NPTH Hatchery Operations and Snake River Steelhead Kelt Reconditioning Environmental Assessment

Draft Environmental Assessment

U.S. Department of Energy - Bonneville Power Administration
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Chapter 1. Purpose and Need for Action

1.1 Introduction

This Environmental Assessment (EA) is being produced by the Bonneville Power Administration (BPA) to evaluate the effects of ongoing and proposed operations at the Nez Perce Tribal Hatchery Complex.[1] BPA proposes to provide funding for the ongoing production and release of Snake River fall and spring/summer Chinook salmon (including changes to juvenile fall Chinook release practices, and operations of a temporary weir on the South Fork Clearwater River); fund a program of capture, reconditioning, and release of post-spawn female steelhead; and fund construction and operation of a new steelhead kelt reconditioning facility.

BPA has prepared this draft environmental assessment (EA) pursuant to the National Environmental Policy Act of 1969 (NEPA) (42 United States Code [USC] 4321 et seq.) and its implementing regulations which require federal agencies to assess the impacts that their actions may have on the environment and make this impact analysis available to the public.

1.2 Need for Action

BPA needs to respond to the Columbia River Intertribal Fish Commission's (CRITFC) request to fund a program of capture, reconditioning, and release of post-spawn steelhead, including construction and operation of a new steelhead kelt reconditioning facility at the Nez Perce Tribal Hatchery (NPTH). BPA also needs to respond to the Nez Perce Tribe's (NPT) request to fund ongoing production and release of Snake River fall and spring/summer Chinook salmon; and to evaluate changes to the release locations of juvenile fall Chinook (total production numbers of fall Chinook would remain the same) and operations of a temporary weir for the potential future development of a localized broodstock in the South Fork Clearwater River.

1.3 Purpose

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

- Support efforts to mitigate for effects of the development and operation of the Federal Columbia River Power System (FCRPS) on fish and wildlife in the mainstem Columbia River and its tributaries under the Pacific Northwest Electric Power Planning and Conservation Act of 1980 (Northwest Power Act) (16 U.S.C. § 839n(h)(10)(A)).
- Assist in carrying out commitments related to proposed hatchery actions contained in the 2008 Columbia Basin Fish Accords Memorandum of Agreement with CRITFC and others.
- Implement BPA's Fish and Wildlife Implementation Plan Environmental Impact Statement and Record of Decision policy direction, which call for protecting weak stocks, like the Snake River steelhead, while sustaining overall populations of fish for their economic and cultural value (BPA 2003).
- Minimize harm to natural or human resources, including species listed under the Endangered Species Act (ESA) (16 U.S.C. § 1531 *et seq*.).

[1] The hatchery complex includes the central incubation and rearing facility located on the mainstem Clearwater River, an early rearing facility on Sweetwater Creek, and five remote acclimation facilities. The NPTH acronym is hereinafter used in this document to refer only to the central facility on the Clearwater River.

1.4 Background

1.4.1 Bonneville Power Administration

BPA is a federal power marketing agency within the United States Department of Energy (USDOE). BPA's operations are governed by several statutes, including the Northwest Power Act. Under the Act, BPA must protect, mitigate, and enhance fish and wildlife affected by the development and operation of federal hydroelectric facilities on the Columbia River and its tributaries. BPA must fulfill this duty in a manner consistent with the Columbia River Basin Fish and Wildlife Program developed by the Northwest Power and Conservation Council (Council). The Council, in turn, gives deference to proposals developed by state and tribal fishery managers.

In addition to its responsibilities under the Northwest Power Act, on May 2, 2008, BPA, Bureau of Reclamation, and U.S. Army Corps of Engineers signed the 2008 Columbia Basin Fish Accords Memorandum of Agreement (2008 Fish Accords) between the Yakama Nation, the Confederated Tribes of the Warm Springs Reservation, the Confederated Tribes of the Umatilla Indian Reservation, and CRITFC. Under this agreement, BPA agreed to make funds available to construct the proposed kelt reconditioning facility subject to Northwest Power and Conservation Council (Council) review and meeting all environmental compliance conditions.

1.4.2 Northwest Power and Conservation Council's Fish and Wildlife Program

The Northwest Power Act directs BPA to protect, mitigate, and enhance fish and wildlife affected by the development and operation of federal hydroelectric facilities on the Columbia River and its tributaries. To assist in accomplishing this, the Council makes recommendations to BPA concerning which fish and wildlife projects to fund. The Council gives deference to project proposals developed by state and Tribal fishery managers.

As part of its Fish and Wildlife Program, the Council has a three-step process for review of artificial propagation projects (i.e., hatcheries) proposed for BPA funding (Council 2006). Step 1 is conceptual planning, represented primarily by master plan development and approval. The master plan provides the scientific rationale for the activities proposed as part of a fish production program, and presents initial designs for proposed new facilities. Step 2 provides preliminary designs and cost estimates and environmental review. Step 3 is the final design review. The Council's Independent Scientific Review Panel (ISRP)[2] reviews the proposed projects as they move from one stage of the process to the next.

1.4.3 History of the Snake River Kelt Reconditioning Program

Funding for Snake River steelhead reconditioning research was approved in 2000 by the Council to be added to an existing project in the Yakima River (the "Steelhead Kelt Reconditioning" project funded for the Yakama Nation by BPA) that was successfully reconditioning kelts. The project's expansion into the Snake River was initially approved by the ISRP at a research scale to test various approaches using small numbers of fish rather than starting at a large production scale. Operating at a research scale, however, prevents the project from meeting kelt release goals (see Section 2.1.3) due to limited rearing space. Before expanding from a research-scale program to a production-scale, the ISRP in 2014 requested additional research.

[2] ISRP was created by the Council in response to Section 4(h)(10)(D) of the Northwest Power Act as amended in 1996. Under the amended Act, the ISRP provides the Council with independent scientific review of projects proposed for funding by BPA.

This research was conducted and presented by the NPT and CRITFC in their 2016 Snake River Kelt Steelhead Master Plan (NPT and CRITFC 2016). Research results clearly demonstrated feasibility of this effort, so the ISRP accepted the results and the Council ultimately approved the program to advance into the current environmental review and final design phase. Increased expense funding was approved, and capital funds are committed to construct a kelt reconditioning facility in the Snake River to achieve production-scale goals. Final construction would be contingent on the Council's review and approval, and the results of analyses and consultations under the ESA, the National Historic Preservation Act, and NEPA.

1.4.4 History of NPTH Hatchery Operations and Facilities

Nez Perce Tribal Hatchery Complex (NPTH Complex), which includes the Nez Perce Tribal Hatchery (referred to as the NPTH) as well as satellite facilities, supports a Chinook salmon supplementation program designed to rear and release fall and spring/summer stocks of Chinook salmon. The overall goals of the hatchery programs in the Clearwater basin are to:

- Increase the natural spawning population of fall and spring/summer Chinook salmon upstream of Lower Granite Dam
- Sustain the long-term preservation and genetic integrity of the fall and spring/summer Chinook salmon population(s)
- Assist in the recovery and delisting of the Snake River fall and spring/summer Chinook salmon Evolutionarily Significant Unit (ESU)
- Provide harvest opportunities for tribal and non-tribal anglers while complying with Lower Snake River Compensation Plan mitigation requirements, U.S. v. Oregon Management Agreement[3] production goals, and the ESA
- Provide information to reduce the uncertainty about impacts of the Snake River spring/summer Chinook salmon hatchery programs on the natural-origin population

The intent of NPTH was to use conventional hatchery and Natural Rearing Enhancement Systems (NATURES) techniques to develop, increase, and restore natural populations of spring/summer and fall Chinook salmon in the Clearwater River subbasin. The original design target production for NPTH was 2.8 million fall Chinook sub-yearlings and 768,000 spring/summer Chinook juveniles. An Environmental Impact Statement (EIS) for the NPTH was prepared in 1997 with construction completed and fish production beginning in 2002.

Modifications to the 1997 decision were addressed in a June 2000 Supplement Analysis (BPA 2000) to respond to recommendations from the Northwest Power Planning Council and the Independent Scientific Review Panel to better accommodate the needs of the fish, and to accommodate the strengths and limitations of the physical locations of the complex facilities. This change relocated some fish production sites, established a two phased facility development and fish production process, changed the location of the main facility (to its current location), made minor changes to the construction and uses of the satellite facilities, and modified the monitoring and evaluation (M&E) plan.

[3] United States v. Oregon (302 F. Supp. 899) is the on-going federal court proceeding that enforces and implements the Columbia River treaty tribes' reserved fishing rights. Fisheries in the Columbia River have subsequently been managed subject to provisions of United States v. Oregon under the continuing jurisdiction of the federal court. The 2008-2017 United States v. Oregon Management Agreement provides the current framework for managing fisheries and hatchery programs in much of the Columbia River Basin.

The total fish production numbers were not changed from what was assessed in the 1997 EIS, but the new phased approach effectively reduced those numbers for Phase 1, leaving the remainder in Phase 2 dependent on the success of Phase 1. Phase 1 production included:

- Reduction of spring Chinook production from 768,000 to 625,000 fish (by postponing the construction of some satellite facilities);
- Production of early run fall Chinook at Cedar Flats and Luke's Gulch satellite facilities was halved from 800,000 to 400,000 fish;
- Production of normal run fall Chinook at the main tribal hatchery facility was reduced from 1,500,000 to 1,000,000 fish.

During the early years of operation, several factors restricted production at the NPTH, including

- Broodstock shortages in both spring/summer and fall Chinook
- System operation failures
- Construction modifications to the surface water intake and filter systems
- Less-than-anticipated flows from both the groundwater system (wells) and the chilled surface water system

In 2009, a change to the program was made to produce an additional 200,000 spring/summer Chinook smolts for release into the Clearwater River, bringing the total spring/summer Chinook production level to 825,000 fish which was analyzed under NEPA in a Supplement Analysis (BPA 2009). This was a 57,000 fish increase over that assessed in the 1997 EIS.[4]

1.4.5 Current Chinook Production Levels

Current production levels of Chinook salmon remain at the phase 1 level: 1,400,000 fall Chinook smolts and 825,000 spring/summer Chinook. The broodstock capture, spawning, rearing, and release practices and facilities for this production, and the effects of these releases on ESA-listed species were the subject of HGMPs prepared by the NPT for the production of fall Chinook (NPT 2011), and for its production of spring/summer Chinook salmon (NPT 2013). The HGMP descriptions of program activities, goals, standards, and results for Snake River Chinook salmon production at current levels are incorporated by reference here.

For fall Chinook, the 2011 HGMP concluded that production remain at its current level, but did not evaluate nor propose any new construction or modifications to the NPTH or the broodstock collection or smolt release sites (NPT 2011). The National Marine Fisheries Service completed an EA in 2012 evaluating the NPT's fall Chinook program as part of their review and approval process for issuance of ESA Section 10 permits for hatchery operations (NMFS 2012). That Environmental Assessment of the effects of fall Chinook production, releases from NPTH and its satellite facilities, and operation of a temporary weir is incorporated by reference in Section 3.5.2 of this EA.

For spring/summer Chinook, the NPT's 2013 HGMP also proposed that production remain at its current level, and likewise did not evaluate nor propose any new construction or modifications to the NPTH or the broodstock collection or smolt release sites (NPT 2013).

[4] Both the 2000 and 2009 changes to the original plan assessed in the 1997 EIS were found to be consistent with that EIS and documented accordingly through supplement analyses in those years. Documentation available at: https://www.bpa.gov/efw/Analysis/NEPADocuments/Pages/Nez-Perce-Hatchery.aspx

1.4.6 Current Condition of Facilities

The NPTH Complex is comprised of the following facilities as described in the June 15, 2001 Supplement Analysis to the 1997 EIS:

- One central incubation and rearing facility: Tribal Allotment 1705;[5]
- One early rearing and adult holding facility: Sweetwater Springs;
- Five satellite facilities for acclimation and release: Yoosa/Camp Creek, Newsome Creek, Cedar Flats, Luke's Gulch, and North Lapwai Valley; and
- Six weir sites: Newsome Creek, Meadow Creek[6], Lolo Creek, Eldorado Creek, American River, and Lapwai Creek.

According to the HGMPs for fall and spring/summer Chinook (NPTH 2011, 2013), the NPTH hatchery programs use the facilities described in the table below. Figure 1 in Section 2.1.1 shows the location of these facilities.

Table 1 NPTH facilities

Facility/site	Location	Functions
Nez Perce Tribal Hatchery, Central Facility (NPTH)	Clearwater River	Spring/summer and fall Chinook adult collection, adult holding, spawning, incubation, rearing, marking, and release for both
North Lapwai Valley Satellite	Lapwai Creek, Clearwater River subbasin	Fall Chinook juvenile acclimation and release
Sweetwater Springs Satellite	Sweetwater Spring/Creek, Lapwai Creek, Clearwater River subbasin	Fall Chinook juvenile rearing
Luke's Gulch Satellite	South Fork Clearwater River, Clearwater River subbasin	Fall Chinook juvenile acclimation and release
Cedar Flats satellite	Selway River, Clearwater River subbasin	Fall Chinook juvenile acclimation and release
Yoosa Camp Creek	Yoosa Creek, Lolo Creek, Clearwater River subbasin	Spring/summer Chinook juvenile acclimation and release
Newsome Creek	Newsome Creek, South Fork Clearwater River, Clearwater River subbasin, Idaho	Spring/summer Chinook juvenile acclimation and release

The NPTH complex today is sufficient to meet the needs of current Chinook salmon production levels, though some of the infrastructure is aging and in need of replacement. The existing NPTH facilities, however, do not have the capacity to accommodate the additional needs for reconditioning steelhead kelts, thus additional tanks and supportive infrastructure are needed (see Section 2.1.4).

[5] The central incubation facility, identified here as "Tribal Allotment 1705" is the facility referred to in this document as the "NPTH".

[6] The Meadow Creek weir has never been constructed, but juvenile spring Chinook are released at its proposed location annually.

1.5 Public Involvement

To help determine issues to be addressed in the EA, BPA conducted public scoping outreach. BPA mailed letters on December 29, 2017, to landowners, tribes, government agencies, and other potentially affected or concerned citizens and interest groups. The public letter provided information about the Proposed Action and EA scoping period, requested comments on issues to be addressed in the EA, and described how to comment (mail, fax, telephone, the BPA website, and at scoping meetings). The public letter was posted on a project website established by BPA to provide information about the program and the EA process. The public comment period began on December 29, 2017, and BPA accepted comments on the program from the public until January 29, 2018. No comments were received.

Chapter 2. Proposed Action and Alternatives

This chapter describes the Proposed Action and the No Action alternative. It also compares the alternatives by program purposes and potential environmental consequences.

2.1 Proposed Action

BPA's Proposed Action is to fund the following elements associated with the NPTH:

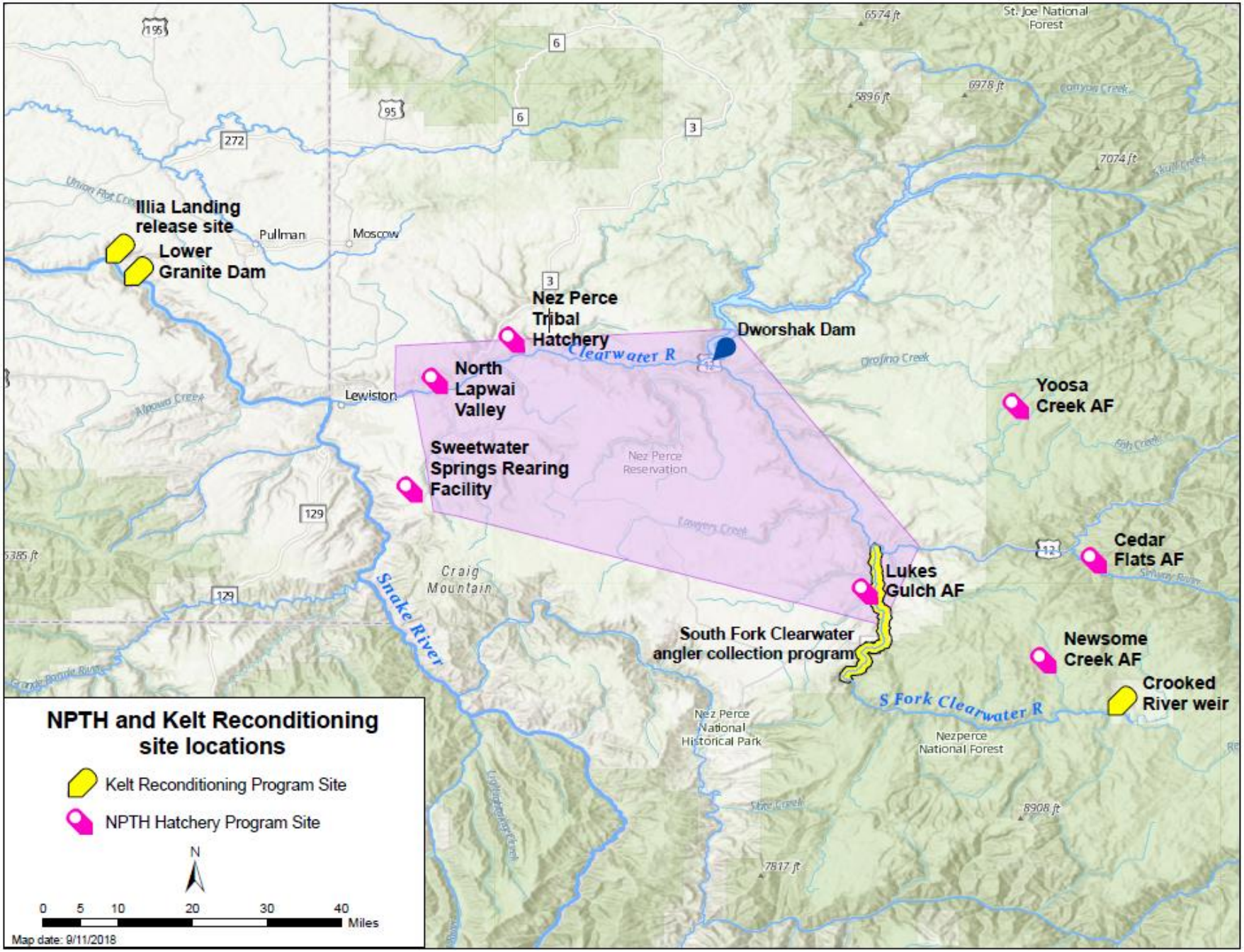
1. the ongoing production and release of Snake River fall and spring/summer Chinook salmon, including changes to release locations of juvenile fall Chinook and operation of a temporary weir on the South Fork Clearwater River;
2. a kelt reconditioning program that would capture, recondition, and release post-spawn steelhead; and
3. the construction and operation of a new steelhead kelt reconditioning facility at NPTH.

Each of these action elements are discussed in detail in the sections below.

2.1.1 Project Area

The project area includes the lower Snake River from Little Goose Dam upstream to its confluence with the Clearwater River at Lewiston Idaho; the Clearwater River; and the South Fork Clearwater River and its tributaries at the locations of the various NPTH Complex facilities. The North Fork Clearwater River is blocked to all anadromous fish by Dworshak Dam 1.75 miles upstream from the confluence of the North Fork and South Fork Clearwater Rivers.

Figure 1 NPTH facilities and Kelt Reconditioning Program locations



2.1.2 Ongoing Hatchery Operations and Chinook Production Levels

2.1.2.1 Operations for Chinook production at the NPTH

Ongoing NPTH operations and practices are described in detail in the NPT's HGMPs (NPT 2011 and 2013) and NMFS' Environmental Assessment for issuance of its ESA Section 10 permit for hatchery operations in support of the fall Chinook program (NMFS 2012). The HGMPs include a thorough description of the hatchery facilities, its staffing, funding, program goals, and performance standards for all Snake River fall and spring/summer Chinook production activities. The hatchery operations as described in these HGMPs comprise the ongoing action considered in this Proposed Action. Those detailed descriptions are incorporated by reference here, and summarized below.

The fall Chinook program is managed to recover and sustain the Snake River fall Chinook population in the Clearwater River while providing tribal and non-tribal harvest opportunities (NPT 2011). The spring/summer Chinook program is managed to produce and release fish that will survive to adulthood, spawn in the Clearwater River Subbasin, and produce viable offspring that will support future natural production and genetic integrity (NPT 2013).

