net pens would also be used for sockeye salmon in this location at some point during the P2IP project.

The collection and release of juvenile and adult sockeye and Chinook salmon could affect target and non-target fish species from trap and net operations, handling, etc. There is the potential that individuals could endure injury and potential mortality from rearing activities. Juvenile fish that are released may interact with ESA-listed stocks below Chief Joseph Dam. There would be a potential effect for competition and the spread of disease and pathogens; however, the spread of disease and pathogens would be reduced by spreading the release locations throughout the Action Area. Additionally, net pen operators would inspect for infected fish prior to and periodically during operation.

The collection and transport of eggs, juveniles, and adults could cause stress on individuals from handling and environmental changes. These activities could also result in non-target fish mortality, particularly to fish that are sensitive to environmental changes. EPMs (**Appendix A**), including the release of non-target fish from active collection facilities and the daily monitoring of non-target fish at passive collection facilities, would reduce or minimize these effects.

Production of hatchery fish would be spread across several other hatcheries. The creation or expansion of acclimation sites would result in minor impacts on fish. The construction phase of enhancing existing facilities would adhere to site-specific mitigation features that would be incorporated once detailed site-specific designs are complete.

### 5.1.3 Effects from Interim Fish Passage

Interim passage actions would focus on the study, design, installation, and testing of upstream and downstream fish passage systems. The initial interim upstream passage strategy would be a trap-and-transport program from existing facilities below Chief Joseph Dam using transport trucks. There is the potential for ESA-listed adults to be encountered during interim adult trapping efforts that occur downstream of Chief Joseph Dam. Fish could endure direct impacts from handling activities, including the collection of adults and sorting according to their juvenile release location determined by the PIT tag code (or other mark). There would be a minor chance that some fish would endure increased stress, injury, and potential mortality from handling activities.

Co-lead Agencies would continue to follow existing EPMs and environmental compliance from projects used in the current program. Additionally, a disposition plan would be developed with the fisheries' managers to determine the specific fate of the fish captured, including any potential ESA-listed adults, such as bull trout (see EPM FR-14 in **Appendix A**).

The Proposed Action would use existing hatchery infrastructure or develop new interim small-scale facilities for egg incubation and early rearing to the subyearling life stage. The construction phase of enhancing existing facilities could have impacts on fish from noise or temporary disturbance. These effects would be minor; standard water quality monitoring and applying construction timing EPMs would be adhered to, thereby reducing the impacts of construction activities. These impacts would be short term.

### 5.1.4 Effects from Future P2IP Activities

Future P2IP activities associated with ongoing installation of research equipment, construction and development of new acclimation and rearing facilities, and development and maintenance of interim passage would impact aquatic wildlife and resources. Construction or installation of equipment to test upstream passage could potentially remove vegetation, which would alter stream features and ecosystem functions and affect salmonids. Any major construction activities, such as the development of new facilities, would have potential new impacts on terrestrial wildlife, including increased traffic, noise, and surface disturbance. Terrestrial plants could be uprooted or trampled from travel and construction. Additionally, fish could be affected by noise occurring near their habitats and from increased sedimentation into waterways from ground disturbance.

These types of activities would occur at additional locations and would be analyzed on a site-specific or implementation-level basis when these activities are considered. As more hatcheries and acclimation facilities are constructed, more fish could be reared and released, which could increase the effects described above.

## 5.2 Bull Trout

### *Direct and Indirect Effects*

Direct and indirect effects for bull trout from the Proposed Action on fisheries are described in **Section 5.1**, *Effects Common to All Aquatic Species*.

### *Cumulative Effects*

Cumulative effects include the effects of future activities that are reasonably certain to occur in the Action Area. Future federal actions that are unrelated to the Proposed Action are not considered in this section because they require separate consultation, pursuant to Section 7 of the ESA.

Past, present, and reasonably foreseeable actions in the project implementation area with the potential to affect terrestrial and aquatic resources include the Colville Confederated Tribes National Telecommunications and Information Administration (NTIA) 2.5 GHZ (gigahertz) Wireless, Middle Mile and Fiber to the Home Project, which would require new road development and construction of new towers and fiber cables. Construction of new roads could cause a new source of sediment to streams, which could impact water quality; this would indirectly affect fish, as described above under *Effects from Interim Fish Passage*. These activities would increase the disturbance and noise levels that could affect bull trout individuals and their habitat. Moreover, bull trout may be caught in ladders or other passive and active collection measures. Developing live-capture, selective fishing gear to collect Chinook salmon brood stock would allow release of non-target species promptly and safely. Gear would be used in locations when and where incidental take of bull trout with little effect.

The Proposed Action, in combination with past, present, and reasonably foreseeable actions within the project implementation area, would potentially contribute to adverse cumulative impacts for bull trout due to the potential for individual mortality. To reduce this, present and reasonably foreseeable future project activities would have their own environmental compliance, and Co-lead Agencies would follow the EPMs (see **Appendix A**).

### *Effect Determination*

The Proposed Action **may affect and is likely to adversely affect** bull trout. Effects would primarily be due to research actions of, handling and tagging. These could result in an increased potential for injury and mortality. The overall effects would be minor but could cause take of some

individuals. Incorporating the EPMs (see **Appendix A**) would reduce or minimize the potential for these effects.

## 5.3 Bull Trout Critical Habitat

### *Direct and Indirect Effects*

The entire reach from Chief Joseph Dam to McNary Dam (see **Figure D-22**, **Appendix D**) is designated as bull trout critical habitat. Bull trout have more specific habitat requirements than other salmonids, requiring cold, clean water and a high degree of habitat complexity. Habitat characteristics, including water temperature, stream size, stream gradient, substrate composition, hydraulic complexity, and large wood, have been associated with juvenile and resident bull trout distribution and abundance. Water temperatures over approximately 50 degrees Fahrenheit are thought to limit their distribution. Under the Proposed Action, potential impacts on water resources include increased use of groundwater and surface water to support juvenile and adult salmon rearing at existing hatcheries and facilities, release of juvenile and tagged fish, and interim passage systems such as trap-and-transportation operations. However, these impacts would be minor relative to the overall water supplies within the associated basins. Remaining P2IP activities, including egg collection and transport, juvenile and adult salmon rearing in net pens, and the operation and maintenance of P2IP telemetry and acoustic tags on released salmon would have no impacts on water resources.

The installation of PIT tags or acoustic receivers, or both, has the potential to directly affect bull trout critical habitat. PIT tags or acoustic receivers, or both, would be installed, operated, and maintained throughout the Project Area, including at the dams. Radio telemetry receivers would be installed for P2IP purposes. However, minimal ground disturbance is expected to occur when installing radio telemetry receiver fixed sites. Receivers, along with two or more sealed, glass-mat batteries; a solar charge controller; and remote modem (where cellular service is available), would be housed within a lockable job box. Mounted to the job box would be a minimum of one solar panel, one or more radio antennae, and a communications antenna (where applicable). Additional antennae would be mounted to metal T-posts adjacent to the job box along the shore of the site. These posts would be pounded into the ground using a T-post pounder where existing structures are unavailable. Up to three antennae would be installed on either side of the job box at 50-foot intervals, extending out 150 feet. In total, a single fixed-radio telemetry site would have up to eight antennae and extend along 300 feet of shoreline.

Minimal ground disturbance would limit any direct effects from this action. These activities would also not affect water temperature ranges (summer temperatures less than 58 degrees Fahrenheit and spawning temperatures less than 48 degrees Fahrenheit). They also would not affect habitat complexity, as required by bull trout.

Major tributaries within this area with local bull trout populations include the Methow, Entiat, Wenatchee, Yakima, and Walla Walla Rivers. Bull trout from the Methow, Entiat, Wenatchee, and Walla Walla Rivers have been documented using the Columbia River as overwintering and migratory habitat in spring, fall, and winter. The activities analyzed above would indirectly benefit bull trout critical habitat by improving the understanding of aquatic ecosystems and informing broader conservation strategies.

### *Cumulative Effects*

Cumulative effects include the effects of future activities that are reasonably certain to occur in the Action Area. Future federal actions that are unrelated to the Proposed Action are not considered in this section because they require separate consultation, pursuant to Section 7 of the ESA.

Past, present, and reasonably foreseeable actions that have the potential to impact water quality and critical habitat include the proposed Hangman Creek Hatchery Site and construction activities associated with the Colville Confederated Tribes NTIA 2.5 GHZ Wireless, Middle Mile and Fiber to the Home Project; town of Coulee Dam feeders 1, 3, and 4 upgrade and replacement; the Chief Joseph Dam powerhouse replacement of vertical sump pumps, all gate valves, all suction piping, and dry sump drainage system; and the Controls and Construction Engineering Group parking lot sinkhole project. Construction activities associated with these projects would involve ground disturbance and the potential to release pollutants, including, but not limited to, sediment and petroleum products, into waterbodies and critical habitat in the Action Area. When combined with past, present, and reasonably foreseeable future actions in the Action Area, there would be only a minor contribution to cumulative impacts on water quality and bull trout critical habitat.

Water temperature in the Columbia River has increased over the past decade. Climate change projections in the Upper Columbia River Basin indicate that warmer air temperatures would lead to earlier snowmelt and more precipitation falling as rain (USACE 2020). This would result in earlier peak flows and lower summer flows (BPA, USACE, & Reclamation. 2020). Solar heating of the proposed hatcheries would have an additive effect to this increase in temperature across the basin due to solar heating. Additionally, different release locations and fish migration patterns contribute to the change in water temperatures.

The Proposed Action, in combination with past, present, and reasonably foreseeable actions within the project implementation area, is not expected to result in potential adverse cumulative impacts for bull trout critical habitat. This is because future project activities would have their own environmental compliance, and Co-lead Agencies would follow the EPMs (see **Appendix A**).

### *Effect Determination*

The Proposed Action is **not likely to adversely affect** bull trout critical habitat. While the project would involve activities that could temporarily impact water quality in critical habitat, they are expected to have little effect, with effective EPMs (see **Appendix A**) in place to ensure the protection and enhancement of bull trout habitats.

## 5.4 Snake River Sockeye Salmon

### *Direct and Indirect Effects*

Common effects from the Proposed Action on fisheries are described in **Section 5.1**, Effects Common to All Aquatic Species. Juvenile Snake River sockeye salmon would not be affected. The following analysis is specific to the adult Snake River sockeye salmon in the P2IP Action Area.

There would be no tagging of Snake River sockeye salmon individuals; therefore, the effects described from research tagging activities would not affect these individuals. There is a potential for Snake River sockeye salmon to be affected during live-capture operations if individual adults stray into the Upper Columbia River. These effects could result in increased stress and the potential for injury and mortality of individuals. However, the potential effects would be limited by the extremely low likelihood that those fish would be present in the blocked area. In 2023, 13 (10 percent) of the

123 adult Snake River sockeye detected at the McNary Dam adult fishways were also detected at the Wells Hydroelectric Facility fish passage facilities (Columbia River DART, Columbia Basin Research, University of Washington 2024a; see **Chapter 4**, *Environmental Baseline*). The potential effects also would be limited due to applicable EPMs, such as immediate release of non-target species; seining operation measures; and the net designs described under **Appendix A**, Best Management Practices.

Salmonids require high amounts of dissolved oxygen and low water temperatures, especially for egg laying (Richter and Kolmes 2005). Released salmon could experience increased competition with other resident and nonresident fish for food and habitat. Based on studies from Phase 1, competition between resident species and reintroduced salmonids for space would be more likely to occur in tributary habitats, whereas competition for food would be more likely to occur in reservoir habitats. Competition between redband trout and reintroduced salmonids would be more likely in tributary habitats, whereas competition between reintroduced salmonids and kokanee would occur in reservoir habitats (UCUT 2019).

Net pens and hatchery facilities could directly affect water quality from hatchery waste products entering the water, which could influence the temperature, pH, and nutrients in the water. Hatchery discharge water also has the potential to introduce exotic pathogens into receiving waters. These pathogens could adversely affect listed salmonids. The CJH operation would follow all state and federal protocols to reduce the transfer of disease to wild fish populations. At each release site, juvenile fish would be sampled for the presence and virulence of pathogens prior to release (Smith Fisheries Consulting Inc. and Meridian Environmental Inc. 2006). These practices should minimize disease effects on listed adult salmon in the Action Area.

EPMs and design features would reduce the effects on sockeye salmon from the proposed activities. There would be little effect on Snake River fish due to their rare occurrence of straying into the Action Area.

### *Cumulative Effects*

Cumulative effects include the effects of future activities that are reasonably certain to occur in the Action Area. Future federal actions that are unrelated to the Proposed Action are not considered in this section because they require separate consultation, pursuant to Section 7 of the ESA.

Past, present, and reasonably foreseeable actions in the project implementation area with the potential to affect terrestrial and aquatic resources include the Colville Confederated Tribes NTIA 2.5 GHZ Wireless, Middle Mile and Fiber to the Home Project, which would require new road development and construction of new towers and fiber cables. Construction of new roads could cause a new source of sediment to streams, which could impact water quality; this would indirectly affect fish, as described above under *Effects from Interim Fish Passage*. These activities would increase soil disturbance and changes in water quality.

The reintroduction of salmon to areas upstream of Chief Joseph Dam and Grand Coulee Dam would allow fish access to habitat that would be more resilient to climate change effects expected to occur over the next 80 years. Current introductions of salmon would provide enough lead time to conduct needed research, build and test fish passage facilities, and develop donor stocks prior to the onset of substantial climate change effects on salmon habitat.

The Proposed Action, in combination with past, present, and reasonably foreseeable actions within the project implementation area, would contribute to potential adverse cumulative impacts for Snake River sockeye salmon due to the potential for individual mortality. To reduce this, present and

reasonably foreseeable future project activities would have their own environmental compliance, and EPMs would be implemented (see **Appendix A**).

### *Effect Determination*

The Proposed Action **may affect and is likely to adversely** affect the Snake River sockeye salmon. Effects would primarily be due to greater disturbances from handling, and transportation. These could result in an increased potential for injury to and mortality of adults. Juveniles would not be affected. The overall effects would be minor but, could cause take of some adults. Incorporating EPMs (see **Appendix A**) would reduce or minimize the potential for these effects.

## 5.5 Snake River Fall-Run Chinook Salmon

### *Direct and Indirect Effects*

Common effects from the Proposed Action on fisheries are described in **Section 5.1**, *Effects Common to All Aquatic Species*. Juvenile Snake River fall-run Chinook salmon would not be affected because they are not present in the Action Area. The following analysis is specific to the adult Snake River fall-run Chinook salmon within the Action Area.

There would be no tagging of Snake River fall-run Chinook salmon individuals; therefore, the effects described from research tagging activities would not affect these individuals. There would be a potential for Snake River salmon to be affected during live-capture operations. These effects could result in increased stress and the potential for injury and mortality of individuals. However, the potential effect would be limited by the relatively low likelihood that those fish would be present in the blocked area (see **Chapter 4**, *Environmental Baseline*) and due to applicable conservation measures, such as the immediate release of non-target species, seining operation measures, and the net designs described under **Section 2.2**, *Conservation Measures*.

Released Chinook salmon could experience increased competition with other resident and nonresident fish for food and habitat. Based on studies from Phase 1, competition between resident species and reintroduced salmonids for space would be more likely to occur in tributary habitats, whereas competition for food would be more likely to occur in reservoir habitats. Competition between redband trout and reintroduced salmonids would be more likely in tributary habitats, whereas competition between reintroduced salmonids and kokanee would occur in reservoir habitats (UCUT 2019). Depending on the time of year that project activities occur, there could be a greater or lesser impact on Chinook salmon. The Snake River fall-run Chinook salmon enters the Snake River in late August to early December; therefore, effects could be increased during that time if stray adults are present in the Action Area. Effects would be the same as described under **Section 5.1**, *Effects Common to All Aquatic Species*.

Net pens and hatchery facilities could directly affect water quality from hatchery waste products entering the water, which could influence the temperature, pH, and nutrients in the water. Hatchery discharge water also has the potential to introduce exotic pathogens into receiving waters. These pathogens could adversely affect listed salmonids. The CJH operation would follow all state and federal protocols to reduce the transfer of disease to wild fish populations. At each release site, fish would be sampled for the presence and virulence of pathogens prior to release (Smith Fisheries Consulting Inc. and Meridian Environmental Inc. 2006). These practices should minimize disease effects on listed salmon in the Action Area.

EPMs (see **Appendix A**) and design features would reduce the effects on Chinook salmon from the proposed activities; however, there would still be a potential for injury and mortality on individuals from the proposed activities.

### *Cumulative Effects*

Cumulative effects include the effects of future activities that are reasonably certain to occur in the Action Area. Future federal actions that are unrelated to the Proposed Action are not considered in this section because they require separate consultation, pursuant to Section 7 of the ESA.

Past, present, and reasonably foreseeable actions in the project implementation area with the potential to affect terrestrial and aquatic resources include the Colville Confederated Tribes NTIA 2.5 GHZ Wireless, Middle Mile and Fiber to the Home Project, which would require new road development and construction of new towers and fiber cables. Construction of new roads could cause a new source of sediment to streams, which could impact water quality; this would indirectly affect fish, as described above under *Effects from Interim Fish Passage*. These activities would increase soil disturbance and changes in water quality.

Salmonids are particularly sensitive to temperature changes in their habitat, and these effects could result in injury or mortality. The reintroduction of salmon to areas upstream of Chief Joseph Dam and Grand Coulee Dam would allow fish access to habitat that would be more resilient to climate change effects expected to occur over the next 80 years. Current introductions of salmon would provide enough lead time to conduct needed research, build and test fish passage facilities, and develop donor stocks prior to the onset of substantial climate change effects on salmon habitat.

The Proposed Action, in combination with past, present, and reasonably foreseeable actions within the project implementation area, would contribute to potential adverse cumulative impacts for Snake River fall-run Chinook salmon due to the potential for individual mortality. To reduce this, present and reasonably foreseeable future project activities would have their own environmental compliance, and EPMs would be implemented (see **Appendix A**).

### *Effect Determination*

The Proposed Action **may affect and is likely to adversely** affect the Snake River fall-run Chinook salmon. Effects would primarily be due to greater disturbances from handling, tagging, and transportation. These could result in an increased potential for injury to and mortality of adults only. The overall effects would be minor due to low encounters in the Action Area, but these activities could cause take of some adults. Incorporating EPMs (see **Appendix A**) would reduce or minimize the potential for these effects.

## 5.6 Snake River Spring/Summer-Run Chinook Salmon

### *Direct and Indirect Effects*

Common effects from the Proposed Action on fisheries are described in **Section 5.1**, *Effects Common to All Aquatic Species*. Juvenile Snake River spring/summer-run Chinook salmon would not be affected because they are not present in the Action Area. The following analysis is specific to the adult Snake River spring/summer-run Chinook salmon within the Action Area.

There would be no tagging of Snake River spring/summer-run Chinook salmon individuals; therefore, the effects described from research tagging activities would not affect these individuals. There is a potential for Snake River salmon to be affected during live-capture operations. These effects could result in increased stress and the potential for injury and mortality on individuals.

However, the potential effect would be limited by the relatively low likelihood that those fish would be present in the blocked area (see *Environmental Baseline* section) and applicable conservation measures, such as immediate release of non-target species, seining operation measures, and the net designs described under **Section 2.2**, *Conservation Measures*.

Transport into new fish hatcheries and acclimation facilities would not have effects on Snake River fish because they would not be transported to new facilities.

Depending on the time of year that project activities occur, there could be a greater or lesser impact on Chinook salmon. The Snake River spring/summer-run Chinook salmon return to the Columbia River between June and July and are most sensitive to water temperatures during that time. Therefore, effects would be increased during summer when they are most vulnerable. A trap-and-transport program for collection, transport, and release of adult summer Chinook salmon is currently underway and would continue until other passage solutions are developed. Effects would be the same as described under **Section 5.1** *Effects Common to All Aquatic Species*.

Net pens and hatchery facilities could directly affect water quality from hatchery waste products entering the water, which could influence the temperature, pH, and nutrients in the water. Hatchery discharge water also has the potential to introduce exotic pathogens into receiving waters. These pathogens could adversely affect listed salmonids. The CJH operation would follow all state and federal protocols to reduce the transfer of disease to wild fish populations. At each release site, fish would be sampled for the presence and virulence of pathogens prior to release (Smith Fisheries Consulting Inc. and Meridian Environmental Inc. 2006). These practices should minimize disease effects on listed salmon in the Action Area.

EPMs (see **Appendix A**) and design features would reduce the effects on spring/summer-run Chinook salmon from the proposed activities; however, there would still be a potential for injury and mortality of individuals from the proposed activities.

### *Cumulative Effects*

Cumulative effects include the effects of future activities that are reasonably certain to occur in the Action Area. Future federal actions that are unrelated to the Proposed Action are not considered in this section because they require separate consultation, pursuant to Section 7 of the ESA.

Past, present, and reasonably foreseeable actions in the project implementation area with the potential to affect terrestrial and aquatic resources include the Colville Confederated Tribes NTIA 2.5 GHZ Wireless, Middle Mile and Fiber to the Home Project, which would require new road development and construction of new towers and fiber cables. Construction of new roads could cause a new source of sediment to streams, which could impact water quality; this would indirectly affect fish, as described above under **Section 5.1.3** *Effects from Interim Fish Passage*. These activities would increase soil disturbance and changes in water quality. Salmonids are particularly sensitive to temperature changes in their habitat, and these effects could result in injury or mortality.

The current Coeur d'Alene Tribe nikwln' Hatchery project is an artificial production facility that is used to rear juvenile summer Chinook salmon from fertilized egg through yearling life stages. This facility is also currently used to mark juvenile summer Chinook salmon with PIT tags and acoustic transponders that are used for survival and behavioral studies. These uses would be expected to continue over the entire 20-year P2IP time frame. This could cause additional effects, such as stress and injury or mortality to fish species, as described above. No construction actions or modifications to existing infrastructure are planned at the nikwln' Hatchery to accommodate artificial production

activities proposed for the P2IP. This project would have its own compliance process to mitigate any adverse impacts on fish populations.

The Proposed Action, in combination with past, present, and reasonably foreseeable actions within the project implementation area, would contribute to potential adverse cumulative impacts for Snake River spring/summer-run Chinook salmon due to the potential for individual mortality. To reduce this, present and reasonably foreseeable future project activities would have their own environmental compliance, and EPMs would be implemented (see **Appendix A**).

### *Effect Determination*

The Proposed Action **may affect and is likely to adversely** affect the Snake River spring/summer-run Chinook salmon. Effects would primarily be due to greater disturbances from handling, tagging, and transportation. These could result in an increased potential for injury to and mortality of adults only. The overall effects would be minor but could cause take of some individuals. Incorporating EPMs (see **Appendix A**) would reduce or minimize the potential for these effects.

## 5.7 Upper Columbia River Spring-Run Chinook Salmon

### *Direct and Indirect Effects*

Common effects from the Proposed Action on fisheries are described in **Section 5.1**, *Effects Common to All Aquatic Species*. The following analysis is specific to the Upper Columbia River spring-run Chinook salmon within the Action Area.

Chinook individuals, including the Upper Columbia River spring-run Chinook, are likely to receive greater impacts than other species from research studies; this is because facilities are primarily used to collect naive Chinook and sockeye salmon for transport and release into the blocked area. A trap-and-transport program for naive and local-origin adults would be established early in the P2IP implementation. Fish could be collected from existing hatcheries and collection facilities in the Columbia River downstream of Chief Joseph Dam, then transported and released upstream in the blocked area. Adult release sites would include Rufus Woods Lake, Lake Roosevelt, the Columbia River transboundary reach, Hangman Creek, Sanpoil River, Spokane River, Little Spokane River, and other spawning and rearing areas.

The effects from the collection, transport, and release of Upper Columbia River summer/fall Chinook salmon could result in effects on individuals, including increased stress and the potential for injury and mortality. Transport into new fish hatcheries and acclimation facilities could temporarily disrupt their habitat and cause stress on individuals. Released Chinook salmon could experience increased competition with other resident and nonresident fish for food and habitat due to competition between resident species and reintroduced salmonids. Competition for space likely would occur in tributary habitats, whereas competition for food is more likely to occur in reservoir habitats. Competition between redband trout and reintroduced salmonids is more likely in tributary habitats, whereas competition between reintroduced salmonids and kokanee would occur in reservoir habitats (UCUT 2019).

Depending on the time of year that project activities occur, there could be a greater or lesser impact on Chinook salmon. The Upper Columbia River spring-run Chinook salmon enter the Upper Columbia River tributaries from April through July; therefore, effects would be increased during that time. A trap and transport program for collection, transport, and release of adult Chinook species is currently underway and would continue until other passage solutions are developed. Effects would be the same as those described under **Section 5.1** *Effects Common to All Aquatic Species.*

The risk of incidental adverse effects on individual Upper Columbia River spring-run Chinook salmon during brood stock collection cannot be eliminated. Some straying of hatchery fish and introgression with Upper Columbia River spring Chinook could occur. Also, some competition of hatchery Chinook juveniles with listed Upper Columbia River spring-run Chinook and steelhead juveniles could occur. Incidental mortality of Upper Columbia River spring-run Chinook and steelhead during the hatchery Chinook harvest could also occur. In addition, Upper Columbia River spring-run Chinook and steelhead may enter the hatchery ladder and be handled and released back to the Columbia River. Therefore, some level of "take," while unquantifiable and minor, is probably unavoidable (Smith Fisheries Consulting Inc. and Meridian Environmental Inc. 2006).

EPMs (**Appendix A**) and design features would reduce the effects on the Upper Columbia River spring-run Chinook salmon from the proposed activities; however, there would still be a potential for injury and mortality on individuals from the proposed activities. Over the long term, the proposed activities would help preserve endangered salmon species and increase population and survival rates. Hatcheries provide a controlled environment where eggs and juveniles are protected from predators. Research studies would allow for a better understanding of salmon migration behaviors and habitat utilization to assess the effectiveness of hatchery programs.

### *Cumulative Effects*

Cumulative effects include the effects of future activities that are reasonably certain to occur in the Action Area. Future federal actions that are unrelated to the Proposed Action are not considered in this section because they require separate consultation, pursuant to Section 7 of the ESA.

Past, present, and reasonably foreseeable actions in the project implementation area with the potential to affect aquatic resources include the Colville Confederated Tribes NTIA 2.5 GHZ Wireless, Middle Mile and Fiber to the Home Project, which would require new road development and construction of new towers and fiber cables. Construction of new roads could cause a new source of sediment to streams, which could impact water quality; this would indirectly affect fish, as described above under **Section 5.1.3** *Effects from Interim Fish Passage*. These activities would increase soil disturbance and changes in water quality.

Salmonids are particularly sensitive to temperature changes in their habitat, and these effects could result in injury or mortality. The reintroduction of salmon to areas upstream of Chief Joseph Dam and Grand Coulee Dam would allow fish access to habitat that would be more resilient to climate change effects expected to occur over the next 80 years. Current introductions of salmon would provide enough lead time to conduct needed research, build and test fish passage facilities, and develop donor stocks prior to the onset of substantial climate change effects on salmon habitat.

The Proposed Action, in combination with past, present, and reasonably foreseeable actions within the project implementation area, is expected to contribute to potential adverse cumulative impacts for Upper Columbia River spring-run Chinook salmon due to the potential for individual mortality. To reduce this, present and reasonably foreseeable future project activities would have their own environmental compliance, and EPMs would be implemented (see **Appendix A**).

### *Effect Determination*

The Proposed Action **may affect and is likely to adversely** affect the Upper Colombia River spring-run Chinook salmon. Effects would primarily be due to greater disturbances from handling, tagging, and transportation. These could result in an increased potential for injury to and mortality of individuals due to physiological stress on Upper Columbia River spring-run Chinook salmon. The effects would be minor. Incorporating EPMs (see **Appendix A**) would reduce or minimize the

potential for these effects. Over the long term, it is anticipated the proposed activities would benefit endangered salmon species and increase population and survival rates. The reintroduction of salmon to areas upstream of Chief Joseph Dam and Grand Coulee Dam would allow fish access to habitat that would be more resilient to climate change effects expected to occur over the next 80 years.

## 5.8 Snake River Steelhead

### *Direct and Indirect Effects*

Common effects from the Proposed Action on fisheries are described in **Section 5.1**, *Effects Common to All Aquatic Species*. Juvenile Snake River steelhead would not be affected because they are not present in the Action Area. The following analysis is specific to the adult Snake River steelhead within the Action Area.

There would be no tagging of Snake River steelhead individuals; therefore, the effects described from research tagging activities would not affect these individuals. There is a potential for Snake River steelhead to be affected during live-capture operations. Snake River steelhead adults could be encountered during interim adult trapping efforts downstream of Chief Joseph Dam. These effects could result in increased stress and the potential for injury to and mortality of individuals. However, the potential effect would be limited by the relatively low likelihood that those fish would be present in the blocked area (see **Chapter 4***, Environmental Baseline*) and applicable conservation measures, such as immediate release of non-target species, seining operation measures, and the net designs described under **Section 2.2**, *Conservation Measures*.

The Proposed Action includes extending the collection time period at the adult ladder below Chief Jospeh Dam. There may be a potential for late-run, mature Snake River steelhead to enter the trap due to these extended operations. Snake River steelhead are not documented to enter the trap. While take from handling at the trap is possible, it is unlikely.

Based on studies from Phase 1, competition between resident species and reintroduced salmonids for space would be more likely to occur in tributary habitats, whereas competition for food would be more likely to occur in reservoir habitats. Competition between redband trout and reintroduced salmonids would be more likely in tributary habitats, whereas competition between reintroduced salmonids and kokanee would occur in reservoir habitats (UCUT 2019). Steelhead tend to prefer side channels for rearing and holding and thus would be more impacted by competition in tributary habitats.

Following EPMs would help reduce effects on steelhead but would not eliminate the potential for injury to and mortality of individuals.

### *Cumulative Effects*

Cumulative effects include the effects of future activities that are reasonably certain to occur in the Action Area. Future federal actions that are unrelated to the Proposed Action are not considered in this section because they require separate consultation, pursuant to Section 7 of the ESA.

Past, present, and reasonably foreseeable actions in the project implementation area with the potential to affect terrestrial and aquatic resources include the Colville Confederated Tribes NTIA 2.5 GHZ Wireless, Middle Mile and Fiber to the Home Project, which would require new road development and construction of new towers and fiber cables. Construction of new roads, which could cause noise disturbances and a new source of sediment to streams, could impact water quality; this would indirectly affect steelhead as described above under **Section 5.1.3** *Effects from Interim Fish*

*Passage*. Snake River steelhead migrating through areas where disturbance from construction could occur would temporarily be displaced from the work area. It is anticipated that steelhead would avoid direct contact with construction equipment and would thus avoid injury and mortality. However, there is still a potential for steelhead to be affected if they remain.

The Proposed Action, in combination with past, present, and reasonably foreseeable actions within the project implementation area, is expected to contribute to potential adverse cumulative impacts for Snake River steelhead due to the potential of individual mortality. To reduce this, present and reasonably foreseeable future project activities would have their own environmental compliance, and EPMs would be implemented (see **Appendix A**).

### *Effect Determination*

The Proposed Action **may affect and is likely to adversely** affect the Snake River steelhead. Effects would primarily be due to greater disturbances from handling, tagging, and transportation. These could result in an increased potential for injury to and mortality of adults only. The effects would be minor. Incorporating EPMs (**Appendix A**) would reduce or minimize the potential for these effects. Over the long term, it is anticipated the proposed activities would benefit endangered salmon species and increase population and survival rates. The reintroduction of salmon to areas upstream of Chief Joseph Dam and Grand Coulee Dam would allow fish access to habitat that would be more resilient to climate change effects expected to occur over the next 80 years.