Operations for both of these programs are conducted at the NPTH and its satellite facilities (described in Section 1.4.6, above) with a staff of technicians, fish culture specialists, and supervisors (15 people total) (NPT 2011).

Broodstock for fall Chinook production (1,052 fish total) are collected primarily from Lower Granite Dam and from the NPTH fish ladder (NPT 2011), but 88 male/female pairs are also collected from a temporary weir in the South Fork Clearwater River. Broodstock collection for spring/summer Chinook (410 fish total) comes from Lolo Creek (100 fish), Newsome Creek (50 fish), and Meadow Creek (260 fish) (NPT 2013).

Hatchery incubation, rearing, and fish health protocols are applied at the NPTH as described in the respective HGMPs. Juvenile fall Chinook are all raised to the smolt stage (ready to migrate) before release at the NPTH main facility (500,000 smolts), Luke's Gulch (200,000 smolts[7]), Cedar Flats (200,000 fish[7]), and North Lapwai Valley (500,000 fish) (NPT 2011).

Spring/summer Chinook, however, are transferred at differing life stages to different locations in the Clearwater River Basin for acclimation prior to release. Juvenile spring/summer Chinook are released at Meadow Creek (400,000 parr[8]), Yoosa/Camp Creek (150,000 pre-smolts), Newsome Creek (75,000 pre-smolts), and the Clearwater River at the NPTH (200,000 smolts) (NPT 2013).

2.1.2.2 Changes to the Release Locations of Juvenile Fall Chinook

Changes to the locations for the release of juvenile fall Chinook salmon are proposed. As described above in the current program, juvenile fall Chinook are all raised to the smolt stage before release at the NPTH main facility (500,000 smolts), Luke's Gulch (200,000 smolts), Cedar Flats (200,000 fish), and North Lapwai Valley (500,000 fish). As displayed in the table below, the following changes are proposed

[7] To be increased to 350,000 as proposed in this Proposed Action at Section 2.1.2.2.

[8] The term "parr" refers to juvenile salmon capable of feeding on small invertebrates and having a pattern of spots and vertical bars (parr marks) that serve as a type of camouflage (see EA cover photo). Salmon can remain in this stage for up to three years. The "parr" development stage follows the "fry" stage where they had freshly emerged from gravel and fed on plankton, and precedes the "smolt" stage where they are ready to migrate to the sea. A "pre-smolt" is in transition from "parr" to "smolt".

Table 2 Proposed changes to release locations of fall Chinook

Changes to release locations and numbers			
Release Sites	**Current numbers**	**Proposed Numbers**	**change**
NPTH	500,000	500,000	0
Luke's Gulch	200,000	350,000	+150,000
Cedar Flats	200,000	350,000	+150000
North Lapwai Valley	500,000	200,000	-300,000
totals	1,400,000	1,400,000	0

These proposed changes are in anticipation of the future development of a localized broodstock for the NPTH program using brood captured at a temporary weir just above the mouth of the South Fork Clearwater River. All the necessary 1,052 adult spawners are currently collected at Lower Granite Dam and the NPTH.

2.1.2.3 Operations of the Temporary Weir on South Fork Clearwater River

The Proposed Action would continue operations of a temporary picket weir on the South Fork Clearwater River for monitoring and broodstock collection of adult fall Chinook. Installation of this weir does not require new construction. The weir is installed annually around October 1 and disassembled around December 1. The weir is a standard temporary picket weir that extends across the entire river channel with panels supported by angle iron tripods. The weir has two separate trap boxes that have been modified to accommodate the size of fall Chinook salmon. The weir is checked daily, and fish are passed upstream or downstream according to their direction of travel within 24 hours. The screening criteria for water withdrawal devices (NMFS 2011) that sets forth standards designed to minimize the risk of harming naturally produced salmonids and other aquatic fauna are implemented under this action.

The weir is used to monitor returns of spawning fall Chinook and to collect broodstock. All returning females are captured and passed above the weir until a target of 132 females or upstream redds are counted. This number of females or redds is intended to allow for natural production in the South Fork Clearwater. Once these 132 females have passed, or redds have been counted, one adult is then kept for broodstock at NPTH for every two that are passed upstream (2:1 pass-keep ratio). These captured fish are spawned at the NPTH for natural broodstock enhancement of the localized stock. This 2:1 pass-keep ratio[9] would be applied until 88 female adults and an equivalent number of males are collected for spawning at NPTH, then all adults are passed above the weir.

The goal for this weir is to eventually provide sufficient broodstock to produce all the juveniles needed for the Luke's Gulch and Cedar Flats releases, which is a total of 700,000 juveniles. At that time, a transition to a localized broodstock program, where all 700,000 juveniles would be produced from fish trapped at this weir, would be subject to scientific and program review and possible further analysis under NEPA and ESA. The broodstock trapped on the South Fork Clearwater River would then be used in place of fish that would otherwise be collected at Luke's Gulch or NPTH.

[9] The pass-keep ratio is initially set for 2-1 but adjusted weekly based on seasonal returns by dam counts.

2.1.2.4 Monitoring and Evaluation of Hatchery Operations

The M&E program is designed to assess the effectiveness of the NPTH Chinook salmon supplementation programs. It examines the performance and status of hatchery and natural fish, species interactions and impacts to non-targeted fish populations, and sustainability of harvest. Chinook population supplementation benefits that are evaluated include increases in the distribution, abundance, and harvest of hatchery and natural Chinook salmon populations in the Clearwater River subbasin. The M&E program is also designed to provide information on the capacity of the natural environment to support Chinook salmon production; give early warning of adverse impacts caused by release of hatchery Chinook on resident biota; and track trends in environmental quality, management, and policy that may affect the NPTH programs' success.

To measure supplementation benefits, changes in the abundance of Chinook salmon in the mainstem Clearwater River and its tributaries are monitored annually. Biological evaluation points include parr density; summer and winter survival to stream mouth; survival to Lower Granite Dam and other downstream dams; adult returns to weirs; spawning escapement; and pre-smolt and smolt yield from both treatment and control streams. Genetic monitoring of the treatment and reference populations would also occur.

Typical M&E actions that have occurred, and could continue, include:

- Snorkeling to evaluate the effectiveness of various release strategies and impact on resident fish
- Use of rotary screw traps (for juvenile fish) to assess their survival, growth in the natural environment, and emigration timing.
- Spawning ground surveys
- Passive Integrated Transponder (PIT[10])-tagging of fish and use of PIT tag arrays
- Trapping of adults at weirs
- Habitat surveys
- Genetic analysis
- Harvest monitoring

Changes in fish populations in the mainstem Clearwater River and its tributaries over the next 15 to 20 years would be assessed to determine whether desired results are being achieved, and to identify adaptive management options and inform program management decisions.

2.1.3 Kelt Reconditioning Program

The purpose of this action is to improve adult (female) returns of Snake River B-run[11] steelhead to Lower Granite Dam by 6%, which would be an increase of 180 adult females. A kelt reconditioning program in the Snake River Basin is believed to be critical for increasing the returns of these fish to this level (BPA and Corps 2013).

[10] A PIT tag is a small electronic tag approximately 12 mm long and 2.1 mm in diameter that is injected into the body cavity of juvenile or adult fish. The tags can be automatically detected and recorded at detection "arrays" at various locations within a river system. The tag can be coded with up to 35 billion unique codes that allow the tracking of individual fish as they move through a river system.

[11] Steelhead returns to the Salmon and Clearwater Rivers are classified as either A-run or B-run. B-run fish spend an extra year and summer in the ocean and migrate later in the year than do A-run fish. B-run fish are larger and more productive than A-run fish.

Kelt reconditioning, as proposed here, consists of the capture of post-spawned steelhead and the administration of disease-preventative medications and feed for the purpose of improving survival over what would be expected in the wild. Upon release, these fish are intended to return to natal populations, thereby increasing spawner escapement and increasing productivity if reconditioned individuals successfully spawn. This Proposed Action includes the reconditioning program (capture, haul, reconditioning, and release of steelhead kelts), as well as construction of a kelt reconditioning facility at the NPTH.

2.1.3.1 Capture sites and numbers

The following sources have been providing steelhead kelts for the ongoing research of kelt reconditioning (as discussed above) and would be used, in the priority order listed here, to provide fish for the expanded program:

- Lower Granite Dam (the primary collection and release site)
- Little Goose Dam
- Crooked River weir (South Fork Clearwater)
- South Fork Clearwater River /Dworshak National Fish Hatchery broodstock collections

The ability to collect adequate numbers of wild, B-run, females is limited by the few collection locations listed above. The Lower Granite Dam juvenile bypass system (discussed below) intercepts about 20-25% of migrating kelts before spill[12], and only 7% after spill starts in April. Of these, a large fraction is of hatchery origin, A-run, or male, making it difficult to acquire the desired number for reconditioning.

The program's goal is to capture and recondition 700 steelhead kelts for reconditioning. This collection number is believed to be sufficient to achieve the release goal of 180 fish after the second full year of operation and is based on survival estimates, re-maturation rates, and target stock proportions of steelhead kelts collected at LGR and experimentally reconditioned at either Dworshak National Fish Hatchery or NPTH (CRITFC 2107).

Juvenile bypass systems at Snake River dams

Lower Granite Dam juvenile bypass system would be the primary kelt collection and release site as this location provides for a broad-based steelhead restoration approach for most of the Snake River steelhead populations. Lower Granite Dam is the uppermost of the four U.S. Army Corps of Engineers (Corps) dams on the lower Snake River and is the first dam encountered by out-migrating steelhead juveniles and kelts from the Salmon, Clearwater, Grande Ronde, and Imnaha river systems. Steelhead kelts migrating downstream from these tributaries that do not use the dam's removable spillway weir[13] are directed (by a large bypass system) to the juvenile bypass system where they are collected by Corps staff. The majority of kelts for the program (approximately 700 fish greater than 60 cm in length per year) would be captured here.

Little Goose is the next dam downstream from Lower Granite Dam and would also provide steelhead kelts for collection if collections from Lower Granite Dam appear to be insufficient.

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[12] "Before spill" refers to the time prior to dam operators spilling water over spillways rather than directing it all through the electric-generating turbines. Spill generally occurs during high water periods when more water is available than can be stored and used for electric generation. Spill may also be initiated to facilitate juvenile fish passage past the dams.

[13] Removable spillway weirs are fish passage structures designed to serve as the primary means for passing juvenile salmon and steelhead downstream around dams. They are a more efficient and less stressful method for fish passage at the Snake River dams, though they provide no mechanism for collecting fish.

Similar to Lower Granite Dam, steelhead kelts are directed through the Little Goose Dam bypass system and collection facility where Corps staff can collect them. All kelts trapped there would be transferred to the reconditioning facility, with an expected average of 200 kelts each year. Up to 390 steelhead kelts can be transferred from Little Goose Dam if logistics allow for collections to occur across the entire emigration season.

Crooked River Weir and South Fork Clearwater Angler Collections

The Crooked River weir and collections from anglers on the South Fork Clearwater River could provide steelhead kelt for reconditioning if collections at Lower Granite and Little Goose Dams are insufficient.

The Crooked River site has a weir that would be used as a future kelt collection site. Adult steelhead collections here will commence once habitat issues upstream are corrected and successful reconditioned adult releases can be more assured. It has been used as a release site for the steelhead mitigation program in the South Fork Clearwater River, and poor adult returns revealed significant habitat issues which are currently being addressed. Mature females from this broodstock would first be air-spawned[14] to collect eggs for production at Dworshak National Fish Hatchery and then transferred to the kelt reconditioning program at NPTH.

Natural B-run steelhead would also be collected directly from the South Fork Clearwater River through collaboration with Idaho Fish and Game (IDFG) and the U.S. Fish and Wildlife Service. Adult steelhead are acquired from local anglers in the river with assistance from IDFG[15] and are provided to the U.S. Fish and Wildlife Service as a locally-adapted segregated broodstock for the Dworshak National Fish Hatchery. As with the Crooked River fish, mature females from this broodstock would first be air-spawned to collect eggs for production at Dworshak National Fish Hatchery and then transferred to the kelt reconditioning program at NPTH.

Kelts from the Crooked River weir and the South Fork Clearwater angling program are expected to provide about 50 additional fish annually.

Table 3 Kelt collection location summary

Collection Location*	Collection Method	Expected Number Collected	Collection Duration
Lower Granite Dam	Juvenile Bypass System	450-700	Mid-March to July, peak in May
Little Goose Dam	Juvenile Bypass System	200	Mid-March to July, peak in May
Crooked River	Weir	50	April-June
South Fork Clearwater River	Angler program		Late February to mid-April

* From highest to lowest in priority

[14] Air spawning is a non-lethal method of egg collection from adult fish. Routine egg collection involves killing and slitting the fish to gain access to the eggs. Air spawning is like pumping up a football: a needle is inserted into the female and air is gently pumped in, which expels the eggs as the air compresses inside the fish.

[15] IDFG recruits up to 100 volunteer anglers to assist with steelhead broodstock collection. Anglers are given a large, perforated, PVC tube with removable capped ends. Anglers place captured adult steelhead in the tube, secure the tube to the bank, and submerge it in the stream. IDFG and USFWS collection crews examine the fish. If it is eligible for use in the South Fork Clearwater River production program, it is transferred to a transport truck and delivered to Dworshak National Fish Hatchery. Broodstock collected are not counted against the angler's bag limit.

2.1.3.2 Collection Timing

The collection timing described here reflects what is currently practiced for the ongoing research program and what would be continued to support the production scale of operation evaluated in this Environmental Assessment.

Steelhead kelt collections at the Lower Snake River dams' juvenile bypass systems would occur from mid to late March until July, with collections focusing around the two-week peak kelt emigration period in May.

The Crooked River weir begins operation in early March, when flows recede enough for safe operations. Kelt trapping would begin there in early April as kelts being arriving and continue through June.

Kelt collections from the Dworshak National Fish Hatchery can occur from late-February through mid-April as dictated by facility constraints and rearing needs at both the Dworshak National Fish Hatchery and the Clearwater Fish Hatchery for which it produces steelhead eggs.

2.1.3.3 Kelt selection, and handling

The actions below describe what has been practiced during the experimental phase of kelt reconditioning over the past few years; these practices will continue in the expanded program proposed in this EA.

The adult fish separator system of the juvenile bypass at Lower Granite Dam is staffed 24 hours per day throughout the spring juvenile salmonid emigration season. Steelhead kelts are netted off the adult separator bars and moved to a hopper that feeds into a kelt receiving tank. At the tributary weirs, trap boxes are examined several times each day.

Trapped kelts are netted from the bypass system receiving tanks or weir trap box and placed in an anesthetic tote, measured, examined, have genetic samples taken, and are PIT-tagged (Figure 2).

Figure 2 Kelt trapping and handling

Kelts targeted for reconditioning are previously-spawned, natural origin (non-hatchery), B-run, adult females, 60 cm or greater, and in comparatively good condition. Fish selected for reconditioning receive an injection of oxy-tetracycline and emamectin. Rejected fish are released into the river downstream.

To minimize fish holding time, fish selected for reconditioning would be transferred from the temporary holding tank at the Lower Granite Dam and Little Goose Dam every one or two days. Fish from Crooked River would be transferred within 12 hours.

Kelts are transferred in 450 to 500-gallons trucks (Figure 3) that are driven to the reconditioning facilities at the NPTH. Transport tank water originates from the capture location. The tanks are fitted with supplemental regulated, compressed oxygen fed air stones, and a 12-volt powered tank aeration pump. Stress Coat® or PolyAqua® is added to the water to replace the fish's natural protective slime coating that may have been compromised during handling. Also, salt is added to reduce osmoregulatory stress. Loading densities are kept to a minimum: no more than 20 kelts are transported to the NPTH at one time.

Figure 3 Kelt transport trucks

The NPTH is on the Clearwater River approximately 22 river miles above its confluence with the Snake River at Lewiston, Idaho (Figure 4). The hatchery is approximately 73 miles from the Lower Granite Dam collection site and 92 miles from the Little Goose Dam collection site.

Figure 4 Primary kelt collection sites and hatchery location

At NPTH, the transport tank water temperature would be checked against the temperature of the reconditioning tank water. If necessary, the water in the transport tank would be tempered to within 5 degrees of the water in the reconditioning tank using an electric submersible pump. The

transport tank drain valve would be opened to prevent transport tank water overflow. The water level, temperature, and fish are carefully monitored while tempering. Then, the water level in the transport tank would be dropped to accommodate netting of fish. Fish would be netted from the transport tank and scanned for a PIT tag. Any fish that shed their PIT tag during transport would be retagged. The fish would be then released into the reconditioning tank.

2.1.3.4 Reconditioning of Steelhead Kelts

At the hatchery, the kelts would be transferred (using nets and/or buckets) to one of 10 circular tanks (to be constructed, see Section 2.1.4, below).

Timing and holding period

The program goal is to recondition kelts for release of sexually re-matured fish in the fall of the year (mid-September through mid-November) when the run at large is returning from the ocean. The recent research effort (see Section 1.4.3, above) has shown that some steelhead re-mature in one year ("consecutive" spawners), but that most (approximately 66%) re-mature the following year ("skip" spawners). Thus, approximately 33% of the fish would be held for up to seven months then released, while 66% may be held for up to 19 months before release. Some, of course, do not survive to re-mature at all[16].

Prophylactic Treatments

Reconditioning of kelts includes the provision of prophylactics and feed for the purpose of improving survival relative to the untreated condition[17]. They are treated for infection, fungus, parasites, and disease and fed a specially formulated diet. Formalin may be administered to control fungus; oxy-tetracycline to control Furunculosis (*Aeromonas salmonicida*), Florfenicol to control bacterial cold water disease (*Cytophaga psychrophila*), and emamectin to control gill copepods (*Salmonicola* spp.) and other external parasites.

Mortalities would be necropsied. Fish would be dissected, organ weights (ovaries, liver, digestive tract) recorded, and tissue samples (liver, stomach, pituitary, ovary, and gill) taken for gene expression and enzyme activity assays.

Feeding

Long-term reconditioned fish would initially be fed frozen krill for 2.5 to 8 weeks and then slowly switched over to a pelletized feed until release. Feeding would occur two to three times a day to satiation, and would be monitored to prevent overfeeding which causes pollution in the holding pond. Krill is utilized as a starter feed due to the readiness of kelts to consume this specific food source. Staff would monitor the feeding behaviors of the kelt and modify feeding practices as needed to improve survival.

Release

Reconditioned kelts would be released from October through November when the steelhead run-at-large is returning from the ocean. The program's goal is to release 180 kelts after the second year of operation.

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[16] The survival rate during reconditioning was found to be about 47% for consecutive spawners, and 24% for skip spawners. Kelt mortalities would be necropsied prior to disposal.

[17] The mortality of kelts migrating to the ocean is very high and consequently only a small number of kelts return to repeat spawning. In the Yakima River, repeat spawners make up about 3% of the steelhead run, yet over half of the run is seen moving downstream as kelts. In the Snake River kelts make up about 1% of the steelhead run. (Lothrop 2016).

Prior to release, all steelhead kelts would be scanned for PIT tags, weighed, and measured for fork-length. They would be transferred (using nets and/or buckets) to trucks then hauled to Lower Granite Dam for release. All fish would be released in the Snake River below LGR at the Illia Landing public boat ramp. This location is along Almota Ferry Road in Garfield County, Washington, approximately three miles west of Lower Granite Dam.

At release, the transport tank water temperature would be checked against the temperature of the river water. If necessary, the water in the transport tank would be tempered to within 5 degrees of the river water using a portable pump. Fish would be netted from the transport tank, placed in the river, and allowed to exit the net freely.

These reconditioned fish generally mingle with the run at large and proceed to over-winter locations and then to spawning grounds in the spring. Ideally, after release, kelt would be detected moving upstream past Lower Granite Dam. In the absence of upstream movement, mature fish may hold in the reservoir environment and join the large segment of migrants in the spring.

2.1.3.5 Research, Monitoring and Evaluation for the Kelt Reconditioning Program

The research, monitoring, and evaluation actions proposed here are focused on the kelt reconditioning process and the fate of reconditioned kelts.

Collection and Transport Metrics

Locations, dates, numbers, and disposition

Kelt collections including collection locations, dates, numbers, and disposition (sex, size, origin) would be summarized annually for all kelts captured and transported to the NPTH reconditioning facility. Summaries of collections would be reported and available, annually.

Kelt condition at intake

At the time of capture, all steelhead kelts would be scanned for an existing PIT tag. Kelts without a PIT tag would receive a 12.5 mm PIT tag injected into the pelvic girdle. All other marks, clips, and tags would be documented. PIT tags would be used to track subsequent migration histories and to determine the efficacy and survival of reconditioning. Biological data, including determination of status (kelt versus maiden, fork length, weight), would be collected. The presence of clipped or non-clipped fins (typically adipose fins) would be noted to determine whether the kelt is of hatchery or wild origin. A small (typically 2 x 2 mm) tissue sample (caudal fin clip) would be collected for genetic analysis. For each kelt, the Fulton's K condition factor (Froese 2006) would be calculated as:

$$K=100*W/L^3$$

Finally, muscle lipid levels would be measured using a Distell Fish Fatmeter. A portion of kelts would have a blood sample taken. Muscle lipid and blood samples would be used for ongoing analyses to determine whether survival and re-maturation can be predicted from fish condition at collection.

Kelts destined for reconditioning would receive an oxytetracycline and an emamectin injection and a blood draw. Receiving-tank mortalities would be returned to the river after processing. They would not receive a PIT tag.

Tagging, biological (length, weight, condition), and sample (e.g., tissue) data for all captured kelts transported to the NPTH reconditioning facility would be summarized and reported, annually. Individual biological data would be available for ongoing analyses regarding reconditioning survival, growth, re-maturation, and spawning success (i.e., do larger fish survive artificial reconditioning at a higher rate?).

Kelt transport

Water temperature and dissolved oxygen levels would be monitored during transport. The number of kelts transported during each trip would also be recorded. Any mortality that occurs during transport would be recorded and reported immediately.

Rearing Facility and Reconditioning Metrics

Facility numbers and Dates

A running inventory would be kept, with the number of kelt gains (collection) or losses (mortality and release) tracked throughout the calendar year, to keep track of the number of kelts at the facility at a given time. Following the initial season, the program estimates that as few as 200 to 300 kelts would be held in the facility over the winter months after release and prior to annual collection; and as many as 650 to 700 kelts may be present at the reconditioning facility over the summer months following annual collections and prior to release.

Prophylactic treatments

The quantities and types of prophylactic treatments administered to kelts transported to the NPTH reconditioning facility would be recorded and available, annually. Prophylactic treatment data would be available to analyze regarding correlations with growth, re-maturation, and survival in the hopes to identify treatments that maximize the condition of kelts reconditioned at the facility.

Water quality

As part of existing practices at the NPTH, the reconditioning facility would continually monitor water quality and temperatures throughout the year. Water temperature and quality problems would be resolved as appropriate. Water quality and temperature data would be available for analyses regarding kelt condition, growth, re-maturation, and survival (e.g. what temperature profiles maximize kelt growth and survival?).

Feed Type and Feed Rate

Staff at the NPTH kelt reconditioning facility would feed food types at rates to optimize condition, re-maturation, and survival for reconditioned steelhead kelts. Feed data would be available for analyses of condition, gonadal development, re-maturation, and survival.

Kelt Performance

Data produced by the NPTH kelt reconditioning program would be used to monitor and evaluate the reproductive performance of reconditioned female kelts. The following may be recorded or calculated during collection and at each point that kelts are handled:

- Fork length
- weight, condition factor

- body lipid percent
- fungal infection
- parasite infestation
- injuries
- recovery from past noted injuries

These would be analyzed to determine and compare growth rates. A blood sample would be taken at collection and at a mid-September survey point. Blood hormone analysis would provide data on individual maturation rates.

Mortalities encountered during the study period may be further sampled for organ weights (ovaries, liver, and digestive tract) and, if indicated, for tissue samples for disease testing. These data can help determine gonad development in surviving kelts by comparing growth rates and hormone levels.

Biological data collected from female kelts at intake at the NPTH facility would be compared to maturation status (consecutive versus skip) to determine factors that best predict maturation trajectory. Such information may be used to improve management of kelts predicted to be skip spawners at intake.

Release Metrics

Prerelease data collection

Biological data (fork length, weight, Fulton's K condition factor, general condition, muscle lipid levels, and a blood sample) and re-maturation status would be collected from all reconditioned kelts prior to release. Muscle lipid levels would be measured non-lethally using a Distell Fish Fatmeter. Blood plasma would be assayed for estradiol levels to determine maturation status.

Biological data from capture and release would be used to measure growth and changes in condition during long-term reconditioning and to identify factors that predict maturation trajectories (consecutive versus skip spawners). In-facility (intake to release) growth metrics for individual fish would be recorded. Growth data would be available to assess how various fish culture practices (water temperature profiles, fish density, feed type and rates, etc.) correlate with growth and condition.

Kelt Survival

All kelt mortalities occurring at the facility would be recorded. Survival rates of consecutive spawners (held for 6 months) and skip spawners (held for 18 months) would be calculated, annually. Pending authorization and funding decisions, analysis of blood hormone levels would be used to screen kelts for consecutive and skip-spawn life histories to allow for the release of fish at appropriate times. Optimizing contributions from consecutive and skip spawners is an important adaptive management question for the project and evaluating various scenarios of extended holding periods, transport and release, and physiological solutions would be important to obtain the maximum benefit to wild steelhead populations.

Survival (mortality) data for individual fish, and for groups as a whole, would be available for analysis with biotic and abiotic factors to identify correlations (i.e., does kelt survival correlate with

water temperature profiles, condition at intake, feed types and rates?) with the goal of identifying fish culture and reconditioning practices that optimize survival at the facility.

Kelt Releases

All kelts reconditioned at the NPTH facility would be recorded at the time of release for the date of release, length, weight, disposition (e.g., sex, origin), and PIT-tag ID. In the case of a lost PIT-tag (typically at time of release), fish would be retagged and an additional genetic sample would be collected. All mortalities at release would be recorded. Summaries of all releases including locations, dates, and number released would be reported annually.

Post-Release Metrics

Mainstem migration

Each reconditioned kelt released from the NPTH would carry a unique PIT tag. Detection of reconditioned kelts at instream PIT tag detection systems (IPTDS) and weirs in tributaries of the Snake River would be used to compare the post-release run timing (and survival) of post-release reconditioned kelts to 1) maiden spawners and 2) natural repeat spawners. Data would be available to compare the run-timing of reconditioned kelts versus the maiden spawning population at large and for specific populations in waters containing IPTDS below spawning reaches (e.g., Lochsa River, Selway River, South Fork Clearwater River, Big Creek, and South Fork Salmon River).

Kelt Homing and Straying

The final spawning location of each reconditioned kelt can be inferred by the detection of individuals at IPTDS or weirs in select Snake River tributaries. The natal origin of each kelt would be estimated using genetic assignment tests (e.g., Piry et al. 2004). Moreover, a fraction (typically 10-25%) of maiden spawners and natural repeat spawners sampled as part of the Lower Granite Dam program would be PIT-tagged and genotyped. Homing and straying of reconditioned kelts released from the NPTH would be compared to homing/straying rates of maiden and natural repeat spawners in the following ways:

- The inferred spawning destination of reconditioned kelts (via PIT tag detections at IPTDS) would be compared to their estimated natal origin from genetic assignment tests to estimate homing/straying rates. Estimated homing/straying rates of reconditioned kelts can be compared to homing/straying rates for maiden spawners (sampled at Lower Granite Dam) calculated using similar methods, though sample sizes for natural repeat spawners would likely be insufficient to include in these analyses.
- Kelts captured in tributaries or weirs (e.g. Crooked River) containing IPTDS and reconditioned at the NPTH facility would be implanted with a PIT tag; subsequent detection information after release from the facility can be used to estimate homing/straying rates.

Adult Escapement

PIT tagging of released kelts, along with tagging of maiden spawners at LGR, would allow an estimate to be made of adult escapement (and run-timing) for each of the groups into populations monitored by IPTDS. Adult escapement would be parsed into maiden and repeat spawners allowing an estimate of the proportional increase in abundance to each population from

reconditioned kelts and any natural repeat spawners that are detected. PIT-tag marking and observation data for all reconditioned kelts would be uploaded and made publicly available annually in PTAGIS (www.ptagis.org).

Tributary Performance and Spawning

Relative reproductive success and lifetime reproductive success were compared among pre-spawn maidens collected, post-spawn maidens collected [kelts], and artificially reconditioned kelts in tributaries of the Yakima River using DNA markers and pedigree analysis (Hatch et al. 2017). Results from this study suggest that the lifetime reproductive success of steelhead spawning more than once is at least double that of single-event spawners. Tissue sampling and genotyping of reconditioned kelts released from the NPTH facility in future years should provide additional data to monitor and evaluate the reproductive success of reconditioned kelts versus maiden and natural repeat spawners. Current data show that reconditioned kelt steelhead contribute to the productivity of the natural population on a scale similar to that of natural kelts, helping to preserve this important life history.

Tributary abundance and contribution to target populations

The PIT tagging of female pre-spawn steelhead at Lower Granite Dam and subsequent detection of those fish at IPTDS in select tributaries of the Snake River facilitates abundance estimation of steelhead populations in those tributaries (e.g., ISEMP/CHaMP 2015). Moreover, each reconditioned kelt released from the NPTH facility would be implanted with a PIT tag, allowing an estimate to be made of the abundance of reconditioned kelt entering target populations. Of the eight target B-run populations in the Snake River, seven are monitored by available IPTDS to estimate abundance. Estimates of maiden spawner and reconditioned kelt abundance would allow an estimate to be made of the 'reconditioned kelt fraction' in each of the monitored target populations.

2.1.4 Kelt Reconditioning Facility Construction

As described in the Master Plan, CRITFC and the NPT are proposing to construct a small reconditioning facility to be part of the existing NPTH facility. The facility would be designed for a maximum capacity of 750 kelts in order to ultimately release 591 reconditioned adults and hold spawners for up to 20 months[18].

2.1.4.1 Existing NPTH facility description

The NPTH is the central incubation and rearing facility for the NPTH Complex and is displayed in Figures 4 and 5. The complex consists of several facilities throughout north central Idaho which includes the central facility discussed here, a rearing facility at Sweetwater Springs, and five remote acclimation facilities across the Clearwater River basin.

[18] These numbers of kelts are based on capture numbers and survival expectations; and needed to achieve the intent of RPA 33 (Lothrop 2016).

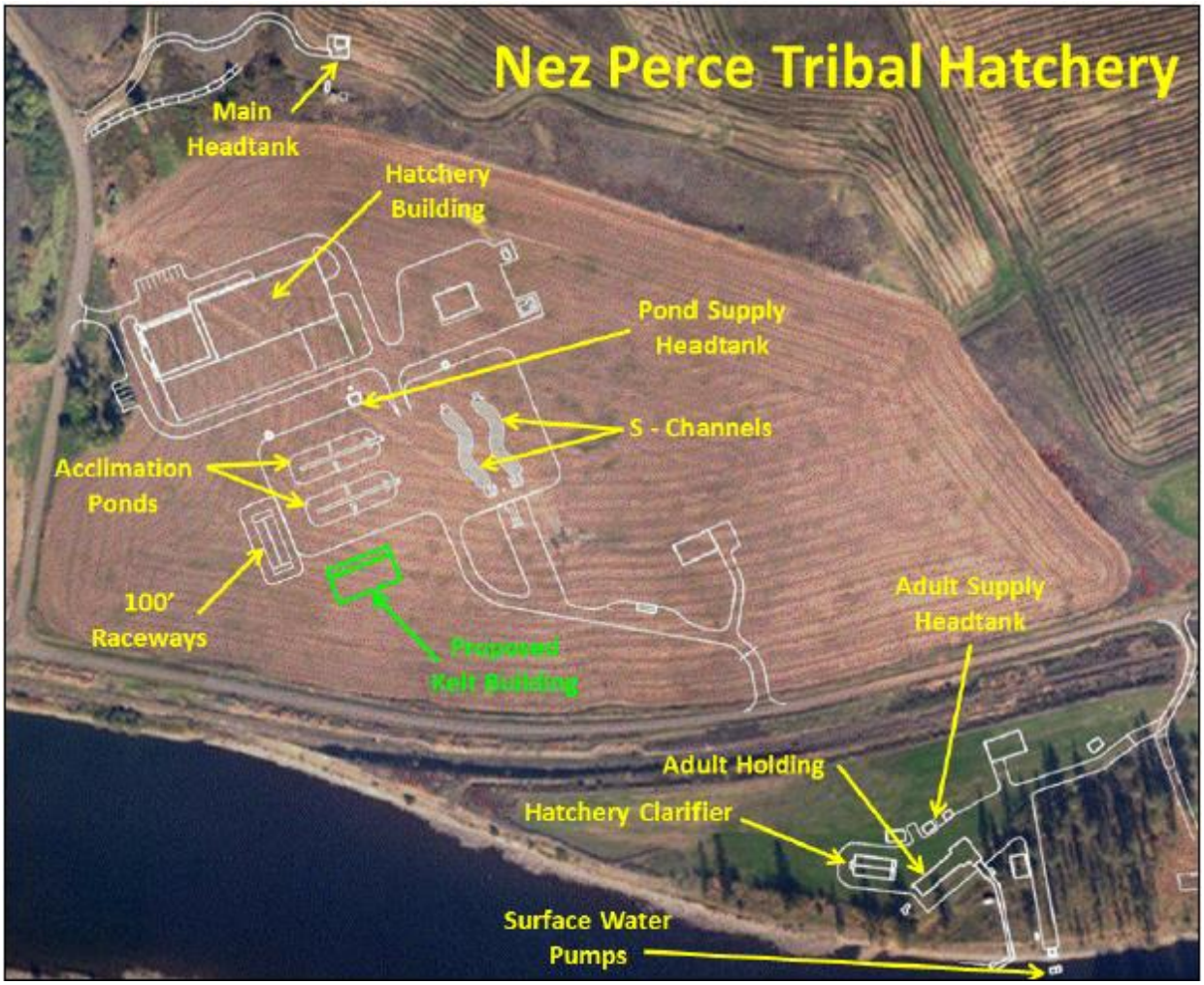
Figure 5 Existing facilities at NPTH

The NPTH was constructed in 2000 through 2002. Hatchery support elements consist of four ground water wells, four surface water pumps, eight Krebs sand filters, a zero gravity filter system, a UV system, a chiller, automated water temperature control, and a backup generator.

2.1.4.2 Facility siting within NPTH

The proposed reconditioning facility would be located immediately south of the existing acclimation ponds and raceways as displayed in Figures 5 and 6.

Figure 6 Location of proposed kelt reconditioning facility within the current hatchery complex



2.1.4.3 Facility components

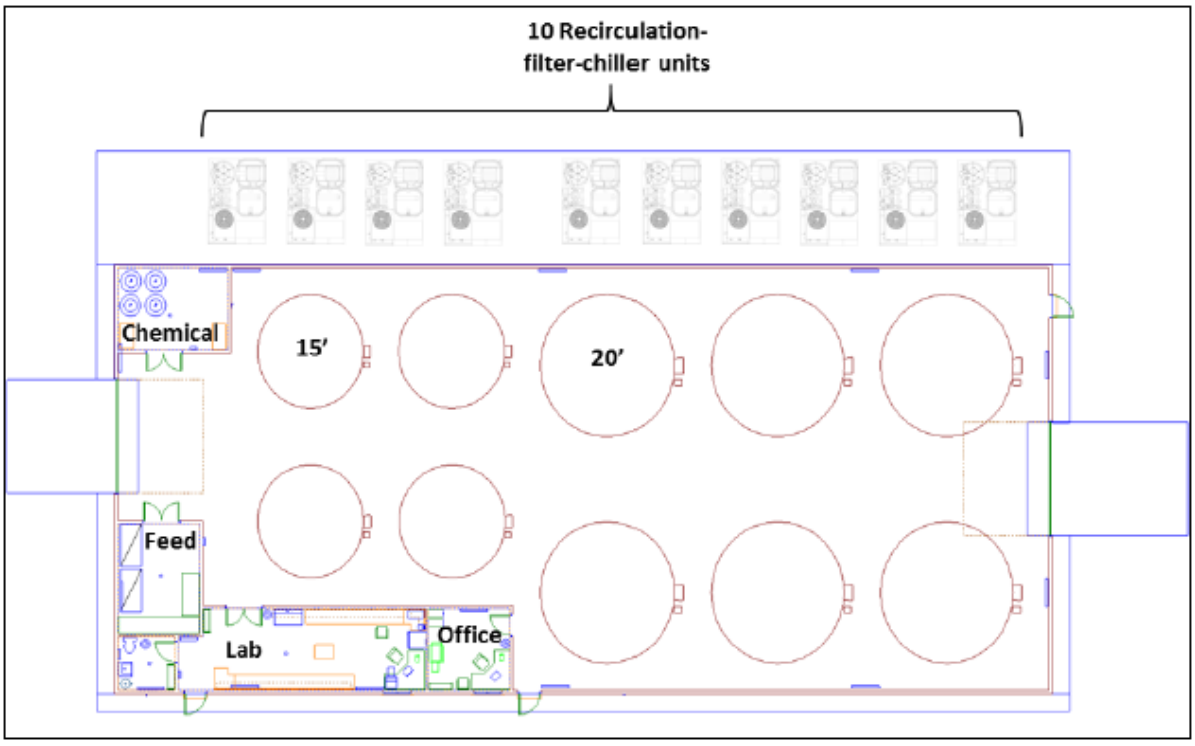
Reconditioning Building

The facility would be contained entirely within one 2,750 square foot pole building (see Figure 6). The gravel-floored building would contain six aluminum 20-foot diameter circular tanks and four 15-foot diameter aluminum circular tanks. Each tank would be enclosed with containment curtains. Total tank design would allow for reconditioning of up to 750 kelts.

The dimensions of the building would provide space for back-up oxygen tanks and air lines near each tank. Wall height and access would be sufficient to allow a one-ton truck access through bay doors. The building would be designed to contain space for feed storage with the capacity to store at least 2 months of feed. This would require two large chest freezers and room for storing pallets of dry feed. A chemical (primarily formalin) storage room would be isolated within the building. This room would contain an automatic formalin delivery system. In addition, the room would be outfitted with appropriate ventilation and spill containment.