## 5.9 Upper Columbia River Steelhead

### *Direct and Indirect Effects*

Common effects from the Proposed Action on fisheries are described in **Section 5.1**, *Effects Common to All Aquatic Species*. The following analysis is specific to the Upper Columbia River steelhead within the Action Area.

There would be the potential for Upper Columbia River steelhead adults to be encountered during interim adult trapping efforts downstream of Chief Joseph Dam. This species could endure increased stress and injury or mortality from operations, handling, and tagging. EPMs (see **Appendix A**) would be followed under the current program to minimize those effects.

A high density of fish in net pens could promote the spread of disease and pathogens. Upper Columbia River steelhead are sensitive to environmental changes, and they are particularly vulnerable to new disease pressures. Net pens and hatchery facilities could directly affect water quality from hatchery waste products entering the water, which could influence the temperature, pH, and nutrients in the water. Hatchery discharge water also has the potential to introduce exotic pathogens into receiving waters. These pathogens could adversely affect listed salmonids. The CJH operation would follow all state and federal protocols to reduce the transfer of disease to wild fish populations. At each release site, juvenile fish would be sampled for presence and virulence of pathogens prior to release (Smith Fisheries Consulting Inc. and Meridian Environmental Inc. 2006). These practices should minimize disease effects on listed steelhead in the Action Area.

Fish-carrying pathogens that do not exist in the natural population would not be released into the Okanogan River or Omak Creek. These practices should minimize disease effects on listed Upper Columbia River spring-run Chinook and steelhead in the Action Area.

The risk of incidental adverse effects on individual Upper Columbia River steelhead adults and to a much lesser degree Upper Columbia River spring-run Chinook during brood stock collection cannot

be entirely eliminated. Some straying of hatchery fish and introgression with Upper Columbia River spring Chinook could occur, and some competition of hatchery Chinook juveniles with listed Upper Columbia River spring Chinook and steelhead juveniles could occur. Incidental mortality of Upper Columbia River spring-run Chinook and steelhead during the hatchery Chinook harvest could also occur. In addition, Upper Columbia River spring-run Chinook and steelhead could enter the hatchery ladder and be handled and released back to the Columbia River. Therefore, some level of "take," while unquantifiable and minor, is probably unavoidable (Smith Fisheries Consulting Inc. and Meridian Environmental Inc. 2006).

Continued and expanded operation of the hatchery facilities could impact water quality and quantity because water would be diverted from the Okanogan or Columbia Rivers to the hatchery facilities and then returned to the river of origin. Water quality would be monitored and measures to minimize adverse effects would be implemented to avoid affecting critical habitat. Critical habitat includes all river reaches accessible to listed steelhead in Columbia River tributaries upstream of the Yakima River and downstream of Chief Joseph Dam. The activities analyzed above would indirectly benefit Upper Columbia River steelhead critical habitat by improving the understanding of aquatic ecosystems and informing broader conservation strategies.

### *Cumulative Effects*

Cumulative effects include the effects of future activities that are reasonably certain to occur in the Action Area. Future federal actions that are unrelated to the Proposed Action are not considered in this section because they require separate consultation, pursuant to Section 7 of the ESA.

Past, present, and reasonably foreseeable actions in the project implementation area with the potential to affect aquatic resources include the Colville Confederated Tribes NTIA 2.5 GHZ Wireless, Middle Mile and Fiber to the Home Project, which would require new road development and construction of new towers and fiber cables. Construction of new roads could cause a new source of sediment to streams, which could impact water quality; this would indirectly affect fish and critical habitat.

The operation of the hatchery facilities could impact water quality and quantity because water would be diverted from the Okanogan or Columbia Rivers to the hatchery facilities and then returned to the river of origin. Water quality would be monitored and measures to minimize adverse effects would be implemented.

Climate change is identified as a major threat to salmon, steelhead, Pacific lamprey, and other aquatic resources in the Columbia River Basin. Efforts to assess and provide adaptation to future climate change are a major current focus for Tribes and other managers of aquatic resources in the region. The best available scientific information from updated global circulation models forecast substantial climate-driven changes to Columbia River Basin hydrology, as well as increased air and stream temperatures. Higher winter and summer stream temperatures and more frequent droughts would stress native aquatic biota and result in increased salmon adult and juvenile mortality, as evidenced by the loss of thousands of adult sockeye salmon in 2015 caused by low flows and warm river temperatures. The reintroduction of salmon to areas upstream of Chief Joseph Dam and Grand Coulee Dam would allow fish access to habitat that would be the most resilient to the climate change effects expected over the next 80 years.

The Proposed Action, in combination with past, present, and reasonably foreseeable actions within the project implementation area, is expected to contribute to potential adverse cumulative impacts for Upper Columbia River steelhead due to the potential for individual mortality. To reduce this,

present and reasonably foreseeable future project activities would have their own environmental compliance, and EPMs would be implemented (see **Appendix A**).

### *Effect Determination*

The Proposed Action **may affect and is likely to adversely affect** the Upper Columbia River steelhead. Effects would primarily be due to greater disturbances from handling, tagging, and transportation. These could result in an increased potential for injury to and mortality of individuals however, the effects would be minor. Incorporating EPMs (see **Appendix A**) would reduce or minimize the potential for these effects. Over the long term, it is anticipated the proposed activities would benefit endangered salmon species and increase population and survival rates. The reintroduction of salmon to areas upstream of Chief Joseph Dam and Grand Coulee Dam would allow fish access to habitat that would be more resilient to climate change effects expected to occur over the next 80 years.

## 5.10 Upper Columbia River Steelhead Critical Habitat

### *Direct and Indirect Effects*

Under the Proposed Action, direct effects on water resources would include increased use of groundwater and surface water to support juvenile and adult salmon rearing at existing hatcheries and facilities, release of juvenile and tagged fish, and interim passage systems such as trap-and-transportation operations. However, these impacts would be minor relative to overall water supplies within the associated basins. The remaining P2IP activities, including egg collection and transport, juvenile and adult salmon rearing in net pens, and the operation and maintenance of P2IP telemetry and acoustics on released salmon would have little and short-term impacts on water resources and Upper Columbia River critical habitat.

The installation of PIT tags or acoustic receivers, or both, would have the potential to directly affect Upper Columbia River steelhead critical habitat. PIT tags or acoustic receivers, or both, would be installed, operated, and maintained throughout the Project Area, including at the dams. Radio telemetry receivers would be installed for P2IP purposes. However, minimal ground disturbance is expected to occur when installing radio telemetry receivers at fixed sites. Receivers, along with two or more sealed, glass-mat batteries; a solar charge controller; and remote modem (where cellular service is available), would be housed within a lockable job box. Mounted to the job box would be a minimum of one solar panel, one or more radio antennae, and a communications antenna (where applicable). Additional antennae would be mounted to metal T-posts adjacent to the job box along the shore of the site. These posts would be pounded into the ground using a T-post pounder, where existing structures are unavailable. Up to three antennae would be installed on either side of the job box at 50-foot intervals, extending out 150 feet. In total, a single fixed-radio telemetry site would have up to eight antennae and extend along 300 feet of shoreline. Minimal ground disturbance would limit any direct effects on Upper Columbia River steelhead critical habitat from this action.

The introduction of salmon could indirectly impact the chemical properties of water quality. The presence of salmon in Upper Columbia River steelhead critical habitat could lead to an increase in biological oxygen demand and reduced dissolved oxygen levels. Dense spawning salmon could modify the dissolved oxygen through processes such as respiration and carcass decomposition. However, Upper Columbia River steelhead critical habitat would not be designated in the blocked area where spawning would occur; therefore, it would be unlikely that a large enough concentration

of carcasses would be present in Upper Columbia River steelhead critical habitat locations to cause measurable changes or adverse effects on water quality.

### *Cumulative Effects*

Cumulative effects include the effects of future activities that are reasonably certain to occur in the Action Area. Future federal actions that are unrelated to the Proposed Action are not considered in this section because they require separate consultation, pursuant to Section 7 of the ESA.

Past, present, and reasonably foreseeable actions that have the potential to impact water quality and critical habitat include the proposed Hangman Creek Hatchery Site and construction activities associated with the Colville Confederated Tribes NTIA 2.5 GHZ Wireless, Middle Mile and Fiber to the Home Project; the town of Coulee Dam feeders 1, 3, and 4 upgrade and replacement; the Chief Joseph Dam powerhouse replacement of vertical sump pumps, all gate valves, all suction piping, and dry sump drainage system; and the Controls and Construction Engineering Group parking lot sinkhole project. Construction activities associated with these projects would involve ground disturbance and the potential to release pollutants, including, but not limited to, sediment and petroleum products, into waterbodies and critical habitat in the Action Area. When combined with past, present, and reasonably foreseeable future actions within the analysis area, there would only be a minor contribution to cumulative impacts on water quality and Upper Columbia River steelhead critical habitat.

Water temperature in the Columbia River has increased over the past decade. Climate change projections in the Upper Columbia River Basin indicate that warmer air temperatures would lead to earlier snowmelt and more precipitation falling as rain (USACE 2020). This would result in earlier peak flows and lower summer flows (BPA 2020; Chang 2023). Solar heating of proposed hatcheries would have an additive effect to this increase in temperature across the basin due to solar heating. The Proposed Action, in combination with past, present, and reasonably foreseeable actions within the project implementation area, is not expected to result in potential adverse cumulative impacts for Upper Columbia River steelhead critical habitat; this is because future project activities would have their own environmental compliance, and EPMs would be implemented (see **Appendix A**).

### *Effect Determination*

The Proposed Action **is not likely to adversely modify** Upper Columbia River steelhead critical habitat. The project's design and implementation include measures to avoid impacts, and any potential disturbances are expected to be temporary and managed to prevent long-term adverse effects. Incorporating EPMs (see **Appendix A**) would reduce or minimize the potential for these effects. Over the long term, it is anticipated the proposed activities would benefit endangered salmon species and increase population and survival rates. The reintroduction of salmon to areas upstream of Chief Joseph Dam and Grand Coulee Dam would allow fish access to habitat that would be more resilient to climate change effects expected to occur over the next 80 years.

## 5.11 Ute Ladies'-tresses

### *Direct and Indirect Effects*

The proposed activities that could potentially affect known Ute ladies'-tresses plants include geotechnical investigations at acclimation sites and deployment of shore-based receivers.

Geotechnical investigations would not affect the population known to occur along the Rocky Reach Reservoir because no vegetation would be removed from that portion of the Action Area. Presence

and absence surveys for Ute ladies'-tresses have not been performed at new acclimation site study areas (see EPM VW-3 in **Appendix A**). Geotechnical investigations that require trenching, drilling, or other surface disturbance at the Louie Creek, sqweyu', and Glen Tana Acclimation Sites could potentially remove plants, presuming plants are present. The potential for Ute ladies'-tresses to occur at the proposed acclimation sites is very low due to the density of overstory vegetation along the riverbanks and the presence of invasive reed canary grass (*Phalaris arundinacea)*, iris (*Iris* spp.), and others, especially at the sqweyu' and Glen Tana Acclimation Sites.

Placement of shore-based receivers in areas known to support Ute ladies'-tresses populations could potentially harm aboveground plant parts if job boxes are placed directly on top of plants. To minimize the potential for effects, the Co-lead Agencies would employ Ute ladies'-tresses conservation measures, such as conducting presence and absence surveys in areas classified as suitable habitat during the growing season prior to ground-disturbing activities. Avoidance and minimization measures would be implemented to assess Ute ladies'-tresses presence. If detected, those areas would be excluded from activities.

### *Cumulative Effects*

Cumulative effects include the effects of future activities that are reasonably certain to occur in the Action Area. Future federal actions that are unrelated to the Proposed Action are not considered in this section because they require separate consultation, pursuant to Section 7 of the ESA.

Past, present, and reasonably foreseeable actions in the project implementation area with the potential to affect Ute ladies'-tressed include the Colville Confederated Tribes NTIA 2.5 GHZ Wireless, Middle Mile and Fiber to the Home Project, which would require new road development and construction of new towers and fiber cables. Construction of new roads could cause surface disturbance, which could degrade or remove habitat if these activities were to occur where Ute ladies'-tresses populations are.

The Proposed Action, in combination with past, present, and reasonably foreseeable actions within the project implementation area, is expected to contribute to potential cumulative impacts for Ute ladies'-tresses due to the potential for disturbance and removal of plants. To reduce this, present and reasonably foreseeable future project activities would have their own environmental compliance, and EPMs would be implemented (see **Appendix A**).

### *Effect Determination*

The Proposed Action **may affect and is not likely to adversely affect** Ute ladies'-tresses. The potential for geotechnical investigations to affect Ute ladies'-tresses is very low because riparian vegetation could be removed from localized riparian areas with dense overstory vegetation and an abundance of invasive species. Absence of the species has not been confirmed at those locations. Sites adjacent to known Ute ladies'-tresses locations with suitable habitat would be surveyed during the growing season (see VW-3 in **Appendix A**). Excluding deployment of new shore-based receivers in known Ute ladies'-tresses populations along Rocky Reach Reservoir would minimize the potential for installation of that equipment to harm individuals known to occur along the Columbia River. The action would cause no disruption to hydrology in the Action Area. For these reasons, the action may affect, but is not likely to adversely affect, Ute ladies'-tresses.

# Chapter 6. Effect Determination Summary

**Table 6** provides a summary of the effect determinations for the species addressed in this biological assessment.

Table 6. Effect Determinations for Species Addressed

| Common Name | Scientific Name | Status | Determinations of Effects[1] |
|---|---|---|---|
| **MAMMALS** | | | |
| Canada lynx | *Lynx canadensis* | Threatened | No effect |
| Gray wolf | *Canis lupus* | Endangered | No effect |
| Grizzly bear | *Ursus arctos horribilis* | Threatened | No effect |
| North American wolverine | *Gulo gulo luscus* | Threatened | No effect |
| **BIRDS** | | | |
| Yellow-billed cuckoo | *Coccyzus americanus* | Threatened | No effect |
| **INSECTS** | | | |
| Monarch butterfly | *Danaus plexippus* | Candidate | No effect |
| **FISH** | | | |
| Bull trout | *Salvenlinus confluentus* | Threatened | LAA |
| Snake River sockeye salmon | *Oncorhynchus nerka* | Endangered | LAA |
| Snake River fall-run Chinook salmon | *Oncorhynchus tshawytscha* | Threatened | LAA |
| Snake River spring/summer-run Chinook salmon | *Oncorhynchus tshawytscha* | Threatened | LAA |
| Upper Columbia River spring-run Chinook salmon | *Oncorhynchus tshawytscha* | Endangered | LAA |
| Snake River steelhead | *Oncorhynchus mykiss* | Threatened | LAA |
| Upper Columbia River steelhead | *Oncorhynchus mykiss* | Threatened | LAA |
| **PLANTS** | | | |
| Spalding's catchfly | *Silene spaldingii* | Threatened | No effect |
| Ute ladies'-tresses | *Spiranthes diluvialis* | Threatened | NLAA |
| Whitebark pine | *Pinus albicaulis* | Threatened | No effect |

[1] **LAA** = may affect, likely to adversely affect; NLAA = may affect, not likely to adversely affect

**Table 7** provides a summary of the effect determinations for critical habitat within the Action Area analyzed in this biological assessment.

Table 7. Effect Determinations for Critical Habitat

| Common Name | Scientific Name | Status | Determinations of Effects[1] |
|---|---|---|---|
| Bull trout critical habitat | *Salvenlinus confluentus* | Threatened; final critical habitat | NLAM |
| Upper Columbia River steelhead critical habitat | *Oncorhynchus mykiss* | Threatened; final critical habitat | NLAM |

[1] **NLAM** = may affect, not likely to adversely modify

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# Chapter 7. Literature Cited


Barrows, M. G., J. M. Hudson, C. Franklin, and J. Sprando. 2021. Clackamas River Bull Trout Reintroduction Project, 2019 Annual Report. U.S. Fish and Wildlife Service, Columbia River Fish and Wildlife Conservation Office, Vancouver, Washington.

Bourret, S. L., C. C. Caudill, and M. L. Keefer. 2016. "Diversity of juvenile Chinook salmon life history pathways." Reviews in Fish Biology and Fisheries 26(3): 375–403. Internet website: https://doi.org/10.1007/s11160-016-9432-3.

BPA et al. (Bonneville Power Administration, U.S. Army Corps of Engineers, & United States Bureau of Reclamation). (2018)1Climate and hydrology datasets for RMJOC long-term planning studies: Second edition (RMJOC-II), Part I: Hydroclimate projections and analyses2. Bonneville Power AdministrationCalifornia Sea Grant. n.d. Salmonid Identification. Internet website: https://caseagrant.ucsd.edu/russian-river-salmon-steelhead/russian-river-learning-center/salmonid-identification.

Columbia River DART, Columbia Basin Research, University of Washington. 2024a. Columbia River DART (Data Access in Real Time). School of Aquatic and Fishery Sciences, College of the Environment, University of Washington. Internet website: https://www.cbr.washington.edu/dart.

_____. 2024b. PIT Tag Observations by ESU/DPS Graphics and Text. Internet website: https://www.cbr.washington.edu/dart/query/esu_graph_text.

Connor, W. P., H. L. Burge, J. R. Yearsley, and T. C. Bjornn. 2003. "Influence of flow and temperature on survival of wild subyearling fall Chinook salmon in the Snake River." *North American Journal of Fisheries Management* 23(2): 362–375.

Connor, W. P., B. D. Arnsberg, J. A. Chandler, T. D. Cooney, P. A. Groves, J. A. Hesse, G. W. Mendel, et al. 2016. A Retrospective (circa 1800–2015) on Abundance, Spatial Distribution, and Management of Snake River Basin Fall Chinook Salmon. Draft 2 Parts I, II, and III. 1. Internet website: Aerial and Deepwater Counts of Fall Chinook Salmon Redds in the Snake River Basin (streamnetlibrary.org)

Crozier, L. G., M. M. McClure, T. Beechie, S. J. Bograd, D. A. Boughton, M. Carr, T. D. Cooney, et al. 2019. "Climate vulnerability assessment for Pacific salmon and steelhead in the California current large marine ecosystem." PLoS ONE 14(7): e0217711. Internet website: https://doi.org/10.1371/journal.pone.0217711.

Dauble, D. D., R. L. Johnson, and A. Garcia. 1999. "Fall chinook spawning in tailraces of lower Snake River hydroelectric projects." Transactions of the American Fisheries Society 128: 672–697.

Douglas County Public Utility District. 2024. The Wells Hydroelectric Project. Internet website: https://douglaspud.org/environmental-stewardship/fish-counts/.

Eiler, J. H., A. N. Evans, and C. B. Schreck. 2015. "Migratory patterns of wild Chinook salmon Oncorhynchus tshawytscha returning to a large, free-flowing river basin." *PLOS ONE* 10(4): e0123127.

Evermann, B. W. 1896. "A preliminary report upon salmon investigations in Idaho in 1984." *U.S. Commission of Fish and Fisheries Bulletin* 15: 253–284.

Ford, M. J., editor. 2011. Status Review Update for Pacific Salmon and Steelhead Listed under the Endangered Species Act: Pacific Northwest. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-113. Internet website: https://www.westcoast.fisheries.noaa.gov/publications/status_reviews/salmon_steelhead/multiple_species/5-yr-sr.pdf.

Ford, M. J., E. Anderson, J. C. Garza, J. M. Myers, T. H. Williams, and R. S. Waples. 2021. Report on a review of the Oregon Coast and the Southern Oregon and Northern California coastal spring-run Chinook salmon ESU configuration. Internet website: https://media.fisheries.noaa.gov/2021-08/OC_SONCC%20spring%20Chinook%20ESU%20report%20060221.pdf

_____. 2022. Biological Viability Assessment Update for Pacific Salmon and Steelhead Listed under the Endangered Species Act: Pacific Northwest. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northwest Fisheries Science Center. Internet website: https://doi.org/10.25923/kq2n-ke70.

Good, T. P., R. S. Waples, and P. Adams, editors. 2005. Updated Status of Federally Listed ESUs of West Coast Salmon and Steelhead. U.S. Dept. Commerce, NOAA Tech. Memo. NMFS-NWFSC-66. https://www.noaa.gov/sites/default/files/legacy/document/2020/Oct/07354626691.pdf

ISAB (Independent Scientific Advisory Board). 2019. Review of Upper Columbia United Tribes' Fish Passage and Reintroduction Phase 1 Report: Investigations Upstream of Chief Joseph and Grand Coulee Dams (Reintroduction Report). Portland, Oregon.

Keefer, M. L., and C. C. Caudill. 2013. "Homing and straying by anadromous salmonids: A review of mechanisms and rates." Reviews in Fish Biology and Fisheries 24: 333–368.

Keefer, M. L., C. C. Caudill, C. A. Peery, and S. R. Lee. 2008. "Transporting juvenile salmonids around dams impairs adult migration." Ecological Applications 18(8): 1888–1900. Internet website: https://doi.org/10.1890/07-0710.1.

Kovach, R. P., J. B. Armstrong, D. A. Schmetterling, R. Al-Chokhachy, and C. C. Muhlfeld. 2018. "Long-term population dynamics and conservation risk of migratory bull trout in the upper Columbia River basin." *Canadian Journal of Fisheries and Aquatic Sciences* 75(11): 1960–1968.

LCFRB (Lower Columbia Fish Recovery Board). 2010. Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan, Volume I—Regional Plan. Internet website: https://www.nwcouncil.org/sites/default/files/Vol_II_A__Col_Estuary_main stem.pdf.

Littell, J. S., D. McKenzie, D. L. Peterson, and A. L. Westerling. 2009. "Climate and wildfire area burned in western US Eco provinces, 1916–2003." *Ecological Applications* 19(4): 1003–1021.

Marsh, Douglas M., J. R. Harmon, N. N. Paasch, K. Thomas, K. McIntyre, B. Sandford, and G. M. Matthews. 2004. Transportation of juvenile salmonids on the Columbia and Snake Rivers, 2003: final report for 2000 and 2001 steelhead juveniles.

Matala, A. P., D. R. Hatch, S. Everett, M. W. Ackerman, B. Bowersox, M. Campbell, and S. Narum. 2016. "What goes up does not come down: The stock composition and demographic characteristics of upstream migrating steelhead differ from post-spawn emigrating kelts." *ICES Journal of Marine Science* 73(10): 2595–2605. Internet website: https://doi.org/10.1093/icesjms/fsw109.

Merz, J. E. 2002. "Seasonal feeding habitats, growth, and movement of steelhead trout in the lower Mokelumne River, California." *California Fish and Game* 88(3): 95–111.

Moore, M. E., B. A. Berejikian, C. M. Greene, and S. Munsch. 2021. "Environmental fluctuation and shifting predation pressure contribute to substantial variation in early marine survival of steelhead." *Marine Ecology Progress Series* 662: 139–156.

Myers, J. M., R. G. Kope, G. J. Bryant, D. Teel, L. J. Lierheimer, T. C. Wainwright, W. S. Grant, et al. 1998. Status Review of Chinook Salmon from Washington, Idaho, Oregon, and California. U.S. Department of Commerce, NOAA Tech. Memo. NMFS-NWFSC-35. https://www.webapps.nwfsc.noaa.gov/assets/25/7190_07042012_124647_Myers.et.al.1998-rev.pdf.

Nau, C. I., E. A. Felts, B. Barnett, M. Davison, C. McClure, J. R. Poole, R. Hand, et al. 2021. Idaho Adult Chinook Salmon Monitoring. Annual report 2020. Idaho Department of Fish and Game Report 21-08. Boise, Idaho.

NMFS (National Marine Fisheries Service). 2006. National Marine Fisheries Service's comments and preliminary recommended terms and conditions for an application for a major new license for the Hells Canyon hydroelectric project (FERC No. 1971). National Marine Fisheries Service, Seattle, Washington. January 24, 2006.

_____. 2008. Biological Opinion on National Marine Fisheries Service Endangered Species Act (ESA) Section 7 Consultation and Magnuson-Stevens Act (MSA) Essential Fish Habitat Consultation. Construction and Operation of Chief Joseph Hatchery by the Confederated Tribes of the Colville Reservation. The Salmon Recovery Division, Northwest Region, NMFS Consultation Number F/NWR/2006/07534.

_____. 2013. Federal Register Federal Register. Vol. 78, No. 237. Tuesday, December 10, 2013. Notices Pages 74116 – 74117. https://www.govinfo.gov/content/pkg/FR-2013-12-10/pdf/FR-2013-12-10.pdf

_____. 2015. Recovery Plan for Snake River Sockeye Salmon (Oncorhynchus nerka). U.S., National Marine Fisheries Service, West Coast Region.

_____. 2017a. ESA Recovery Plan for Snake River Fall Chinook Salmon and Snake River Basin Steelhead. U.S. Department of Commerce, National Oceanic and Atmospheric Administration.

_____. 2017b. ESA Recovery Plan for Snake River Spring/Summer Chinook Salmon and Snake River Basin Steelhead. U.S. Department of Commerce, National Oceanic and Atmospheric Administration.

_____. 2017c. National Marine Fisheries Service (NMFS) consultation on the Confederated Tribes of the Colville Reservation (CTCR) Tribal Resource Management Plan (TRMP) under the Endangered Species Act (ESA) Tribal 4(d) Rule-Decision Memorandum

_____. 2017d. Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat (EFH) Consultation**.**

Issuance of a Tribal 4(d) Rule Determination for a Tribal Resource Management Plan (TRMP) submitted by the Confederated Tribes of the Colville Reservation, and Funding and Carrying Out Activities Pursuant to that TRMP

_____. 2018. Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response from the USFWS and Bureau of Indian Affairs. Internet website: https://www.fisheries.noaa.gov/s3//dam-migration/s7-_usvoregon_2018-2027_mgmagmnt__final_signed.pdf.

_____. 2022. 5-Year Review: Summary and Evaluation of Upper Columbia River Spring-run Chinook Salmon and Upper Columbia River Steelhead. Internet website: https://www.fisheries.noaa.gov/resource/document/2022-5-year-review-summary-evaluation-upper-columbia-river-spring-run-Chinook.

_____. 2023a. Status of the Species: Snake River Sockeye Salmon. Internet website: https://www.fisheries.noaa.gov/west-coast/endangered-species-conservation/snake-river-sockeye-salmon.

_____. 2023b. About the Species: Sockeye Salmon. Internet website: https://www.fisheries.noaa.gov/species/sockeye-salmon.

_____. 2023c. Status of the Species: Upper Columbia Spring-run Chinook Salmon. Internet website: https://www.fisheries.noaa.gov/s3/2023-02/feb-2023-status-ucr-Chinook.pdf.

_____. 2023d. Status of the Species: Snake River Spring/Summer-run Chinook Salmon. Internet website: https://www.fisheries.noaa.gov/west-coast/endangered-species-conservation/snake-river-spring/summer-run -run-Chinook-salmon.

_____. 2023e. Status of the Species: Snake River Basin Steelhead. Internet website: https://www.fisheries.noaa.gov/west-coast/endangered-species-conservation/snake-river-basin-steelhead.

_____. 2024. Threatened and Endangered Species List. Provided by the Bureau of Reclamation.

NOAA (National Oceanic and Atmospheric Administration). 1992. Endangered and Threatened Species; Threatened Status for Snake River Spring/Summer Chinook Salmon, Threatened Status for Snake River Fall Chinook Salmon. 57 *Federal Register* 14653

_____. 2015. ESA Recovery Plan for Snake River Sockeye Salmon (Oncorhynchus nerka). United States, National Marine Fisheries Service, West Coast Region.

_____. 2017a. ESA Recovery Plan for Snake River Fall Chinook Salmon (Oncorhynchus tshawytscha). United States, National Marine Fisheries Service, West Coast Region.

_____. 2017b. ESA Recovery Plan for Snake River Spring/Summer Chinook Salmon (Oncorhynchus tshawytscha) and Snake River Basin Steelhead (Oncorhynchus mykiss). United States, National Marine Fisheries Service, West Coast Region.

NPCC (Northwest Power and Conservation Council). 2014. Columbia River Basin Fish and Wildlife Program. Internet website: www.nwcouncil.org/fw/program.

Northwest Power and Conservation Council. (2020)2020 Addendum to the 2014 Columbia River Basin Fish and Wildlife Program1. Council document 2020-9

Pacific States Marine Fisheries Commission (PSMFC). 2014. PIT Tag Marking Procedures Manual. Version 3.0, 2014. Prepared by PIT Tage Steering Committee.

Pope, V.R. and K.A. Cordell. 2019. Rocky Reach Reservoir Ute Ladies' Tresses (*Spiranthes diluvialis*) Monitoring Report, 2019: Annual monitoring summary and weed control effort. Public Utility District No. 1 of Chelan County, Fish and Wildlife Department, Wenatchee, Washington.

_____. 2020. Rocky Reach Reservoir Ute Ladies' Tresses (*Spiranthes diluvialis*) Monitoring Report, 2020: Annual monitoring summary and weed control effort. Public Utility District No.

Quinn T. P. 2005. The Behavior and Ecology of Pacific Salmon and Trout. Bethesda, MD: American Fisheries Society.

Reclamation (Bureau of Reclamation). 2024. Phase 2 Implementation Plan: Testing Feasibility of Reintroduced Salmon in the Upper Columbia River Basin, Programmatic Environmental Assessment. Columbia-Pacific Northwest Region Office, Boise, Idaho.

Richter, A., and S. A. Kolmes. 2005. "Maximum temperature limits for Chinook, coho, and chum salmon, and steelhead trout in the Pacific Northwest." Reviews in Fisheries Science 13: 23–49. Internet website: https://www.noaa.gov/sites/default/files/legacy/document/2020/Oct/07354626288.pdf.

Skalski, John & Buchanan, Rebecca & Griswold, Jim. 2009. Review of Marking Methods and Release-Recapture Designs for Estimating the Survival of Very Small Fish: Examples from the Assessment of Salmonid Fry Survival. Reviews in Fisheries Science. 17. 391-401. 10.1080/10641260902752199.

Smith Fisheries Consulting Inc. and Meridian Environmental Inc. 2006. Chief Joseph Hatchery Program Biological Assessment. Action Agency: Bonneville Power Administration. Portland, OR.

Trouet, V., A. A. Taylor, A. M. Carleton, and C. M. Skinner. 2006. Fire-climate interactions in forests of the American Pacific coast. Geophysical Research Letters 33: L18704.

UCSRB (Upper Columbia Salmon Recovery Board). 2007. Upper Columbia Spring Chinook Salmon and Steelhead Recovery Plan. Internet website: https://repository.library.noaa.gov/view/noaa/15990.

UCUT (Upper Columbia United Tribes). 2019. Fish Passage and Reintroduction Phase 1 Report: Investigations Upstream of Chief Joseph and Grand Coulee Dams. Prepared by the Upper Columbia United Tribes. Portland, Oregon.

_____. 2022. The Phase 2 Implementation Plan: Testing Feasibility of Reintroduced Salmon in the Upper Columbia River Basin. Version: August 4, 2022. https://ucut.org/wp-content/uploads/2022/08/UCUT-Phase-2-Implementation-Plan-Version-4Aug2022.pdf

USACE (U.S. Army Corps of Engineers). 2020. Climate and hydrology datasets for RMJOC long-term planning studies: Second edition (RMJOC-II).

USFWS (U.S. Fish and Wildlife Service). 1999. Determination of Threatened Status for Bull Trout in the Coterminous United States. 64 *Federal Register* 58910.

_____. 2002. Proposed Designation of Critical Habitat for the Klamath River and Columbia River Distinct Population Segments of Bull Trout. November 29, p.67.

_____. 2010. Revised Designation of Critical Habitat for Bull Trout in the Conterminous United States. 75 Federal Register 63898.

_____. 2014. Tribal Resource Management Plan for the 18 Confederated Tribes of the Colville Reservation Final Plan. Nespelem, WA.

_____. 2015a. Recovery Plan for the Coterminous United States Population of Bull Trout (Salvelinus confluentus). Portland, Oregon.

_____. 2015b. Bull Trout (Salvelinus confluentus) 5-Year Review: Summary and Evaluation. Boise, Idaho. Internet website: https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/2337.pdf.

_____. 2015c. Mid-Columbia River Unit Implementation Plan for Bull Trout (*Salvelinus confluentus*). U.S. Fish and Wildlife Service. Oregon Fish and Wildlife Office. Portland, Oregon.

_____. 2024. Information for Planning and Consultation (IPaC). Internet website: https://ipac.ecosphere.fws.gov/.

WDNR (Washington Department of Natural Resources). n.d. Bull Trout Biological and Conference Opinion. fp_hcp_usfws_bo_pt_4.pdf

WANHP Database (Washington State Department of Natural Resources Database). 2024. Washington Natural Heritage Program Data Explorer. Internet website: https://www.dnr.wa.gov/NHPdataexplorer.

WDFW (Washington Department of Fish and Wildlife). 2024. Species and Habitats in Washington Canada Lynx description. Internet website: https://wdfw.wa.gov/species-habitats/species/lynx-canadensis#desc-range.

Wild Steelhead Coalition. 2022. The Steelhead Puzzle: The Complex and Interwoven Impacts on Wild Steelhead Populations. Internet website: https://www.wildsteelheadcoalition.org/news/puzzle.

# Appendix A

Environmental Protection Measures

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# Appendix A. Environmental Protection Measures

The following list is a preliminary list of environmental protection measures (EPMs) for the Phase 2 Implementation Plan: Testing Feasibility of Reintroducing Salmon in the Upper Columbia River Basin (P2IP) programmatic environmental assessment (PEA) and future environmental compliance processes, as required, to reduce or eliminate environmental impacts during the P2IP project.

## Air Quality (AQ) EPMs

| EPM # | EPM Description | Ensure Compliance with | Project Activity/NEPA Phase | Responsible Party |
|---|---|---|---|---|
| AQ-1 | To control dust or air pollution, treat work sites and gravel areas with a dust retardant, such as water or magnesium chloride.<br>Identify water supply locations prior to construction to minimize impacts on soil, water quality, fisheries, wetlands, and vegetation resources. When pumping water from reservoirs or streams for dust abatement, screen intake hoses with the appropriate mesh size (generally 3/32 inch) or as described through consultation with the National Oceanic and Atmospheric Administration Fisheries or the U.S. Fish and Wildlife Service, or both. | Clean Air Act<br>Clean Water Act<br>Endangered Species Act (ESA) | Data collection (PEA and future environmental compliance)<br>Construction (future environmental compliance) | Project Proponents<br>Contractors |
| AQ-2 | To protect exposed soil surfaces and to reduce fugitive dust, apply temporary ground covers, such as mulching, temporary grasses, erosion blankets, or similar methods of dust control and wind erosion control, to disturbed areas. | Clean Air Act | Data collection (PEA and future environmental compliance)<br>Construction (future environmental compliance) | Project Proponents<br>Contractors |
| AQ-3 | Develop a fugitive dust-control plan with specific dust-control measures and procedures for construction contractors. | Clean Air Act | Data collection (PEA and future environmental compliance)<br>Construction (future environmental compliance) | Project Proponents<br>Contractors |

## Fisheries Resources (FR) EPMs

| EPM # | EPM Description | Ensure Compliance with | Project Activity/NEPA Phase | Responsible Party |
|---|---|---|---|---|
| FR-1 | Continue to implement fish hatchery program operations during the P2IP research. | ESA Hatchery Management Plans | Existing hatchery activities (PEA) | Facility Owner/Operators |
| FR-2 | Develop live-capture, selective fishing gear to collect Chinook brood stock that would allow release of non-target species promptly and safely. Use live-capture, selective gear when and where incidental take of Upper Columbia River spring-run Chinook and bull trout could occur. Expect capture of Upper Columbia River steelhead during August through November brood stock collection. Take particular attention to release listed steelhead unharmed with little or no handling. | ESA | Fish collection (PEA) | Project Proponents |
| FR-3 | During salmon collection operations, the Project Proponents would apply measures that minimize the risk of harm to listed bull trout, salmon, and steelhead. These measures include, but are not limited to, limits on the duration (hourly, daily, and weekly) of collection activities, limits on the duration of holding listed fish, and allowance for free passage of listed fish migrating through collection sites in main stem and tributary river locations when those sites are not being actively operated. | ESA | Fish collection (PEA) | Project Proponents or Facility Owner/Operators |
| FR-4 | Any listed bull trout, salmon, or steelhead that might enter the hatchery ladder and adult holding facilities would be sorted, tallied and promptly released unharmed back into the Columbia River. | ESA | Fish collection (PEA) | Project Proponents/Facility Owner/Operators |
| FR-5 | Clip the adipose fins of all juvenile Chinook to distinguish them from Upper Columbia River spring-run Chinook produced in the Methow River. | | | |

| EPM # | EPM Description | Ensure Compliance with | Project Activity/NEPA Phase | Responsible Party |
|---|---|---|---|---|
| FR-6 | Project Proponents would continue to implement the Salmonid Disease Control Policy of the Fisheries Co-managers of Washington State (NWIFC and WDFW 1998) and Pacific Northwest Fish Health Protection Committee (PNFHPC 2007) guidelines to minimize the risk of fish disease amplification or transfer and to ensure that artificially propagated fish are released in good health. | Salmonid Disease Control Policy | Fish health checks (PEA) | Project Proponents |
| FR-7 | Externally mark all artificially propagated spring Chinook salmon juveniles with an adipose fin clipped prior to release. | | | |
| FR-8 | Internally tag (such as with coded-wire tag or passive integrated transponder [PIT] tag) at least a portion of each hatchery release group for monitoring and evaluation purposes. | N/A | Marking/tagging fish (PEA) | Project Proponents |
| FR-9 | Seining operations<br>• During purse and beach seine operations, release any non-target fish immediately, including all ESA-listed fish (that is, bull trout, wild Chinook, or wild steelhead).<br>• Use stretched net mesh of a size no larger than 3.5 inches.<br>• Sort by hand or by use of a knotless dip net. Sort and/or release all fish prior to removing the entire seine from the water. Do not dry sort.<br>• Remove non-target fish as soon as practicable.<br>o For beach seine operations, the sorting time is defined as the elapsed time from when the outer towed end of the net first contacts the shore or block until the net is emptied of fish.<br>o For purse seine operations, the sorting time is defined as the elapsed time from when all rings are pursed and out of the water until the net is emptied of fish. | ESA | Seining, Fyke Netting, and Hook and Line operations (PEA) | Project Proponents |

| EPM # | EPM Description | Ensure Compliance with | Project Activity/NEPA Phase | Responsible Party |
|---|---|---|---|---|
| FR-10 | Check net pens for mortalities at least once per week. Remove mortalities and recover PIT tags. | N/A | Net pen operations (PEA) | Project Proponents |
| FR-11 | Fyke net operations<br>• Check nets daily. Release any non-target fish immediately, including all ESA-listed fish (that is, bull trout, wild Chinook, or steelhead). | | | |
| FR-12 | Hook and line capture<br>• Release any non-target fish immediately, including all ESA-listed fish (that is, bull trout, wild Chinook, or steelhead).<br>• Use only barbless hooks. Do not use treble hooks. | | | |
| FR-13 | Geotechnical investigations<br>• Limit disturbance of riparian vegetation to the minimum necessary to achieve investigation objectives, minimizing habitat alteration and the effects of erosion and sedimentation. | CWA<br>ESA | Geotechnical investigations (PEA and future environment compliance) | Project Proponents |
| FR-14 | Develop a disposition plan with the fisheries' managers to determine the specific fate of the fish captured, including any potential ESA-listed adults, such as bull trout. | | | |

| EPM # | EPM Description | Ensure Compliance with | Project Activity/NEPA Phase | Responsible Party |
|---|---|---|---|---|
| FR-15 | Live Fish Transport Pre-Trip Procedures: It would be the responsibility of the transport truck driver and accompanying staff to make sure all necessary equipment is present and in satisfactory working condition. An inspection of the transport truck and all equipment would be performed both pre- and post-trip. If the condition or function of the vehicle and equipment is questionable, any repairs should be made prior to transporting fish; if this is not possible, an alternative vehicle or equipment should be procured.<br>• Truck Inspection: The truck and its equipment would be inspected prior to arriving at the fish-loading facility. It would be confirmed that all necessary supportive equipment and materials are packed with the vehicle. For all transport activities, the truck would be fueled to full prior to fish loading the fish.<br>• Tank Inspection: The transport tank would be inspected utilizing the Fish Transport Tank Inspection Form.<br>• Oxygen Support System: Oxygen tanks must contain enough supply for the transport event and unplanned delays. The plan would be to use 1 liter per minute per 100 pounds of fish and adjust from there.<br>• Equipment Decontamination: If water has been sourced from a non-pathogen-free location, the tank and supporting equipment should be air dried and then disinfected with 200 parts per million (ppm) chlorine or polyvinylpyrrolidone iodine for a minimum of 1 hour. To neutralize the chlorine and iodine, the tank and equipment would be rinsed with sodium thiosulfate at 1 liter of 200 ppm chlorine and iodine to 1.5 grams of sodium thiosulfate. | N/A | Live fish transport (PEA and future environment compliance) | Project Proponents |

| EPM # | EPM Description | Ensure Compliance with | Project Activity/NEPA Phase | Responsible Party |
|---|---|---|---|---|
| FR-16 | Live Fish Transport Water Temperature: Depending on the time of year, temperatures between collection and release waters may differ significantly. At a minimum, the collection and release sites' water temperatures would be retrieved and recorded 2 days before the event to allow for proper planning and tempering.<br>• Temperature Threshold: No transport of fish would occur if either the loading or receiving water temperatures are greater than 21 degrees Celsius (°C). At release, the temperature difference between the receiving water and the tank shall be within 4°C; if greater, the tank water would be tempered at a rate of 0.5°C per 15 minutes. The tempering rate shall be recorded in the fish transport monitoring log. | N/A | Live fish transport (PEA and future environment compliance) | Project Proponents |

| EPM # | EPM Description | Ensure Compliance with | Project Activity/NEPA Phase | Responsible Party |
|---|---|---|---|---|
| FR-17 | Live Fish Transport Collection Site: The transport tank would be filled with water to the recommended level, and the tank would be treated. Air stones would be turned on to ensure they are working. Once fish are loaded, the tank would be filled to the recommended maximum level, and aerators would be turned on. The fish transport monitoring log would be filled out with all relevant information, including the water treatment methods and products, water temperature, oxygen data, carrying capacity, and fish health-check data.<br>Oxygen: Instances of dissolved oxygen levels above 100 percent would be minimized and should not drop below 7 ppm or 7 milligrams per liter. The oxygen tank regulator would be set to an output of 1 liter per minute for every 100 pounds of fish. It would be adjusted, as necessary, to remain within the criteria.<br>Carrying Capacity: Water temperatures influence the carrying capacity of a tank. Warmer temperatures increase oxygen consumption, thus reducing the carrying capacity. If loading temperatures are above 11°C, for every 1°C above or below 11°C, the carrying capacity of the tank should be reduced by 2.5 percent.<br>Fish Health Checks: To reduce holding times and minimize stress, the driving time would be estimated before the event. A fish health check would be conducted at the first 30-minute mark and then once per hour thereafter. The tank temperature and percent dissolved oxygen would be recorded. Fish behavior would be noted, looking for signs of stress and mortality. All mortalities would be removed and noted. | N/A | Live fish transport (PEA and future environment compliance) | Project Proponents |

| EPM # | EPM Description | Ensure Compliance with | Project Activity/NEPA Phase | Responsible Party |
|---|---|---|---|---|
| FR-18 | Live Fish Transport Release: The location for release would be identified prior to the transport activity. The release location would accommodate the transport truck and provide access to water. Releases should occur as early in the morning as possible. The fish monitoring log would be filled out with tempering information and release data.<br>• Tempering: Temperature differences between the receiving water and tank shall be within 4°C; if greater, the tank water would be tempered at a rate of 0.5°C per 15 minutes.<br>• Release: The fish release hose would be secured to the opening of the truck, and there would be support for the hose as necessary. The water pumped from the receiving water would be used to the transport tank to aid in flushing fish from the tank. Once the tank and hose are cleared of fish, the liberation of fish would be complete. | | | |

## Invasive Species (IS) EPMs

| EPM # | EPM Description | Ensure Compliance with | Project Activity/NEPA Phase | Responsible Party |
|---|---|---|---|---|
| IS-1 | Survey data collection and construction areas prior to use for invasive plant species. Avoid areas with invasive weed infestations, where feasible; if avoidance is not possible area, pretreat using the appropriate treatment to prevent the spread of invasive plant species. | | All activities (PEA and future environmental compliance) | Project Proponents Contractors |

| EPM # | EPM Description | Ensure Compliance with | Project Activity/NEPA Phase | Responsible Party |
|---|---|---|---|---|
| IS-2 | Using properly trained staff, inspect all equipment that is planned to be on-site for invasive species (plant and animal) prior to entering the site.<br>To avoid or reduce the introduction of weed seeds and propagules to the Project Area, include provisions in all contracts to ensure all vehicles, earth disturbing, construction, and road maintenance equipment are cleaned and inspected prior to entering the Project Area. Require all contractors to ensure all equipment is free of soil, seeds, vegetative matter, or other debris that could contain seeds. | | All activities (PEA and future environmental compliance) | Project Proponents<br>Contractors<br>Co-lead Agencies |
| IS-3 | Inspect and sanitize all in-water equipment, including boats and equipment for water drafting and dust abatement, and personal gear to prevent aquatic invasive species transmission and establishment. Require sanitation if equipment or gear has been used in an area known to be contaminated with aquatic invasive species. If boats or barges are found to have aquatic invasive species present, do not use them or allow them to launch. | | All activities (PEA and future environmental compliance) | Project Proponents<br>Contractors<br>Co-lead Agencies |

## Vegetation and Wetlands (VW) EPMs

| EPM # | EPM Description | Ensure Compliance with | Project Activity/NEPA Phase | Responsible Party |
|---|---|---|---|---|
| VW-1 | Revegetate disturbed areas to conditions similar to prework conditions by spreading stockpiled native materials (for example, spoils, vegetation, rock, and woody debris), seeding, and/or planting with certified weed-free seed mixes or native cultivars. | | Data collection (PEA and future environmental compliance)<br>Construction (future environmental compliance) | Project Proponents<br>Contractors |
| VW-2 | Avoid mapped wetlands during construction activities to the maximum extent practicable. Where practicable, ensure no ground-disturbing activities occur within a 50-foot buffer area of mapped wetlands. | | Construction (future environmental compliance) | Project Proponents<br>Contractors |

| EPM # | EPM Description | Ensure Compliance with | Project Activity/NEPA Phase | Responsible Party |
|---|---|---|---|---|
| VW-3 | Conduct presence and absence surveys on properties within the Action Area during the Ute ladies'-tresses' growing season, prior to any ground-disturbing activities. | | Data collection (PEA and future environmental compliance) | Project Proponents Contractors |

## Water Quality (WQ) EPMs

| EPM # | EPM Description | Ensure Compliance with | Project Activity/NEPA Phase | Responsible Party |
|---|---|---|---|---|
| WQ-1 | Use silt fencing, straw bales, or similar devices to control erosion and runoff from disturbance areas on the project site and along routes for the power transmission lines. Maintain erosion-control barriers throughout the construction period and remove them for disposal at the completion of construction activities. | | Data collection (PEA and future environmental compliance)<br>Construction (future environmental compliance) | Project Proponents Contractors |
| WQ-2 | Use temporary covering of stockpiled materials, spoils, and exposed soils with certified weed-free straw mulch, erosion-control blankets, or similar measures for erosion and runoff control. | | Data collection (PEA and future environmental compliance)<br>Construction (future environmental compliance) | Project Proponents Contractors |

| EPM # | EPM Description | Ensure Compliance with | Project Activity/NEPA Phase | Responsible Party |
|---|---|---|---|---|
| WQ-3 | *Require the contractor to develop and submit a stormwater pollution prevention plan that complies with the State of Washington Stormwater Management Manual for Eastern Washington. Ensure the stormwater pollution prevention plan identifies vegetation clearing limits, construction access, and EPMs for erosion control. EPMs for erosion control may include:<br>• Preserving natural vegetation whenever possible<br>• Using a natural vegetation buffer zone along streams, wetlands, and other waterbodies<br>• Stabilizing construction access to reduce sediment transport onto paved roads<br>• Using a wheel wash to reduce sediment from the construction site onto paved roads<br>• Stabilizing and grading construction roads and staging areas<br>• Temporary and permanent seeding to stabilize exposed soils<br>• Mulching disturbed areas for erosion control<br>• Applying erosion-control blanket or nets to exposed soils<br>• Ensuring dust control<br>• Having erosion-control material on hand at the work site in case of an emergency situation, such as an unexpected heavy rain<br>• Using concrete handling and concrete washout<br>• Using materials delivery, storage, and containment | | Construction (future environmental compliance) | Project Proponents Contractors |

| EPM # | EPM Description | Ensure Compliance with | Project Activity/NEPA Phase | Responsible Party |
|---|---|---|---|---|
| WQ-4 | Have spill containment structures or portable spill kits that are commensurate with the amount of fuel stored and supplies, such as shovels, absorbent pads and/or booms, on-site during construction and operation activities. Equip the backup generator and permanent fuel tank with a shutoff system if a leak is detected. | | Construction (future environmental compliance) | Project Proponents Contractors |
| WQ-5 | Ensure lubricates used for the operation and maintenance of the pumps are eco-friendly, such as plant-based oils. Ensure all lubricants used for equipment adjacent to or on the water comply with the applicable sections of the 2013 Environmental Protection Agency regulations for Vessel General Permits Environmentally Acceptable Lubricants relative to the regulatory definitions of biodegradable, minimally toxic, and not bioaccumulative. | | Construction (future environmental compliance) | Project Proponents Contractors |
| WQ-6 | Ensure refueling and petroleum product storage occur in specified areas outside the ordinary high-water mark of streams and rivers in the Project Area. | | Data collection (PEA and future environmental compliance) Construction (future environmental compliance) | Project Proponents Contractors |
| WQ-7 | Transport hazardous materials (petroleum products and chemicals) to an approved site for disposal. | | Data collection (PEA and future environmental compliance) Construction (future environmental compliance) | Project Proponents Contractors |
| WQ-8 | When not in use, store vehicles and construction equipment containing petroleum products, hydraulic fluids, or chemicals at the staging area, construction, or parking area. | | Data collection (PEA and future environmental compliance) Construction (future environmental compliance) | Project Proponents Contractors |

## Literature Cited – Appendix A

PNFHPC (Pacific Northwest Fish Health Protection Committee). 2007. Pacific Northwest fish health protection committee guidelines.

# Appendix B

Essential Fish Habitat

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Chapter Page



# Tables

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# Acronyms and Abbreviations

| | Full Phrase |
|---|---|
| Bonneville | Bonneville Power Administration |
| CDAT | Coeur d'Alene Tribe |
| CFR | Code of Federal Regulations |
| CTCR | Confederated Tribes of the Colville Reservation |
| CWA | Clean Water Act |
| EFH | essential fish habitat |
| EPM | environmental protection measures |
| ESA | Endangered Species Act |
| FMP | fishery management plan |
| HAPC | habitat area of particular concern |
| MSA | Magnuson-Stevens Fishery Conservation and Management Act |
| NMFS | National Marine Fisheries Service |
| NOAA | National Atmospheric and Oceanic Administration |
| P2IP | Phase 2 Implementation Plan: Testing Feasibility of Reintroduced Salmon in the Upper Columbia River Basin |
| PIT | passive integrated transponders |
| PFMC | Pacific Fishery Management Council |
| Reclamation | Bureau of Reclamation |
| STOI | Spokane Tribe of Indians |
| UCUT | Upper Columbia United Tribes |
| USACE | U.S. Army Corps of Engineers |
| USC | United States Code |

# Appendix B. Essential Fish Habitat Assessment

## B.1 Introduction

The purpose of this appendix is to present the findings of the essential fish habitat (EFH) assessment conducted for the potential effects on EFH and federally managed species from the Proposed Action, as required by the Magnuson-Stevens Fishery Conservation and Management Act of 1972 (MSA), as amended by the Sustainable Fisheries Act of 1996 (16 United States Code [USC] 1801 *et seq.*). The objectives of this EFH assessment are to describe how the Proposed Action (Federal Support for the Phase 2 Implementation Plan Testing Feasibility of Salmon Reintroduction in the Upper Columbia River Basin [P2IP]) may adversely affect EFH designated by the National Marine Fisheries Service (NMFS) and Pacific Fishery Management Council (PFMC) for the project's Action Area. For purposes of the MSA, EFH means "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity and includes the physical, biological, and chemical properties that are used by fish" (50 CFR § 600.10).

EFH includes all streams, lakes, ponds, wetlands, and other currently viable waterbodies and most of the habitat historically accessible to salmon in Washington, Oregon, Idaho, and California. EFH does not include habitats above the impassible barriers identified by the PFMC Fishery Management Plan, which includes Chief Joseph Dam (PFMC 1999). Thus, EFH is only designated within the Project Area below Chief Joseph Dam and does not include the blocked area (NOAA Fisheries 2024).

The EFH assessment includes a description of the Proposed Action; an analysis of the direct, indirect, and cumulative effects on EFH and managed fish species; and proposed mitigation measures that would be implemented to avoid or minimize impacts.

The MSA established procedures designed to identify, conserve, and enhance EFH for those species regulated under a federal fishery management plan (FMP). Section 305(b)(2) of the MSA requires federal agencies to consult with the NMFS on all actions or proposed actions authorized, funded, or undertaken by the agencies that may adversely affect EFH.

## B.2 Project Description

The Bureau of Reclamation (Reclamation), Bonneville Power Administration (Bonneville), and United States (U.S.) Army Corps of Engineers (USACE), collectively the "Co-lead Agencies," are providing federal support for the P2IP proposal[13] brought forward by the Confederated Tribes of the Colville Reservation (CTCR), Spokane Tribe of Indians (STOI), and Coeur d'Alene Tribe (CDAT), through and with the assistance of the Upper Columbia United Tribes (UCUT), collectively the "Project Proponents." The P2IP includes three categories of activities:

[13] Available at https://ucut.org/wp-content/uploads/2022/08/UCUT-Phase-2-Implementation-Plan-Version-4Aug2022.pdf.

- Juvenile and adult salmon research studies[14]
- Development of fish-holding, fish-rearing, and acclimation facilities
- Development and testing of interim upstream and downstream fish passage facilities

The biological assessment describes the purpose of and need for both the site-specific and programmatic activities, identifies activities that may require future environmental compliance, and informs the decisions that the Co-lead Agencies may make based on the P2IP proposal and available information.

The Project Proponents are currently implementing P2IP components that are approved or permitted by the appropriate agency or agencies. These ongoing activities are expected to continue under the existing environmental compliance unless changes are identified in this document. Ongoing activities include:

- Acquiring, collecting, and transporting non-federally protected Chinook and sockeye salmon eggs, juveniles, and adults from existing hatcheries to support juvenile and adult research studies
- Rearing Chinook and sockeye salmon at existing hatcheries, net pens, and acclimation sites
- Releasing tagged juvenile and adult Chinook and sockeye salmon
- Operating and maintaining previously installed P2IP telemetry and acoustic receivers
- Monitoring released Chinook and sockeye salmon

The EFH guidelines (50 CFR § 600.05–600.930) outline procedures that federal agencies must follow to satisfy MSA consultation requirements. Federal agencies must provide the NMFS with an EFH assessment if the federal action may adversely affect EFH. The EFH assessment must include the following contents (50 CFR § 600.920(e)(3)): (1) a description of the action; (2) an analysis of the potential adverse effects of the action on EFH and the managed species; (3) the federal agency's conclusions regarding the effects of the action on EFH; and (4) proposed mitigation, if necessary.

The objective of this EFH assessment is to describe how the Proposed Action may affect EFH for federally managed species in the proposed Project Area. It also describes conservation measures (or mitigation) proposed to avoid, minimize, or otherwise offset potential adverse effects on designated EFH. EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (50 CFR § 600.10). The assessment addresses Pacific salmon EFH, which has been designated for Chinook salmon [*Oncorhynchus tshawytscha*] and coho salmon [*O. kisutch*], within the Project Area. This EFH assessment was prepared following the MSA regulations, Essential Fish Habitat Consultation Guidance (NMFS 2004), and based on guidance received from the NMFS on recent EFH assessments.

The P2IP describes the research needed to resolve uncertainties identified in the Phase 1 report and to develop and test strategies to guide the long-term reintroduction planning. For more information, please refer to Section 1.2, Background and Location, of the biological assessment, to which this EFH assessment is an appendix. The P2IP identifies a stepwise approach to monitoring and evaluation that provides for adjustments to the research approaches over the next 20 years. Step 1 focuses on collecting baseline information and developing support programs and facilities. Step 2 focuses on the incremental design, building, and testing of interim fish passage facilities at five

[14] References to salmon in descriptions of P2IP activities that are funded under the September 20, 2023, Memorandum of Understanding and Mediated Settlement Agreement are limited to salmon that are neither federally listed under the Endangered Species Act (ESA) as threatened or endangered nor a proposed species for listing under the ESA, whether or not specifically stated.

individual dams in the Project Area (Chief Joseph Dam [operated by the USACE]), Grand Coulee Dam [operated by Reclamation], and the three Spokane River dams operated by Avista Corporation) (UCUT 2019).

The geographic scope of the P2IP project activities is the Upper Columbia River Basin within the U.S., defined as the Columbia River upstream of Beebe Bridge (about 12 miles downstream of Wells Dam), including all major tributaries upstream of Chief Joseph Dam (refer to **Figure 1** in the P2IP Biological Assessment). The juvenile and adult salmon studies would also use currently permitted programs at existing facilities (such as hatcheries, fishways at dams, passive integrated transponders (PITs), and juvenile salmon acoustic telemetry system transmitters or acoustic tag receivers) within the Columbia River Basin to the Pacific Ocean.

# B.3 Essential Fish Habitat in the Proposed Project Area

## B.3.1 Introduction

The 1996 amendments to the MSA set forth a mandate for the NMFS, regional fishery management councils, and other federal agencies to identify and protect the EFH of economically important marine and estuarine fisheries. To achieve this goal, suitable fishery habitats need to be maintained. A provision of the MSA requires that fishery management councils identify and protect the EFH for every species managed by an FMP (16 USC § 1853(a)(7)). Specific locations have been defined as habitat areas of particular concern (HAPCs), which are areas "with extremely important ecological function and/or areas that are especially vulnerable to human-induced degradation" (NMFS 2021). No HAPCs would overlap the Project Area.

As previously defined, EFH is those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (50 CFR 600.10). For the purposes of this definition in 50 CFR 600:

- "Waters" means aquatic areas and their associated physical, chemical, and biological properties.
- "Substrate" includes sediment, hard bottoms, structures underlying the water surfaces, and associated biological communities.
- "Necessary" means the habitat required to support a sustainable fishery and healthy ecosystem.
- "Spawning, feeding, and breeding" are terms used to encompass the complete life cycle of a species.

The Proposed Action has the potential to have little effect on EFH in freshwater waterbodies. EFH for Pacific salmon has been designated under the FMPs in or near areas where proposed project activities would occur. EFH has not been designated for groundfish or coastal pelagic species within the Project Area. **Table B-1** lists the designated EFH for federally managed species in the proposed Project Area. EFH is designated based off the National Atmospheric and Oceanic Administration's (NOAA) Essential Fish Habitat Mapper.

Table B-1. EFH Designations

| Fishery | Common Name | Scientific Name |
|---|---|---|
| Salmon | Chinook salmon | *Oncorhynchus tshawytscha* |
| Salmon | Coho salmon | *Oncorhynchus kisutch* |

Source: NOAA Essential Fish Habitat Mapper

## B.3.2 Managed Fish Species

The locations of designated EFH for managed fisheries are depicted on the figures available on the NOAA Fisheries' web page (NOAA Fisheries 2024). An EFH determination is based on the species' distribution maps and habitat association tables. In estuaries, the EFH of the species consists of the areas depicted on the maps as "common," "abundant," and "highly abundant." **Table B-2**, below, provides the regional information on the seasonality and migratory patterns of adult and juvenile salmon with designated EFH.

Table B-2. Generalized Salmon Run Timing for the Columbia River Basin

| Species | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|
| Chinook | | | | | | | | | | |
| Coho | | | | | | | | | | |

Sources: NMFS 2023; Quinn 2005; UCSRB n.d.

Note: Dark squares represent adult stages present. Gray squares represent juvenile stages present.

## B.3.3 Chinook Salmon

### *Life History and Distribution*

Chinook salmon are the largest of the Pacific salmon in the Project Area. They were historically distributed above Chief Joseph and Grand Coulee dams, but they are largely restricted to the main stem Columbia River below these dams (Columbia River Salmon Reintroduction Initiative, n.d.). Larger rivers generally tend to support larger Chinook runs. Chinook salmon may spawn up to 2,000 miles upstream from the ocean, or they may use short tributaries just above tidewater (NMFS 2023). Chinook salmon abundances have declined near the southern portion of their range (Washington, Oregon, Idaho, and California) due to increased urbanization and habitat degradation associated with water management strategies for flood risk management, agriculture, and other water withdrawal needs. Reliance on hatchery programs for supplementation has led to increased ecological interactions that also likely pose potential threats (NPFMC 2021).

Chinook salmon exhibit high variability within and among populations in length and timing of freshwater, estuarine, and oceanic residency. They have two basic life history types: stream- and ocean-type fish (Quinn 2005). Stream-type fish have a long freshwater residency as juveniles (1 to 2 years), migrate rapidly to oceanic habitats, and return to their natal river in the spring or summer, several months prior to spawning. Ocean-type fish have a short freshwater residency (lasting up to 1 year) and an extensive estuarine residency, have a more coastal-oriented ocean distribution, and return to their natal river in the fall to spawn (NMFS 2023).

Young Chinook salmon feed on terrestrial and aquatic insects, amphipods, and other crustaceans. Adult Chinook salmon are highly piscivorous (that is, they feed on fish) and are also distributed deeper in the water column than other Pacific salmon species. While other species of salmon generally are surface oriented, primarily using the upper 66 feet (20 meters) of the water column, Chinook salmon tend to be at greater depths (98 to 230 feet [30 to 70 meters]) and typically remain at sea for 1 to 6 years before returning to their natal streams to spawn (NMFS 2023). Fish make up the largest component of the Chinook salmon diet at sea, although squid, pelagic amphipods, copepods, and euphausiids are also important prey species (NMFS, n.d.).