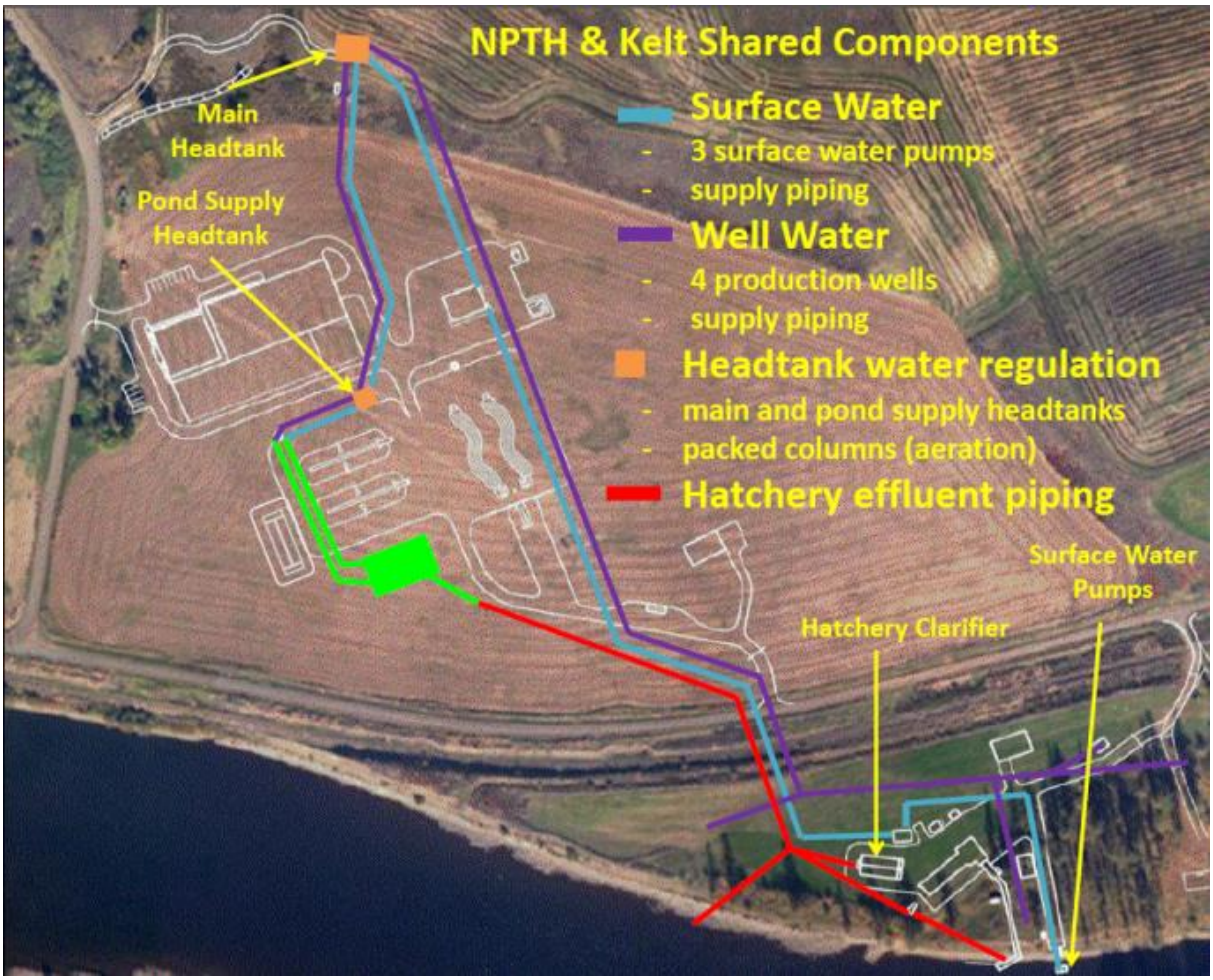
An additional room would serve as a laboratory to provide-on site biological analysis and data storage. This is where kelt mortalities would be necropsied and placed in a separate freezer prior to disposal. Finally, a small office and a bathroom would be included. A carport style enclosure running the length of the north end of building would cover the recirculation-filter-chiller units.

Figure 7 Proposed kelt reconditioning facility



The facility would tap into the NPTH's water supply and effluent systems as shown in Figure 7. Additional pumping capacity and water chilling capabilities would also be needed to support the additional facility.

Figure 8 NPTH and kelt reconditioning facility's shared components



Water source

Kelt reconditioning requires a year-round water supply. For most of the year, water that supplies the kelt reconditioning tanks would come from the Clearwater River via the existing pond supply head tank (Figure 6). Refer to Section 3.2.1 below for a more thorough discussion of the hatchery's water supply.

Pathogen filtration

Turbidity in the Clearwater River increases significantly during spring freshets. The NPTH facility's existing sand filters are designed for large particle filtration and are not sufficient to deliver pathogen-free water. A filter unit consisting of a mechanical 43 micron filter and a fluidized bed bio-filter would be used to reduce the turbidity and remove large pathogens. After initial microfiltration, an ultraviolet array would disinfect the water resulting in nearly pathogen free water. This system could be bypassed when not needed and during maintenance down-time.

Temperature control

Surface water may be too warm during the summer months for kelt reconditioning purposes. Quality egg production in the female kelts declines when water temperatures exceed 60 degrees Fahrenheit. Water chillers are therefore proposed to maintain water temperatures at optimum levels. Each kelt reconditioning tank would have its own dedicated recirculation-filter-chiller unit.

Water exiting the ultraviolet disinfectant arrays would enter a chiller/heat exchanger.

The capacity of each chiller would be designed to handle maximum summer flow requirements (approximately 1,125 gallons per minute) and keep the temperature near or below 57 degrees Fahrenheit. Both the chiller and filter would be configured to allow for maximum recirculation efficiency. The system would contain a CO_2 stripping tower[19] and a backup pump. Each kelt reconditioning tank would have its own dedicated recirculation unit.

The existing water system at NPTH would provide adequate pressure to accommodate the additional chilling and filtration systems proposed here. No additional booster pump would be required to push water through the filtration and chilling system, though smaller pumps are planned as part of the recirculation system.

Effluent

The kelt reconditioning program is anticipated to produce effluent amounts well below the threshold required for a Clean Water Act National Pollution Discharge Elimination System (NPDES) permit and would utilize the existing fish release discharge line. However, the outflow could be diverted, if necessary, through the waste drain line into the hatchery clarifier for particulate settling prior to discharge (Figure 7). The outflow would be protected by a series of check valves and would connect with the fish release line at a steep angle to prevent fish from traveling back through the outflow.

Existing Power and Water Lines

The recirculation-filter-chiller units would require substantial energy so new utility poles and electrical service upgrades would be added to power the kelt reconditioning building. Main power lines are within 500 feet of the proposed building sites and have adequate clearance (40 feet) at the poles for on-site construction.

Several hatchery production water lines are located near the proposed kelt water line (Figure 7). These include supply to the outdoor 100-foot raceways and the acclimation ponds, as well as overflow and waste drain lines. Protection measures are prescribed in Section 2.4 to protect those lines during construction. Piping would be installed to the northwest corner of the kelt reconditioning building under the gravel skirting west of the acclimation ponds.

Potable Water, Sanitary Sewer and Telephone

NPTH has an on-site potable water line located northwest of the 100-foot raceways. This line would be extended to supply the kelt reconditioning building. A septic tank with an adequate drain field would be installed to service the bathroom. Hard line telephone service is available in the main hatchery production building, and reliable cellular telephone service is available at the proposed building site. Flow and water quality alarms would require telephone service.

2.1.4.4 Construction Methodology and Timing

For construction of the reconditioning building, the site would be stripped of organic materials to a shallow depth in preparation for the gravel floor and footings using heavy equipment such as excavators and loaders. Gravel would be imported for the footings and floor, and surfacing for access driveways, parking, and circulation areas. Geotextile would be used during construction of the building to prevent the migration of soil.

[19] Carbon dioxide 'stripping' is needed in recirculating aquaculture systems to provide adequate oxygen/carbon dioxide gas exchange to accommodate the higher density of fish supported by these systems.

Initial site grading and preparation would occur during the dry season of June through October to minimize stormwater runoff to surface waters and include several construction mitigation measures. These measures, listed in Section 2.4, would require a spill containment plan (i.e., spill pollution, control, and countermeasures plan); an invasive species control plan, and an erosion control plan for all the areas being disturbed by construction activities.

Construction would comply with the Idaho Department of Environmental Quality's Catalog of Stormwater Best Management Practices for Idaho Cities and Counties (IDEQ 2005). Construction specifications would include these Best Management Practices (BMPs) as guidance for contractors. Additionally, any permit conditions would be implemented, such as Section 401 of the Clean Water Act (Water Quality Certification) issued by Idaho Department of Environmental Quality.

Once completed, the reconditioning facility would operate year-round.

2.2 No Action Alternative

Under the No Action alternative, BPA would neither fund CRITFC or the NPT for any of the elements of the Proposed Action described above. This action is a federal funding decision by BPA, not a decision to proceed or not proceed with these programs. CRITFC and the NPT could acquire funding from other non-federal sources and proceed with these actions. For the purposes of this EA, however, the No Action alternative is evaluated here as if it were a decision to not proceed with these action and hatchery production of all stocks at NPTH would cease.

Under this alternative, BPA would not fund NPTH hatchery operations, and existing production of Chinook salmon would cease. There would also be no funding for a kelt reconditioning program or reconditioning facility, and the existing experimental program would cease, and not expand to a production scale.

This No Action alternative does not include the removal of existing facilities.

2.3 Comparison of Alternatives

The following two tables compare the Proposed Action and the No Action alternative. Table 4 compares the alternatives by the purposes of this project. Table 5 displays a summary of the impacts of implementing each alternative; the information is condensed from the discussions in Chapter 3, and the reader is referred there for more detail.

Table 4 Comparison of alternatives by BPA purposes

Purposes	Proposed Action	No Action Alternative
BPA: Support efforts to mitigate for effects of the development and operation of the FCRPS on fish and wildlife in the mainstem Columbia River and its tributaries under the Northwest Power Act.	Would help support mitigation efforts called for in the Northwest Power Act by increasing Snake River steelhead kelt and Chinook spawning return rates within the Clearwater River basin.	Cessation of these hatchery operations would not further support BPA's FCRPS mitigation efforts regarding Snake River steelhead kelt survival and spawning, and Snake River spring and fall Chinook production.
BPA: Assist in carrying out commitments related to proposed hatchery actions contained in the 2008 Columbia Basin Fish Accords Memorandum of Agreement with the CRITFC and others	Would assist in fulfilling the Fish Accords' commitments regarding production levels of Snake River steelhead.	Would not fulfill Accord commitments regarding assistance to the existing hatchery programs for Snake River steelhead in the Clearwater River basin. Would not further those commitments regarding kelt reconditioning.
BPA: Implement BPA's Fish and Wildlife Implementation Plan EIS and ROD policy direction, which call for protecting weak stocks, like the Snake River steelhead, while sustaining overall populations of fish for their economic and cultural value.	Would contribute to establish self-sustaining populations of Snake River Chinook salmon and steelhead in the Clearwater River Basin, which is of cultural value and may provide economic benefits while at the same time protecting ESA-listed fish.	Would not further actions to help protect Snake River Chinook salmon and steelhead in the Clearwater River Basin, or sustain populations for economic and cultural values beyond current actions.
BPA: Minimize harm to natural or human resources, including species listed under the Endangered Species Act.	Proposed mitigation measures would minimize harm to natural and human resources. Regulatory agency review, approval, and reporting requirements would minimize the risk of adverse effects to ESA-listed species. (See Table 5 for a summary of impacts.)	With no hatchery activities at NPTH, no construction of new facilities, and no reconditioning of steelhead kelts, there would be no potential to affect natural and human resources or impacts to native ESA-listed species.

Table 5 Comparison of alternatives by resource effects

Resource Affected	Proposed Action	No Action Alternative
Geology and Soils	Impacts only from construction actions with disturbance of about 0.25 acres of soil from construction of the reconditioning facility. The facility would damage soils within its footprint with long-term compromise of soil productivity. There would be little, if any, erosion potential during construction and impacts would be minimized by implementation of mitigation measures in Table 6. Given the small scale of these effects, the impact to the geologic and soil resources would be low.	No new impacts to geology and soils near the NPTH, its satellite facilities, or the kelt collection sites. Geology and soil conditions would likely continue similar to present conditions.
Water Resources	No change in water quality or quantity from ongoing hatchery activities or its associated research, monitoring, or evaluation activities. Construction activities for the kelt reconditioning facility would not likely compromise water quality since actions are occurring on flat ground (with little potential for runoff) and construction site is over 300 feet from the Clearwater River with road and railroad flow barriers in between. No impact to water quality from activities at the collection/release sites. Water use would increase 19% with addition of reconditioning facility operations, but withdrawal and return flow volumes remain inconsequential given large flow of Clearwater River at hatchery location (0.3% of river volume at lowest flows). Overall effects on water resources would be low.	No new impacts to water resources at the NPTH or the kelt collection sites. Under the No Action alternative there would be no water withdrawal since ongoing hatchery production would cease. The current ongoing minimal impacts to water quantity and quality from operations at the NPTH and its satellite facilities would cease. This would be a low, beneficial effect on water quality and quantity.
Vegetation	No impact to native vegetation communities from construction of the reconditioning facility since existing condition is a plowed field. No impact from annual collection, reconditioning, and release operations. Minimal potential to contribute to spread of noxious weeds des to construction activities, but application of when mitigation measures in Table 6 would minimize this risk. Overall effect would be low.	No new impacts to vegetation at the NPTH or the kelt collection sites. Vegetation conditions would likely continue similar to present conditions.

Resource Affected	Proposed Action	No Action Alternative
Wetlands and Floodplains	No wetlands or floodplains are present at the NPTH so there would be impacts from hatchery operations there or from construction of the kelt reconditioning facility. The satellite facility at Newsome Creek is the only one within a floodplain or wetland, but no changes are proposed for that facility, so there would be no effect. No impacts from annual kelt collection, reconditioning, and release operations, since no ground disturbance would occur.	No impacts to wetlands or floodplains at the NPTH, its satellite facilities, or the kelt collection sites.
Fish	Continued beneficial effect of contribution to restoring salmon runs to Clearwater River basin, with no change to current level of Chinook salmon production. Adverse effects of hatchery operations would be low to moderate with greatest effect being genetic influence of hatchery fish on native fish. Changes in Overall effects of hatchery operations would be moderately beneficial. Increased numbers of juvenile fall Chinook released into the South Fork Clearwater could benefit bull trout as short term increase in prey; Minimal short-term effect to local populations of resident fish in South Fork (adverse) or Mainstem (beneficial) from changes in release numbers. Approximately 700 female kelts would be stressed from the handling associated with collection, reconditioning, and release in the reconditioning program, but survival otherwise would have been unlikely. Overall effects of kelt reconditioning would be moderately beneficial.	There would be no operational impacts to fish near the NPTH or its satellite facility and habitat conditions for fish would likely continue similar to present conditions, but the cessation of Chinook production at the NPTH would reduce the numbers of Chinook salmon returning to the Clearwater River basin. Effects of the No Action alternative in hatchery operations would be moderately to highly adverse. The effect of not funding a kelt reconditioning program would be moderately adverse. Mortality of non-reconditioned steelhead kelts would remain high. Additional steelhead spawning productivity from reconditioned kelts would not be realized.

Resource Affected	Proposed Action	No Action Alternative
Wildlife	Loss of low-quality habitat (plowed field) and temporary local wildlife disturbance from construction of the reconditioning facility and operations at satellite facilities. No impacts to critical habitat for listed species or identified priority habitats. No impacts to wildlife from human disturbance associated with reconditioning, program. Increased steelhead populations could provide increased food source for piscivorous wildlife in future. Overall effects on wildlife would be low.	No new impacts to wildlife near the NPTH or the kelt collection sites. Habitat conditions for wildlife would likely continue similar to present conditions. There would be a decrease in food sources for wildlife that feed on migrating juvenile or adult salmon. Effects would be low.
Socioeconomics and Environmental Justice	Low beneficial economic benefits from ongoing employment of 15 people and local expenditures associated with ongoing hatchery and satellite facility operations. Addition of one (estimated) additional employee and seasonal employment opportunities for steelhead kelt reconditioning program would have low beneficial effect. Short term local and regional economic benefits from employment and expenditures associated with construction of reconditioning facility. Increased fish runs from both the ongoing Chinook program and the proposed steelhead reconditioning program increase the value of the fishery with benefits to commercial, recreational, and tribal fishing interests. Overall socioeconomic effect would be low to moderate. Existing employment opportunities would be retained and one or two new opportunities would be created for the NPT. The social, cultural, and traditional values of the NPT would continue to be supported by NPTH operations and its contribution to increased salmon harvests. Effects would be moderate.	Loss of employment and expenditure benefits to the local and regional economy from ongoing operations and construction of reconditioning facility. If hatchery production were to cease, the reduction in value of the local fishery could impact recreational and tribal fisheries. Socioeconomic effect of the No Action alternative would be moderate. Existing employment opportunities would be lost and new employment opportunities would not be realized. Declining salmon runs and harvests in the Clearwater basin from cessation of NPTH operations would have a moderate effect on the NPT's social, cultural and traditional values, and the subsistence needs of some families.

Resource Affected	Proposed Action	No Action Alternative
Land Use and Recreation	There would be no changes to land use at the NPTH or its satellite facilities beyond the ¼-acre loss of prime farmland at the site of the new reconditioning facility. Hatchery operations and construction of the reconditioning facility would be compatible with existing land uses. There are no expected impacts on other land uses from steelhead collection or release operations. Recreational opportunities for steelhead fishing could be enhanced with a successful reconditioning program. Overall effects on land use and recreation would be beneficially low to moderate.	There would be no changes to land use or potential disturbance to adjacent land owners by ceasing operations at the NPTH or its satellite facilities. There would be a lost opportunity to increase recreational opportunity for benefits for steelhead fishing. Reduced numbers of Chinook salmon from cessation of hatchery operations would adversely impact recreational coastal, Columbia and Clearwater river fisheries. Adverse effects would be low to moderate.
Visual Resources	Low impacts to visual resources from construction of the reconditioning facility. New construction is visually consistent with existing facility. No impacts from annual collection, reconditioning, and release operations.	No visual changes at the NPTH and no visual changes to seasonal operations at the kelt collection sites. There would be no effect.
Air Quality, Noise, and Public Health and Safety	Ongoing hatchery operations and operations of new reconditioning facility would not increase effects to these resources beyond what is currently occurring with exception of a minor increase in truck traffic for kelt transportation. Impacts primarily from construction activities: fugitive dust; vehicle/equipment-related drips, spills, and emissions; noise; construction-vehicle traffic; and potential increased demand on public safety services. Effects would be low, short-term, and temporary. Impacts would be limited by implementation of mitigation measures in Section 2.4.	The No Action alternative would cease operations at the existing facility, eliminating all current sources of impact to air quality and noise. There would be no change to public safety since current facilities and operations make no contribution (positively or negatively) to the public safety environment or services. The overall effect of the No Action alternative on air, noise, and public safety would be low.
Cultural Resources	Impacts would only be from construction activities, and these would occur only on previously plowed agricultural land. No changes to existing NPTH, or satellite facilities. Kelt collection actions require no ground disturbance. Compliance with NHPA Section 106 and coordination with the NPT would ensure potential adverse effects would be low.	Under this alternative, activities would cease but facilities would remain. No construction would occur and there would be no potential for cultural resources to be disturbed. There would be no effect on Cultural Resources.

Resource Affected	Proposed Action	No Action Alternative
Climate Change	Low impact on greenhouse gas (GHG) emissions from ongoing operational vehicle use, with slight increase from short-term construction vehicle operation and additional fish haul needed for kelt reconditioning. Effect on climate change would be low.	There would be no vehicle use from operations of the NPTH or the reconditioning facility, and no short-term construction-related vehicle use. Current ongoing impacts, though minimal, would cease. This would be a low beneficial effect on climate change.

2.4 Mitigation Measures

Table 6 lists the mitigation measures that would reduce or avoid the impact of the Proposed Action.

Table 6 Mitigation Measures

Environmental Resource	Mitigation Measure	Applicable Proposed Action element
Geology and Soils	Install and maintain all temporary erosion controls downslope of applicable project activities until construction actions are complete.	facility construction
	Segregate topsoil from subsoil and store during excavation for use in site reclamation.	facility construction
	Grade and cover disturbed areas and areas of excavated soils with at least 2 inches of compost upon completion of construction.	facility construction
	Implement BMP erosion and sediment control measures during construction.	facility construction
Water Resources	Follow project-specific Clean Water Act permit protection measures.	facility construction
	Comply with Nez Perce Tribe NPDES Permit Waste Management Plan	kelt reconditioning; ongoing Chinook collection, production, acclimation, and release
	Use sediment barriers such as fences, weed-free straw matting/bales, or fiber wattles, as necessary, in all work areas to intercept any surface flow that might transport sediment to the Clearwater River.	facility construction
	Inspect erosion and sediment controls weekly, maintain them as needed to ensure their continued effectiveness, and remove them from the proposed hatchery site when vegetation is re-established and the area has been stabilized.	facility construction
	Maintain materials for spill containment and cleanup on site during pre-construction, construction and restoration phases of the project.	facility construction
	Locate vehicle staging, cleaning, maintenance, refueling, and fuel storage areas a minimum of 150 feet from the Clearwater River.	facility construction

Environmental Resource	Mitigation Measure	Applicable Proposed Action element
	Wash heavy equipment before delivery to project site to remove oils, fluids, grease, etc. Inspect and clean equipment regularly. Prohibit discharge of vehicle wash water into any stream, water body, or wetland without pretreatment to meet state water quality standards.	facility construction
	Inspect machinery daily for fuel or lubricant leaks.	facility construction
	Design and operate on-site chemical storage buildings to fully contain accidental spills of chemicals stored at the proposed facilities.	facility construction; kelt reconditioning; ongoing Chinook collection, production, acclimation, and release
	Inspect and maintain access roads and other facilities after construction to ensure proper function and nominal erosion rates.	facility construction
	Perform all non-emergency maintenance of equipment off-site.	facility construction
Vegetation	Seed disturbed areas with a native erosion-control grass seed mix to prevent future erosion, stem the invasion of noxious weeds, and provide wildlife benefit.	facility construction
	Cover all temporarily disturbed areas with at least 2 inches of compost and replant with native vegetation.	facility construction
	Implement a noxious weed control program which includes the following elements: • Treat known infestations before ground disturbance begins by scheduling appropriate weed treatments, such as mowing, hand pulling, and use of approved herbicides. • Map and flag areas of noxious weed populations so these populations can be avoided when possible. • Ensure equipment brought into the project area is free of weeds and weed seeds. • Work from relatively weed-free areas into the infested areas rather than vice-versa. • Clean equipment and vehicles of mud, dirt, and plant parts after working in infested areas. • Maintain weed-free staging areas. • Apply herbicides according to labeled rates and recommendations to ensure protection of surface water, ecological integrity, and public health and safety. • Implement and periodically schedule post-project control of noxious weeds on an as-needed basis.	facility construction; kelt reconditioning; ongoing collection, production, acclimation, and release
Fish	Apply protective measures resulting from consultation with USFWS and NMFS.	facility construction; kelt reconditioning; ongoing Chinook collection, production, acclimation, and release

Environmental Resource	Mitigation Measure	Applicable Proposed Action element
	Apply the screening criteria for water withdrawal devices found in the 2011 NMFS publication "Anadromous Salmonid Passage Facility Design" (NMFS 2011) that sets forth standards designed to minimize the risk of harming naturally produced salmonids and other aquatic fauna. This would be applied at all facilities, including the temporary weir.	ongoing Chinook collection, collection, production, acclimation, and release
	Daily monitoring for bull trout congregating above and below the weirs during bull trout migration periods would be conducted daily by the NPTH personnel. If congregations are evident, a section of the weir would be opened to facilitate migration through the weir facility.	ongoing Chinook collection, production, acclimation, and release
	Coordinate timing and methods of construction with NMFS to minimize disturbance to ESA-listed species and life stages.	facility construction
	Maintain fish screens at water intake structures to minimize entrainment of aquatic species.	ongoing Chinook collection, production, acclimation, and release
	Follow established protocols (legal or scientific) for handling ESA-listed species.	facility construction; kelt reconditioning; ongoing Chinook collection, production, acclimation, and release
	Ensure that the hatchery facilities are operating in compliance with all applicable fish health guidelines and facility operation standards and protocols, by conducting annual audits and producing reports that indicate the level of compliance with applicable standards and criteria.	kelt reconditioning; ongoing Chinook collection, production, acclimation, and release
	Adaptively manage fish releases to maximize survival of released and non-target fish based on recent studies and from NPTH and kelt reconditioning research, monitoring, and evaluation activities.	kelt reconditioning; ongoing Chinook collection, production, acclimation, and release
	Conduct all MR&E activities in accordance with the terms and conditions of the existing Section 7 consultations terms and conditions.	kelt reconditioning; ongoing Chinook collection, production, acclimation, and release
	Comply with all applicable terms and conditions of the existing ESA Section 10 permits issued for the NPTH and any future ESA Section 7 consultation terms and conditions.	kelt reconditioning; ongoing Chinook collection, production, acclimation, and release
	Screen all surface water pumps according to NMFS juvenile salmonid criteria.	kelt reconditioning; ongoing Chinook collection, production, acclimation, and release
	If formalin treatments are necessary, the discharge would be managed to ensure 1 milligram per liter or less would be discharged to adjacent waters.	kelt reconditioning; ongoing Chinook collection, production, acclimation, and release

Environmental Resource	Mitigation Measure	Applicable Proposed Action element
	Use therapeutic chemicals only when necessary, and typically for short durations, to be in conformance with accepted standard practices and treatment applications.	kelt reconditioning; ongoing Chinook collection, production, acclimation, and release
Wildlife	Coordinate timing and methods of construction with USFWS to minimize disturbance to ESA-listed species and life stages.	facility construction
	Develop and implement a plan to minimize and manage predatory wildlife being attracted to fish and other potential food sources available at the facilities.	ongoing Chinook collection, production, acclimation, and release
	Apply protective measures resulting from consultation with USFWS, if any.	facility construction; kelt reconditioning; ongoing Chinook collection, production, acclimation, and release
Land Use and Recreation	Provide appropriate contact information for contractor liaisons and project staff to local residents for any concerns or complaints during construction.	facility construction
	Repair damage to roads that may occur through project construction or construction vehicle use.	facility construction
	Limit construction activity to normal workday hours or 8:00 AM to 5:00 PM to minimize impacts to nearby residents.	facility construction
Visual Resources	Remove all temporary structures, devices, materials, and equipment from the site upon completion of all construction activities; and dispose of all excess spoils and waste materials in compliance with federal, state, and local regulations.	facility construction
Air Quality, Noise, and Public Safety	Sequence and schedule construction work to minimize the amount of bare soil exposed to wind erosion.	facility construction
	Apply dust control measures (e.g. watering trucks, low speeds, apply gravel to access roads, etc.) as needed. Minimize dust generation during facility construction by watering and using dust suppression equipment. Sequence and schedule work to reduce the amount of bare soil exposed to wind erosion and potential fugitive dust production.	facility construction
	Do not burn vegetation or other debris associated with construction clearing.	facility construction
	Handle and dispose of all potentially odorous waste during operation in a manner that does not generate odorous emissions.	facility construction; kelt reconditioning; ongoing Chinook collection, production, acclimation, and release
	Recycle or salvage nonhazardous construction and demolition debris, as well as waste generated during facility operation, where practicable.	facility construction
	Use flaggers and safety signage as necessary to avoid vehicle and other conflicts.	facility construction

Environmental Resource	Mitigation Measure	Applicable Proposed Action element
	Use the least noise-generating equipment and methods for operations at facilities where noise might intrude into residential areas. Require sound-control devices on all construction equipment powered by gasoline or diesel engines that are at least as effective as those originally provided by the manufacturer.	facility construction; kelt reconditioning; ongoing Chinook collection, production, acclimation, and release
	Require sound-control devices that are at least as effective as those originally provided by the manufacturer on all equipment powered by gasoline or diesel engines.	facility construction; kelt reconditioning; ongoing Chinook collection, production, acclimation, and release
	Dispose of cleared vegetation and other debris in a manner other than burning, to avoid or minimize air quality impacts. Transport all such material to an approved composting or landfill facility, as appropriate.	facility construction
	Prepare and implement a Spill Prevention, Containment, and Control Plan. Include measures to: • reduce and recycle hazardous and non-hazardous wastes, • notification procedures • specific cleanup and disposal instructions for different products • quick response containment and cleanup measures • proposed methods of disposal of spilled materials • employee training on spill containment	facility construction; kelt reconditioning; ongoing Chinook collection, production, acclimation, and release
	Develop and follow the protocol for dealing with hazardous substances inadvertently discovered during project activities. Conduct all project-related activities in compliance with regulations and guidelines for use, handling, storage, and disposal of toxic and hazardous substances.	facility construction; kelt reconditioning; ongoing Chinook collection, production, acclimation, and release
	Dispose of non-hazardous wastes in approved landfills. Dispose of hazardous wastes according to applicable federal and state laws.	facility construction; kelt reconditioning; ongoing Chinook collection, production, acclimation, and release
	Conduct all project-related activities in compliance with regulations and established guidelines for use, handling, storage, and disposal of toxic and hazardous substances.	facility construction; kelt reconditioning; ongoing Chinook collection, production, acclimation, and release
	Train staff in the proper use, transport, handling, and storage of all chemicals to minimize dangers of overexposure or accidental release to the environment.	facility construction; kelt reconditioning; ongoing Chinook collection, production, acclimation, and release

Environmental Resource	Mitigation Measure	Applicable Proposed Action element
	Coordinate with local law enforcement, fire protection, and other emergency responders to ensure they are prepared to address any emergencies that may arise during construction.	facility construction
	Prepare a Safety Plan in compliance with state requirements before starting construction; specify how to manage hazardous materials, such as fuel and any toxic materials found in work sites; include a Fire Prevention and Suppression Plan, and detail how to respond to emergency situations. Keep the Safety Plan on site during construction and maintain and update, as needed.	facility construction
	Require the construction contractor to hold safety meetings with workers at the start of each work week to review potential safety issues and concerns.	facility construction
Cultural Resources	Mark known cultural resource sites as 'avoidance areas' on construction drawings and flag as 'no-work areas' in the field prior to construction.	facility construction
	Prepare an Archaeological/Cultural Resource Inadvertent Discovery Plan. Protect any unanticipated cultural resources discovered during construction as follows: • Stop work in the immediate vicinity of the discovery and protect find in place. • Notify NPTH Project Manager, BPA Archaeologist, and BPA Contracting Officer's Representative immediately. • Implement mitigation or other measures as instructed by BPA.	facility construction; kelt reconditioning; ongoing Chinook collection, production, acclimation, and release
Climate Change	Encourage the use of the proper size of equipment for each job because larger equipment requires the use of additional fuel.	facility construction
	Ensure that all vehicle and construction equipment engines are maintained in good operating condition to minimize exhaust emissions.	facility construction; kelt reconditioning; ongoing Chinook collection, production, acclimation, and release
	Minimize vehicle idling.	
	Encourage carpooling and the use of shuttle vans among workers to minimize emissions.	
	Use alternative fuels, such as propane, for stationary equipment at the construction sites or use electrical power where practicable.	facility construction

Environmental Resource	Mitigation Measure	Applicable Proposed Action element
	Implement the following measures to minimize impacts related to energy: • Where possible, use high-efficiency light fixtures (e.g., LED, compact fluorescent, high efficiency fluorescent bulbs). • Where possible, install automatic lighting controls, including occupancy sensors and lighting control panels. • Use skylights, windows, and/or opaque wall panels for natural lighting of occupied spaces. • Minimize lighting and use lighting fixtures that direct light downward and not towards off-site areas. • Use chilled-water energy recovery via water-to-water heat exchangers. • Use premium-efficiency pump motors on process water systems and heating, ventilation, and air conditioning (HVAC) units. • Install low-flow plumbing fixtures for domestic uses to reduce well pumping. • Install a central flow monitoring and control system.	facility construction; kelt reconditioning; ongoing Chinook collection, production, acclimation, and release

Chapter 3. Affected Environment and Environmental Consequences

This chapter includes an analysis of the potential effects of the Proposed Action and the No Action alternative on the human environment. Impacts are described for both construction and operations. The impact levels are characterized as high, moderate, low, or no impact. High impacts are considered to be significant impacts, whereas moderate and low impacts are not. The impact levels are based on the analysis provided, which incorporates the considerations of context and intensity defined in the Council of Environmental Quality Regulations (40 Code of Federal Regulations [CFR] 1508.27).

The sections below provide a detailed, resource-specific, discussion of the existing environmental condition of the affected environment (the context) and the Proposed Action's environmental effects. The effects discussed in these sections are the consequences to the resources of the actions' impacts and are evaluated within the applicable context (the scale of the environment affected) and considering the intensity ('how much' of that environment would be affected) at which the actions' impacts would occur.

The mitigation measures referenced in this chapter refer to those listed in Section 2.4.

3.1 Geology and Soils

3.1.1 Affected Environment for Geology and Soils

The NPTH is located in the lower Clearwater River canyon which is generally a deeply dissected canyon cut through basalt layers of the Columbia plateau. These canyons are relatively steeply sloping, with basalt outcrops, and represent a transition zone between valley bottoms and upland basins. They were formed where rock and soil eroded down to underlying granite as wind erosion formed the upland basins and rolling hills around it by transporting and depositing eroded material.

The NPTH is located in an area where this canyon broadens out with more gentle slopes to the north leading up to the dissected loess[20] uplands of the Palouse and Nez Perce prairies (a non-forested area of rolling hills with highly productive wind-deposited soils). The hatchery site itself is located on an elevated ancient floodplain bench above the valley bottom on the north bank of the river.

3.1.2 Effects of the Proposed Action on Geology and Soils

The only impacts from the Proposed Action would be from the construction of the kelt reconditioning facility. It is the only ground-disturbing activity of the three elements of the Proposed Action. The impacts would occur, however, on 0.25 acres of flat lands previously plowed and managed for agricultural production. There would be little, if any, potential for erosion, though there would likely be soil productivity impairment.

Facility construction would require a foundation on which to build, which would entail the leveling of a pad and the placement of a layer of gravel and a concrete slab. The footprint of this facility would, of course, compact the soil, mix its uppermost horizons, and introduce a layer of gravel, all making this footprint unavailable for agricultural uses absent building and gravel removal, and soil reconditioning. If, in the future, the facility should be removed and the site restored to agricultural

[20] Loess is loosely compacted deposit of windblown sediment formed by an accumulation of wind-blown silt, forming fertile topsoil a few meters deep.

uses, some remnant gravel and concrete would likely be permanently present in the soil. That impact, along with the compaction and displacement impacts from heavy equipment operations would likely compromise soil productivity to some degree on this site. The soil would remain productive, but likely less productive than it is currently.

This action affects only an additional 0.25 acres of the 1,200 acre valley. The scale of the impact is small (though long-lasting) and the potential for erosion effects are low; thus, the overall effect of these actions' impacts on geology and soils would be *low*.

There would be no impacts to geology or soils from research, monitoring, or evaluation activities associated with either hatchery operations or the kelt reconditioning program. These activities take no action that would modify hydrologic, riparian, or upland conditions in any way that would compact, displace, mix, or otherwise alter the soil resource.

3.1.3 Effects of the No Action Alternative on Geology and Soils

Under the No Action alternative, all NPTH hatchery and kelt reconditioning programs at all its facilities would cease and there would be no funding for construction of a kelt reconditioning facility. There would be no ground disturbance and thus no new impact or effect on geology and soils.

3.2 Water Resources

The 1997 EIS (BPA 1997) and the 2012 EA produced by NMFS (NMFS 2012), which assessed the effects of issuance of Permits for the Hatchery Genetic Management Plans for the fall Chinook production at this hatchery (and others) under Section 10 of the Endangered Species Act, provide detailed descriptions of surface and ground water resources, including their quantity and quality and uses by the NPTH hatchery and its acclimation facilities. Those discussions, from page 3-11 to 3-19 in the Nez Perce Tribal Hatchery EA and from page 17 through 21 in the 2012 EA, displayed use figures for each facility and discussed water quantity and quality considerations. These discussions are incorporated here by reference and provided the data for the discussions in the sections below.

3.2.1 Affected Environment of Water Resources

3.2.1.1 Water Quantity

The NPTH uses both ground water and surface water from the Clearwater River to meet current hatchery program needs. Surface water is used almost exclusively, with ground water relied upon when the pumps are off-line for maintenance (generally for about two weeks per year).

The Clearwater River is the largest tributary (by discharge) of the Snake River. Flows near the NPTH range from 5,000 cfs in the fall to 35,000 cfs in spring. At the point of withdrawal, the river is approximately 535 feet wide before quickly dividing around a 58-acre island, with the primary channel (420 feet wide)on the hatchery side (right bank) of the river.

Ground water in this area is hydraulically linked[21] to the Clearwater River. Its source is the river and its depth corresponds to flows in the river. Use of wells for hatchery water thus does not

[21] If the groundwater table is in physical contact with the stream bed, it is a hydraulically "linked" system. The exchange of water between the groundwater system and a stream is controlled by the difference in elevation between groundwater table and the water level in the stream.

impact a water supply in an isolated aquifer. This area is not within an Idaho State "Critical Groundwater Area[22]" (IDWR 2017) indicating there is sufficient water in the aquifer for irrigation and other uses.

Water uses both upstream and downstream from the NPTH are almost exclusively for domestic and agricultural purposes. Below the confluence of the North Fork Clearwater River, much of this water is withdrawn from tributaries rather than the mainstem of the Clearwater River as most of the agricultural lands are up and out of the Clearwater River floodplains. Water districts north (#86) and south (#85) of the Clearwater River in this area are inactive, with irrigation withdrawals and other detailed water use figures unavailable.

Total water use for the NPTH facility is 17.25 cfs. All withdrawn surface water (minus evaporation) is returned to the river after circulating through the facility, so the only segment of the river impacted by current operations would be that between the water intake and discharge structures: a distance of about 500 feet. Given the flows of the Clearwater River (between 5,000 cfs in the fall and 35,000 cfs in spring), this represents a .35% to .049% reduction in water quantity for that 500 feet distance.

Water uses at the satellite facilities of the NPTH are displayed in Table 7. Only two of them use groundwater, and as discussed in NMFS Fall Chinook EA (2012), neither of these is in areas identified as Critical Groundwater Area by the state of Idaho. Discussions of satellite facility water sources and use amounts (BPA 1997 at pages 3-14 through 3-16, incorporated here by reference) found adequate quantities and qualities for Chinook production purposes. Those conditions remain today as displayed in Table 7.

Table 7 Current water use for each facility in the BPA-funded NPTH programs

Facility	Total facility water use (cfs)	Surface water use (cfs)	Ground-water use (cfs)	Water source	Discharge location
Nez Perce Tribal Hatchery, Central Facility (NPTH)	17.25	13.4	3.85	Clearwater River and groundwater	Clearwater River
North Lapwai Valley Satellite	5	1.4	3.6	Lapwai Creek and ground-water	Lapwai Creek
Sweetwater Springs Satellite	3.44	0	3.44	Upland spring	West Fork Sweetwater Creek
Luke's Gulch Satellite	2.8	2.2	0.6	South Fork Clearwater River and ground-water	South Fork Clearwater River
Cedar Flats satellite	2.2	2.2	0	Selway River	Selway River
Yoosa/Camp Creek	4.41	2.5/1.91	0	Yoosa Creek/Camp Creek	Lolo Creek
Newsome Creek	1.70	1.70	0	Newsome Creek	Newsome Creek

[22] An area designated by the State of Idaho where all or part of a ground water basin does not have sufficient ground water to provide a reasonably-safe supply for irrigation or other uses at the current or projected rates of withdrawal.

3.2.1.2 Water Quality

The State of Idaho has not evaluated the water quality status of the Clearwater River below the confluence of the North Fork Clearwater River in response to the Tribe's request to not report on Tribal waters (IDEQ 2014). There is therefore no assessment of water quality for the Clearwater River by IDEQ near the NPTH. The IDEQ 2014 water quality report does, however, identify dissolved gas supersaturation (from the operations of Dworshak Dam) as the only water quality parameter for which standards may be needed and for which it was de-listed as a water quality impaired stream in an earlier (2012) report (IDEQ 2014). This parameter is not influenced by operations of the NPTH.

Since the State of Idaho has not evaluated the water quality status of the Clearwater River, and the NPTH does not discharge effluent into a reach of the Clearwater River with otherwise known water quality concerns, there is no requirement for the hatchery for a NPDES[23] permit for its discharge. However, the NPT developed a NPDES Permit Waste Management Plan for all its facilities, including the NPTH. Final plans were submitted to IDEQ and the Nez Perce Tribe Water Quality Division (NPT 2013).

Sweetwater and Lapwai Creek are also identified as Tribal waters and have not been assessed. The Yoosa Creek, Camp Creek, and Newsome Creek were determined by Idaho DEQ (IDEQ 2014) to be "fully supporting their beneficial uses" (water quality standards and criteria are being achieved and a healthy, balanced biological community is present).

Pesticide sampling by the Idaho State Department of Agriculture of tributaries flowing into the Clearwater River (including Jack's Creek and Cotton wood Creek closely above and below the NPTH) identified a total of 13 pesticides with Metribuzin, Diuron, Dicamba, and Atrazine detections leading the list. All pesticide concentrations detected during that study were below any chronic or acute levels that may cause ill effects for aquatic species. (ISDA 2004)

At current production levels, the NPTH produces approximately nine metric tons of fish waste annually (BPA1997). This waste is treated on site using a settling pond, or "clarifier", for the continuous removal of solids through sedimentation. The solids are collected, dried, then applied to land as fertilizer or disposed of as solid waste at an approved sanitary landfill. The liquid effluent is then discharged directly to the Clearwater River downstream of the hatchery's water intake with no further treatment. This discharge is the primary source of water quality impact from the NPTH on the Clearwater River. The hatchery diverts much less than one percent of the river's average monthly flows, thus hatchery return flows comprise a fraction of flows in the mainstem Clearwater River (see above).