Chinook salmon may spawn in water ranging in depth from a few inches to several feet, with velocities typically ranging from 15 to 25 inches (40 to 60 centimeters) per second. Females bury their eggs in clean gravel, 8 to 14 inches (20 to 36 centimeters) deep. Because of their large size,

Chinook salmon are able to spawn in higher water velocities and use coarser substrates than other salmonid species. Once the eggs are fertilized, Chinook females remain on their redds for 6 to 25 days after spawning. Fertilized eggs begin their 5- to 8-month period of embryonic development and growth in gravels. Threats to eggs, alevins (hatchlings), and preemergent fry include freezing, desiccation, streambed scouring or shifting, and predators.

Stream-type juveniles depend on freshwater ecosystems because of their extended residence in these areas. Their principal freshwater prey consists of larval and adult insects. The seaward migration of smolts is timed so the smolts arrive in the estuary when food is plentiful and consists of epibenthic organisms, insects, and zooplankton (NPFMC 2021).

### *EFH Description*

Chief Joseph Dam: Chinook salmon EFH occurs below Chief Joseph Dam to Beebe Bridge within the Project Area. Per 50 CFR 660.412, EFH is identified for anadromous Pacific salmon stocks managed by the PFMC under the Pacific Coast Salmon Fishery FMP. These managed salmon include most of the Chinook salmon stocks from Washington, Oregon, Idaho, and California. The geographic extent of the freshwater EFH is specifically identified in the FMP as all waterbodies currently or historically occupied by PFMC-managed salmon in Washington, Oregon, Idaho, and California, including aquatic areas above all artificial barriers that are not specifically excluded. The blocked area above Chief Joseph Dam is excluded from EFH designation. (NMFS 2024).

Chinook salmon EFH also includes the estuarine and marine areas extending from the extreme high-tide line in nearshore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone (200 nautical miles) offshore of Washington, Oregon, and California north of Point Conception.

## B.3.4 Coho Salmon

### *Life History and Distribution*

Coho salmon are widely distributed in the Columbia River, ranging throughout the Mid- and Upper Columbia River, including the Entiat, Methow, and Wenatchee Rivers (Yakama Nation Fisheries 2024). They are extremely adaptable and use more diverse habitats than other salmon. Coho salmon are most abundant in coastal areas from central Oregon north through southeast Alaska.

Preferred spawning sites have relatively silt-free gravels ranging from 0.8 to 4 inches (2 millimeters to 10 centimeters) in diameter, well-oxygenated intra-gravel flow, and nearby cover (Quinn 2005). The eggs develop during the winter and hatch in early spring, and the embryos remain in the gravel until they emerge in May or June. The emergent fry occupy ponds, lakes, and pools in streams and rivers, usually among woody debris and slow-velocity, calm waters. During the fall, juvenile coho salmon locate off-channel habitat to overwinter.

Research has found that estuaries play a crucial role in the growth and development of juvenile coho salmon and are considered to be an important life strategy mechanism (Koski 2009). Studies have found that juvenile coho move great distances to opportunistically feed and then retreat and rest (Armstrong et al. 2013). Evidence of coho rearing and overwintering in estuarine habitats suggests that estuaries function as much more than just staging or transitional habitats (Koski 2009).

Juvenile coho salmon require year-round rearing habitat and access to and from the estuary (NPFMC 2021). Some fish leave fresh water in the spring and rear in brackish estuarine areas, then migrate back to fresh water in the fall. They typically spend 1 to 2 years in streams before migrating to the sea in the spring (CRITFC, n.d.).

Coastal residence time varies. Coho salmon may spend variable time in estuarine areas (Weitkemp et al. 2002). Juveniles move northward toward central Alaska (Weitkemp et al. 2012). Adult females spend about a year at sea before returning to natal streams to spawn (Sandercock 1991). Their diet at sea consists mainly of fish and squid (National Geographic).

### *EFH Description*

Chief Joseph Dam: Coho salmon EFH occurs below Chief Joseph Dam to Beebe Bridge within the Project Area. Per 50 CFR 660.412, EFH is identified for anadromous Pacific salmon stocks managed by the PFMC under the Pacific Coast Salmon FMP. These managed salmon are coho salmon (*O. kisutch*) stocks from Washington, Oregon, Idaho, and California. The geographic extent of the freshwater EFH is specifically identified in the FMP as all waterbodies currently or historically occupied by PFMC-managed salmon in Washington, Oregon, Idaho, and California, including aquatic areas above all artificial barriers that are not specifically excluded. The blocked area above Chief Joseph Dam is excluded from EFH designation (NMFS 2024).

Coho salmon EFH also includes the estuarine and marine areas extending from the extreme high-tide line in nearshore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone (200 nautical miles) offshore of Washington, Oregon, and California north of Point Conception.

## B.4 Assessment of Impacts and Mitigation Measures

In this section, potential impacts on EFH are examined, and identifiable impacts caused by the Proposed Action on EFH are described. Potential environmental consequences that may result from impacts on EFH are reviewed along with the environmental protection measures (EPMs) that would be used to avoid or minimize impacts on any EFH, as necessary.

### B.4.1 Impacts on EFH

No effects are expected to impact EFH due to the installation of additional telemetry equipment and other research devices. During installation, there would be no potential to impact water quality in those areas of EFH where equipment installation is occurring.

### B.4.2 Essential Fish Habitats of Particular Concern

There are no HAPCs in the Project Area.

### B.4.3 Environmental Consequences of the Proposed Action

The Proposed Action has funding to support a long-term study to test the feasibility of reintroducing salmon in the blocked area through the development and operation of fish-rearing facilities, fisheries research studies, and the design, installation, and operation of interim fish passage systems. Federal actions may include:

- Federal funding to support P2IP activities throughout the Action Area
- Review, approval, and issuance of permits for actions including, but not limited to, data collection, installation of equipment, or construction of facilities (interim passage or rearing facilities, or both) on federally managed lands and facilities
- Providing eggs, juveniles, and adult salmon from existing hatcheries

The three categories of P2IP activities are research studies, fish hatchery and acclimation facilities, and interim fish passage

The installation of telemetry equipment and construction of facilities would have little impact on the water quality of EFH. Installation and demobilization activities would be temporary in nature; therefore, any effects that could potentially occur would be short term. Also, the EPMs in place to minimize any disturbances would minimize the potential for adverse effects.

### B.4.4 Proposed Mitigative Measures and Guidelines for EFH Protection

The following EPMs would serve to mitigate any long-term or permanent effects on EFH (see **Appendix A** of the P2IP biological assessment):

**Fisheries Resources (FR) EPMs**

| EPM # | EPM Description | Ensure Compliance with | Project Activity/NEPA Phase | Responsible Party |
|---|---|---|---|---|
| FR-1 | Continue to implement fish hatchery program operations during the P2IP research. | ESA Hatchery Management Plans | Existing hatchery activities (PEA) | Facility Owner/Operators |
| FR-2 | Develop live-capture, selective fishing gear to collect Chinook brood stock that would allow release of non-target species promptly and safely. Use live-capture, selective gear when and where incidental take of Upper Columbia River spring-run Chinook and bull trout could occur. Expect capture of Upper Columbia River steelhead during August through November brood stock collection. Take particular attention to release listed steelhead unharmed with little or no handling. | ESA | Fish collection (PEA) | Project Proponents |
| FR-3 | During salmon collection operations, the Project Proponents would apply measures that minimize the risk of harm to listed bull trout, salmon, and steelhead. These measures include, but are not limited to, limits on the duration (hourly, daily, and weekly) of collection activities, limits on the duration of holding listed fish, and allowance for free passage of listed fish migrating through collection sites in main stem and tributary river locations when those sites are not being actively operated. | ESA | Fish collection (PEA) | Project Proponents or Facility Owner/Operators |
| FR-4 | Any listed bull trout, salmon, or steelhead that might enter the hatchery ladder and adult holding facilities would be sorted, tallied and promptly released unharmed back into the Columbia River. | ESA | Fish collection (PEA) | Project Proponents/Facility Owner/Operators |

| EPM # | EPM Description | Ensure Compliance with | Project Activity/NEPA Phase | Responsible Party |
|---|---|---|---|---|
| FR-5 | Clip the adipose fins of all juvenile Chinook to distinguish them from Upper Columbia River spring-run Chinook produced in the Methow River. | | | |
| FR-6 | Project Proponents would continue to implement the Salmonid Disease Control Policy of the Fisheries Co-managers of Washington State (NWIFC and WDFW 1998) and Pacific Northwest Fish Health Protection Committee (PNFHPC 2007) guidelines to minimize the risk of fish disease amplification or transfer and to ensure that artificially propagated fish are released in good health. | Salmonid Disease Control Policy | Fish health checks (PEA) | Project Proponents |
| FR-7 | Externally mark all artificially propagated spring Chinook salmon juveniles with an adipose fin clipped prior to release. | | | |
| FR-8 | Internally tag (such as with coded-wire tag or passive integrated transponder [PIT] tag) at least a portion of each hatchery release group for monitoring and evaluation purposes. | N/A | Marking/tagging fish (PEA) | Project Proponents |
| FR-9 | Seining operations<br>• During purse and beach seine operations, release any non-target fish immediately, including all ESA-listed fish (that is, bull trout, wild Chinook, or wild steelhead).<br>• Use stretched net mesh of a size no larger than 3.5 inches.<br>• Sort by hand or by use of a knotless dip net. Sort and/or release all fish prior to removing the entire seine from the water. Do not dry sort.<br>• Remove non-target fish as soon as practicable.<br>o For beach seine operations, the sorting time is defined as the elapsed time from when the outer towed end of the net first contacts the shore or block until the net is emptied of fish.<br>o For purse seine operations, the sorting time is defined as the elapsed time from when all rings are pursed and out of the water until the net is emptied of fish. | ESA | Seining, Fyke Netting, and Hook and Line operations (PEA) | Project Proponents |

| EPM # | EPM Description | Ensure Compliance with | Project Activity/NEPA Phase | Responsible Party |
|---|---|---|---|---|
| FR-10 | Check net pens for mortalities at least once per week. Remove mortalities and recover PIT tags. | N/A | Net pen operations (PEA) | Project Proponents |
| FR-11 | Fyke net operations<br>• Check nets daily. Release any non-target fish immediately, including all ESA-listed fish (that is, bull trout, wild Chinook, or steelhead). | | | |
| FR-12 | Hook and line capture<br>• Release any non-target fish immediately, including all ESA-listed fish (that is, bull trout, wild Chinook, or steelhead).<br>• Use only barbless hooks. Do not use treble hooks. | | | |
| FR-13 | Geotechnical investigations<br>• Limit disturbance of riparian vegetation to the minimum necessary to achieve investigation objectives, minimizing habitat alteration and the effects of erosion and sedimentation. | Clean Water Act (CWA) ESA | Geotechnical investigations (PEA and future environment compliance) | Project Proponents |
| FR-14 | Develop a disposition plan with the fisheries' managers to determine the specific fate of the fish captured, including any potential ESA-listed adults, such as bull trout. | | | |

| EPM # | EPM Description | Ensure Compliance with | Project Activity/NEPA Phase | Responsible Party |
|---|---|---|---|---|
| FR-15 | Live Fish Transport Pre-Trip Procedures: It would be the responsibility of the transport truck driver and accompanying staff to make sure all necessary equipment is present and in satisfactory working condition. An inspection of the transport truck and all equipment would be performed both pre- and post-trip. If the condition or function of the vehicle and equipment is questionable, any repairs should be made prior to transporting fish; if this is not possible, an alternative vehicle or equipment should be procured.<br>• Truck Inspection: The truck and its equipment would be inspected prior to arriving at the fish-loading facility. It would be confirmed that all necessary supportive equipment and materials are packed with the vehicle. For all transport activities, the truck would be fueled to full prior to fish loading the fish.<br>• Tank Inspection: The transport tank would be inspected utilizing the Fish Transport Tank Inspection Form.<br>• Oxygen Support System: Oxygen tanks must contain enough supply for the transport event and unplanned delays. The plan would be to use 1 liter per minute per 100 pounds of fish and adjust from there.<br>Equipment Decontamination: If water has been sourced from a non-pathogen-free location, the tank and supporting equipment should be air dried and then disinfected with 200 parts per million (ppm) chlorine or polyvinylpyrrolidone iodine for a minimum of 1 hour. To neutralize the chlorine and iodine, the tank and equipment would be rinsed with sodium thiosulfate at 1 liter of 200 ppm chlorine and iodine to 1.5 grams of sodium thiosulfate. | N/A | Live fish transport (PEA and future environment compliance) | Project Proponents |

| EPM # | EPM Description | Ensure Compliance with | Project Activity/NEPA Phase | Responsible Party |
|---|---|---|---|---|
| FR-16 | Live Fish Transport Water Temperature: Depending on the time of year, temperatures between collection and release waters may differ significantly. At a minimum, the collection and release sites' water temperatures would be retrieved and recorded 2 days before the event to allow for proper planning and tempering.<br>• Temperature Threshold: No transport of fish would occur if either the loading or receiving water temperatures are greater than 21 degrees Celsius (°C). At release, the temperature difference between the receiving water and the tank shall be within 4°C; if greater, the tank water would be tempered at a rate of 0.5°C per 15 minutes. The tempering rate shall be recorded in the fish transport monitoring log. | N/A | Live fish transport (PEA and future environment compliance) | Project Proponents |

| EPM # | EPM Description | Ensure Compliance with | Project Activity/NEPA Phase | Responsible Party |
|---|---|---|---|---|
| FR-17 | Live Fish Transport Collection Site:<br>• The transport tank would be filled with water to the recommended level, and the tank would be treated. Air stones would be turned on to ensure they are working. Once fish are loaded, the tank would be filled to the recommended maximum level, and aerators would be turned on. The fish transport monitoring log would be filled out with all relevant information, including the water treatment methods and products, water temperature, oxygen data, carrying capacity, and fish health-check data.<br>• Oxygen: Instances of dissolved oxygen levels above 100 percent would be minimized and should not drop below 7 ppm or 7 milligrams per liter. The oxygen tank regulator would be set to an output of 1 liter per minute for every 100 pounds of fish. It would be adjusted, as necessary, to remain within the criteria.<br>• Carrying Capacity: Water temperatures influence the carrying capacity of a tank. Warmer temperatures increase oxygen consumption, thus reducing the carrying capacity. If loading temperatures are above 11°C, for every 1°C above or below 11°C, the carrying capacity of the tank should be reduced by 2.5 percent.<br>Fish Health Checks: To reduce holding times and minimize stress, the driving time would be estimated before the event. A fish health check would be conducted at the first 30-minute mark and then once per hour thereafter. The tank temperature and percent dissolved oxygen would be recorded. Fish behavior would be noted, looking for signs of stress and mortality. All mortalities would be removed and noted. | N/A | Live fish transport (PEA and future environment compliance) | Project Proponents |

| EPM # | EPM Description | Ensure Compliance with | Project Activity/NEPA Phase | Responsible Party |
|---|---|---|---|---|
| FR-18 | Live Fish Transport Release: The location for release would be identified prior to the transport activity. The release location would accommodate the transport truck and provide access to water. Releases should occur as early in the morning as possible. The fish monitoring log would be filled out with tempering information and release data.<br>• Tempering: Temperature differences between the receiving water and tank shall be within 4°C; if greater, the tank water would be tempered at a rate of 0.5°C per 15 minutes.<br>• Release: The fish release hose would be secured to the opening of the truck, and there would be support for the hose as necessary. The water pumped from the receiving water would be used to the transport tank to aid in flushing fish from the tank. Once the tank and hose are cleared of fish, the liberation of fish would be complete. | | | |

## Invasive Species (IS) EPMs

| EPM # | EPM Description | Ensure Compliance with | Project Activity/NEPA Phase | Responsible Party |
|---|---|---|---|---|
| IS-3 | Inspect and sanitize all in-water equipment, including boats and equipment for water drafting and dust abatement, and personal gear to prevent aquatic invasive species transmission and establishment. Require sanitation if equipment or gear has been used in an area known to be contaminated with aquatic invasive species. If boats or barges are found to have aquatic invasive species present, do not use them or allow them to launch. | | All activities (PEA and future environmental compliance) | Project Proponents Contractors Co-lead Agencies |

## Water Quality (WQ) EPMs

| EPM # | EPM Description | Ensure Compliance with | Project Activity/NEPA Phase | Responsible Party |
|---|---|---|---|---|
| WQ-1 | Use silt fencing, straw bales, or similar devices to control erosion and runoff from disturbance areas on the project site and along routes for the power transmission lines. Maintain erosion-control barriers throughout the construction period and remove them for disposal at the completion of construction activities. | | Data collection (PEA and future environmental compliance)<br>Construction (future environmental compliance) | Project Proponents<br>Contractors |
| WQ-2 | Use temporary covering of stockpiled materials, spoils, and exposed soils with certified weed-free straw mulch, erosion-control blankets, or similar measures for erosion and runoff control. | | Data collection (PEA and future environmental compliance)<br>Construction (future environmental compliance) | Project Proponents<br>Contractors |
| WQ-3 | *Require the contractor to develop and submit a stormwater pollution prevention plan that complies with the State of Washington Stormwater Management Manual for Eastern Washington. Ensure the stormwater pollution prevention plan identifies vegetation clearing limits, construction access, and EPMs for erosion control. EPMs for erosion control may include:<br>• Preserving natural vegetation whenever possible<br>• Using a natural vegetation buffer zone along streams, wetlands, and other waterbodies<br>• Stabilizing construction access to reduce sediment transport onto paved roads<br>• Using a wheel wash to reduce sediment from the construction site onto paved roads<br>• Stabilizing and grading construction roads and staging areas<br>• Temporary and permanent seeding to stabilize exposed soils<br>• Mulching disturbed areas for erosion control<br>• Applying erosion-control blanket or nets to exposed soils<br>• Ensuring dust control<br>• Having erosion-control material on hand at the work site in case of an emergency situation, such as an unexpected heavy rain<br>• Using concrete handling and concrete washout<br>• Using materials delivery, storage, and containment | | Construction (future environmental compliance) | Project Proponents<br>Contractors |

| EPM # | EPM Description | Ensure Compliance with | Project Activity/NEPA Phase | Responsible Party |
|---|---|---|---|---|
| WQ-4 | Have spill containment structures or portable spill kits that are commensurate with the amount of fuel stored and supplies, such as shovels, absorbent pads and/or booms, on-site during construction and operation activities. Equip the backup generator and permanent fuel tank with a shutoff system if a leak is detected. | | Construction (future environmental compliance) | Project Proponents Contractors |
| WQ-5 | Ensure lubricates used for the operation and maintenance of the pumps are eco-friendly, such as plant-based oils. Ensure all lubricants used for equipment adjacent to or on the water comply with the applicable sections of the 2013 Environmental Protection Agency regulations for Vessel General Permits Environmentally Acceptable Lubricants relative to the regulatory definitions of biodegradable, minimally toxic, and not bioaccumulative. | | Construction (future environmental compliance) | Project Proponents Contractors |
| WQ-6 | Ensure refueling and petroleum product storage occur in specified areas outside the ordinary high-water mark of streams and rivers in the Project Area. | | Data collection (PEA and future environmental compliance) Construction (future environmental compliance) | Project Proponents Contractors |
| WQ-7 | Transport hazardous materials (petroleum products and chemicals) to an approved site for disposal. | | Data collection (PEA and future environmental compliance) Construction (future environmental compliance) | Project Proponents Contractors |
| WQ-8 | When not in use, store vehicles and construction equipment containing petroleum products, hydraulic fluids, or chemicals at the staging area, construction, or parking area. | | Data collection (PEA and future environmental compliance) Construction (future environmental compliance) | Project Proponents Contractors |

EPMs for site-specific construction activities:

- Use silt fencing, straw bales, or similar devices to control erosion and runoff from disturbance areas on the project site. Maintain erosion-control barriers throughout the construction period and remove them for disposal at the completion of construction activities.
- Temporarily cover stockpiled materials, spoils, and exposed soils with certified weed-free straw mulch, erosion-control blankets, or similar measures for erosion and runoff control.
- Require the contractor to develop and submit a stormwater pollution prevention plan that complies with the State of Washington Stormwater Management Manual for Eastern Washington. The stormwater pollution prevention plan would identify vegetation clearing limits, construction access, and EPMs for erosion control.

- Ensure lubricants used for operation and maintenance of the pumps are eco-friendly, such as plant-based oils. Ensure all lubricants used for equipment adjacent to or on the water comply with the applicable sections of the 2013 Environmental Protection Agency regulations for vessel general permits and environmentally acceptable lubricants relative to the regulatory definitions of biodegradable, minimally toxic, and not bioaccumulative.
- Refuel and store petroleum products in specified areas outside the ordinary high-water mark of streams and rivers in the Project Area.
- Transport hazardous materials (petroleum products and chemicals) to an approved site for disposal.
- When not in use, store vehicles and construction equipment containing petroleum products, hydraulic fluids, or chemicals at the staging area, construction area, or parking area.

## B.5 Conclusion

Based on the Proposed Action, there would be no impacts associated with the updates to the existing infrastructure or additional radio telemetry and PIT -related installations. Following the EPMs described in **Appendix A**, the Proposed Action would not hinder a sustainable Pacific salmon fishery for either Chinook or coho salmon. Implementing the hatchery program would have the potential to enhance the Pacific salmon fishery by providing additional harvest opportunity.

## B.6 References

Armstrong, J. B., D. E. Schindler, C. P. Ruff, G. T. Brooks, K. E. Bentley, and C. E. Torgersen. 2013. "Diel horizontal migration in streams: Juvenile fish exploit spatial heterogeneity in thermal and trophic resources." *Ecology* 94(9): 2066–2075.

Bjornn, T. C., D. R. Craddock, and D. R. Corley. 1968. Migration and survival of Redfish Lake, Idaho, sockeye salmon, Oncorhynchus nerka. Transactions of the American Fisheries Society. 97:360–373.

Columbia River Salmon Reintroduction Initiative. n.d. Bringing the Salmon Home: The Columbia River Salmon Reintroduction Initiative. Internet website: https://columbiariversalmon.ca/about/the-salmon/

CRITFC (Columbia River Inter-tribal Commission). n.d. Salmon Life Cycle and Species Information. Internet website: https://critfc.org/fish-and-watersheds/columbia-river-fish-species/columbia-river-salmon/

Koski, K. V. 2009. "The fate of coho salmon 'nomads': The story of an estuarine-rearing strategy promoting resilience." *Ecology and Society* 14 (1).

National Geographic. (n.d.). Coho Salmon. Internet website: https://www.salmonfishingnow.com/coho-salmon-biology/

NMFS (National Marine Fisheries Service). 2004. Essential Fish Habitat Consultation Guidance, Version 1.1. National Marine Fisheries Service Office of Habitat Conservation. Silver Spring, Maryland.

_____. 2021. Recovery Planning for Endangered Species Act (ESA)-listed Salmon and Steelhead. National Marine Fisheries Service Office of Habitat Conservation. Silver Spring, Maryland.

_____. 2023. Status of the Species: Upper Columbia Spring-run Chinook Salmon. National Marine Fisheries Service Office of Habitat Conservation. Silver Spring, Maryland.

_____. 2024. EFH Mapper. Pacific Council. https://www.habitat.noaa.gov/apps/efhmapper/?page=page_4&org=noaa

_____. n.d. U.S. wild-caught Chinook salmon. Internet website: https://www.fisheries.noaa.gov/species/chinook-salmon.

NOAA Fisheries. 2024. Essential Fish Habitat (EFH) Mapper. Internet website: https://www.habitat.noaa.gov/apps/efhmapper/.

NPFMC (North Pacific Fishery Management Council, Alaska Fisheries Science Center, and Alaska Department of Fish and Game). 2021. Chinook Salmon Migration and Distribution in the North Pacific Ocean. Anchorage, Alaska.

PNFHPC (Pacific Northwest Fish Health Protection Committee). 2007. Pacific Northwest fish health protection committee guidelines.

Quinn, T. P. 2005. *The Behavior and Ecology of Pacific Salmon and Trout*. University of Washington Press. Seattle, WA.

Sandercock, F. K. (1991). Life history of coho salmon (Oncorhynchus kisutch). *Pacific salmon life histories*, 395-445. Seatle, WA.

UCSRB (Upper Columbia Salmon Recovery Board). n.d. Spawning Patterns of Various Fish Species. Internet website: https://www.ucsrb.org/outreach/seeingsalmon/

UCUT (Upper Columbia United Tribes). 2019. Fish Passage and Reintroduction Phase 1 Report: Investigations Upstream of Chief Joseph and Grand Coulee Dams. Spokane, WA.

Weitkamp, L. A., & Neely, K. (2002). Coho salmon (Oncorhynchus kisutch) ocean migration patterns: Insight from marine coded-wire tag recoveries. *Canadian Journal of Fisheries and Aquatic Sciences, 59*(7), 1100-1115. https://doi.org/10.1139/f02-075

Weitkamp, Laurie & Goulette, Graham & Hawkes, James & O'Malley, Michael & Lipsky, Christine. (2014). Juvenile salmon in estuaries: Comparisons between North American Atlantic and Pacific salmon populations. *Reviews in Fish Biology and Fisheries*. 24. 10.1007/s11160-014-9345-y. Dordrecht, NL.

Yakama Nation Fisheries. 2024. Mid-Columbia Coho Project. Yakama Nation Fisheries. Toppenish, WA.

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# Appendix C

No Effect Determinations

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# Appendix C. No Effect Determinations

The following eight species are excluded from detailed analysis and would result in a no effect determination: Canada lynx, gray wolf, grizzly bear, North American wolverine, monarch butterfly, yellow-billed cuckoo, Spalding's catchfly, and whitebark pine. The Proposed Action would have no effect on these terrestrial plants and wildlife because they are either not found in the Project Area, or the project would not affect these species' suitable or critical habitat. Placement of new land-based installations of receivers and the anchor for the Sanpoil Arm net pens would only involve human and vehicle presence during installation, and the receivers and anchor would be small job boxes with solar panels (for the receivers) and either an I-bolt or ecology block (for the anchor). No ground disturbance would be required for these installations.

Geotechnical and groundwater testing to define future construction of new facilities would have minor impacts on terrestrial plants and wildlife because test wells and trenches would be temporary and localized. Best management practices, such as minimizing surface disturbance and reclamation of temporarily disturbed areas, would mitigate or reduce the intensity of some impacts. Reclamation and the U.S. Army Corps of Engineers' standards for geotechnical investigations would be followed for all project components where geotechnical investigation is necessary.

Listed wildlife species are not expected to be present in the Project Area. In the rare event that gray wolf or wolverine wander into the Project Area, they are expected to avoid the installation and testing sites. The Proposed Action would not result in any injury, mortality, or significant behavioral modifications to wildlife species. The project would not affect any suitable or critical habitats. Further documentation describing why listed wildlife and plant species were excluded from further analysis is provided below.

## C.1 Species Excluded from Detailed Analysis

### C.1.1 Canada Lynx

Canada lynx are listed as a threatened species wherever they are found in the contiguous United States (U.S.), pursuant to the Endangered Species Act (ESA). Primary threats to lynx include small population size, habitat loss and fragmentation from large wildfires, and climate change. Historically, the lynx range once extended south through Chelan County and across Ferry, Steven, and Pend Oreille Counties to Idaho. Today, lynx are restricted to small portions of their historical range. Between 50 and 100 Canada lynx likely reside in Washington across the North Cascades, Kettle River Mountain Range, and Selkirk Mountains. A small population of fewer than 50 Canada lynx occupies high-elevation forests in the North Cascades, almost entirely within the western half of Okanogan County (WDFW 2024). The Action Area overlaps portions of historical lynx range along Lake Rufus Woods, the upper Sanpoil Basin, and the transboundary reach of Lake Roosevelt.

The Action Area currently supports no suitable lynx habitat because high-elevation forest types with deep snow do not exist. The Action Area does not contain suitable habitat for snowshoe hare, a primary prey species of lynx; snowshoe hares are not widely distributed in the Action Area because the average amount of snow accumulation is not adequate to support snowshoe hare denning. Lynx are not expected to use the Action Area because it lacks subalpine and boreal coniferous forests that

have substantial accumulations of snow during the late fall, winter, and early spring. In Washington, lynx habitat includes Engelmann spruce, lodgepole pine, and subalpine fir forests higher than 4,600 feet in elevation (WDFW 2024). The Action Area generally includes valley bottoms, riparian areas, foothill breaks along the upper Columbia River, Lake Roosevelt, and aquatic environments along river drainages, shorelines, or existing roads at or below 2,108 feet. Vegetation in the Action Area does not support suitable lynx habitat. High-elevation forest habitats would not be removed or altered by the Proposed Action. Therefore, the action would not affect lynx.

### C.1.2 Gray Wolf

The gray wolf is endangered in the western U.S., except within the delisted Northern Rocky Mountains distinct population segment (DPS), which includes Idaho, Montana, Wyoming, eastern Oregon, Washington, and a small portion of north-central Utah, pursuant to the ESA. Most of the Action Area falls within the eastern one-third of Washington, where the wolf population has been delisted and is now managed by the State and Tribes. The lowest portions of the Action Area extend along the Columbia River below the Okanogan-Wenatchee National Forest. Packs known to range in the Northern Cascade region are protected, pursuant to the ESA. Wolves are known to disperse over long distances. At the end of 2022, there were approximately 2,682 wolves inside the Northern Rocky Mountains DPS and 115 wolves outside the Northern Rocky Mountains DPS for an estimated total of 2,797 wolves in the western U.S.

Gray wolves are habitat generalists and could potentially use portions of habitat within the Action Area. However, the proposed project activities would typically occur directly along bodies of water. Research and construction activities could be conducted intermittently throughout the project duration, but these activities would be limited to relatively short durations. These areas typically have been previously developed, which typically leads to avoidance of the area by gray wolves.

The fish transport, release, and research activities would not affect wolves because activities would occur at fish hatcheries, reservoir shorelines, highways, roads, and boat ramps. Wolf packs typically avoid these areas due to the human footprint. Wolves generally establish their ranges in areas where the potential for human conflict is lower, such as national forests with large blocks of contiguous federal land, when prey is available. The Proposed Action would not affect the size or condition of wolf packs; it also would not limit the ability of new packs to form throughout the current range. The Proposed Action would not affect the availability of ungulate prey available to individuals or packs in the region. For the reasons listed above, the Proposed Action would have no effect on gray wolf.

### C.1.3 Grizzly Bear

Grizzly bears are threatened in the conterminous (lower 48) states, except where listed as an experimental population. Most of the Action Area falls in the recently designated North Cascades nonessential experimental population area, which includes all of Washington, except for the portion of northeastern Washington defined by the Kettle River from the international border with Canada, downstream to the Columbia River, to its confluence with the Spokane River, then upstream on the Spokane River to the Washington-Idaho border (USFWS 2024b). There are no known populations within the North Cascades Ecosystem (USFWS 2024b). Grizzly bears have not been confirmed in the North Cascades of Washington since 1996 (WDFW 20204). On April 25, 2024, the National Park Service and the U.S. Fish and Wildlife Service (USFWS) announced a record of decision to actively restore grizzly bears to the North Cascades. There is no set timeline for when translocation of grizzly bears to the nonessential experimental population ecosystem may begin.

The Selkirk Ecosystem Recovery Zone supports a minimum population of 53 grizzly bears on the U.S. side of the international boarder (USFWS 2024b). Grizzly bears have been verified in areas outside of current distributions. For example, grizzly bears have been infrequently documented near the Canadian border in northern Stevens and Ferry Counties of Washington (USFWS 2024b).

Grizzly bears are likely to use the far northeastern portions of the Action Area along the Columbia River transboundary reach and upper Kettle River. Observational data suggest that bears use small portions of the Action Area, infrequently dispersing from the Selkirk Ecosystem Recovery Zone. The relative scarcity of grizzly bears in Washington outside the Selkirk Ecosystem indicates that grizzly bears do not rely on habitats, forage, or prey in the Action Area.

The Proposed Action would not substantially modify habitats or food supplies that grizzly bears might use within the Action Area. Increased human activity at fish release, fish acclimation, telemetry sites, and geotechnical investigation areas would not affect grizzly bears that might be dispersing through the Action Area; this is because those activities would not occur in the portions of the Action Area that the grizzly bears might use. For the reasons listed above, the Proposed Action would have no effect on the grizzly bear.

### C.1.4 North American Wolverine

The North American wolverine is a threatened DPS in the contiguous U.S., under the ESA. An interim 4(d) rule provides conservation measures tailored to the DPS conservation needs. The USFWS intends to affirm the interim 4(d) rule or issue a revised 4(d) rule by December 2024 (USFWS 2023). Primary threats to the DPS include habitat loss from climate change and the cumulative impacts of other lower-level stressors, including winter recreation, development, and major roads.

The species' range in northeastern Washington spans forests along the U.S.-Canada border from the Cascade Mountain Range to the Selkirk Mountains of Idaho. Wolverine observations in the North Cascade Mountains of Washington far outnumber those in other locations (USFWS, 2023). Four observations were reported in far northeastern Washington from 2009 to 2016, and two additional observations have been reported since then. Observations in northeastern Washington were made in the mountains east of the Pend Oreille River, and one observer recorded a wolverine in the mountains west of the Pend Oreille River along the U.S.-Canada border.

The known range and observation data for the species suggest the Action Area supports no wolverine home range. The species is highly mobile, and wolverines may occasionally disperse through the Action Area from higher-elevation boreal and alpine habitats in the region. In the southern Canadian Rockies, wolverine density was found to be positively correlated with the number of years of persistent spring snow cover and negatively correlated with road density (Clevenger 2019; Mowat et al. 2020). Relating these two habitat conditions to the Action Area suggests wolverine occurrence in the Action Area is likely limited to dispersing animals; this is because the Action Area generally supports little spring snow cover along drainage bottoms where roads are common features.

The Proposed Action would not substantially modify habitats or prey that dispersing wolverines might use in the Action Area. Human activity at fish release, fish acclimation, telemetry sites, and geotechnical investigation areas would cause lone wolverines that may disperse through the Action Area to avoid localized areas. Avoidance behaviors would not affect wolverine mobility due to the availability of undeveloped roadless areas in the surrounding landscape. For the reasons listed above, the Proposed Action would have no effect on the North American wolverine.

### C.1.5 Yellow-billed Cuckoo

Currently, the yellow-billed cuckoo primarily breeds in large tracts of dense riparian woodlands along low-gradient streams. Vegetation typically includes riparian tree species such as cottonwood (*Populus* spp.) and willow (*Salix* spp.). The species' status is not well known in the Action Area. The yellow-billed cuckoo is reported as "extremely rare and local" in the northern Rocky Mountains and northern Great Plains. The primary threat to the species is the loss and degradation of its habitat from altered watercourse hydrology and natural stream processes (USFWS 2020).

The Proposed Action would not substantially modify habitats that individuals might use within the Action Area. Human activity at fish release, fish acclimation, telemetry sites, and geotechnical investigation areas would cause little noise impacts that could potentially disturb individual cuckoos if they are present during the time of activity. This would be rare, and avoidance behaviors would be temporary. Therefore, the Proposed Action would not affect yellow-billed cuckoo populations.

### C.1.6 Monarch Butterfly

The monarch butterfly is a candidate species and is not yet listed or proposed for listing. The Action Area lacks habitat for the monarch butterfly. Individual monarch butterflies in temperate climates, such as eastern and western North America, undergo long-distance migration and live for an extended period. In the fall, in both eastern and western North America, monarch butterflies begin migrating to their respective overwintering sites (USFWS 2023). The proposed activities that would occur within the Action Area include increased tagging of salmonids and expansion of acclimation and rearing facilities, which would have little impact on monarch butterflies and their habitat. Additionally, the classification of the monarch butterfly as a candidate species does not require the USFWS to consult on this species. Therefore, project activities would have no effect on the monarch butterfly, and this species is excluded from further analysis.

### C.1.7 Spalding's Catchfly

Spalding's catchfly was listed as threatened (66 *Federal Register* 51598) under the ESA of 1973, as amended (16 United States Code 1531 *et seq.*).

Spalding's catchfly habitat is associated with Pacific Northwest bunchgrass grasslands and sagebrush-steppe, and occasionally open-canopy pine stands. The Action Area lacks habitat for the Spalding's catchfly. The proposed activities that would occur within the Action Area include increased tagging of salmonids and expansion of acclimation and rearing facilities, which would have no impact on terrestrial plants such as Spalding's catchfly. Therefore, project activities would have no effect on the Spalding's catchfly, and this species is excluded from further analysis.

### C.1.8 Whitebark Pine

Whitebark pine is associated with cold and windy high-elevation or high-latitude sites in western North America. The Action Area lacks habitat for the whitebark pine. The proposed activities that would occur within the Action Area include increased tagging of salmonids and expansion of acclimation and rearing facilities, which would have no impact on whitebark pine. Therefore, project activities would have no effect on the whitebark pine, and this species is excluded from further analysis.

## C.2 Literature Cited – Appendix C

Clevenger, A. 2019. Mapping the wolverine way: Identifying conservation corridors and transboundary linkages in the Canadian Crown of the Continent region. Center for Environmentally Sustainable Transportation in Cold Climates.

Mowat, G., A. Clevenger, D. Kortello, D. Hausleitner, M. Barreuto, L. Smit, B. O. Dorsey, et al. 2020. "The sustainability of wolverine trapping mortality in southern Canada." *Journal of Wildlife Management* 84: 213–226.

USFWS (U.S. Fish and Wildlife Service). 1976. Proposed Determination of Critical Habitat for Grizzly Bear (*Ursus arctos horribilis*). 41 *Federal Register* 48757–48759.

_____. 2020. Species Assessment and Listing Priority Assignment Form - Yellow-billed cuckoo. Internet website: https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/publication/904.pdf.

_____. 2023. Species Assessment and Listing Priority Assignment Form - Monarch Butterfly. Internet website: https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/publication/4118.pdf.

_____. 2024a. Ute ladies'-tresses (*Spiranthes diluvialis*) Species Profile Page. Retrieved from ECOS (Environmental Conservation Online System). Internet website: https://ecos.fws.gov/ecp/species/2159

_____. 2024b. Grizzly Bear Species Profile Page. Retrieved from ECOS (Environmental Conservation Online System). Internet website: https://ecos.fws.gov/ecp/species/7642

WDFW (Washington Department of Fish and Wildlife). 2024. Washington Department of Fish and Wildlife Species and Habitats. Grizzly Bear (*Ursus arctos*). Internet website: https://wdfw.wa.gov/species-habitats/species/ursus-arctos#resources.

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# Appendix D

Summary of P2IP Activities

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# Appendix D. Summary of P2IP Activities

## D.1 P2IP Summary of Activities Table

**Table D-1** identifies the P2IP activities' general location, waterbody, the alternative under which each P2IP activity would occur, and the earliest implementation year. Ongoing P2IP activities under the No Action Alternative are identified by NAA, followed by the earliest implementation year in the appropriate activity column. Similarly, the proposed P2IP activities are identified by PA, followed by the implementation year in the appropriate activity column. Locations identified in the table are general locations; it is important to note that there may be adjustments to locations within the waterbody to allow for research flexibility. The table includes all P2IP activities, including those requiring additional environmental compliance processes.

Table D-1. P2IP Activities

| General Location | Waterbody | P2IP Activities (No Action Alternative [NAA] or Proposed Action [PA] and Earliest Implementation Year) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Telemetry Receivers | Juvenile Salmon Collection/ Acquisition | Adult Salmon Collection/ Acquisition | Marking Salmon | Salmon Release*** | Salmon Rearing | Spawning and Carcass Surveys | Data Collection – Acclimation Design and Existing Hatchery Upgrades | Data Collection Interim Passage | Construction of New Acclimation or Upgrading Existing Hatchery* | Interim Passage Trap and Transport | Construction and Testing Interim Upstream Passage* | Construction and Testing Interim Downstream Passage* |
| 01 Spring Canyon South | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| 02 Spring Canyon | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| 03 Spring Canyon | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| 04 Plum Point | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| 05 Plum Point | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| 06 Camel Rocks | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| 07 Camel Rocks | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| 08 Keller Ferry Boat Launch | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| 09 Keller Ferry East | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| 10 Hanson Harbor | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| 11 Whitestone Creek | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| 12 Whitestone Rock | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| 13 Halverson Canyon | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| 14 Burbot Creek | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| 15 Hawk Creek | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| 16 Seven Bays | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| 17 Castle Rock | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| 18 Wilmont Cove | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| 19 Hunters | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| 987 Keller West | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Additional Telemetry Receivers | As needed in Project Area above Beebe Bridge | PA TBD | | | | | | | | | | | | |

| General Location | Waterbody | P2IP Activities (No Action Alternative [NAA] or Proposed Action [PA] and Earliest Implementation Year) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Telemetry Receivers | Juvenile Salmon Collection/ Acquisition | Adult Salmon Collection/ Acquisition | Marking Salmon | Salmon Release*** | Salmon Rearing | Spawning and Carcass Surveys | Data Collection – Acclimation Design and Existing Hatchery Upgrades | Data Collection Interim Passage | Construction of New Acclimation or Upgrading Existing Hatchery* | Interim Passage Trap and Transport | Construction and Testing Interim Upstream Passage* | Construction and Testing Interim Downstream Passage* |
| Alder Creek | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Bissell Island | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Black Sands Beach | Columbia River Transboundary Reach | PA 2025 | | | | | | | | | | | | |
| Bowl and Pitcher | Spokane River | PA 2026 | | | | | | | | | | | | |
| Bradbury Beach | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Bridgeport State Park | Lake Rufus Woods | | | | | NAA 2019 | | | | | | | | |
| Buckly Bar | Lake Rufus Woods | PA 2025 | | | | | | | | | | | | |
| CDAT nikwin' Hatchery/Plummer Recirculating Aquaculture System | Plummer Creek | | | | NAA 2023 | | NAA 2023 | | | | | | | |
| Chalk Grade | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Chelan Falls Hatchery | Columbia River | | PA 2026 | PA 2026 | | | | | | | | | | |
| Chief Joseph Dam | Columbia River/Lake Rufus Woods | | | | | NAA 2023 | | | | PA 2025 | | | PA 2027 | PA 2032 |
| Chief Joseph Dam #1 | Lake Rufus Woods | PA 2025 | | | | | | | | | | | | |
| Chief Joseph Dam #2 | Lake Rufus Woods | PA 2025 | | | | | | | | | | | | |
| Chief Joseph Dam #3 | Lake Rufus Woods | PA 2025 | | | | | | | | | | | | |
| Chief Joseph Dam Forebay | Lake Rufus Woods | PA 2025 | | | | | | | | | | | | |
| Chief Joseph Dam Tailrace Left Bank | Columbia River | PA 2025 | | | | | | | | | | | | |
| Chief Joseph Dam Tailrace Right Bank | Columbia River | PA 2025 | | | | | | | | | | | | |
| Chief Joseph Hatchery | Columbia River | | NAA 2024 | NAA 2024 | PA 2025 | | PA 2025 | | | | PA 2026 | NAA 2024 | | |
| Chief Joseph Hatchery Ladder | Columbia River | PA 2025 | | | | | | | PA 2025 | | PA 2026 | | | |
| China Bend | Lake Roosevelt (Transboundary Reach) | PA 2025 | | | | | | | | | | | | |

| General Location | Waterbody | P2IP Activities (No Action Alternative [NAA] or Proposed Action [PA] and Earliest Implementation Year) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Telemetry Receivers | Juvenile Salmon Collection/ Acquisition | Adult Salmon Collection/ Acquisition | Marking Salmon | Salmon Release*** | Salmon Rearing | Spawning and Carcass Surveys | Data Collection – Acclimation Design and Existing Hatchery Upgrades | Data Collection Interim Passage | Construction of New Acclimation or Upgrading Existing Hatchery* | Interim Passage Trap and Transport | Construction and Testing Interim Upstream Passage* | Construction and Testing Interim Downstream Passage* |
| China Bend Ramp | Lake Roosevelt (Transboundary Reach) | PA 2025 | | | | | | | | | | | | |
| China Bend Upper Log Boom | Lake Roosevelt (Transboundary Reach) | PA 2025 | | | | | | | | | | | | |
| China Bend Winery | Lake Roosevelt (Transboundary Reach) | PA 2025 | | | | | | | | | | | | |
| Columbia River Purse Seining, Beach Seining, or Hook-and-Line Sampling | Columbia River | | NAA 2024 | NAA 2024 | | | | | | | | | | |
| Colville River Mouth | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Colville Tribe Trout Hatchery | Columbia River | | | | | | PA 2026 | | | PA 2026 | PA 2027 | | | |
| Crescent Bay Boat Ramp | Lake Roosevelt | | | | | NAA 2024 | | | | | | | | |
| Dart-Lo | Little Spokane River | PA 2026 | | | | | | | | | | | | |
| Downriver Park | Spokane River | | | | | NAA 2024 | | | | | | | | |
| East Bank/Wenatchee River Hatchery Program | Columbia River | | PA 2025 | PA 2025 | | | | | | | | PA 2025 | | |
| Elmer City Left Bank | Lake Rufus Woods | PA 2025 | | | | | | | | | | | | |
| Elmer City Right Bank | Lake Rufus Woods | PA 2025 | | | | | | | | | | | | |
| Entiat National Fish Hatchery | Entiat River | | NAA 2024 | NAA 2024 | | | NAA 2021 | | | | | PA 2025 | | |
| Evans Boat Ramp | Lake Roosevelt | | | | | NAA 2024 | | | | | | | | |
| Flat Creek Eddy | Lake Roosevelt (Transboundary Reach) | PA 2025 | | | | | | | | | | | | |
| Ford Hatchery | Tshimikain Creek (Chamokane Creek) | | | | | NAA | NAA 2021 | | PA 2025 | | PA 2026 | | | |
| French Rocks | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Game Range Cove | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Geezer Beach | Lake Roosevelt | | | | | NAA 2020 | | | | | | | | |
| Gifford | Lake Roosevelt | PA 2026 | | | | | | | | | | | | |
| Gifford | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |

| General Location | Waterbody | P2IP Activities (No Action Alternative [NAA] or Proposed Action [PA] and Earliest Implementation Year) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Telemetry Receivers | Juvenile Salmon Collection/ Acquisition | Adult Salmon Collection/ Acquisition | Marking Salmon | Salmon Release*** | Salmon Rearing | Spawning and Carcass Surveys | Data Collection – Acclimation Design and Existing Hatchery Upgrades | Data Collection Interim Passage | Construction of New Acclimation or Upgrading Existing Hatchery* | Interim Passage Trap and Transport | Construction and Testing Interim Upstream Passage* | Construction and Testing Interim Downstream Passage* |
| Glen Tana (Little Spokane) | Little Spokane River | PA 2026 | | | | | | | | | | | | |
| Glen Tana (Little Spokane) | Little Spokane River | | | | PA 2027 | PA 2023 | PA 2027 | | PA 2025 | | PA 2027 | | | |
| Grand Coulee Dam | Lake Roosevelt/Lake Rufus Woods | NAA 2022 | | | | NAA 2022 | | | | PA 2026 | | | PA 2029 | PA 2028 |
| Grand Coulee Dam #1 | Lake Roosevelt | NAA 2020 | | | | | | | | | | | | |
| Grand Coulee Dam #2 | Lake Roosevelt | NAA 2020 | | | | | | | | | | | | |
| Grand Coulee Dam #3 | Lake Roosevelt | NAA 2020 | | | | | | | | | | | | |
| Grand Coulee Forebay | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |
| Grand Coulee Forebay 3D Study Receivers | Lake Roosevelt | PA 2026 | | | | | | | | | | | | |
| Grand Coulee Tailrace Left Bank | Lake Rufus Woods | PA 2025 | | | | | | | | | | | | |
| Grand Coulee Tailrace Right Bank | Lake Rufus Woods | PA 2025 | | | | | | | | | | | | |
| Hall Creek | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Hangman Creek Screw Trap | Hangman Creek | | PA 2027 | | PA 2027 | | | | | | | | | |
| Hanson Harbor | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Harvey Creek Upstream | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Hunter Creek Upstream | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Indian Painted Rocks | Little Spokane River | PA 2026 | | | | | | | | | | | | |
| Jones Bay | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Keller Ferry | Lake Roosevelt | PA 2026 | | | | NAA 2022 | | | | | | | | |
| Keller Ferry/Sanpoil Arm | Lake Roosevelt (Sanpoil Arm) | | | | | NAA 2019 | | | | | | | | |
| Kendall Yards/Spokane Falls | Spokane River | PA 2026 | | | | | | | | | | | | |
| Kettle Falls | Lake Roosevelt | PA 2026 | | | | | | | | | | | | |
| Kettle Falls Marina | Lake Roosevelt | PA 2025 | | | | NAA 2019 | | | | | | | | |
| Kettle River Screw Trap | Kettle River | | PA 2027 | | PA 2027 | PA 2027 | | | | | | | | |
| kɬ cp̓əlk̓ stiḿ (Penticton) Hatchery | Okanogan River (Canada) | | PA 2025 | PA 2025 | PA 2025 | | PA 2025 | | | | | | | |
| Lake Roosevelt Beach Seining and Fyke Netting | Lake Roosevelt and Transboundary Reach | | PA 2026 | | PA 2026 | | | | | | | | | |

| General Location | Waterbody | P2IP Activities (No Action Alternative [NAA] or Proposed Action [PA] and Earliest Implementation Year) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Telemetry Receivers | Juvenile Salmon Collection/ Acquisition | Adult Salmon Collection/ Acquisition | Marking Salmon | Salmon Release*** | Salmon Rearing | Spawning and Carcass Surveys | Data Collection – Acclimation Design and Existing Hatchery Upgrades | Data Collection Interim Passage | Construction of New Acclimation or Upgrading Existing Hatchery* | Interim Passage Trap and Transport | Construction and Testing Interim Upstream Passage* | Construction and Testing Interim Downstream Passage* |
| Lake Rufus Wood (CTCR Boat Launch) | Lake Rufus Woods | | | | | NAA 2019 | | | | | | | | |
| Lake Spokane Campground | Spokane River (Lake Spokane) | | | | | PA 2027 | | | | | | | | |
| Lake Wenatchee | Lake Wenatchee | | PA 2025 | PA 2025 | | | | | | | | | | |
| Lincoln V2 | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Little Dalles Eddy | Lake Roosevelt and Transboundary Reach | PA 2025 | | | | | | | | | | | | |
| Little Falls Acclimation Facility | Spokane River | | | | PA 2025 | PAA 2020 | NAA 2020 | | | | PA 2025 | | | |
| Little Falls Dam | Spokane River | | | | | NAA 2022 | | | | PA 2028 | | | PA 2030 | PA 2032 |
| Little Falls Dam Tailrace Left Bank | Spokane River | PA 2026 | | | | | | | | | | | | |
| Little Falls Dam Tailrace Right Bank | Spokane River | PA 2026 | | | | | | | | | | | | |
| Little Spokane River Screw Trap | Little Spokane River | | PA 2027 | | PA 2027 | | | | | | | | | |
| Long Lake Dam | Spokane River | | | | | NAA 2023 | | | | PA 2028 | | | PA 2030 | PA 2032 |
| Long Lake Dam Tailrace Left Bank | Spokane River | PA 2026 | | | | | | | | | | | | |
| Long Lake Dam Tailrace Right Bank | Spokane River | PA 2026 | | | | | | | | | | | | |
| Lower Sanpoil River | Sanpoil River | | | | | NAA 2023 | | | | | | | | |
| Martha-Boardman Bridge | Tshimikain Creek | | | | | NAA 2020 | | | | | | | | |
| Meeker Mountain | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Middle Sanpoil River (30-Mile Bridge) | Sanpoil River | PA 2027 | | | | NAA 2020 | | | | | | | | |
| Milepost 110 | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Milepost 120/Northport | Lake Roosevelt (Transboundary Reach) | PA 2025 | | | | | | | | | | | | |
| Mission Point | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Mitchell Point | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Modeled salmon habitat reaches and outplant areas | Throughout blocked areas | | | | | | | NAA 2020 | | | | | | |
| Nancy Creek | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |

| General Location | Waterbody | P2IP Activities (No Action Alternative [NAA] or Proposed Action [PA] and Earliest Implementation Year) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Telemetry Receivers | Juvenile Salmon Collection/ Acquisition | Adult Salmon Collection/ Acquisition | Marking Salmon | Salmon Release*** | Salmon Rearing | Spawning and Carcass Surveys | Data Collection – Acclimation Design and Existing Hatchery Upgrades | Data Collection Interim Passage | Construction of New Acclimation or Upgrading Existing Hatchery* | Interim Passage Trap and Transport | Construction and Testing Interim Upstream Passage* | Construction and Testing Interim Downstream Passage* |
| Nespelem River Confluence #1 | Lake Rufus Woods | PA 2025 | | | | | | | | | | | | |
| Nespelem River Confluence #2 | Lake Rufus Woods | PA 2025 | | | | | | | | | | | | |
| Nine Mile Creek | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Nine Mile Dam | Spokane River | | | | | NAA 2023 | | | | PA 2028 | | | PA 2030 | PA 2032 |
| Nine Mile Dam Tailrace Left Bank | Spokane River | PA 2026 | | | | | | | | | | | | |
| Nine Mile Dam Tailrace Right Bank | Spokane River | PA 2026 | | | | | | | | | | | | |
| North Gorge | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Northport | Lake Roosevelt (Transboundary Reach) | PA 2026 | | | | | | | | | | | | |
| Northport | Lake Roosevelt (Transboundary Reach) | PA 2025 | | | | | | | | | | | | |
| Northport, WA | Transboundary Reach | | | | | NAA 2020 | | | | | | | | |
| Okanogan River Beach Seining | Okanogan River | | PA 2027 | | PA 2027 | | | | | | | | | |
| Okanogan River Screw Trap | Okanogan River | | PA 2027 | | PA 2027 | | | | | | | | | |
| Okanogan River Weir | Okanogan River | | | PA 2027 | PA 2027 | | | | | | | | | |
| O-Ra-Pak-En Creek | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Pacific Aquaculture | Lake Rufus Woods | PA 2025 | | | | NAA 2022 | NAA 2022 | | | | | | | |
| Pacific Aquaculture #1 | Lake Rufus Woods | PA 2025 | | | | | | | | | | | | |
| Pacific Aquaculture #2 | Lake Rufus Woods | PA 2025 | | | | | | | | | | | | |
| Pacific Northwest National Laboratories | Columbia River | | | | | NAA 2025 | NAA 2024 | | | | | | | |
| Peaceful Valley | Spokane River | | | | | PA 2025 | | | | | | | | |
| Plese Flats | Spokane River | PA 2026 | | | | NAA 2024 | | | | | | | | |
| Priest Rapids Dam/Hatchery | Columbia River | | | PA 2025 | PA 2025 | | | | | | | PA 2025 | | |
| Purse Seine Okanogan River Confluence (Upstream Transport) | Okanogan River | | | NAA 2024 | NAA 2024 | | | | | | | NAA 2024 | | |

| General Location | Waterbody | P2IP Activities (No Action Alternative [NAA] or Proposed Action [PA] and Earliest Implementation Year) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Telemetry Receivers | Juvenile Salmon Collection/ Acquisition | Adult Salmon Collection/ Acquisition | Marking Salmon | Salmon Release*** | Salmon Rearing | Spawning and Carcass Surveys | Data Collection – Acclimation Design and Existing Hatchery Upgrades | Data Collection Interim Passage | Construction of New Acclimation or Upgrading Existing Hatchery* | Interim Passage Trap and Transport | Construction and Testing Interim Upstream Passage* | Construction and Testing Interim Downstream Passage* |
| Quillisascut/La Fleur Creeks | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Rice | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Rickey Point | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Ringold Springs Hatchery | Columbia River | | | PA 2026 | PA 2026 | | | | | | | PA 2026 | | |
| Rocky Reach Juvenile bypass | Columbia River | | PA 2025 | PA 2025 | PA 2025 | | | | | | | PA 2025 | | |
| Rufus Woods Nespelem East | Lake Rufus Woods | PA 2025 | | | | | | | | | | | | |
| Rufus Woods, boat launch | Lake Rufus Woods | PA 2025 | | | | | | | | | | | | |
| Sand Hills/Wynhoff Canyon | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Sanpoil Arm | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Sanpoil Arm 1 (Shore Based) | Lake Roosevelt (Sanpoil Arm) | NAA 2024 | | | | | | | | | | | | |
| Sanpoil Arm 10 (Submersible) | Lake Roosevelt (Sanpoil Arm) | NAA 2024 | | | | | | | | | | | | |
| Sanpoil Arm 2 (Shore Based) | Lake Roosevelt (Sanpoil Arm) | NAA 2024 | | | | | | | | | | | | |
| Sanpoil Arm 3 (Shore Based) | Lake Roosevelt (Sanpoil Arm) | NAA 2024 | | | | | | | | | | | | |
| Sanpoil Arm 4 (Submersible) | Lake Roosevelt (Sanpoil Arm) | NAA 2024 | | | | | | | | | | | | |
| Sanpoil Arm 5 (Submersible) | Lake Roosevelt (Sanpoil Arm) | NAA 2024 | | | | | | | | | | | | |
| Sanpoil Arm 6 (Submersible) | Lake Roosevelt (Sanpoil Arm) | NAA 202 | | | | | | | | | | | | |
| Sanpoil Arm 7 (Submersible) | Lake Roosevelt (Sanpoil Arm) | NAA 2024 | | | | | | | | | | | | |
| Sanpoil Arm 8 (Submersible) | Lake Roosevelt (Sanpoil Arm) | NAA 2024 | | | | | | | | | | | | |
| Sanpoil Arm 9 (Submersible) | Lake Roosevelt (Sanpoil Arm) | NAA 2027 | | | | | | | | | | | | |
| Sanpoil Arm Buoy B | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Sanpoil Arm Mouth Middle | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Sanpoil Arm Net Pens | Lake Roosevelt (Sanpoil Arm) | | | | | PA 2026 | PA 2025 | | | | PA 2025 | | | |
| Sanpoil Buoy C | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Sanpoil Campground | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Sanpoil Middle | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |

| General Location | Waterbody | P2IP Activities (No Action Alternative [NAA] or Proposed Action [PA] and Earliest Implementation Year) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Telemetry Receivers | Juvenile Salmon Collection/ Acquisition | Adult Salmon Collection/ Acquisition | Marking Salmon | Salmon Release*** | Salmon Rearing | Spawning and Carcass Surveys | Data Collection – Acclimation Design and Existing Hatchery Upgrades | Data Collection Interim Passage | Construction of New Acclimation or Upgrading Existing Hatchery* | Interim Passage Trap and Transport | Construction and Testing Interim Upstream Passage* | Construction and Testing Interim Downstream Passage* |
| Sanpoil Mouth Buoy A East | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Sanpoil Mouth Buoy A West | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Sanpoil River at Louie Creek | Sanpoil River | | | | PA 2027 | | PA 2027 | | | PA 2025 | PA 2027 | | | |
| Lower Sanpoil River | Sanpoil River | PA 2027 | | | | | | | | | | | | |
| Sanpoil River Screw Trap | Sanpoil River | | NAA 2021 | | NAA 2021 | NAA 2021 | | | | | | | | |
| Screw Traps: Other Tributary of Lake Roosevelt | To Be Determined | | PA 2027 | | PA 2027 | | | | | | | | | |
| Seatons Grove | Lake Rufus Woods | PA 2024 | | | | | | | | | | | | |
| Seatons Grove | Lake Rufus Woods | | | | | PA 2019 | | | | | | | | |
| Seven Bays | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Seven Devils | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Sheep Creek | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Sherman Creek/Kettle Falls Net Pens | Lake Roosevelt | | | | | NAA 2021 | NAA 2021 | | | | | | | |
| Sixmile Creek upstream | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Snag Cove | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| SP Harker Canyon | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Spokane Community College | Spokane River | PA 2026 | | | | | | | | | | | | |
| Spokane House | Spokane River | PA 2026 | | | | | | | | | | | | |
| Spokane River (People's Park) | Spokane River | | | | | NAA 2022 | | | | | | | | |
| Spokane River Confluence V2 | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Spokane Tribal Hatchery | Spokane River (Chamokane Creek) | | | | | NAA 2020 | NAA 2019~~21~~ | | | | | | | |
| SP-Tribal Boat Launch | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| sqweyu' (Hangman Creek) | Hangman Creek | PA 2027 | | | PA 2027 | NAA 2022 | PA 2027 | | PA 2025 | | PA 2027 | | | |
| SR1 Fort Spokane | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| SR2 McCoys Marina | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| SR3 Upper Spokane River | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Star Boat Launch | Columbia River | | | | | PA 2025 | | | | | | | | |
| Sterling Point West | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Stray Dog Canyon upstream | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Swawilla Basin Central | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |

| General Location | Waterbody | P2IP Activities (No Action Alternative [NAA] or Proposed Action [PA] and Earliest Implementation Year) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Telemetry Receivers | Juvenile Salmon Collection/ Acquisition | Adult Salmon Collection/ Acquisition | Marking Salmon | Salmon Release*** | Salmon Rearing | Spawning and Carcass Surveys | Data Collection – Acclimation Design and Existing Hatchery Upgrades | Data Collection Interim Passage | Construction of New Acclimation or Upgrading Existing Hatchery* | Interim Passage Trap and Transport | Construction and Testing Interim Upstream Passage* | Construction and Testing Interim Downstream Passage* |
| To Be Determined | To Be Determined | PA 2025 | | | | | | | | | | | | |
| Threemile Creek | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Tributary Streamside Incubation Boxes | Sanpoil River, Spokane River, Little Spokane River | | | | | | PA 2025 | | | | | | | |
| Tshimikain Creek Screw Trap | Tshimikain Creek | | NAA 2024 | | NAA 2024 | | | | | | | | | |
| Tumwater Dam | Wenatchee River | | | PA 2025 | | | | | | | | PA 2025 | | |
| Two Rivers Marina | Lake Roosevelt (Spokane Arm) | PA 2026 | | | | | | | | | | | | |
| Two Rivers Marina Net Pens | Lake Roosevelt (Spokane Arm) | | | | | NAA 2022 | NAA 2021 | | | | | | | |
| UCT01 Nine Mile Dam Forebay | Spokane River | NAA 2022 | | | | | | | | | | | | |
| UCT02 Nine Mile Dam Forebay Backup | Spokane River | NAA 2022 | | | | | | | | | | | | |
| UCT03 Long Lake Dam Forebay | Spokane River | NAA 2022 | | | | | | | | | | | | |
| UCT04 Long Lake Dam Forebay Backup | Spokane River | NAA 2022 | | | | | | | | | | | | |
| UCT05 Little Falls Dam Forebay Backup | Spokane River | NAA 2022 | | | | | | | | | | | | |
| UCT06 Little Falls Dam Forebay Backup | Spokane River | NAA 2022 | | | | | | | | | | | | |
| UCT07 Fort Spokane downstream Backup | Spokane River | NAA 2022 | | | | | | | | | | | | |
| UCT08 Fort Spokane Upstream Backup | Spokane River | NAA 2022 | | | | | | | | | | | | |
| UCT11 Gifford Right Bank | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |
| UCT12 Gifford Mid-Channel | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |
| UCT13 Gifford Left Bank | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |
| UCT14 Stoi Sturgeon Buoy | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |
| UCT15 Abraham Cove Right Bank | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |
| UCT16 Abraham Cove | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |
| UCT17 Abraham Cove | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |
| UCT18 Abraham Cove Left Bank | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |

| General Location | Waterbody | P2IP Activities (No Action Alternative [NAA] or Proposed Action [PA] and Earliest Implementation Year) | | | | | | | | | | | | |
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| UCT19 Keller Right Bank | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |
| UCT20 Keller Mid-Channel | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |
| UCT21 Keller Left Bank | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |
| UCT22 Grand Coulee Forebay West | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |
| UCT23 Grand Coulee Forebay | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |
| UCT24 Grand Coulee Forebay | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |
| UCT25 Grand Coulee Forebay | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |
| UCT26 Grand Coulee Forebay | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |
| UCT27 Grand Coulee Forebay | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |
| UCT28 Grand Coulee Forebay East | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |
| UCT29 Grand Coulee Dam Wpp North | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |
| UCT30 Grand Coulee Dam Wpp South | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |
| UCT31 Grand Coulee Dam Rph Corner | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |
| UCT32 Grand Coulee Dam Rph Unit 18 | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |
| UCT33 Grand Coulee Dam Spillway 11 | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |
| UCT34 Grand Coulee Dam Spillway 8/9 | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |
| UCT35 Grand Coulee Dam Spillway 5/6 | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |
| UCT36 Grand Coulee Dam Spillway 2/3 | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |
| UCT37 Grand Coulee Dam Spillway 1 | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |
| UCT38 Grand Coulee Dam Lph Units 4/5 | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |
| UCT39 Grand Coulee Dam Lph Unit 1 | Lake Roosevelt | NAA 2022 | | | | | | | | | | | | |
| UCT40 Banks Canal East | Banks Canal | NAA 2022 | | | | | | | | | | | | |
| UCT41 Banks Canal West | Banks Canal | NAA 2022 | | | | | | | | | | | | |
| UCT42 Setons Grove Right Bank | Lake Rufus Woods | NAA 2022 | | | | | | | | | | | | |

| General Location | Waterbody | P2IP Activities (No Action Alternative [NAA] or Proposed Action [PA] and Earliest Implementation Year) | | | | | | | | | | | | |
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| | | Telemetry Receivers | Juvenile Salmon Collection/ Acquisition | Adult Salmon Collection/ Acquisition | Marking Salmon | Salmon Release*** | Salmon Rearing | Spawning and Carcass Surveys | Data Collection – Acclimation Design and Existing Hatchery Upgrades | Data Collection Interim Passage | Construction of New Acclimation or Upgrading Existing Hatchery* | Interim Passage Trap and Transport | Construction and Testing Interim Upstream Passage* | Construction and Testing Interim Downstream Passage* |
| UCT43 Seatons Grove Left Bank | Lake Rufus Woods | NAA 2027 | | | | | | | | | | | | |
| UCT44 Rufus Woods Mid-Res Upstream | Lake Rufus Woods | NAA 2022 | | | | | | | | | | | | |
| UCT45 Rufus Woods Mid-Res Downstream | Lake Rufus Woods | NAA 2022 | | | | | | | | | | | | |
| UCT46 Chief Joseph Forebay North | Lake Rufus Woods | NAA 2022 | | | | | | | | | | | | |
| UCT47 Chief Joseph Forebay Middle | Lake Rufus Woods | NAA 2022 | | | | | | | | | | | | |
| UCT48 Chief Joseph Forebay South | Lake Rufus Woods | NAA 2022 | | | | | | | | | | | | |
| UCT49 Chief Joseph Dam Spillway North | Lake Rufus Woods | NAA 2022 | | | | | | | | | | | | |
| UCT50 Chief Joseph Dam Spillway South | Lake Rufus Woods | NAA 2022 | | | | | | | | | | | | |
| UCT51 Chief Joseph Dam Unit 4/5 | Lake Rufus Woods | NAA 2027 | | | | | | | | | | | | |
| UCT52 Chief Joseph Dam Unit 11/12 | Lake Rufus Woods | NAA 2022 | | | | | | | | | | | | |
| UCT53 Chief Joseph Dam Unit 16/17 | Lake Rufus Woods | NAA 2022 | | | | | | | | | | | | |
| UCT54 Chief Joseph Dam Unit 23/24 | Lake Rufus Woods | NAA 2022 | | | | | | | | | | | | |
| UCT55 Chief Joseph Dam Tail Right Bank US | Columbia River | NAA 2022 | | | | | | | | | | | | |
| UCT56 Chief Joseph Dam Tail Right Bank DS | Columbia River | NAA 2022 | | | | | | | | | | | | |
| UCT57 Beebe Br Right Bank Piling US | Columbia River | NAA 2022 | | | | | | | | | | | | |
| UCT58 Beebe Br Right Bank Piling Ds | Columbia River | NAA 2022 | | | | | | | | | | | | |
| UCT59 Beebe Br Left Bank Shore Us | Columbia River | NAA 2022 | | | | | | | | | | | | |
| UCT60 Beebe Br Left Bank Shore Ds | Columbia River | NAA 2022 | | | | | | | | | | | | |
| UCTXX Marcus Flats Left Bank | Lake Roosevelt | NAA 2026 | | | | | | | | | | | | |
| UCTXX Marcus Flats Mid-Channel | Lake Roosevelt | PA 2026 | | | | | | | | | | | | |

| General Location | Waterbody | P2IP Activities (No Action Alternative [NAA] or Proposed Action [PA] and Earliest Implementation Year) | | | | | | | | | | | | |
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| UCTXX Marcus Flats Right Bank | Lake Roosevelt | PA 2026 | | | | | | | | | | | | |
| Upper North Gorge Eddy | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |
| Upper Sanpoil River | Sanpoil River | | | | | NAA 2020 | | NAA - 2020 | | | | | | |
| Upper Sanpoil River Acclimation Facility** | Sanpoil River | | | | | | A 2029 | | PA 2027 | | PA 2029 | | | |
| Waikiki Springs | Sanpoil River | PA 2026 | | | | | | | | | | | | |
| Wells Dam and Hatchery | Columbia River | | NAA 2019 | NAA 2019 | NAA 2023 | | NAA 2022 | | | | | NAA 2019 | | |
| Wilmont V2 | Lake Roosevelt | PA 2025 | | | | | | | | | | | | |

*Denotes P2IP activities that would be evaluated under future environmental compliance processes.
** This site is only to be considered if the Sanpoil River at Louie Creek site is determined to be unviable.
*** Salmon may be released at any accessible site within the Project Area in addition to named sites.

## D.2 Figures: P2IP Activities

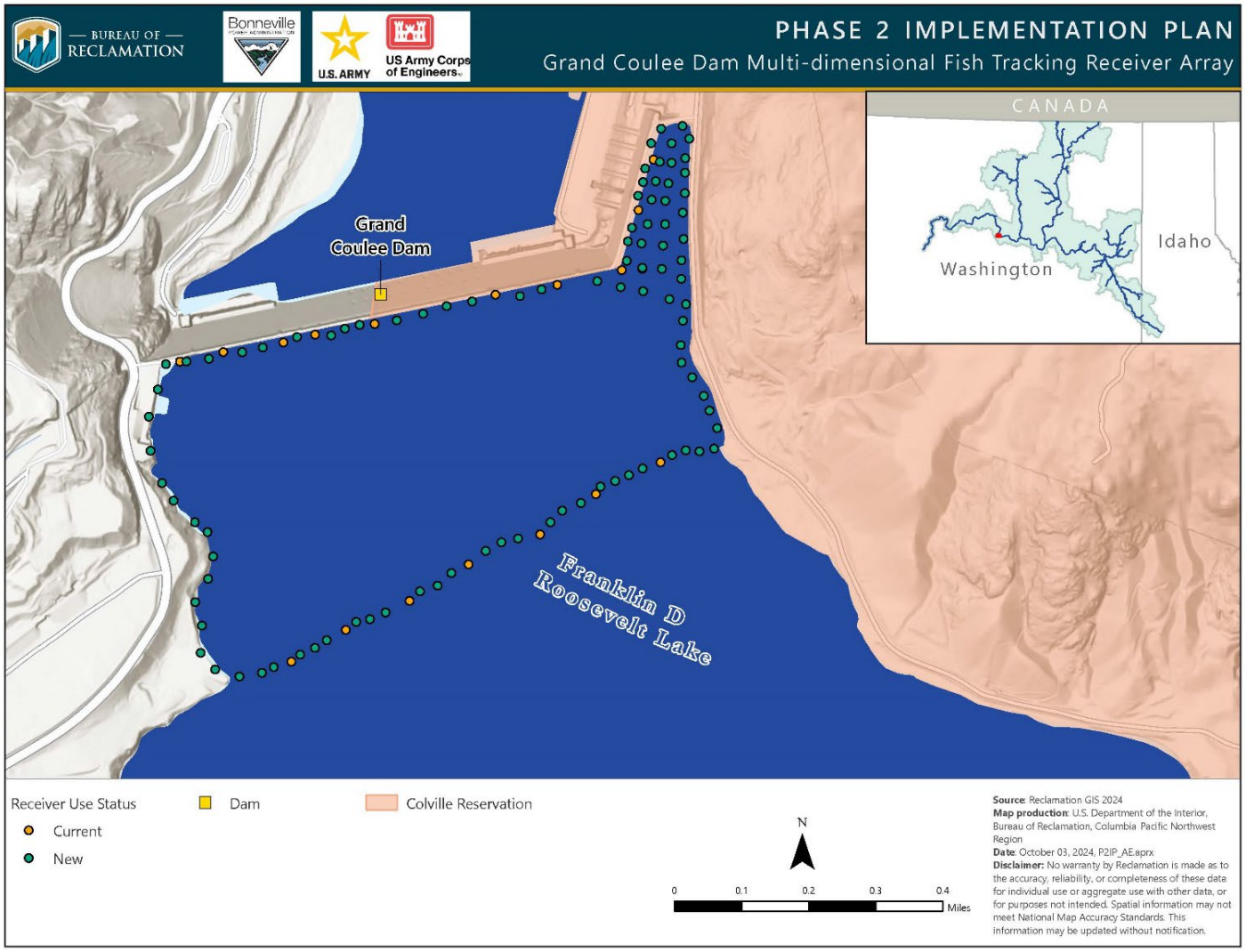


Figure D-1. Approximate layout of receiver array at Grand Coulee Dam forebay to accommodate multidimensional fish tracking

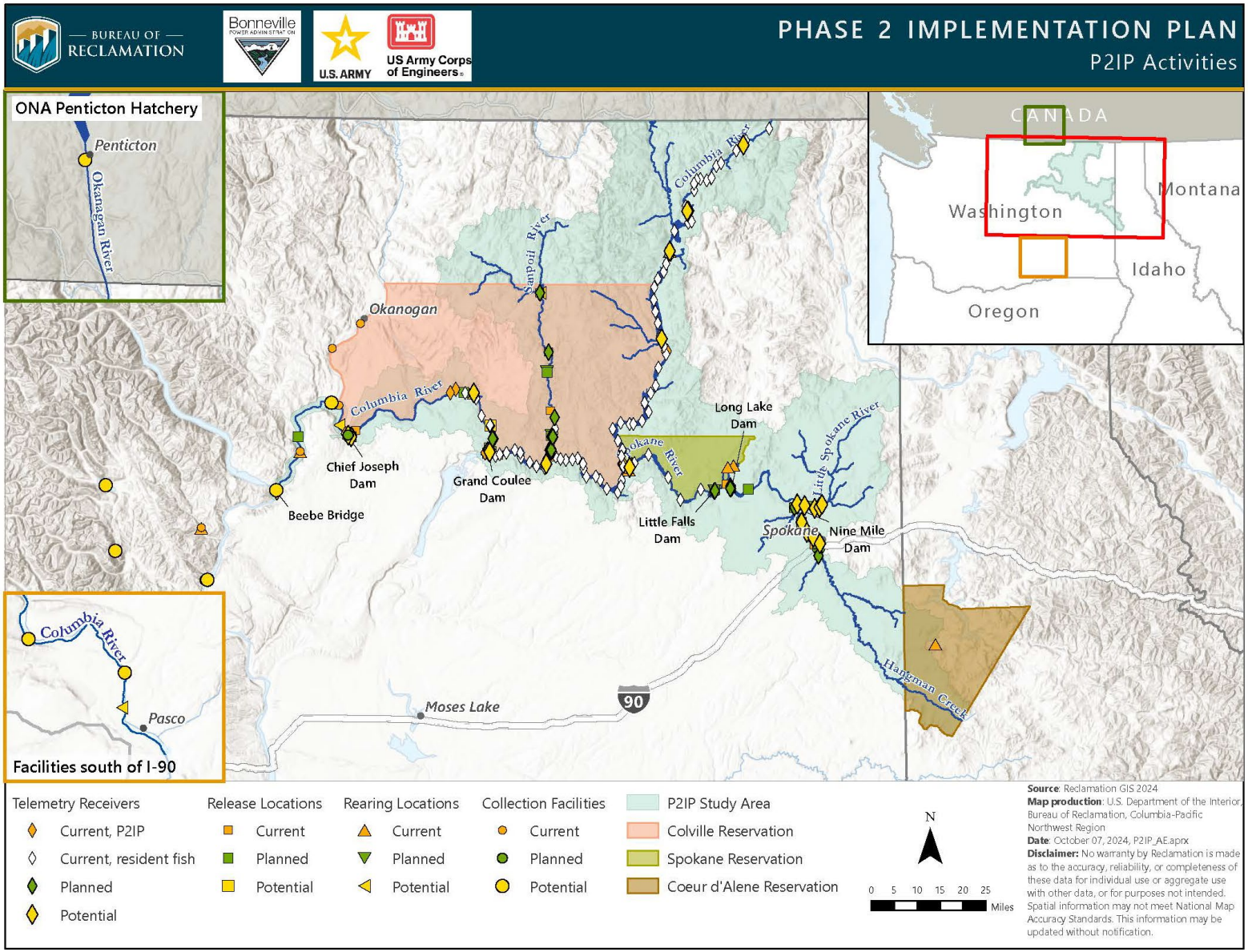


Figure D-2: Overview map with research locations: receivers, salmon release, and rearing locations.

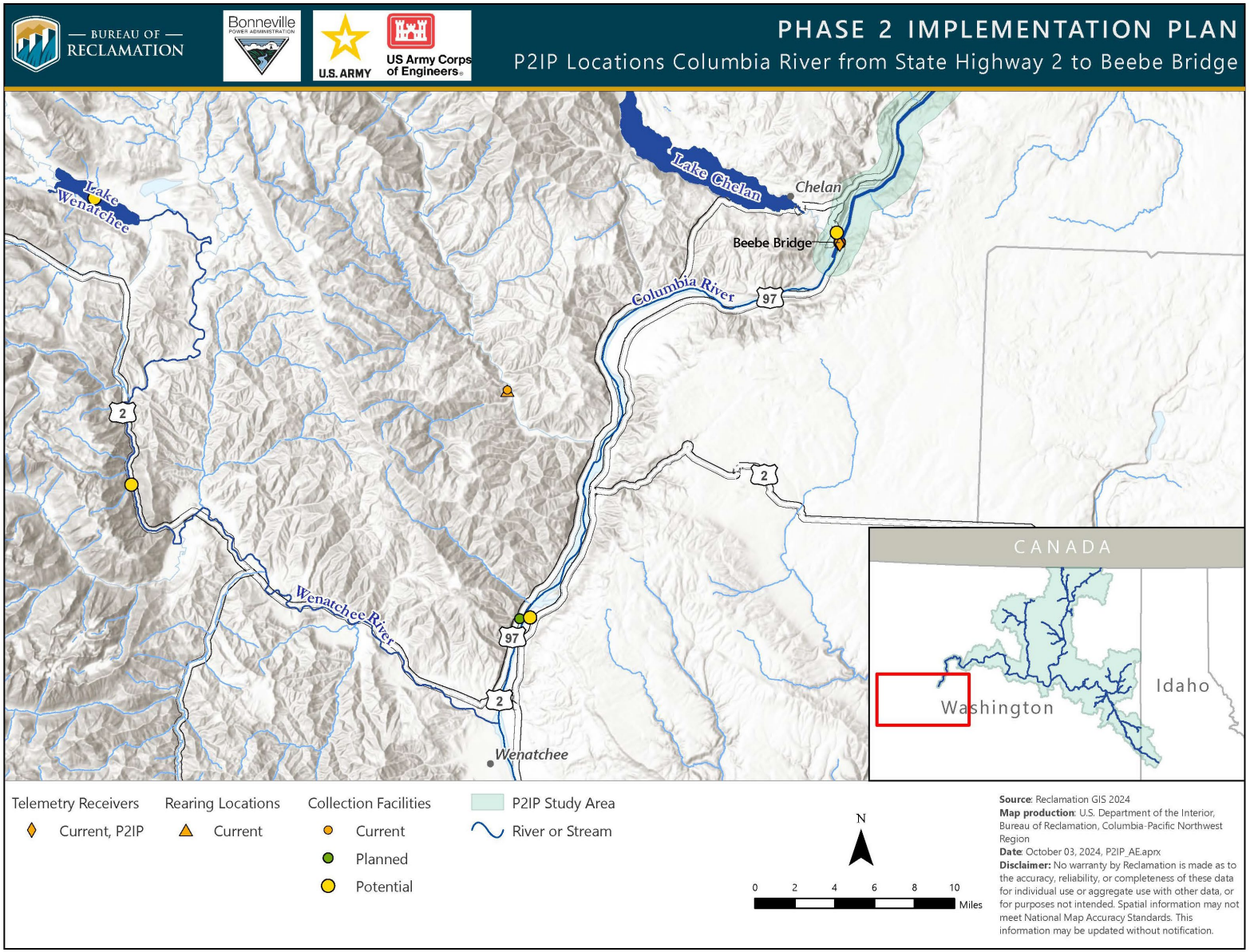


Figure D-3: Map of P2IP locations downstream of Beebe Bridge

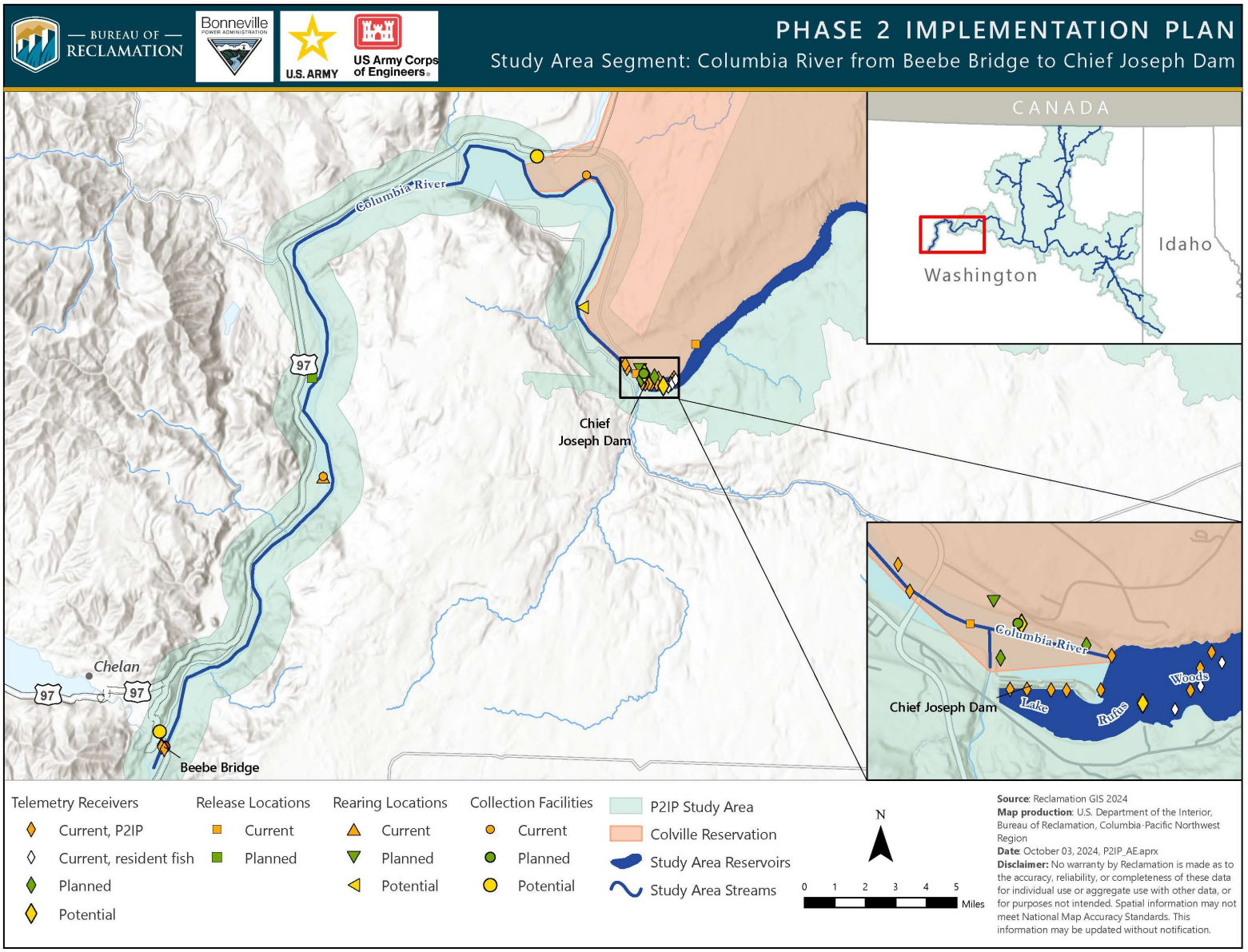


Figure D-4: Project Area segment: Columbia River from Beebe Bridge to Chief Joseph Dam

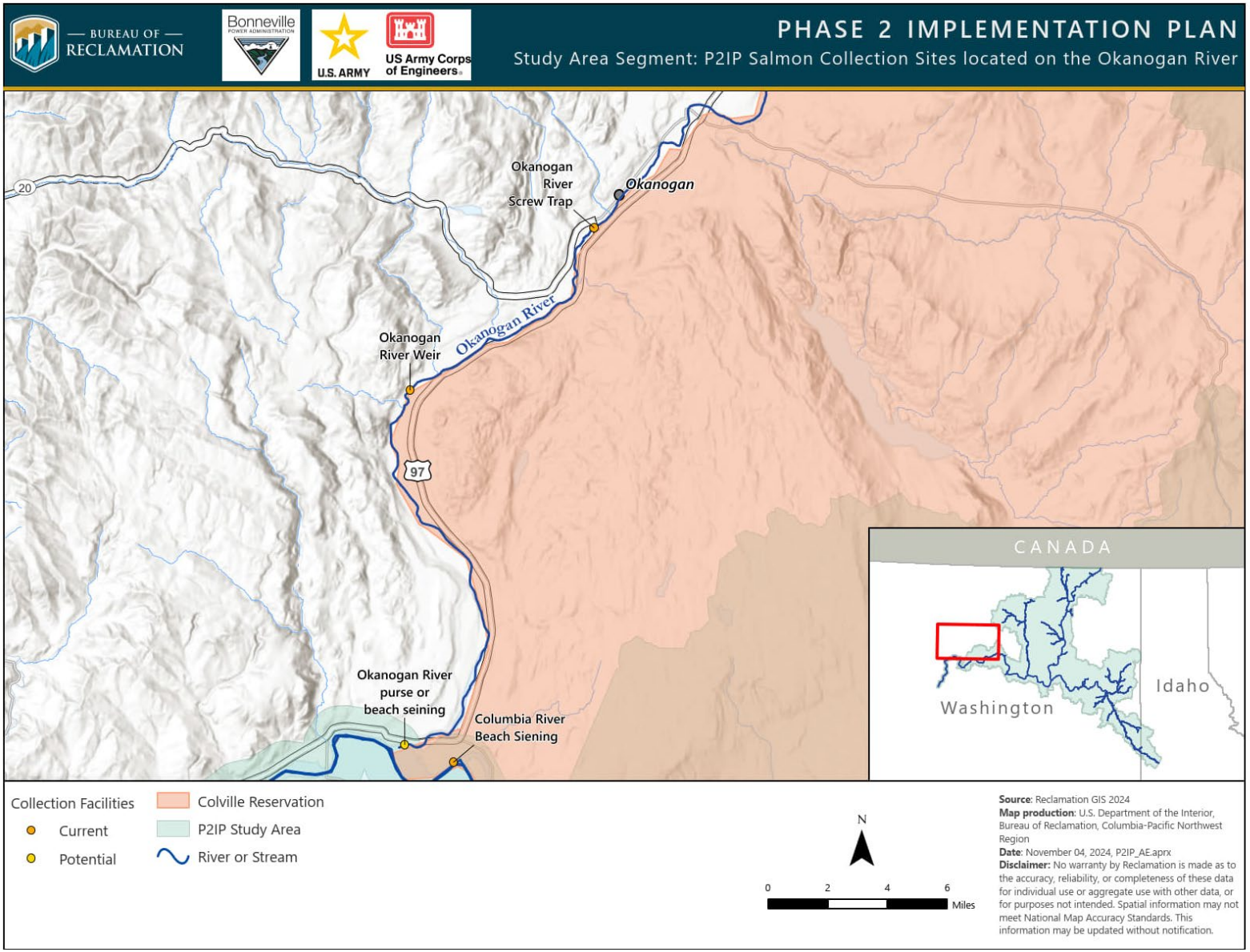


Figure D-5: Map of Salmon Collection Sites located on the Okanogan River

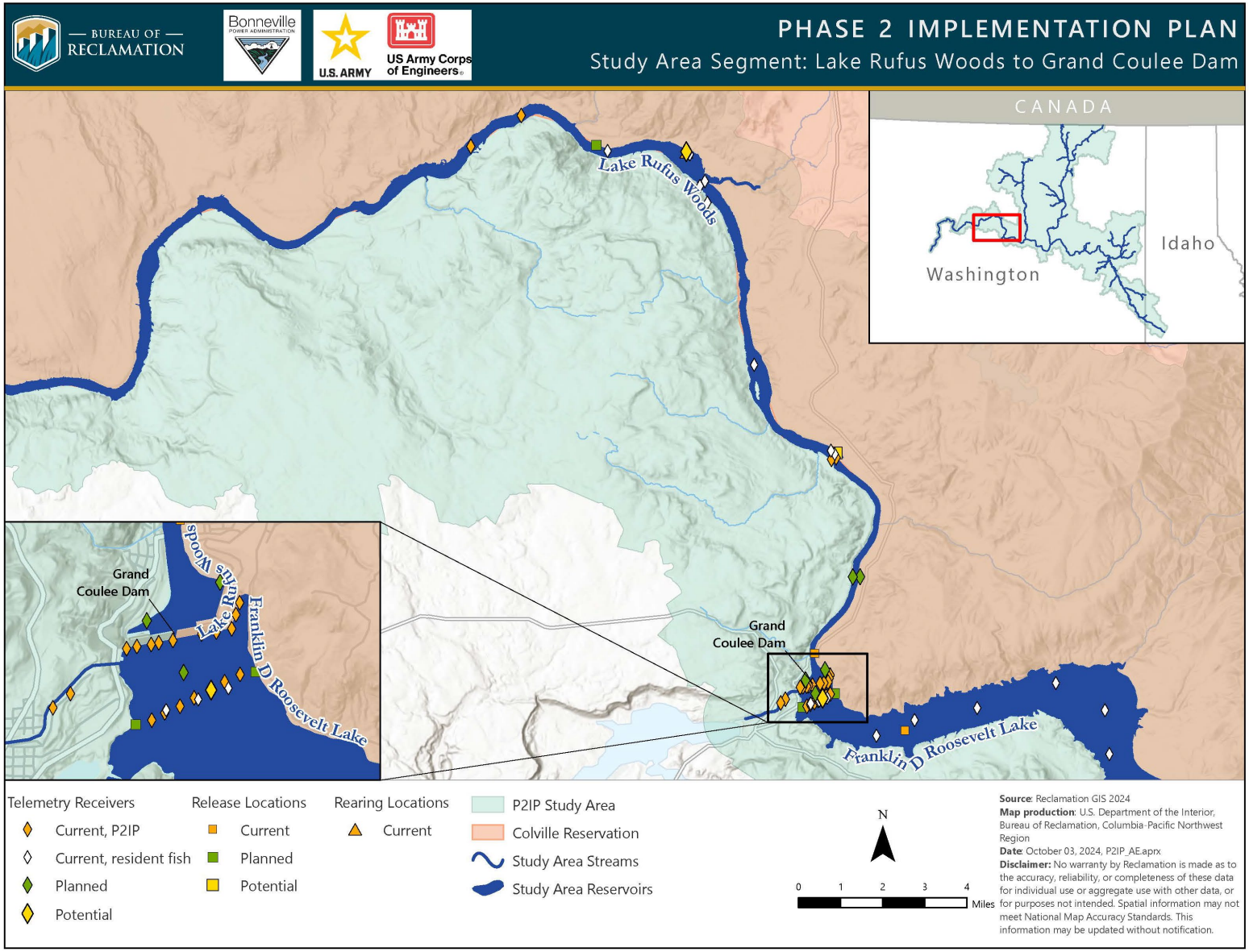


Figure D-6: Study Area Segment Map: Lake Rufus Woods to Grand Coulee Dam

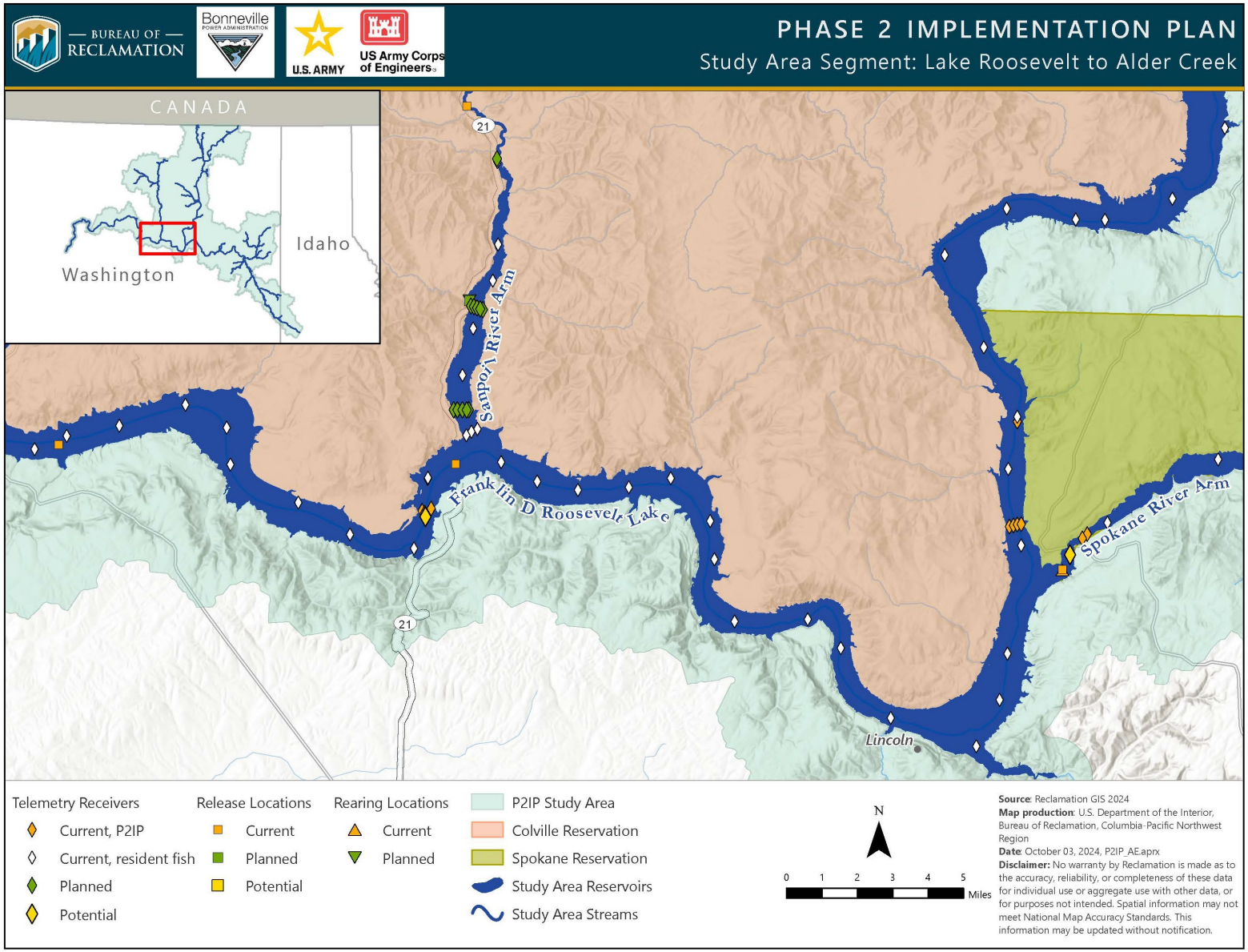


Figure D-7: Study Area Segment Map: Lake Roosevelt Upstream of Grand Coulee Dam to Alder Creek