3.2.2 Effects of the Proposed Action on Water Resources

3.2.2.1 Water Quantity

In general, hatchery programs can affect groundwater and hydrology when they take groundwater from a well or surface water from a neighboring river or stream. All water, minus evaporation, that is diverted from a river or taken from a well is usually discharged to an adjacent water body after it circulates through the hatchery facility. When hatchery programs use surface water, they may lead to dewatering of the stream between the water intake and discharge structures. Generally, water

[23] An NPDES permit is a permit under the Clean Water Act for controlling the discharge of pollutants into the nation's waters. This permit is not required on the NPTH because it is on tribal land and they have opted to manage effluent discharge under their own waste management plan.

intake and discharge structures are located as close together as possible to minimize the area of the stream that may be impacted by a water withdrawal.

For this Proposed Action, the effects to water quantity would come only from the impacts from ongoing operations of the hatchery and satellite facilities, and the additional water use from operation of the proposed kelt reconditioning facility at the NPTH (3.34 cfs; a 19% increase). The annual total water use with this additional action at the NPTH would be 20.59 cfs. The change of location for release of fall Chinook requires no change in the amount of water used at the release facilities.

Given the flows of the Clearwater River (5,000 cfs in the fall to 35,000 cfs in the late spring), this 20.59 cfs total represents only a 0.41% reduction in flow during the lowest flows in the fall, and only a 0.06% reduction during the high spring flows. This slight reduction in flow occurs only for a distance of about 500 feet along the river since the used water from the hatchery is returned to the river that far below the water intake. Given the comparatively small amount to water "borrowed" from the Clearwater River for a distance only 500 feet, the effects of these actions are considered low.

Generally, when hatchery programs use groundwater, they may reduce the amount of water for other users in the same aquifer. For this Proposed Action, however, the ground water is hydraulically linked to the Clearwater River, thus well water would not be withdrawn from an isolated aquifer. Both surface and groundwater withdrawals affect only the flows in the Clearwater River.

There is no proposal to modify water uses at any of the satellite facilities, thus water quantities in the waters serving those facilities would not be affected.

3.2.2.2 Water Quality

The impacts of construction activities for the kelt reconditioning facility would not likely compromise water quality since these actions are occurring on flat ground (with little potential for erosive runoff) and the construction site is over 300 feet from the Clearwater River with road and railroad flow barriers in between.

Effects to water quality from this Proposed Action would come primarily from the impacts of effluent discharge from ongoing hatchery operations and effluent discharge increases from operations of the proposed kelt reconditioning program.

The effects of hatchery discharge into rivers has been shown to possibly elevate temperature, ammonia, organic nitrogen, total phosphorus, biological oxygen demand, pH, and suspended solids levels (Sparrow 1981; WDOE 1989; Kendra 1991; Cripps 1995; Bergheim and Åsgård 1996; Michael 2003). Chemical use within hatcheries could result in the release of antibiotics (a therapeutic), fungicides, and disinfectants into receiving waters (Boxall et al. 2004; Pouliquen et al. 2008; Martínez-Bueno et al. 2009). Other chemicals and organisms that could potentially be released by hatchery operations are polychlorinated biphenyls (PCBs), dichlorodiphenyltrichloroethane (DDT) and its metabolites (Missildine 2005; HSRG 2009), pathogens (HSRG 2005; HSRG 2009), steroid hormones (Kolodziej et al. 2004), anesthetics, pesticides, and herbicides.

NPTH effluent discharge is the same as its 17.25 cfs water withdrawal (or slightly less considering evaporation). The additional water use from operation of the kelt reconditioning facility would increase this discharge to the Clearwater River to approximately 20.6 cfs, or about 19% over current discharges from ongoing hatchery operations. This increase however, elevates the discharge volume to only 0.41% of the river's lowest annual flows from the existing condition of

0.06%. Given the comparatively large flows of the Clearwater River, the treated effluent would adversely impact water quality only in the immediate area downstream of its discharge site, with return flows dissipating quickly downstream and the effects diminishing accordingly.

There would be no impacts to water quantity or quality from research, monitoring, or evaluation activities associated with either hatchery operations or the kelt reconditioning program. These activities take no action that would use or affect water resources beyond what was described above, nor do they modify hydrologic, riparian, or upland conditions. There may be a potential for short-term, small-scale disturbance of stream or river beds associated with people wading in these waters as they conduct habitat and spawning surveys; or by installing and operating screw traps, but those effects to the water resource are *de minimus.*

There is no proposal to modify water uses or discharges at any of the satellite facilities, thus water quality in the waters serving those facilities would not be affected.

The limited effects discussed above would be further reduced by the application of mitigation measures as described in Section 2.4, and the overall effect of the Proposed Action's impacts on water quality would be *low*.

3.2.3 Effects of the No Action Alternative on Water Resources

Under the No Action alternative, all programs at all of the NPTH facilities would cease. No water would be withdrawn from the Clearwater River, groundwater, or from streams adjacent to satellite facilities, nor would effluent-laden water be discharged back into the rivers or streams following hatchery or acclimation facility use.

These facilities currently take only a small proportion of the total flow from adjacent streams, and the effect on water quantity is already minimized by the short distance (less than 500 feet) between water intake and discharge. None of these facilities are located in State Critical Groundwater Areas (i.e., there is sufficient water in the aquifer for irrigation and other uses). Therefore, effects on groundwater and hydrology from terminating production at NPTH and its satellite facilities (the No Action alternative) would be low relative to existing conditions.

The effect on water quality from the termination of hatchery operations at NPTH would be the cessation of processing nine metric tons of fish waste annually and the resultant discharge of hatchery effluent into the Clearwater River. This would be a beneficial effect for the river, though as discussed above, the relative quantity and impact of this effluent is low; thus, the improvement from not discharging it would also be low, though beneficial.

3.3 Vegetation

3.3.1 Affected Environment of Vegetation

A detailed description of native vegetative communities and conditions surrounding the NPTH site is included in the 1997 EIS and is included here by reference. At the NPTH, the ecotype is characterized as part of the Great Basin Grassland vegetative type. The vegetation changes with elevation up the Clearwater River Basin, transitioning from grasslands to Ponderosa pine forests, to the Douglas-fir/grand fir forests at the elevations at many of the satellite facilities.

The actual hatchery site, however, is a flat parcel of former agricultural land that had been used for hay production but is now managed as a mowed field. It lies on the north side of the Clearwater River, separated from the river and the narrow riparian vegetative strip along it by River Road and

a railroad right of way. The narrow riparian zone along the Clearwater River is dominated by black cottonwood, box elder, black locust, white alder, coyote willow, and Wood's rose.

None of the locations described above have problematic infestations of invasive plants.

3.3.2 Effects of the Proposed Action on Vegetation

Effects to vegetation come solely from the impacts of the heavy equipment use and ground disturbance associated with the construction of the kelt reconditioning facility at the NPTH. This is the only ground-disturbing activity proposed in these actions and only 0.25 acres of mowed field would be permanently disturbed, as described under Soils and Geology, above. There would be no effect to native vegetation, since none exists today, but the vegetation that does exist there would be replaced by a gravel pad and a constructed building.

Disturbance of soil would provide opportunity for the spread of invasive plants. Application of the mitigation measures in Section 2.4 designed to prevent the spread of noxious weeds would effectively minimize or prevent infestations of these species.

There would be no impacts to vegetation from operations at the satellite facilities, including the changed fall Chinook release numbers, or from research, monitoring, or evaluation activities associated with either hatchery operations or the kelt reconditioning program. Research, monitoring, or evaluation activities would not modify hydrologic, riparian, or upland vegetative conditions.

The overall effect of these actions' impacts on vegetation would be low.

3.3.3 Effects of the No Action Alternative on Vegetation

Under the No Action alternative, all NPTH hatchery programs at all its facilities would cease. The No Action alternative would not impact vegetation in the project area.

3.4 Wetlands and Floodplains

3.4.1 Affected Environment of Wetlands and Floodplains

3.4.1.1 Wetlands

As noted above, the NPTH is located entirely on former agricultural lands that had been plowed and cultivated. None of this area is classified as wetland, and none of the Proposed Action elements would occur in wetlands.

3.4.1.2 Floodplains

The 1997 EIS revealed that floodplain maps had not been created for the Clearwater River Basin at the location of the NPTH facilities, but that an analysis using existing nearby stream gauge records (to determine channel characteristics) along with slope, channel roughness, bottom width, and top width was applied to determine the river's flood capacity. From that analysis, the NPTH facility and all satellite facilities except Newsome Creek were estimated to be outside the Clearwater River's 100-year floodplain. Floodplain maps have still not been prepared for this area[24] so the 1997 analysis remains the best indicator of floodplain potential.

[24] A check of the Federal Emergency Management Agency's floodplain map website on March 3, 2017 revealed that the hatchery is located on "Nez Perce Indian Reservation AREA NOT INCLUDED".

Newsome Creek was determined to likely be within the 100-year floodplain. The 1997 EIS indicated a possibility of locating the facility outside of that floodplain, but current pictures show it to be within the creek bottom adjacent to the creek, so it is likely located within the 100 year floodplain.

3.4.2 Effects of the Proposed Action on Wetlands and Floodplains

Since no element of the Proposed Action is within wetlands or floodplains (no change is proposed at the Newsome Creek facility), there would be no impact or effect from the Proposed Action. There would also be no impacts to wetlands and floodplains from research, monitoring, or evaluation activities associated with either hatchery operations or the kelt reconditioning program. These activities would not modify hydrologic, riparian, or wetland conditions.

3.4.3 Effects of the No Action Alternative on Wetlands and Floodplains

Under the No Action alternative, all NPTH hatchery programs at all its facilities would cease. Since only the Newsome Creek facility is within a floodplain, and since there would be no actions with this alternative, there would be no impact or effect from the No Action alternative on wetlands or floodplains.

3.5 Fish

3.5.1 Affected Environment of Fish Populations

Fish populations in the project area include native anadromous fish, and both native and non-native non-anadromous fish.

3.5.1.1 Anadromous Fish Species

Anadromous fish in the Lower Snake and Clearwater Rivers historically included Snake River fall and spring/summer runs of Chinook salmon(*Oncorhynchus tshawytscha*); coho salmon; Snake River Basin steelhead (*O mykiss*); and Snake River sockeye salmon (*O. nerka*). Sockeye salmon were not present in Clearwater basin historically and are not there now; they use the Snake River through the project area only for migration purposes.

The upper reaches of the South Fork Clearwater River were blocked to all passage of anadromous fish by the 1910 construction of Harpster Dam near Grangeville, Idaho; and native populations of Chinook and coho salmon were virtually eliminated from the entire Clearwater basin by the 1927 construction of Lewiston Dam four miles upstream of the mouth of the Clearwater River (Leth et al., 2010). Steelhead populations persisted, however, as Lewiston Dam was not a complete barrier to them and they were able to survive in their non-anadromous life form above the dam (Leth et al., 2010). Adult fish passage improvements were made to Lewiston Dam in the 1940s providing for limited resumption of Chinook and steelhead runs until both dams were ultimately removed. Harpster Dam was removed in 1963 providing access to over 500 miles of suitable spawning and rearing habitat in the South Fork Clearwater River (NMFS 2016), and Lewiston Dam was removed in 1973. The Dworshak Dam was constructed in 1971 and steelhead and Chinook salmon runs were extirpated from the North Fork Clearwater River (NMFS 2016).

Chinook Salmon

Reintroduction of **fall Chinook salmon** began in the 1950s and intensified in the 1970s. These reintroductions were from fish bred at hatcheries along the Snake and Clearwater Rivers, but also from hatcheries in western Washington and the lower Columbia River. Fall Chinook recolonized the lower Clearwater River by 1987(Arnsberg 1992) , but the numbers were limited and subject to

the same impacts from dams and ocean conditions depressing all naturally spawning salmon runs in the Snake River Basin (Ecovista 2003). Intensified recovery efforts since the mid-1990s have produced steadily increasing numbers of returning fall Chinook to the Clearwater River basin (Arnsberg et al. 2015).

Historical **spring and summer-run Chinook** populations are suggested in anecdotal accounts of Chinook returns to the Clearwater basin prior to their extirpation following construction of the Lewiston Dam (Leth et al., 2010). Reintroduction of spring Chinook salmon has since resulted in naturally-reproducing runs there and hatchery managers are now developing a locally-adapted summer-run Chinook population for the Clearwater River. Since natural production of spring/summer Chinook and coho salmon is the result of re-introduction, they are not ESA-listed.

Initial reintroductions of these fish had come from Carson, Big White Salmon, and Little White hatcheries or other spring Chinook captured at Bonneville Dam (Nez Perce Tribe and Idaho Department of Fish and Game 1990), raising early questions about genetic suitability to the Clearwater basin. Founding stock for the Clearwater hatcheries, however, came primarily from Rapid River hatchery (Snake River) stocks (Kiefer et al. 1992; Nez Perce Tribe and Idaho Department of Fish and Game 1990) and genetic analyses has since confirmed that existing natural spring Chinook salmon in the Clearwater River subbasin are now derived from these reintroduced Snake River stocks (Matthews and Waples 1991). Eggs from Salmon River and other Snake River tributary populations, including some locally-adapted runs, are also now being used to develop locally-adapted runs throughout the Clearwater basin, but these are, nonetheless, non-indigenous hatchery stocks replacing the historical populations that were likely extirpated. For this reason, these fish are not listed under the ESA (NMFS 1999, IDFG 2011).

This effort to restore naturally-spawning, spring/summer Chinook in the Clearwater basin has been successful to a degree, but it has only produced small, scattered populations due to poor post-release survival (NPT 2013). In general, there is consistently high survival during hatchery culture, but post-release survival is highly variable, and survival of released sub-yearlings is poor. An increase in post-release survival has been observed since the mid-1990s but it still falls short of the numbers necessary to meet mitigation objectives for Clearwater basin spring/summer Chinook. (Leth et al., 2010).

Today both fall-run and spring/summer-run Chinook occupy the Clearwater River but their life history and use of habitat differs: adult migration timing differs, their spawning locations differ, and they rear in different areas (NMFS 2012). Snake River spring/summer Chinook salmon generally use the mainstem Snake and Clearwater Rivers as migration corridors (NMFS 2012) and spawn in its tributaries, whereas fall Chinook can be found spawning in the these rivers' mainstem (Arnsberg et al. 2015). These differences have lead hatchery operators to collect and release fall Chinook in different areas than they do spring/summer Chinook. Smolts of both species, however, both head to the ocean in the spring, thus their habitat use patterns overlap during this period.

Fall Chinook are listed under the Endangered Species Act and re-establishing runs of spring/summer Chinook salmon is a key value for the NPT. The rearing and release of these fish has been the primary focus of the NPTH. NPTH programs for broodstock capture, rearing, and release of these fish are described in detail in the NPTH's HGMPs (NPT 2011 and 2013). Also included is information on their life histories, the results of NPTH hatchery actions, and discussions of the non-hatchery Snake River spring/summer and fall Chinook populations affected by these programs.

Snake River Steelhead

As discussed above, a number of dams were built on the Clearwater River which blocked or impaired anadromous fish migration. Unlike Chinook and coho, steelhead were able to maintain

access to the Clearwater subbasin during the Lewiston dams' existence. The dam was believed to have been only a partial barrier to adult steelhead with the effect of limiting but not totally excluding migrating steelhead from reaching the upper basin (NMFS 2016). Additionally, steelhead were able to survive in their non-anadromous life form above the dams (Leth et al., 2010).

The steelhead population in the Clearwater River basin today is composed of six subpopulations that together comprise the Clearwater River Steelhead major population group (MPG), as managed under the Endangered Species Act. One of these, the North Fork, is the historical population whose habitat in the North Fork Clearwater River was blocked when the Dworshak Dam was constructed. The other five subpopulations include the Lower Mainstem, Lolo Creek, Lochsa River, Selway River, and South Fork. The NPTH central hatchery facility and most of its satellite facilities are located in the habitat of the Lower Mainstem subpopulation. The Yoosa/Camp Creek Acclimation facility is in the Lolo subpopulation area. Cedar Flats Acclimation Facility and the Meadow Creek release sites are in the Selway subpopulation area, and the Newsome Creek Acclimation Facility is in the South Fork Clearwater.

Snake River steelhead are genetically differentiated from other Interior Columbia steelhead populations, as they spawn at higher altitudes (up to 2,000 m) after longer freshwater migrations (up to 1,500 km) (Busby et al. 1996). Like steelhead in other areas, these fish exhibit a wide range of life history strategies, including varying times of freshwater rearing or ocean residence (NMFS 2016).

The mainstem Snake River and Clearwater River near the NPTH are predominantly migration corridors for steelhead (NMFS 2012). In general, steelhead do not spawn or rear in the areas where fall Chinook salmon spawn, rear, or are released/collected for the fall Chinook salmon hatchery programs, though some spatial overlap may occur in lower sections of the Lower Snake River tributaries (NMFS 2016). Snake River steelhead are known to spawn and rear in all tributaries used by spring/ summer Chinook salmon, as well as many additional tributaries, some of which are much smaller than those used by spring/summer Chinook salmon (NMFS 2016).

Snake River steelhead are generally classified as summer run, based on their adult run-timing patterns. They enter the Columbia River from late June to October, hold over the winter, and spawn the following spring (typically from March to May) (Good et al. 2005). Emergence occurs by early June in low elevation streams and as late as mid-July at higher elevations. These steelhead usually migrate to the sea at two or three years of age. Steelhead typically reside in marine waters for one to three years before returning to their natal stream to spawn at four or five years of age. Steelhead may also exist in the resident (non-migratory) lifeform in many of the drainages used by Snake River steelhead (NMFS 2016).

Steelhead, unlike salmon, do not die after spawning; they can spawn multiple times in a life history pattern known as iteroparity. After steelhead spawn in the spring, kelts[25] move downstream and eventually back to the ocean for one or more years where they re-mature and then return upstream as repeat spawners. The mortality of kelts migrating to the ocean is very high because of downstream passage mortality at hydroelectric dams, thus only a small number return to repeat spawning. In the Snake River, kelts make up only about 1% of the in-migrating steelhead run (NPCC 2016) yet iteroparity persists in several tributaries of the Snake River basin despite strong selection against downstream adult passage (Narum et al. 2008).

The capture and reconditioning of steelhead kelt has been applied at a research scale in the Snake River since 2008 with the percentage of kelts surviving reconditioning reaching nearly 63% in

[25] A post-spawn steelhead is termed a "kelt".

2016 and an average of 35 reconditioned kelts released each year for the past five years (Lothrop 2016). This proposal seeks to expand kelt reconditioning to a production level.

Snake River Sockeye Salmon

The Snake River sockeye salmon ESU is listed as endangered under the ESA and includes all anadromous and residual sockeye salmon from the Snake River basin, as well as sockeye salmon from the Snake River sockeye captive broodstock program. There are no sockeye salmon in the Clearwater River Basin, but they migrate down the Snake River through the project area on their way to the ocean and then up again to their spawning grounds in other watersheds.

The sockeye salmon populations declined through the early- to mid-1900s, leading NMFS to list the species as Endangered under the ESA in 1991. The listing was reaffirmed in 2005 (NMFS 2005).

When Snake River sockeye salmon were listed as endangered in 1991, all but one of the Snake River sockeye salmon populations, the Redfish Lake population in the Sawtooth Valley, were extirpated; and that population had dwindled to fewer than 10 fish per year. In some years before 1998, no anadromous sockeye salmon returned to the Snake River basin.

NMFS' status review that led to the original listing decision attributed the decline to "overfishing, irrigation diversions, obstacles to migrating fish, and eradication through poisoning."[26] NMFS' 1991 listing decision noted that such factors as hydropower development, water withdrawal and irrigation diversions, water storage, commercial harvest, and inadequate regulatory mechanisms represented a continued threat to the species' existence. These combined factors reduced the number of sockeye salmon to the single digits. The decline in abundance itself has become a major limiting factor, making the remaining population vulnerable to catastrophic loss and posing significant risks to genetic diversity (NMFS 2014b).

In 1991, a partnership of state, tribal and federal fish managers initiated a captive broodstock hatchery program to save the Redfish Lake sockeye salmon population. Between 1991 and 1998, all 16 of the natural-origin adult sockeye salmon that returned to the weir at Redfish Lake were incorporated into the captive broodstock program, as well as out-migrating smolts captured between 1991 and 1993, and residual sockeye salmon captured between 1992 and 1995. The program has used multiple rearing sites to minimize chances of catastrophic loss of broodstock and has produced several million eggs and juveniles, as well as several thousand adults, for release into the wild (NMFS 2014b). As a result of this effort, approximately 100,000 juvenile sockeye salmon out-migrate in the spring, passing downstream through the lower Snake River between April and June (FPC 2012) and the count of in-migrating adults over Lower Granite Dam has been increasing steadily over the past few years[27] (FPC 2012, 2016).

While the program has successfully prevented extinction, and has preserved the genetic lineage of Redfish Lake sockeye salmon, the species continues to have a very high risk of extinction as abundance over the last 30 years has generally remained low (NMFS 2014b).

Coho Salmon

Coho salmon were declared extirpated (non-existent) in 1985 in the Clearwater and other Snake River subbasins in Idaho. Early restoration efforts in the 1960s failed, but successful reintroduction in the Clearwater River basin was achieved beginning in the early 1990s. Though Lower Columbia River eggs were used to produce broodstock to begin this reintroduction,

[26] The poisoning referred to here was the chemical treatment of Sawtooth Valley lakes in the 1950s and 1960s.

[27] The 2015 return was an exception, when the majority of the run perished from the effects of high water temperatures before passing all the Snake River dams.

broodstock has since been produced from the offspring of in-basin returning adults, which produce fish that are believed to be better adapted to local conditions and more capable of the long migration from the ocean to these waters. Coho salmon in the lower Snake and Clearwater River basin are not listed under the Endangered Species Act because they were declared extirpated, and the coho populations there today are not of the original, native, genetic strains.

Pacific Lamprey

The Pacific lamprey range is from Japan to Baja California along the Pacific Rim. Its range in the Columbia River Basin is as far inland as the Salmon River in the Snake River Basin in Idaho and the Okanogan River in the upper Columbia River Basin in Washington, though less than one percent that pass Bonneville Dam are heading to the Snake River (McIlraith et al. 2014). Once the fish pass Lower Granite Dam they head to spawning grounds in the Clearwater, Salmon, Imnaha, and Snake Rivers.

The Pacific lamprey's numbers in the Snake River system have declined from tens of thousands in 1960 to about 100 in 2010, in part due to the passage challenges in the Columbia River and at the four lower Snake River hydroelectric dams and the lack of passage at Hells Canyon Dam upstream (Stevens et al. 2015).

A recent study (McIlraith et al. 2014) found that when given the choice at the confluence of the Snake and Clearwater rivers, most of the lamprey head up the Clearwater River. In fact, 59 percent to 70 percent over the three-year study chose to move into the Clearwater River, while 16 percent to 25 percent chose to migrate up the Snake River. Some 13 percent to 16 percent moved into the Salmon River and 0 to 3 percent migrated into Oregon's Imnaha River. This apparent preference for the Clearwater River basin was unexpected, given its smaller basin size than the Snake or the other tributaries.

The study also found that most migration occurs during March to May and most overwintering of the lamprey occurs in the lower to middle reaches of the larger rivers (McIlraith et al. 2014). The NPTH is in the lower reaches of the Clearwater River and is thus likely adjacent to overwintering areas for Pacific lamprey.

3.5.1.2 Non-Anadromous Fish Species

Approximately 60 species of non-anadromous fish live in the Snake River and tributaries. About one-half are native species primarily of the families Salmonidae (trout), Catastomidae (suckers), Cyprinidae (carps and minnows), and Cottidae (sculpins). White sturgeon (*Acipenser transmontanus*) occurs in the main Snake and Salmon rivers. The Snake River Basin also supports at least 25 introduced species, primarily representing the taxonomic families Percidae (perch and walleye), Centrarchidae (bass, crappie, sunfish), and Ictaluridae (catfish). The following table displays likely interactions between these fish and hatchery-reared salmon.

Table 8 Non-anadromous fish interactions with hatchery fish

Species	Range in Columbia River Basin	Federal/State Listing Status*	Type of Interaction with NPTH fish
Pacific, river, and brook lamprey (*Entosphenus tridentatus, Lampetra fluviatilis,* and *L. planeri)*	All accessible reaches in the Columbia River basin	Not listed under the federal ESA. Pacific lamprey and river lamprey are Federal Species of Concern; river lamprey is a Washington State candidate species; Pacific lamprey is an Oregon State sensitive species and an Idaho State imperiled species	Freshwater predator species of Chinook salmon

Species	Range in Columbia River Basin	Federal/State Listing Status*	Type of Interaction with NPTH fish
White sturgeon (*Acipenser transmontanus*)	All accessible reaches in the Columbia River basin	Not listed under the federal ESA; Idaho Species of Greatest Conservation Need - Tier One	May compete with Chinook salmon for food
Margined, reticulate, and riffle sculpin (*Cottus marginatus, C. perplexus,* and *C. gulosus*)	All accessible reaches in the Columbia River basin	Not listed under the federal ESA; Washington State Species of Concern	Predators of salmon egg and fry
Leopard dace (*Rhinichthys falcatus*)	Columbia River basin	Not listed under the federal ESA, Washington State Candidate Species	Freshwater prey of Chinook salmon but not within the project area
Mountain sucker (*Catostomus platyrhynchus*)	Middle- Columbia and Upper Columbia River watersheds	Not listed under the federal ESA; Washington State Species of Concern	Occurs in similar freshwater habitats, but is a bottom feeder and has a different ecological niche
Northern Pikeminnow (*Ptychocheilus oregonensis*)	Throughout the Columbia River basin	Not listed	Freshwater predator species
Smallmouth bass (*Micropterus dolomieu*)	Throughout the Columbia River basin	Not listed	Freshwater predator species
Walleye (*Sander vitreus*)	Throughout the Columbia River basin	Not listed	Freshwater predator species
Channel catfish (*Ictalurus punctatus*)	Throughout the Columbia River basin	Not listed	Freshwater predator species
Pygmy whitefish (*Prosopium coulterii*)	Cle Elum and Kachess Lakes in Yakima basin; Priest	Federal Species of Concern; Washington State Sensitive Species	Freshwater prey of Chinook salmon but not within the project area
Inland redband trout (*Oncorhynchus mykiss gairdneri*)	Throughout the Columbia River basin	Not listed	May feed on hatchery-released Chinook salmon
Umatilla dace (*Rhinichthys umatilla*)	Columbia, Kootenay, Slocan, and Snake Rivers	Not listed under the federal ESA, Washington State Species of Concern	Freshwater prey of salmon and steelhead but not within the project area
Westslope cutthroat trout (*Oncorhynchus clarki lewisi*)	Upper Columbia River basin and Snake River	Federal Species of Concern, Idaho State Vulnerable Species	May feed on hatchery-released Chinook salmon

Sources: Finger 1982; Horner 1978; IDFG 2005; Krohn 1968; Maret et al. 1997; 1 Polacek et al. 2006; Ward et al. 1995; WDFW 2012.
* Federal and state listing status definitions are as follows:

Species	Range in Columbia River Basin	Federal/State Listing Status*	Type of Interaction with NPTH fish
"**Federal Species of Concern**" is an informal term that refers to those species which NMFS and USFWS believe might be in need of concentrated conservation actions. "**Oregon State Sensitive Species**" are defined as having small or declining populations, are at-risk, and/or are of management concern. Implementation of appropriate conservation measures to address existing or potential threats may prevent them from declining to the point of qualifying for threatened or endangered status. "**Species of Concern in Washington**" include those species listed as State Endangered, State Threatened, State Sensitive, or State Candidate, as well as species listed or proposed for listing by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service. "**Washington State Sensitive Species**" is defined in WAC 232-12-297, Section 2.6, to include "any wildlife species native to the state of Washington that is vulnerable or declining and is likely to become endangered or threatened throughout a significant portion of its range within the state without cooperative management or removal of threats." "**Washington State Candidate Species**" is defined in WDFW Policy M-6001 to include fish and wildlife species that the Department will review for possible listing as State Endangered, Threatened, or Sensitive. A species will be considered for designation as a State Candidate if sufficient evidence suggests that its status may meet the listing criteria defined for State Endangered, Threatened, or Sensitive. **Idaho State "Species of Greatest Conservation Need-Tier One"** are species in Idaho with the most critical conservation needs, i.e., an early-warning list of taxa that may be heading toward extirpation. **Idaho State** "**Vulnerable Species**" are those species at moderate risk because of restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors that make it vulnerable to range-wide extinction or extirpation.			

3.5.1.3 Bull Trout

Bull trout, salmon, and steelhead can occur in similar aquatic habitat types, but bull trout are more sensitive than salmon and steelhead to increased water temperatures, poor water quality, habitat conditions, and low flow conditions. They therefore select waters at higher elevations with less disturbed habitats. Bull trout also require colder water temperatures than other salmon and trout and are more likely to occur in headwater streams where temperatures tend to be cooler.

Bull trout feed primarily on fish as sub-adults and adults, and can therefore be a substantial predator of young salmon and steelhead. Juvenile bull trout feed on similar prey as salmon and steelhead (USFWS 2002, 2008).

Bull trout were listed as threatened under the ESA in 1999 with a Final Recovery Plan produced in 2015. The recovery plan is built around management of "Core Areas" (usually subwatersheds) and "Recovery Units" which are aggregations of Core Areas. The NPTH project area is within the Mid-Columbia Recovery Unit. This Recovery Unit includes the Lower Snake geographic region which includes the lower Snake River's tributaries in Oregon and Washington, and portions of the Clearwater River basin in Idaho. The Clearwater River basin contains four bull trout recovery "core areas": the South Fork Clearwater Core Area, the Selway River Core Area, the Lochsa River Core Area, and the North Fork Clearwater River Core Area. This geographic region is identified in the 2015 Recovery Plan as a likely "stronghold" for bull trout, with the Clearwater core areas listed among those with likely the most abundant populations.

Bull trout are present in the Clearwater River, and the abundance of bull trout in the South Fork Clearwater River is estimated between 1,000 and 2,500 individuals (USFWS 2005). The bull trout in the South Fork Clearwater river basin are less likely to migrate to the mouth of the South Fork Clearwater River because the life history types present do not migrate extensively (USFWS 2008).

The Snake River and the mainstem of the Clearwater River itself are outside the core areas, but are identified as foraging, migration, and overwintering (FMO) habitat for bull trout (USFWS 2015). These larger rivers may be used by bull trout from multiple core areas as FMO habitats.

Both adult and subadult bull trout use the Snake River in areas near Lower Granite Dam. Bull trout that enter the mainstem Snake River typically do so during the fall and winter (e.g., October – February) and return to tributary subbasins in spring and early summer (e.g., March – July). This

timing indicates bull trout are likely present somewhere in the mainstem Snake River near Lower Granite Dam in all but the warmest summer months (August – September) (Barrows 2016).

3.5.1.4 ESA-Listed Fish

There are four species of ESA-listed fish in the area of the Proposed Action as displayed in Table 9. Only three of these are in the Clearwater River basin. Sockeye salmon and ESA-listed spring/summer Chinook are only found in the mainstem of the Snake River. As discussed under the "Anadromous Fish Species" section, above, the spring/summer runs of Chinook salmon in the Clearwater basin were extirpated historically, and the fish there now are a locally adapted, non-indigenous, genetic strain not listed under ESA.

Table 9 ESA-listed fish species

Species	ESA status	Critical Habitat	Protective Regulations
Chinook salmon (*Oncorhynchus tshawytscha*)			
Snake River fall Chinook salmon	threatened (June 28, 2005; 70 FR 37160)	December 28, 1993; 58 FR 68543	June 28, 2005; 70 FR 37160
Snake River spring/summer Chinook salmon*	threatened (June 28, 2005; 70 FR 37160)	December 28, 1993; 58 FR 68543, and October 25, 1999; 64 FR 57399	June 28, 2005; 70 FR 37160
Steelhead (*Oncorhynchus mykiss*)			
Snake River basin steelhead	threatened (January 5, 2006; 71 FR 834)	September 2, 2005; 70 FR 52630	June 28, 2005; 70 FR 37160
Sockeye salmon (*Oncorhynchus nerka*)			
Snake River sockeye salmon	endangered (June 28, 2005; 70 FR 37160)	December 28, 1993; 58 FR 68543 and September 2, 2005; 70 FR 52630	Not Applicable (protections automatically applied since species is listed as Endangered)
Bull trout (*Salvelinus confluentus*)			
Bull trout	threatened (November 1, 1999; 64 FR 58910)	September 30, 2010; 75 FR 63898	Protections automatically applied by 1978 USFWS 4(d) regulations
* Though Snake River spring/summer Chinook salmon are listed as endangered under the ESA, the populations in the Clearwater River are not included as an endangered ESU because the original genetic strain was extirpated.			

Consultations under ESA for actions affecting these listed species have been completed or are in progress as shown in Table 10, below.

Table 10 ESA consultations for ESA-listed Fish

Proposed Action	Primary location of Proposed Action's affect	NMFS consultation status or completed reference number	USFWS consultation status or completed reference number

Ongoing NPTH operations	Operation of NPTH on the mainstem Clearwater River with acclimation and release facilities throughout the basin	Fall Chinook consultation: August 12, 2018, WCR-2018-9988, Spring Summer Chinook and Coho: December 12, 2017, WCR-2017-7303	Clearwater Hatchery Programs; December 15, 2017; 01EIFW00-2017-F-1143 Fall Chinook Hatchery Programs; May 16, 2017; 01EIFW00-2012-F-0448
Trapping Kelt at Snake River Dams	Operation of the juvenile bypass facilities at Lower Granite and Little Goose Dams	currently ongoing between the operator of this facility, the Army Corps of Engineers (Corps), and NMFS;	currently ongoing between the operator of this facility, the Army Corps of Engineers (Corps), and USFWS;
Construction and operation of kelt facility.	NPTH on the mainstem Clearwater River	Steelhead consultation: December 2017, WCR-2017-7286	Ongoing between BPA and USFWS
Kelt collections at temporary weir on the South Fork Clearwater River	Operation of temporary weir near mouth of South Fork Clearwater River	Steelhead consultation: December 2017, WCR-2017-7286 Fall Chinook consultation: August 12, 2018, WCR-2018-9988,	Fall Chinook Hatchery Programs; May 16, 2017; 01EIFW00-2012-F-0448
Kelt collections at the Crooked River satellite facility	Operation of the Crooked River Weir/Trap facility on the Crooked River	Steelhead consultation: December 2017, WCR-2017-7286	Partially under 01EIFW00-2017-F-1143 with remainder ongoing between BPA and USFWS

Several species are identified by the IDFG as "species of greatest conservation need" within the project area (Pacific lamprey, white sturgeon, westslope cutthroat trout, and inland redband trout) (IDFG 2005). Pacific lamprey is also a "species of concern" as identified by the USFWS and is present in the Snake River basin. WDFW also describes several fish species as species of concern, including leopard dace, margined sculpin, mountain sucker, Paiute sculpin, pygmy whitefish, reticulated sculpin, riffle sculpin, river lamprey, and Umatilla dace (WDFW 2012).

3.5.1.5 Designated Critical Habitat under the ESA

Designated critical habitat under the ESA for Snake River fall Chinook salmon, Snake River basin steelhead, and Snake River sockeye salmon is within the project area. Primary constituent elements of critical habitat here include freshwater spawning, freshwater rearing, and freshwater migration corridors. River and stream reaches on tribal lands are frequently mapped or described as critical habitat for these species, but these reaches on these lands are specifically excluded from critical habitat designation.[28]

Critical habitat for fall Chinook in the Lower Snake and Clearwater Rivers is designated as all rivers and tributaries in the basin presently or historically accessible to fall Chinook salmon (except those above Dworshak dam). This includes all facilities, weirs and release sites used by the NPTH program not on tribal lands[29].

The Clearwater River basin is not designated as critical habitat for spring/summer Chinook. It was specifically excluded from designation in 58 FR 68543 and was not included in the list of hydrologic

[28] 70 FR 52630, 52669 to 52670 (September 2, 2005)

[29] Tribal lands are explicitly excluded from the federal designation of critical habitat (70 FR 52630 pages 52669 to 52670). NMFS identified the "benefits of a co-manager process" with the Nez Perce Tribe as being more effective for recovery of listed fish than designation of critical habitat there.

units specified as critical habitat in 64 FR 57399 because the native genetic stock was likely extirpated by construction of the Lewiston Dam. Critical habitat for this species is, however, designated in the mainstem Snake River through the project area.

Sockeye salmon critical habitat is only designated in the mainstem Snake River through the project area.

Critical habitat for Snake River steelhead includes essentially all reaches of the Snake and Clearwater Rivers and its tributaries (Nez Perce tribal lands excluded [28]) throughout the project area.

Critical habitat for bull trout includes essentially all reaches of the Clearwater River and its tributaries (Nez Perce tribal lands included[30]).

Table 11 Critical Habitat designations at NPTH facility locations

Facility/site	Location and Ownership	Critical Habitat
Nez Perce Tribal Hatchery, Central Facility (NPTH)	Clearwater River; tribal lands	bull trout
North Lapwai Valley Satellite	Lapwai Creek, Clearwater River subbasin; tribal lands	none
Sweetwater Springs Satellite	Sweetwater Spring/Creek, Lapwai Creek, Clearwater River subbasin; state land (IDFG)	fall Chinook SRB steelhead bull trout
Luke's Gulch Satellite	South Fork Clearwater River, Clearwater River subbasin; tribal lands	bull trout
Cedar Flats satellite	Selway River, Clearwater River subbasin; NFS lands	fall Chinook SRB steelhead bull trout
Yoosa Camp Creek AF	Yoosa Creek, Lolo Creek, Clearwater River subbasin; NFS lands	fall Chinook SRB steelhead bull trout
Newsome Creek AF	Newsome Creek, South Fork Clearwater River, Clearwater River subbasin, Idaho; NFS lands	fall Chinook SRB steelhead bull trout

3.5.1.6 Essential Fish Habitat under the Magnuson-Stevens Fishery Conservation and Management Act

The Lower Snake River and the Clearwater River Basin, which defines the area of the Proposed Action, has also been designated as Essential Fish Habitat (EFH) for Chinook salmon under the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1801, et seq.), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267). EFH for Chinook salmon is defined as the bodies of water and substrate required for fish spawning, breeding, and feeding, and habitat where they can grow to maturity. EFH includes all freshwater habitats used by fall-run Chinook salmon in the Clearwater River Basin.

[30] FR Vol 75, No 200, page 63961

Essential Fish Habitat has not been described by NMFS for steelhead.

3.5.2 Effects of the Proposed Action on Fish

Effects on fish are caused by the impacts of actions associated with ongoing Chinook production activities, and the proposed steelhead kelt reconditioning program as they relate to fish production, acclimation, and release; and the research, monitoring, and evaluation actions. The construction of the kelt reconditioning facility would not affect fish or fish habitats in the Clearwater River. The construction actions are occurring on flat ground (with little potential for runoff effects) and the construction site is over 300 feet from the Clearwater River with road and railroad barriers in between. This action does not have the potential to impact aquatic habitats or the river itself.

No physical facility changes are proposed for the satellite facilities; thus, there would be no effects to fish or fish habitats from those types of activities there.

3.5.2.1 Effects on Fish from Ongoing Hatchery Operations, including Monitoring and Evaluation

Effects of ongoing hatchery operations on native fall Chinook, native spring Chinook, Snake River sockeye salmon, Snake River Basin steelhead, bull trout, and other species have been described in BPA's 1997 NPTH EIS (BPA 1997 at pages 4-21 through 4-49); the NPTH 2011 HGMP for fall Chinook production (NPT 2011 at pages 30-55 and pages 102-14); the NPTH 2013 HGMP for spring/summer Chinook production (NPT at pages 24-58); and in NMFS' 2012 Final EA for issuance of a section 10 permit to NPTH (and others) for fall Chinook production (NMFS 2012 at pages 72-81 and 83-87). The discussions in these documents analyze the effects from actions from fish handling; water withdrawal; effluent discharge; and the genetic, disease, competition, predation, and harvest effects on ESA-listed fish from releasing hatchery–reared fish. These discussions are summarized here.