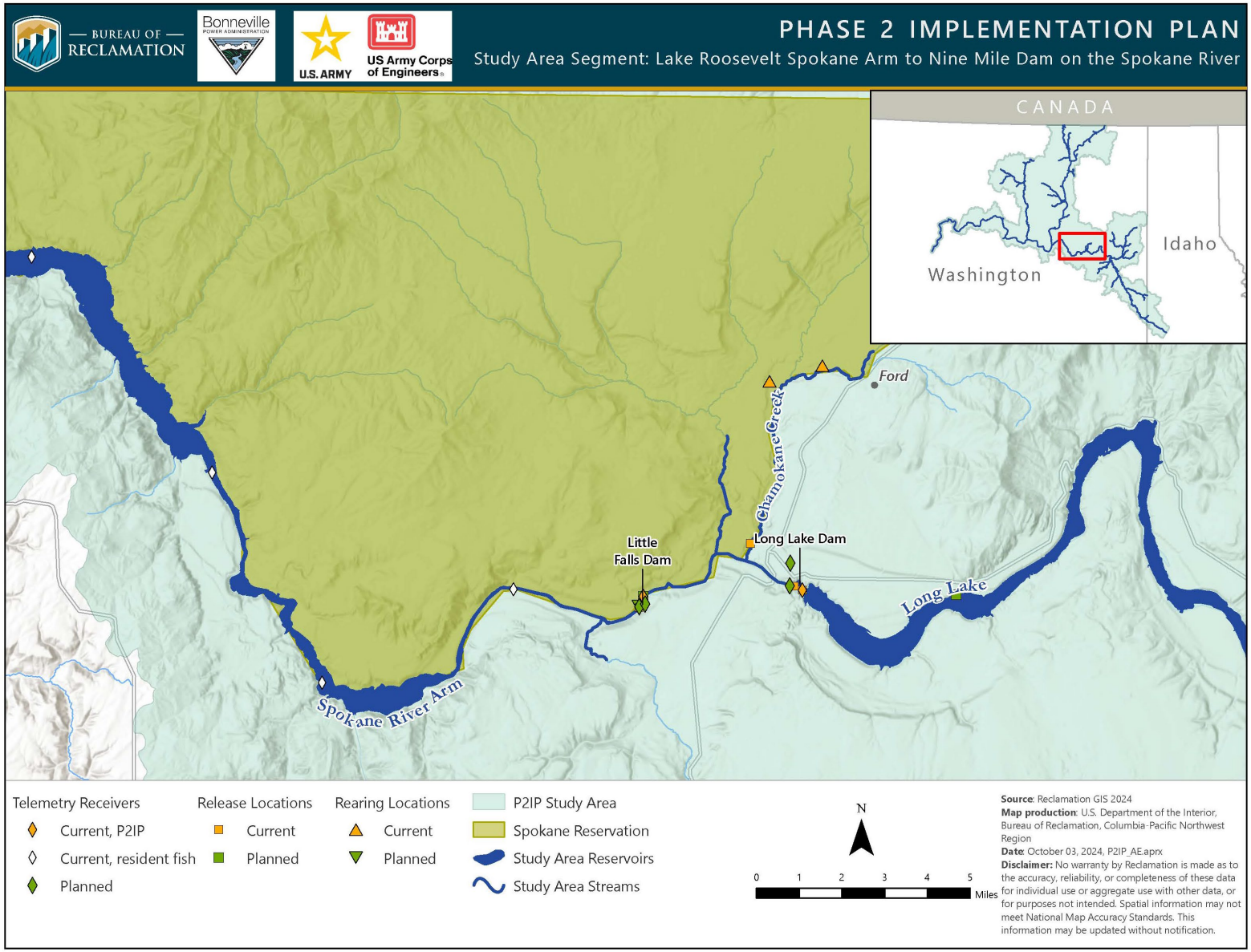


Figure D-8: Study Area Segment: Lake Roosevelt Spokane Arm to Long Lake Dam on the Spokane River

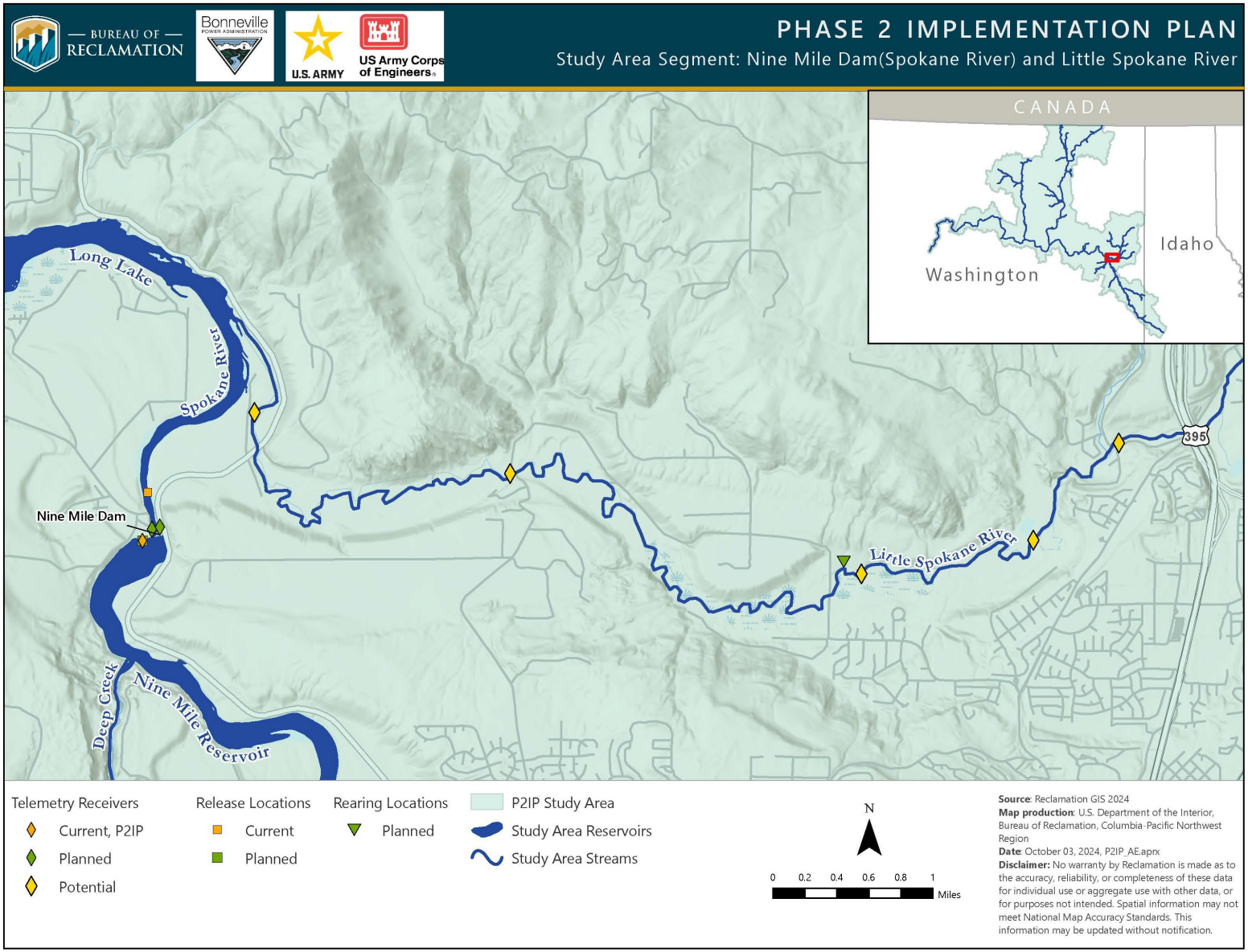


Figure D-9: Study Area Segment Nine Mile Dam (Spokane River) and Little Spokane River

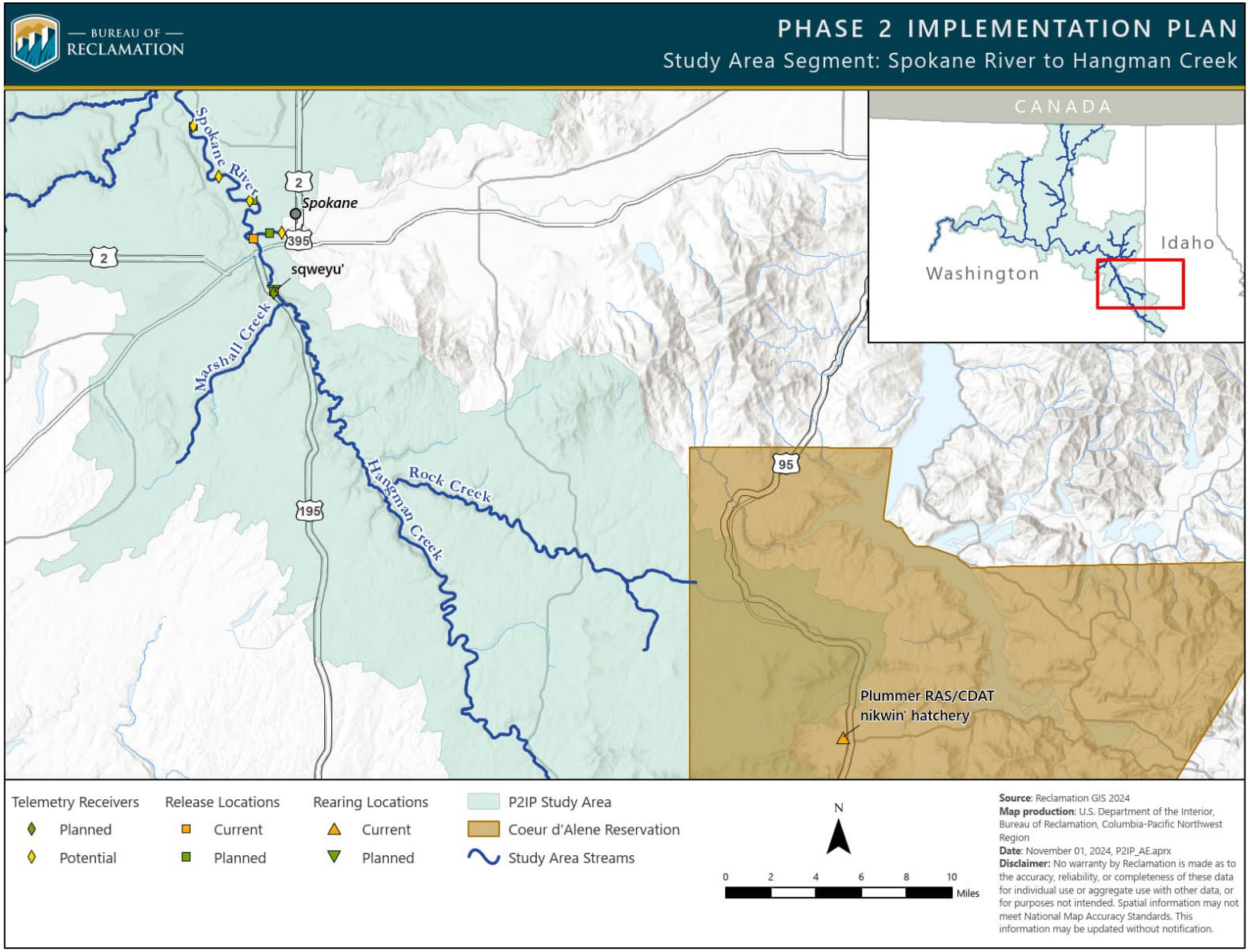


Figure D-10: Study Area Segment: Spokane River Upstream of Nine Mile Dam and Hangman Creek

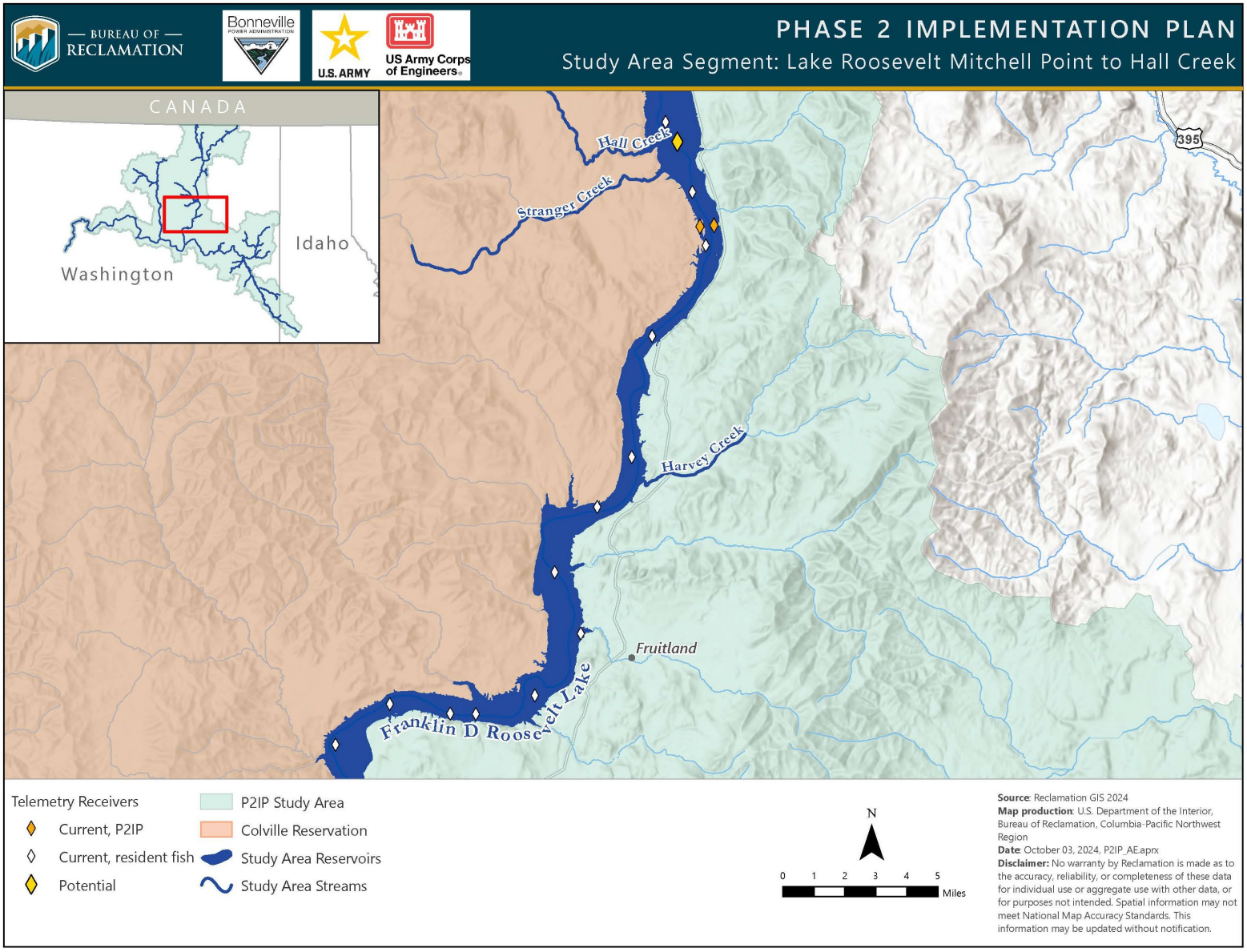


Figure D-11: Study Area Segment: Lake Roosevelt from Mitchell Point to Hall Creek

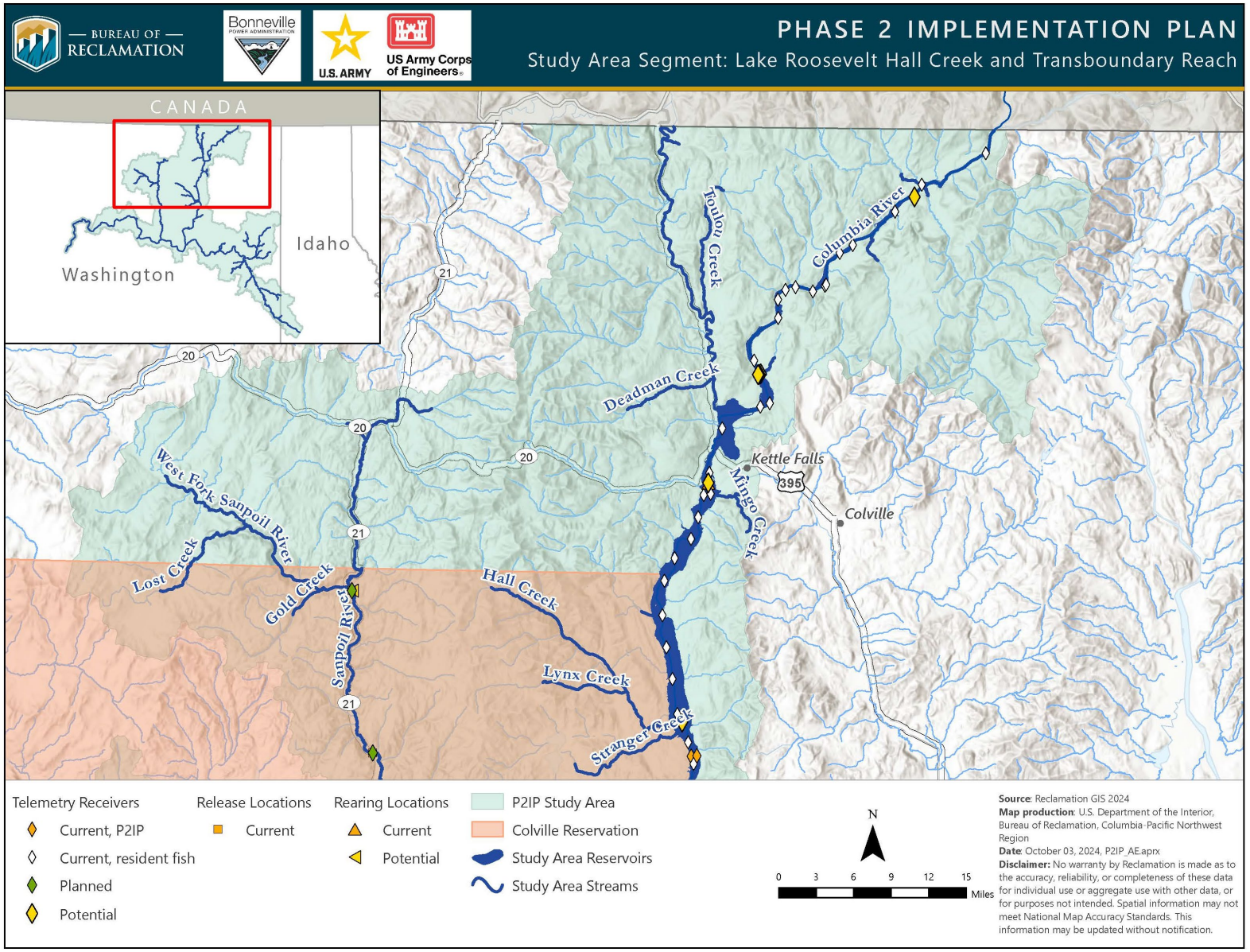


Figure D-12: Upper Sanpoil River, Lake Roosevelt Upstream of Hall Creek, and Columbia River Transboundary Reach

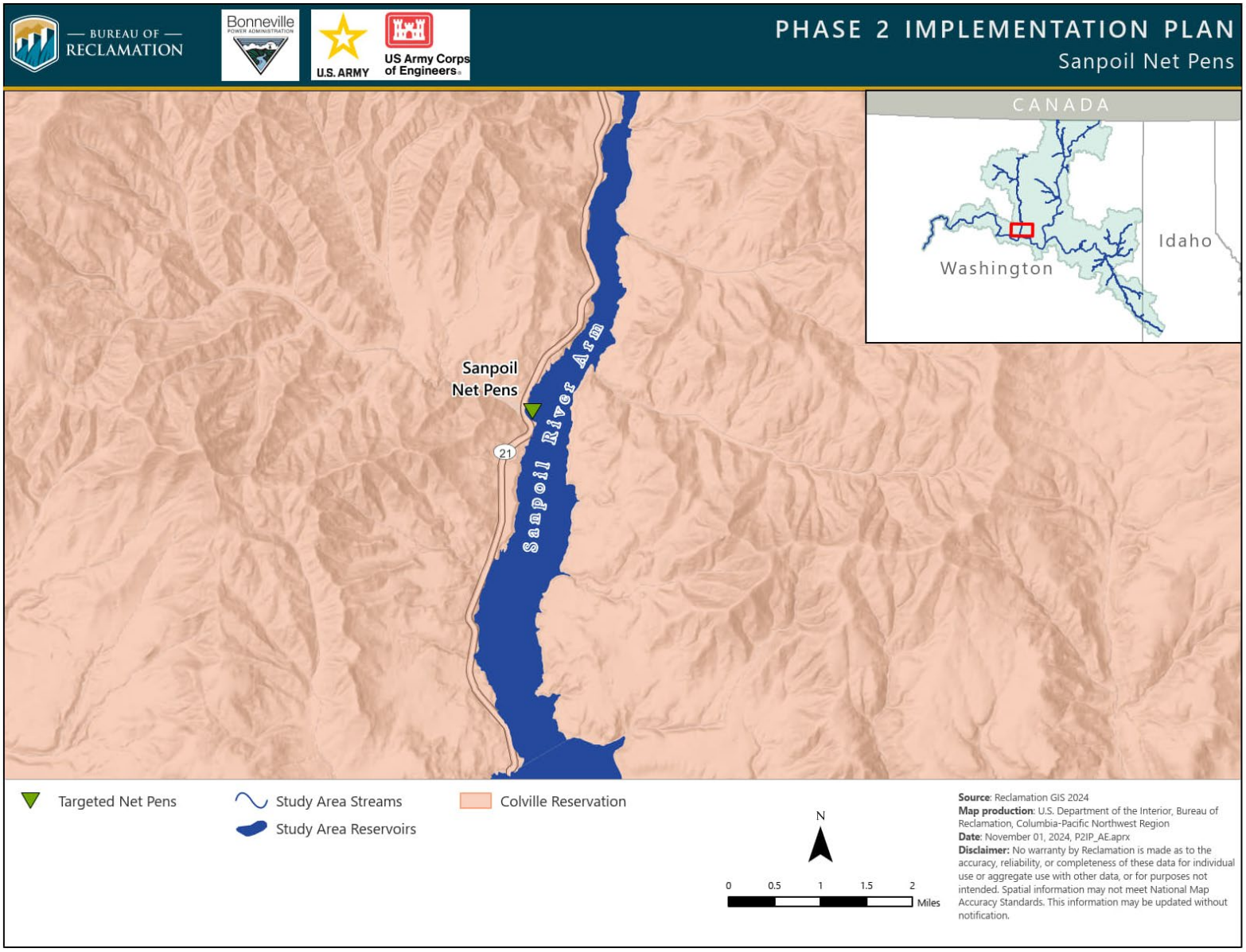


Figure D-13. Sanpoil Arm with approximate location of targeted deployment of net pens.

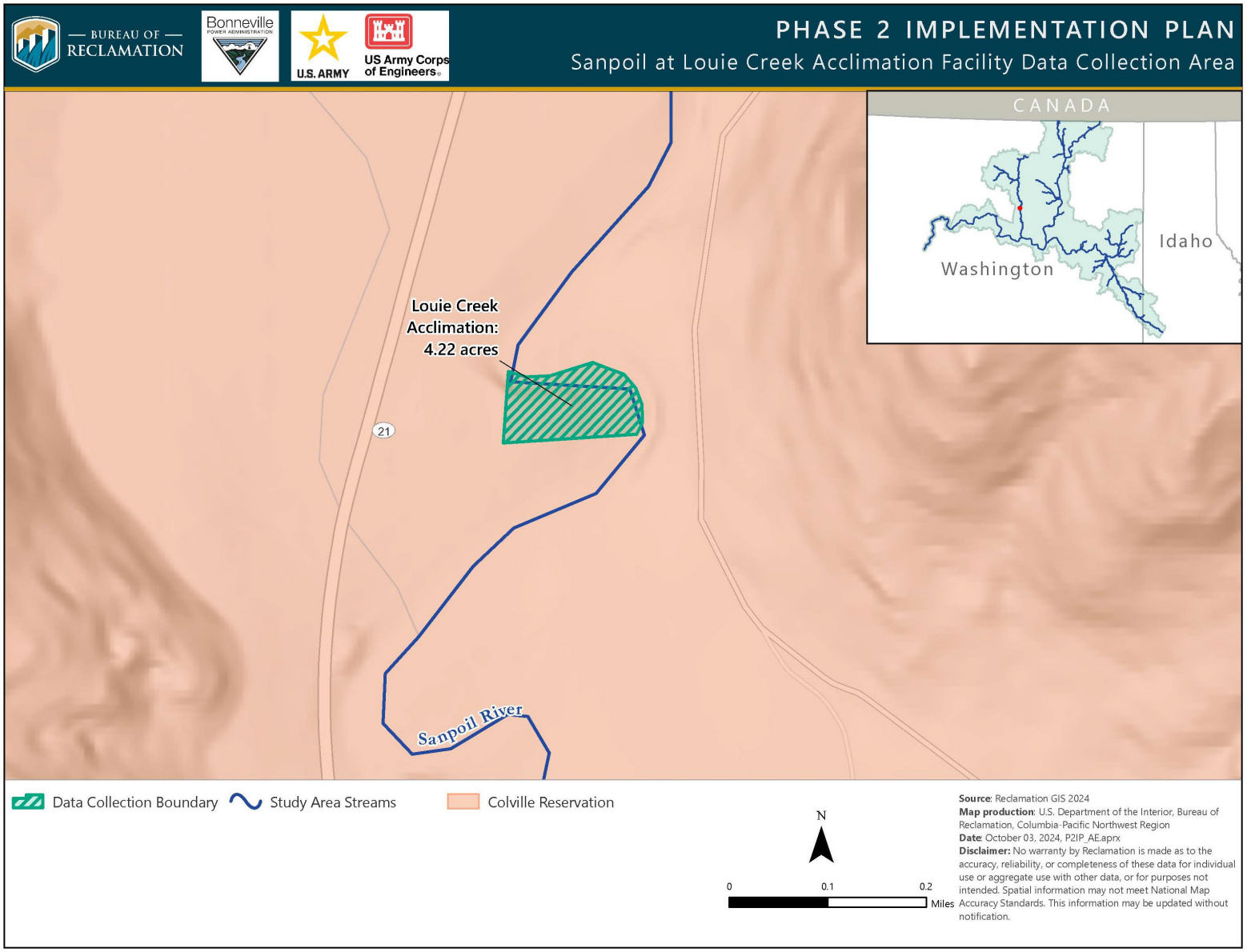


Figure D-14. Sanpoil at Louie Creek Acclimation Facility Data Collection Area

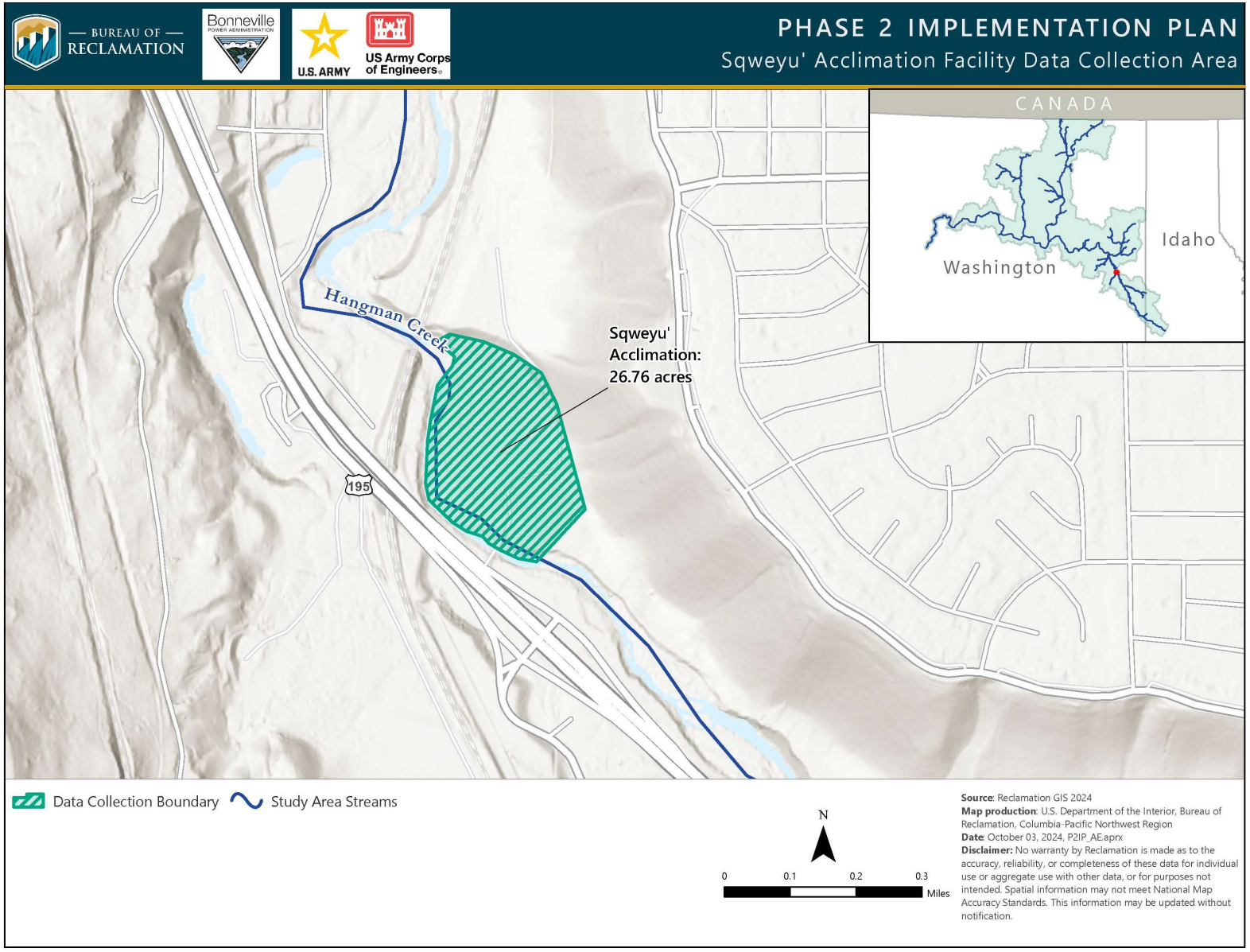


Figure D-15. sqweyu' Acclimation Facility Data Collection Area

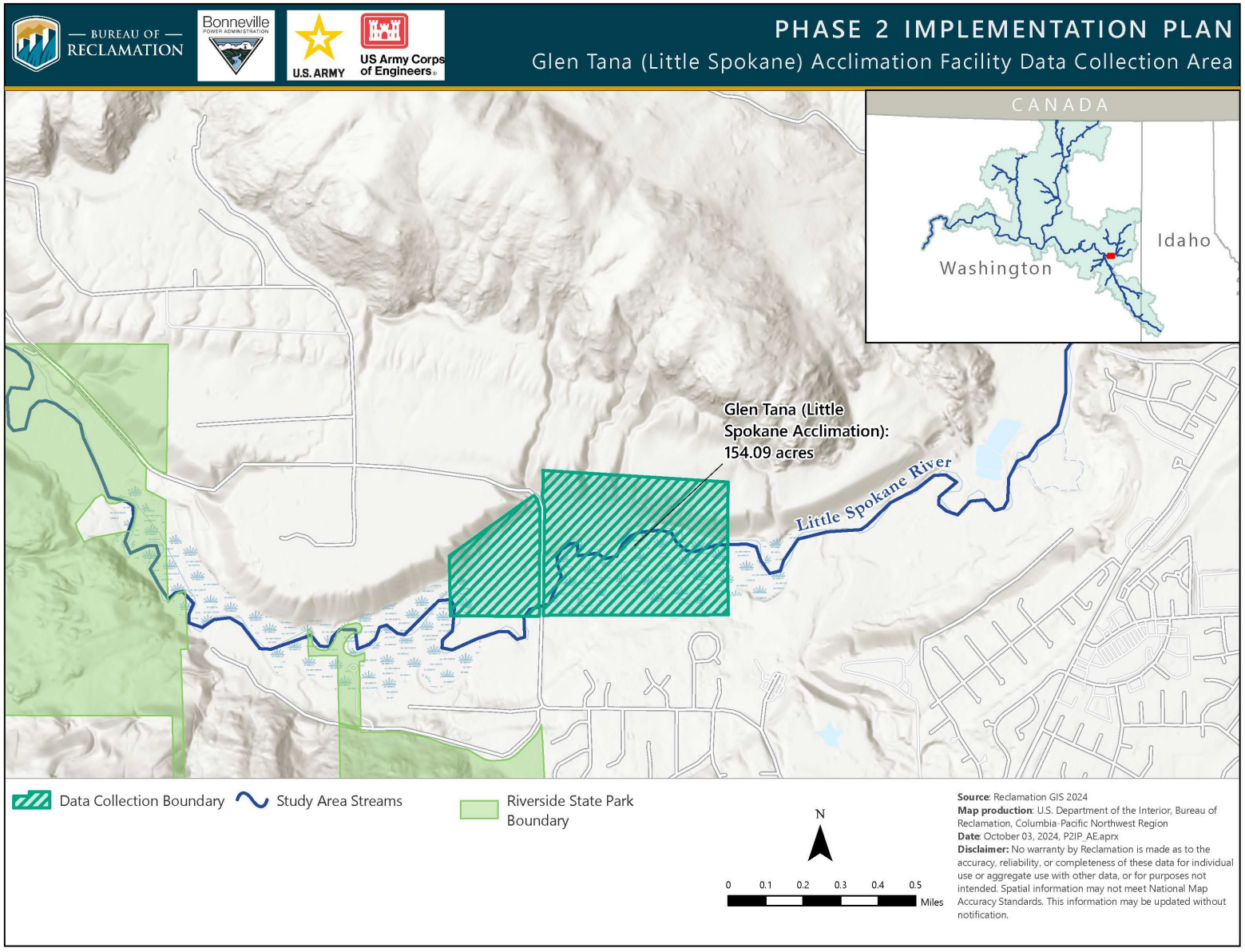


Figure D-16. Glen Tana Acclimation Facility Data Collection Area

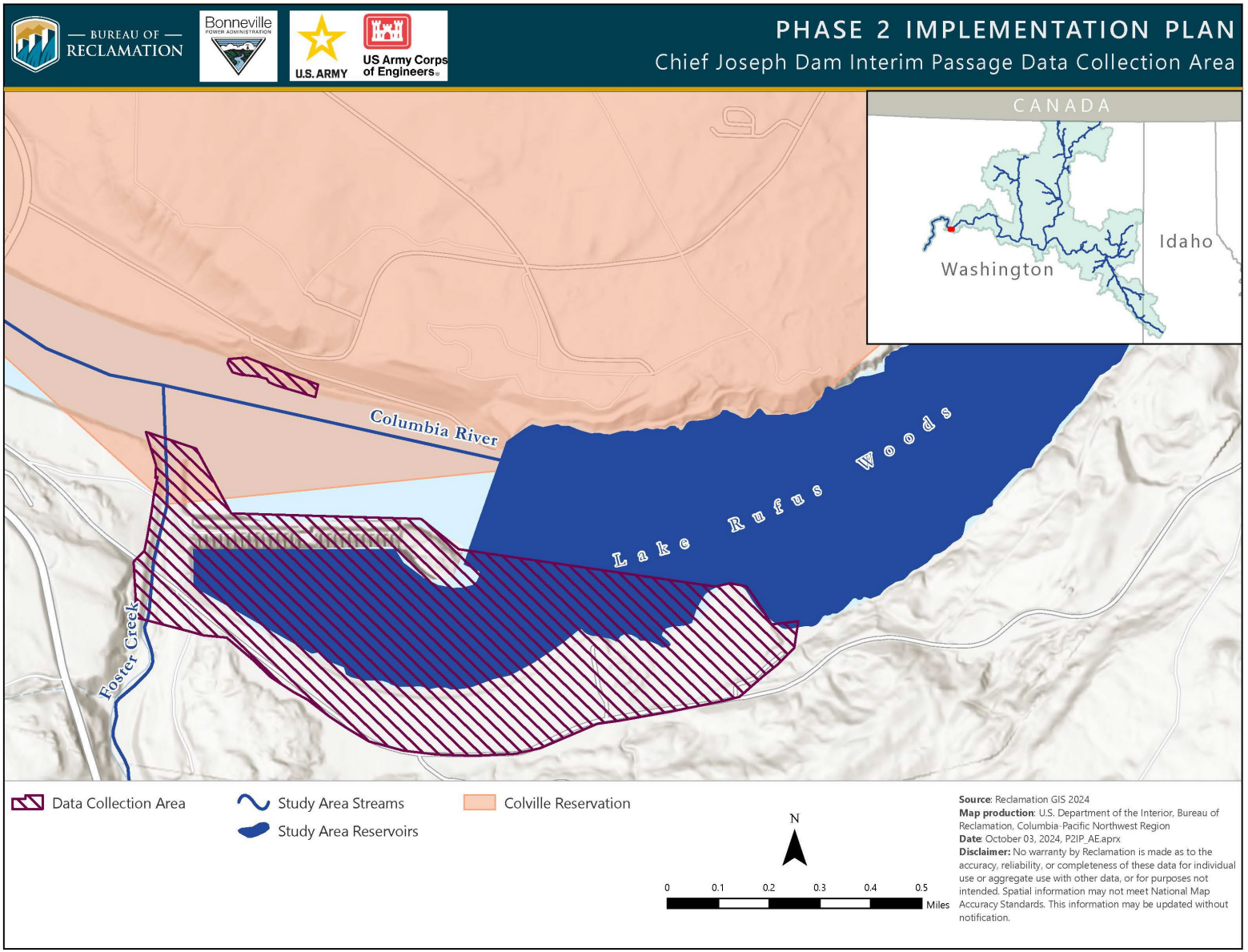


Figure D-17. Chief Joseph Dam Interim Passage Data Collection Area

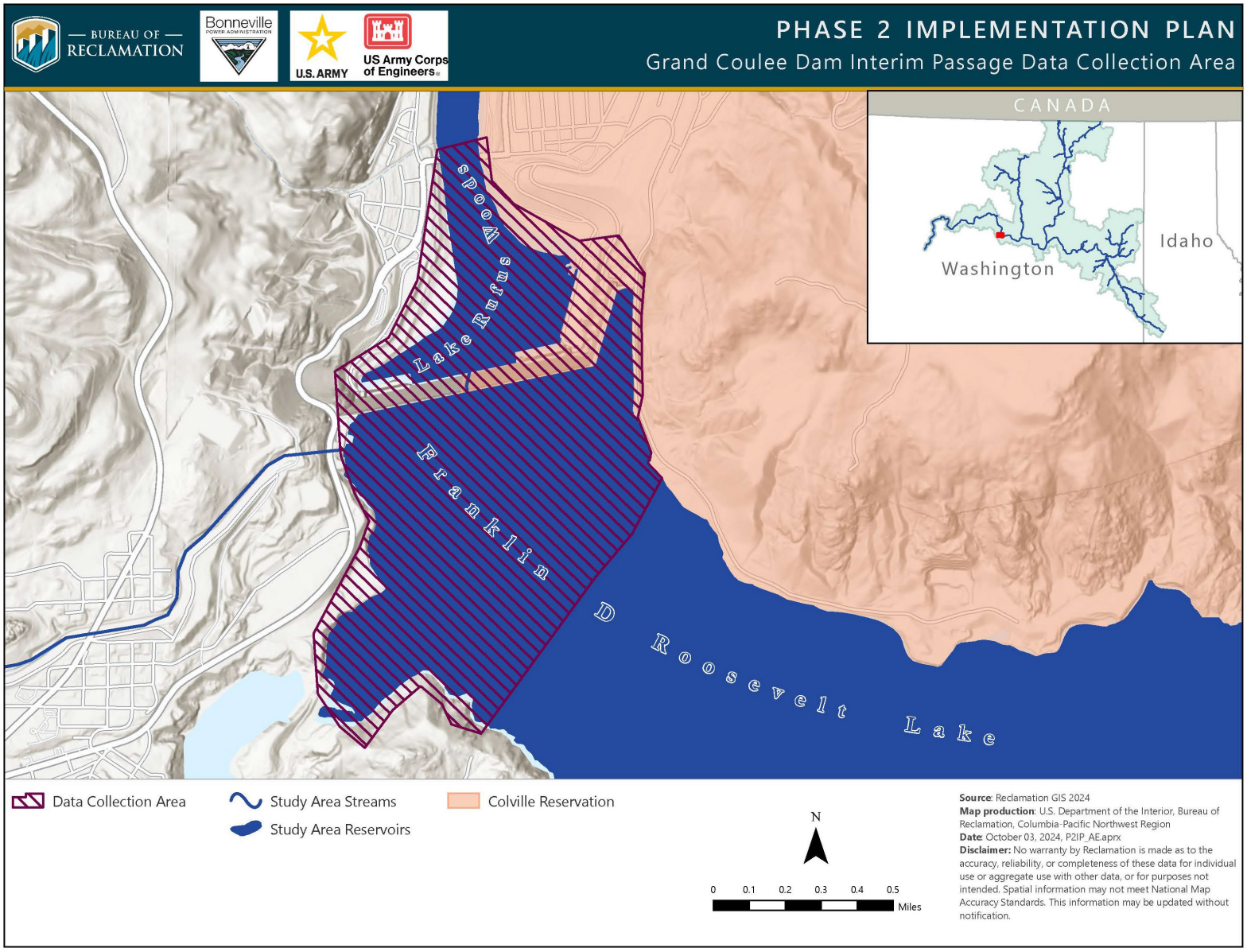


Figure D-18. Grand Coulee Dam Interim Passage Dam Collection Area

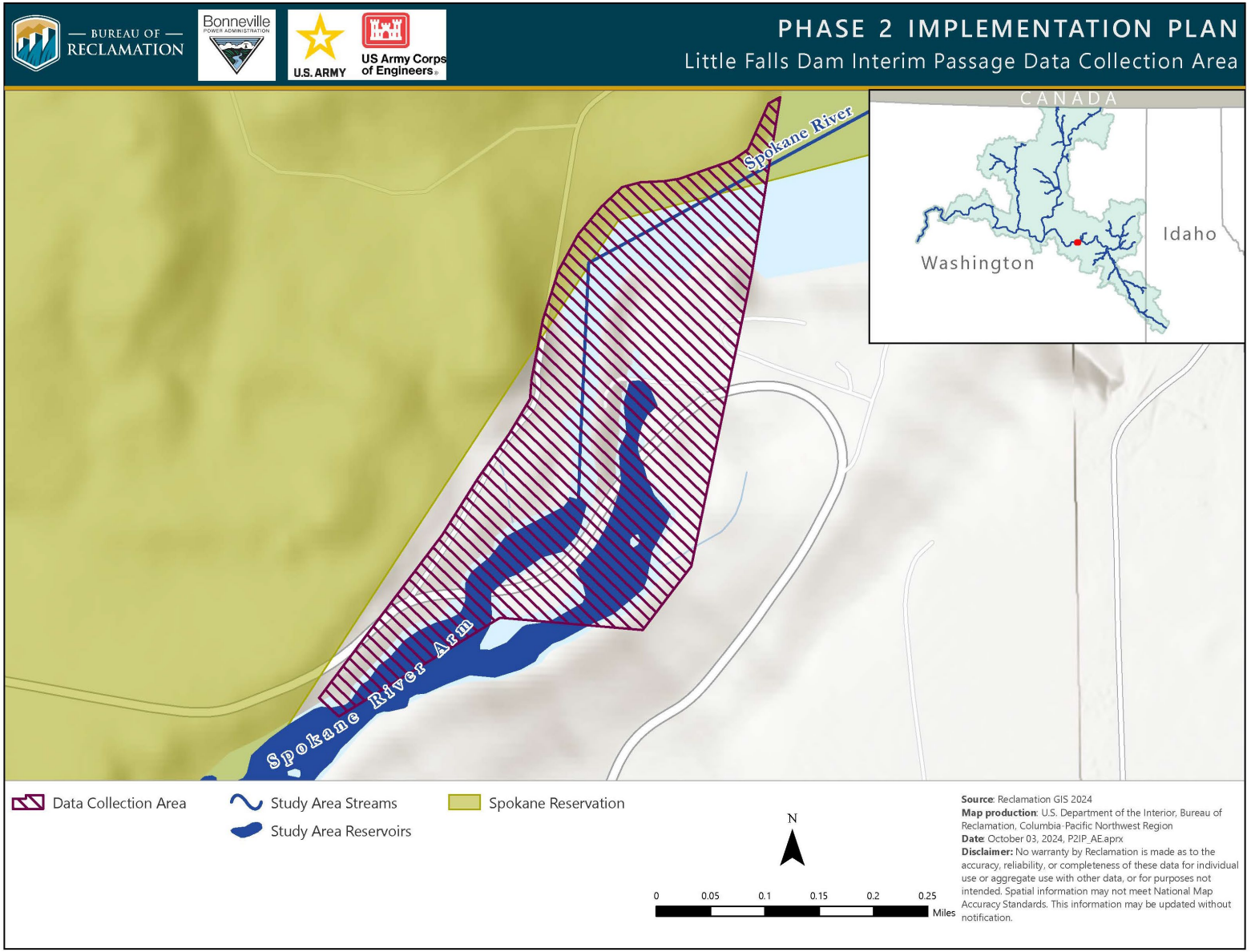


Figure D-19. Little Falls Dam Interim Passage Data Collection Area

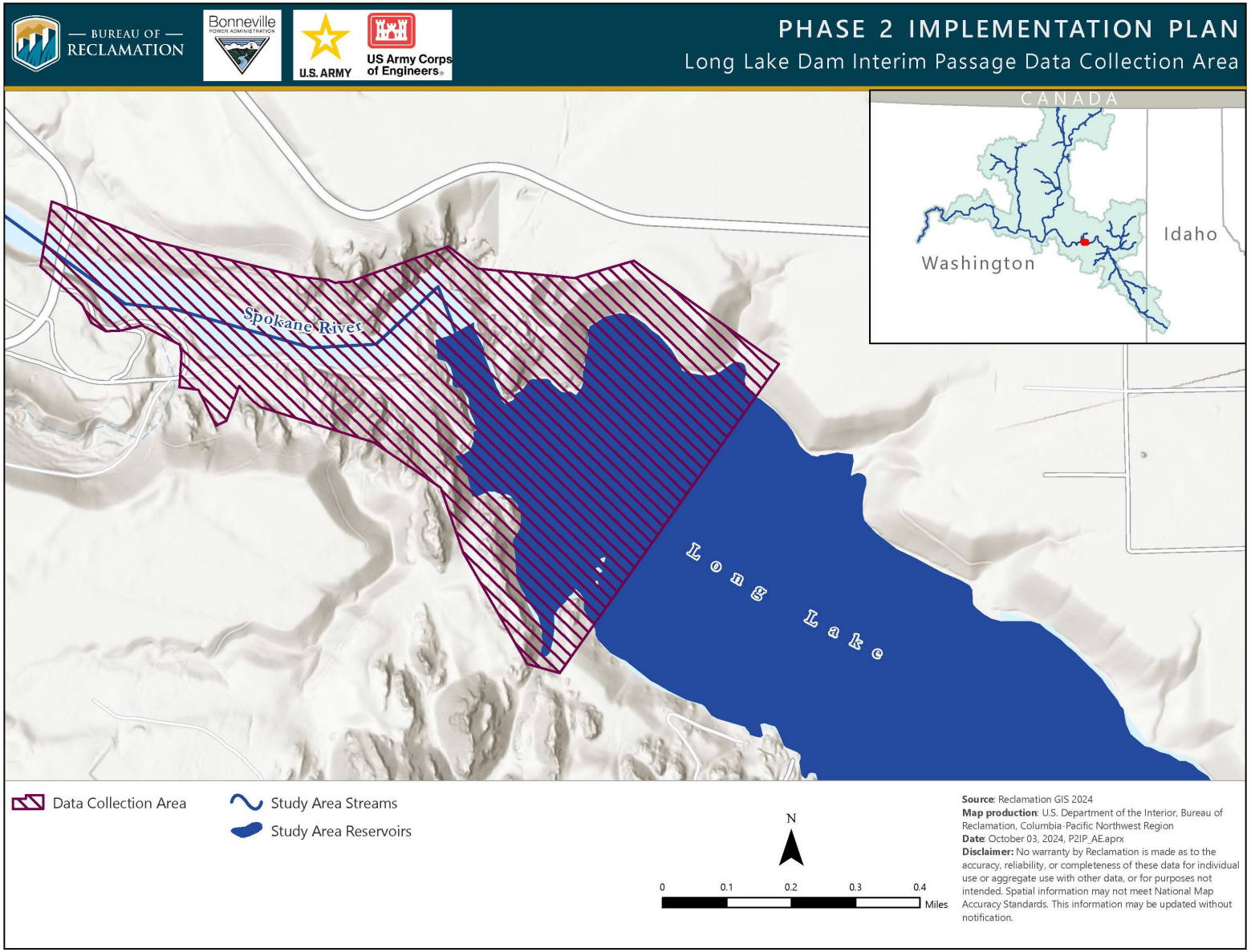


Figure D-20. Long Lake Dam Interim Passage Data Collection Area

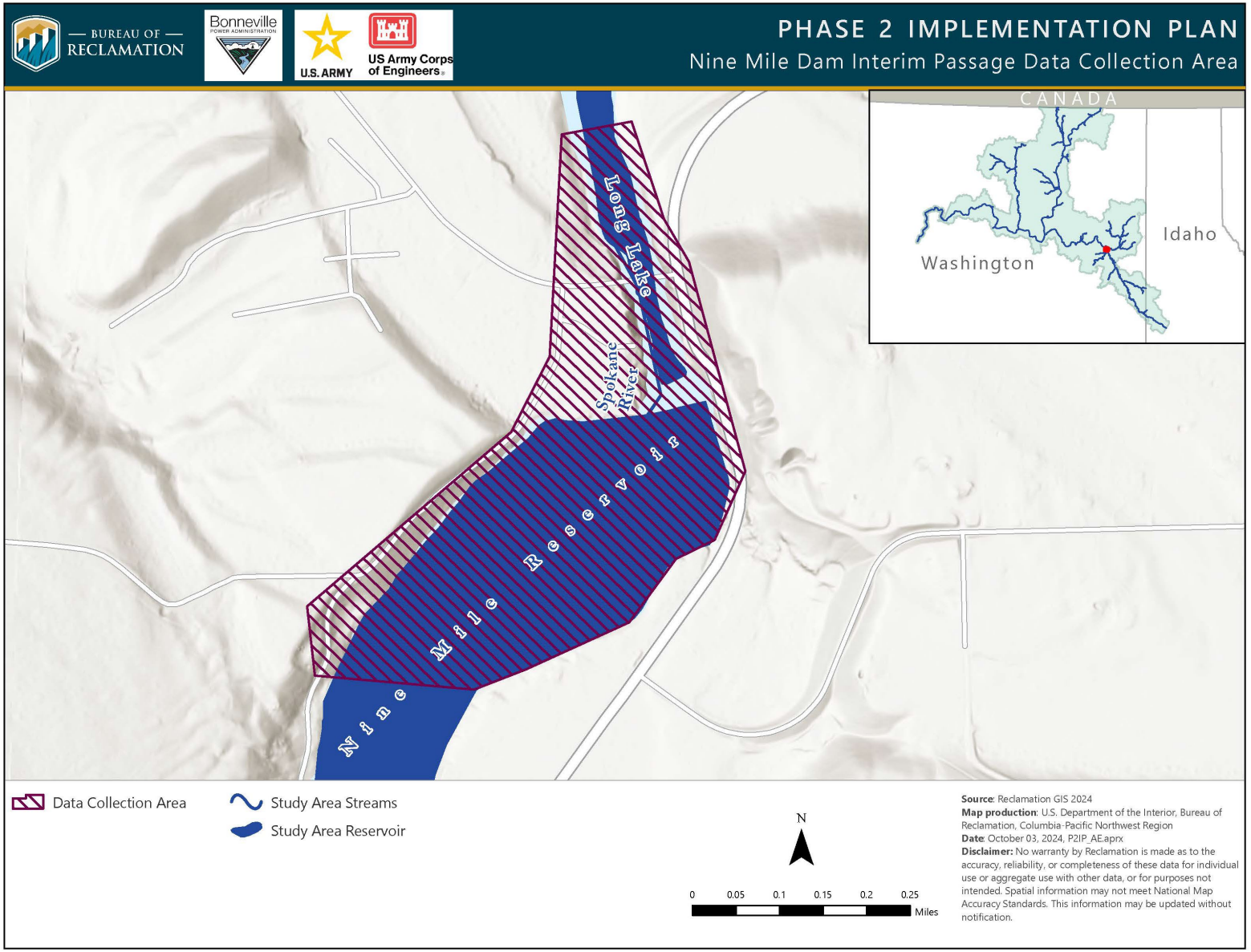


Figure D-21. Nine Mile Dam Interim Passage Data Collection Area

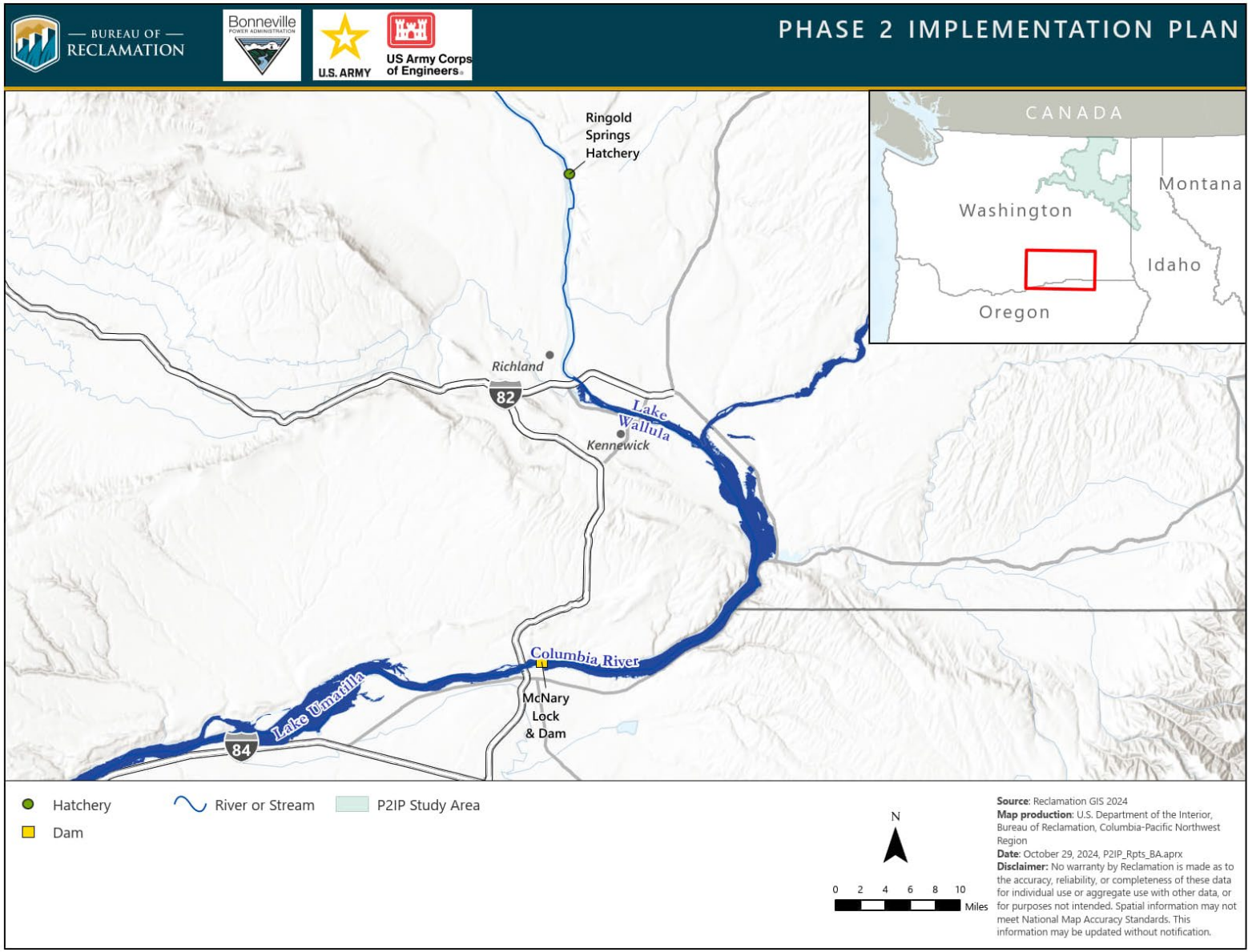


Figure D-22. Ringold Springs Hatchery to McNary Lock and Dam

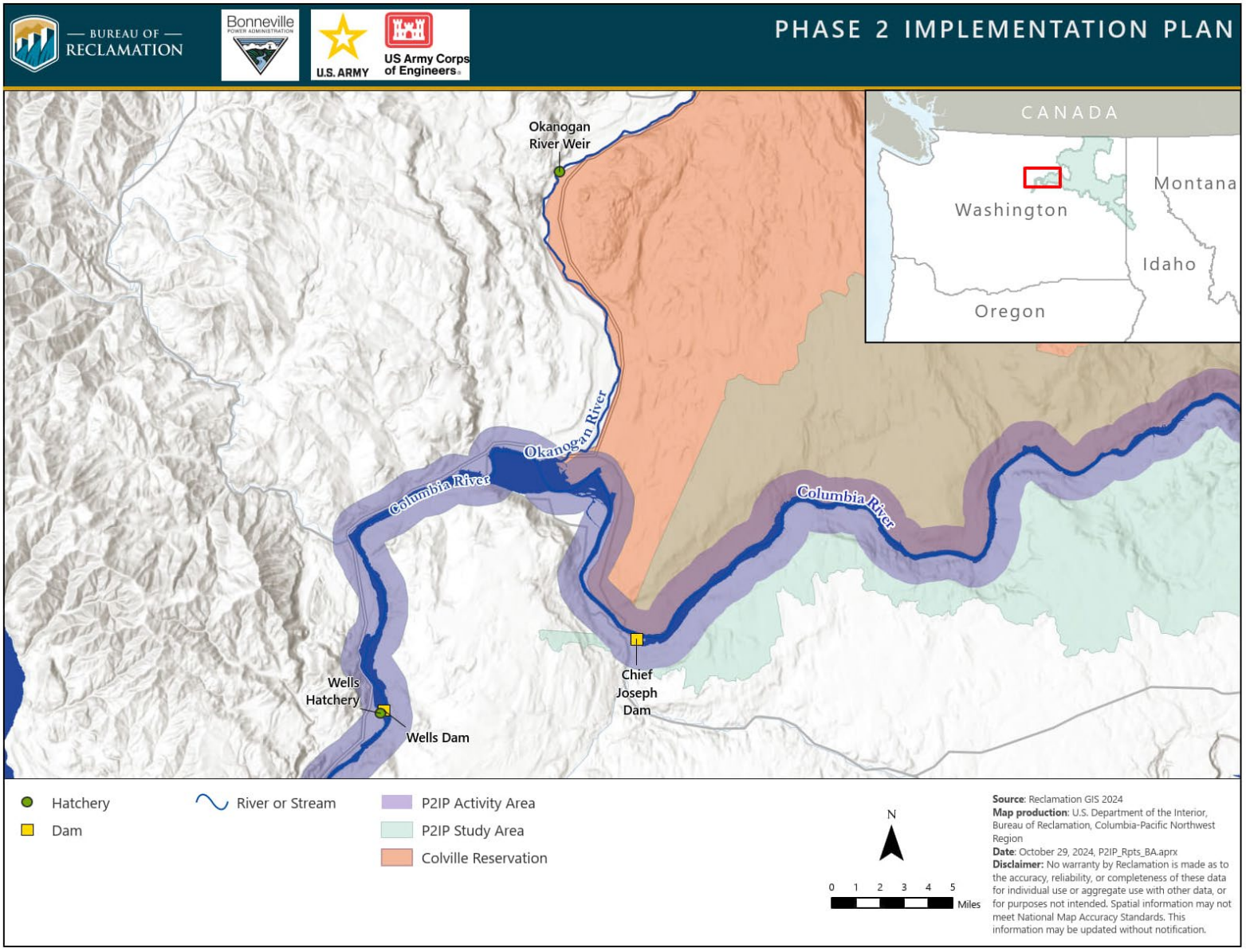


Figure D-23. Wells Dam and Hatchery on the Columbia River and Okanogan Weir on the Okanogan River

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