Artificial production

The hatchery environment and experience of artificial production is stressful on individual fish. Broodstock and juveniles are netted, handled, transported, fin clipped, injected, reared in a crowded tank environment, and fed. Over 75% of hatchery juveniles are handled or marked in some way (pit tags, adipose fin clip, or coded wire tags). These actions are potentially harmful and some mortality occurs, though effects are minimized by adherence to established fish handling protocols (Mitigation Measures, Section 2.4).

Juvenile Release

Most of the effects on fish from the NPTH would result from releasing over 2 million hatchery-origin salmon in the Clearwater River basin each year. These fish comprise over 90% of all Chinook salmon smolt outmigration from the Clearwater River, and 78% of the total of adult returns to Lower Granite Dam (NMFS 2014a). Releasing hatchery-origin fish could affect genetics, disease, ecological interactions, nutrient cycling, and harvest as discussed below. There would also be effects from the increase in the number of Chinook salmon that would return to the action area as adults.

- **Genetic influence** effects on native stocks of fall Chinook salmon comes from the hatchery-origin adults returning to the spawning grounds, ultimately influencing the genetic make-up of natural offspring. Broodstock collection also has an effect, as over 300 natural-origin fall Chinook salmon may be taken from the population and used as broodstock (NPT 2011), preventing them from spawning naturally. The fall Chinook program is not meeting the standards for natural origin spawners on the spawning grounds but recommendations for

addressing this concern focus on broodstock development actions outside of the ongoing hatchery operations (NPT 2011).

There is no genetic influence concern for spring/summer Chinook in the Clearwater River basin since that run is not considered native, is not listed under ESA, and there is thus no native stock to be compromised by genetic mixing with hatchery-reared fish.

- **Disease transfer** is a risk and an effect of the annual release of over 2.2 million juvenile Chinook salmon each year into the Snake and Clearwater River systems. Hatchery conditions are susceptible to disease outbreak, and ultimately disease transmission by the fish reared there. The interaction of this many hatchery-reared fish with natural-origin fish increases the risk of disease transmission to natural-origin fish. Hatchery operators, however, would implement mitigation measures to prevent and control outbreaks in the hatchery and minimize the potential for disease transfer upon release.
- **Ecological interactions** (competition and predation) Chinook salmon would be reared in hatchery facilities and released into the Snake and Clearwater Rivers. Hatchery-origin Chinook salmon would be released into areas where natural-origin Chinook salmon may spawn, rear, and migrate. Consequently, competition for food and cover with natural-origin juvenile Chinook salmon would result in the areas of release, the migration corridor, and the Columbia River estuary. These ecological effects are most severe when wild and hatchery fish share a limited environment for a substantial period of time (Kostow 2009). The NPTH juvenile fall Chinook, however, would occupy habitat in the Clearwater River for only a limited period of time. They leave the acclimation facility when they are ready to migrate and when they do, they move quickly down the system. Upon return as spawning adults, there would be competition for suitable spawning locations and mate selection between hatchery and natural-origin Chinook salmon.
- **Nutrient Cycling** The migration of adult fish transfers ocean-derived nutrients upriver where they are ultimately deposited into river systems upon the death of post-spawned fish. Aquatic and riparian ecosystems benefit from this nutrient cycling, and this benefit would be increased for all species by the availability of more nutrients from more hatchery-origin salmon carcasses.
- **Harvest** Chinook salmon would be released from hatchery facilities and would return to the Snake and Clearwater Rivers where they may be intercepted by commercial, recreational, and tribal fisheries. Hatchery production and release numbers could increase harvest opportunities for fisheries in the ocean/west coast, Columbia River, and tribal treaty fisheries in the Snake and Clearwater River basins. There would also be increased "opportunity" for incidental harvest in other fisheries not targeting Chinook specifically (e.g. a steelhead fishing season).

Increasing numbers of released fish in the South Fork Clearwater

This action increases the number of juvenile fall Chinook released into the South Fork Clearwater River from 400,000 to 700,000 fish; an increase of 75%. This increase, however, would not likely create a significant increase in competitive pressure on native fish since the releases are volitional from acclimation facilities and migration through and out of the area is rapid[31].

[31] The median travel time to Lower Granite Dam for hatchery smolts released from traps in the Snake River over the last 10 years is 5.7 days for hatchery Chinook salmon, and 2.5 days for steelhead (Fish Passage Center 2017). Fish released in the Clearwater River are believed to be comparable in their downstream migration speed.

This increased mass of migrating fish may have beneficial effects on fish such as bull trout, which feed on fish like this as they pass through.

Decreased numbers of released fish into the mainstem Clearwater River

With the increased releases into the South Fork, there is a corresponding decrease of juvenile fall Chinook released into the mainstem Clearwater River from the North Lapwai Valley release site. Release numbers there decrease from 500,000 to 200,000. The effects here would be a decreased potential for competitive pressure on local fish given the reduced number of hatchery fish released. Like those in the South Fork, however, they are released at a time when they are ready to migrate and their presence in the system at any one point is limited; thus, the benefit of reduced competition is minimal. There would be no corresponding decrease in prey abundance for bull trout in the mainstem Clearwater River (as there would be a corresponding increase in the South Fork) because bull trout are not present in this area at the time when these fall Chinook juveniles are released.

Temporary Weir Operation

Under the Proposed Action, a temporary picket weir would be installed annually on the South Fork Clearwater River to monitor fall Chinook returns and collect broodstock. Weir installation could cause some minor disturbance to habitat availability as people enter the river to place weir panels. Substrate disturbance and sedimentation would be limited to the small amount disturbed by human feet during wading. The weir would be installed annually around October 1 and disassembled around December 1. Free movement of fish would be obstructed while the weir is in place and their movements up or downstream to otherwise accessible habitat would be delayed. Non-target fish trapped during operations would be manually transported around the weir[32]. Daily monitoring of the weir and passage of all non-target fish would limit this migration delay to 24-hours or less. Additionally, the screening criteria for water withdrawal devices (NMFS 2011) set forth standards that minimize the risk of harming naturally-produced salmonids and other aquatic fauna. These criteria would be implemented under the Proposed Action. Because (1) there would be no permanent structures associated with the weir, (2) the weir would be monitored daily, (3) all non-target fish would be passed above the weir within 24 hours, and (4) screening criteria would be implemented, impacts on instream habitat from the weir would be low.

Restoration of anadromous fish populations

The above discussions focus on the adverse effects of hatchery operations on fish and fish habitat. The largest effect of hatchery operations on fish, however, relates to its fundamental purpose: to restore salmon populations in the Columbia River basin. As discussed in Section 3.5.1 above, salmon runs in the Clearwater River basin were extirpated after 1927, but recovery efforts have produced steadily increasing numbers of returning fall and spring/summer Chinook salmon to the Clearwater River, due largely to hatchery operations. Over the last two decades, the NPTH has contributed significantly to those efforts, creating an appreciable beneficial effect on anadromous fish populations.

Non-anadromous Fish

The discussion above focused on the effects of the action on anadromous salmonids. There are however, also effects on native, non-anadromous fishes. Some of these effects, such as competition for food and space, and disease transmission are the same as those described above. Some effects, however, may be unique to native species. Native species can be trapped inadvertently, then suffer

[32] Between 200 and 400 steelhead are expected to be trapped and released at the seasonal collection weir on the SF Clearwater River (NMFS 2012). Bull trout would also be trapped and released.

from the stress of being captured, handled, and released. The release of masses of juvenile fish may provide competition for food sources for some native fish species, but may also be that food source for others (e.g. bull trout). Such a mass of juvenile fish may also attract more fish predators which could increase risk to native fish; but, at the same time, that mass of hatchery fish may overwhelm the capabilities of a local predator population thereby providing protective cover to native species. Predation by hatchery fish released in large numbers could have an effect on smaller fish species' populations. However, juvenile yearling Chinook can prey on fishes smaller than themselves, but research reveals that most of their diet is insects and crustaceans with less than ten percent being embryonic fish (Randorf et. al. 1990, Muir and Coley 1996). Further, released hatchery fish usually migrate downstream within hours or days of release, so these effects would be temporary (unless you are that embryonic fish).

Monitoring and Evaluation

Effects of monitoring and evaluation are associated with the stress and risk of injury to individual fish during handling (for tagging, marking, and measuring purposes) and to the operation of weirs and traps and the incidental capture and handling of non-target fish during those operations. These effects are discussed in the NMFS EA by species (NMFS 2012 at pages 33 through 46).

3.5.2.2 Effects on Fish from implementing the Proposed Kelt Reconditioning Program

The effects of the kelt reconditioning program would come from the trapping of post-spawn steelhead kelts (removal of these fish from the environment); the effects on individual fish from the reconditioning and release process; the human activities associated with kelt-reconditioning hatchery operations; the additional water withdrawal needs; the incremental additions to effluent discharge; and the effects on fish and aquatic habitats from the release of reconditioned kelts.

Trapping of post-spawn steelhead kelts

Once spawning is complete, steelhead either die or return to the ocean where they would recover from the physiological drain of the spawning effort and prior migrations (up-river to spawn and then down-river to the ocean). These iteroparous fish would then return in one or two years to spawn again. They may complete this "repeat-spawning" cycle more than once. However, given that spawning in the Snake River basin requires a considerable journey for steelhead to take from the ocean, not much is known on the naturally-occurring percentage of repeat spawning rates or survival rates. Tagging data of down-river migrating steelhead kelts revealed that only 27% to 37%[33] of Snake River Basin kelts survive the journey to the Columbia River below Bonneville Dam (Colotelo et al 2013, Harnish et al 2015). There would be additional mortality to these fish during their time in the ocean and in their journey back up river, but those that successfully return to repeat spawn have been shown to be larger and more prolific than first-time spawning fish, and are believed to successfully influence the population's reproduction. Placing Snake River steelhead kelts on barges with juvenile salmonids to transport them downstream through the hydrosystem was also investigated as part of the 2008 BiOp RPA but was eventually de-prioritized due to low success rates relative to benefits obtained from in-river improvements and the reconditioning program.

[33] Differences in return rates between these years may have been due to water temperature differences those years and the stress that warm temperatures place on migrating fish. Kelt survival of dam passage was positively correlated with fish condition (Harnish 2015). Survival was higher in 2012 (the colder year) than 2013 (the warmer year) (Harnish 2015). High temperatures are known to stress fish, and more post-spawn kelts were likely in fair/poor condition beginning their downstream migration in 2013 than in 2012.

The post-spawning trapping of these fish provides them with an opportunity to receive treatments and high-protein feed. These spawned-out fish can often be in poor condition and many would not survive the outward migration without some intervention and treatments. This is one of the key purposes in implementing a hatchery reconditioning action. The stress and mortality of the migration journey is mitigated by the collection and reconditioning activities. However, there would still be stress and mortality risk associated with hatchery reconditioning. Trapping and handling of fish causes stress, and exposes fish to human error, accident, mechanical failure, etc. Though there is such risk to trapped kelts, survival rates are higher than could be expected otherwise. Survival rates, from collection to release, of hatchery-reconditioned fish trapped at Lower Granite Dam (where most NPTH kelts would be acquired) have been shown to be greater than 32% (Hatch et al. 2016).

Trapping these fish and keeping those that are the most likely to survive for reconditioning (about 700 fish) also removes their ecological influence in the river (downstream migration), the ocean, the estuary, and the river again in upstream migration. Their contribution to ecological conditions in these areas is poorly understood and expected to be *de minimus* given their small numbers, but would nonetheless be absent.

Reconditioning effects to individual fish

As mentioned above, trapping and handling of fish causes stress, and hatchery reconditioning exposes fish to routine handling and hatchery-related actions; these can include human error, accident, mechanical failure, etc. Reconditioning operations require that kelts be trapped, handled, transported, artificially fed, medicated, fin clipped, and injected with a pit-tag. Adult post-spawn steelhead would be kept in an artificial environment for 6 to 18 months (depending on their rate of sexual re-maturation). Though adhering to well-established fish-handling guidelines to minimize impact, this process can be stressful on the fish and would potentially lead to some mortality; others, however, would benefit, and survive to be released and spawn again. A beneficial effect is likely in the difference between the survival rate with hatchery reconditioning versus the survival rate to the ocean and back to the river to spawn once more.

Kelt reconditioning hatchery operations, water withdrawal, and effluent discharge

Hatchery facility operational activities at the kelt reconditioning facility would be essentially the same as those for the ongoing Chinook salmon production operations as discussed in Section 2.1.2, above; but these are new, additional facilities with new, additional operations that would thus create a small incremental increase in operational activities. The effects on fish from water withdrawal from, and effluent discharge to, the river would therefore also increase slightly over what was discussed above. The water use and discharge increases would result in a less than 0.5% difference in the withdrawal and discharge volumes and the effects on fish and fish habitat would still be low.

Release of reconditioned kelts

Reconditioned kelts would be released below Lower Granite Dam at a time when they can join the B-run steelhead migrating in from the ocean. Reconditioned steelhead would comprise only a portion of B-run steelhead in-migrating to breed, and these fish would be divided among the Salmon, Grande Ronde, and Imnaha River populations[34]. Though these numbers are low (180 reconditioned fish), these fish would comprise a large proportion of the second and third year

[34] The reconditioned kelts under the research program at NPTH have been determined by genetic assays to come from Salmon, Grande Ronde, and Imnaha River populations (Hatch et al. 2016).

spawners[35] and they are estimated to provide greater benefit (given their larger size and greater egg production) to the population in terms of fish on the spawning grounds than their potential contribution as natural repeat spawners (Lothrop 2016). Reconditioned kelts are more productive spawners than first-year spawners (Hatch et al 2016). They are generally larger fish that produce more and larger eggs that ultimately contribute more offspring to future generations. Larger eggs are also believed to provide a survival edge to the fry produced (Jenkins, 2016).

Overall, the reconditioning program would increase the number of larger, sexually mature female steelhead migrating upstream from Lower Granite Dam especially during years with low abundance of first-time spawning steelhead (e.g. 2017). There would be more spawners at the spawning grounds that would lay more and larger eggs with a higher likelihood of survival over the offspring of first-year spawners. This would increase the numbers of fish naturally produced from the Snake River Basin overall, and thus increase the numbers of fish ultimately returning to spawn.

There could be genetic effects on the steelhead population from reconditioning. While the effort would only collect wild fish that have already spawned (keeping genetic effects low), those fish that successfully survive the reconditioning process to spawn again are expected to contribute to the genetic pool disproportionately over others. This effect would likely magnify as time progresses and would likely be a beneficial effect because of the increased fitness of their offspring (from larger eggs) and the increased likelihood of maintaining the diversity of life history pathways (iteroparity, and consecutive/skip spawning) in steelhead.

Effects on Fish from Kelt Reconditioning Research, Monitoring, and Evaluation Activities

The actions associated with the research, monitoring, and evaluation of the proposed kelt reconditioning program consist of data collection (locations, fish numbers, dates, water temperatures, water quality parameters, PIT tag array information, etc.) and fish measurements (length, body condition, blood samples, tissue samples, etc.). These actions do not modify terrestrial, riparian, or aquatic habitats; nor do they impact fish beyond the individual kelts being measured and sampled during reconditioning. The direct fish handling and sampling techniques would likely be very stressful to the individual kelts affected, but these actions would have no effect on fish habitats or other fish.

3.5.2.3 Effects on Essential Fish Habitat

The effects of the actions proposed and evaluated in this EA are the same as those described in NMFS' 2012 Environmental Assessment (NMFS 2012) and incorporated by reference below:

> "*There will be no effect on ocean or coastal habitats from the Proposed Action because the action area is in the lower Snake River, a tributary to the Columbia River, hundreds of river miles from its confluence with the ocean."*
>
> *"There will be no effect on EFH for Chinook salmon because there will be limited or no impact on water quality or substrate necessary for Chinook salmon to carry out spawning, breeding, feeding, or growth to maturity and because activities associated with the proposed HGMPs, such as maintenance of intake structures, are unlikely to remove or destroy habitat elements. The return of hatchery-origin fall Chinook salmon in the proposed HGMPs is likely to have a positive effect on*

[35] Numbers of B-run steelhead passing Lower Granite Dam is generally low: from about 3,000 in 2007 (Bellerud 2007) to fewer than 1,000 in recent years (FPC 2016).

water quality related to marine-derived nutrients because the additional returns from hatchery production will result in a net increase of marine-derived nutrients in the action area."

3.5.2.4 Summary of Effects of the Proposed Action on Fish

The effects on fish from the Proposed Action include a combination of moderately to highly beneficial effects in the form of contributing to increases in Chinook and steelhead returns, providing a short-term juvenile salmon food source for native fish, and contributing to the cycling of marine nutrients in the basin; along with minimally adverse effects from hatchery operations. Overall, the effects on fish and fish habitats from hatchery operations would be moderately beneficial, weighted largely by the restored runs of Chinook salmon to the Clearwater River basin. The adverse effect of hatchery fish release on the genetics of the naturally-produced Chinook population is also considered to be moderate.

The overall effect of the proposed kelt reconditioning program would be moderately beneficial. In this program there are no effects to fish habitat or fish beyond those to the kelts directly handled. And for those fish, though the handling is stressful, the overall effect is beneficial in that they are spared the stress of a journey to the ocean and back; and they receive food, medication, and protection until they are released to spawn again. The large beneficial effects of protecting this unique steelhead life history and of improving reproduction on the spawning grounds outweigh the minimal adverse effect of minor increases in water withdrawal from, and effluent discharge to, the river.

3.5.3 Effects of the No Action Alternative on Fish

Under the No Action alternative, all NPTH hatchery programs at all its facilities would cease. Current hatchery and acclimation site operations would cease, as would their water withdrawals and their effluent discharges. Though current water uses and discharges are only a minor adverse and localized effect, the cessation of water quantity and quality impacts under the No Action alternative would be a positive effect.

Under the No Action alternative, BPA funding of ongoing NPTH production of fall and spring/summer Chinook for release in the Clearwater basin, however, would cease. Numbers of these fish would likely decline in the Clearwater basin as current population levels and habitat conditions may not be self-sustaining. As a result, less salmon would be available for fisheries in the Columbia, Snake, and Clearwater Rivers. This may require an increase in production at other hatcheries in the Snake River Basin. The No Action alternative may also hinder BPA's ability to meet commitments under the Northwest Power and Conservation Council's Fish and Wildlife Program.

The No Action alternative would also not fund steelhead kelt reconditioning at a production level. Without such a steelhead reconditioning program, there could be a slight decline or loss of diversity in Snake River steelhead life history pathways (iteroparity, and consecutive/skip spawning) over time. The adverse effects of not funding a kelt reconditioning program would be moderately adverse. Mortality of non-reconditioned steelhead kelts would remain high. Additional steelhead spawning productivity from reconditioned kelts would not be realized.

The largest effect of the No Action alternative would be a reduction in the numbers of fish produced to maintain and increase runs of Snake River fall and spring/summer Chinook. Though Chinook

salmon production in the Clearwater River basin would likely continue at other facilities, populations of these fish may be reduced. The adverse effect of this No Action alternative on Chinook salmon runs would be moderate to high.

3.6 Wildlife

3.6.1 Affected Environment

The 1997 EIS provided a thorough description of the wildlife in the Clearwater River basin where this Proposed Action would occur (BPA 1997, pages 3-43 through 3-47). Similarly, the National Marine Fisheries Service's 2012 Final Environmental Assessment on permit issuance for fall Chinook production at NPTH (NMFS 2012, pages 47-48) includes an effective discussion of ESA-listed species in the area and their likely degree of interaction with hatchery activities, or with fish produced and released from there. The discussions from these documents are incorporated by reference and summarized below.

The NPTH EIS and NMFS EA cited above describe wildlife occurrence near the NPTH and its satellite facilities that is consistent with the types of habitats available there. Descriptions of waterfowl, raptor, big game, and aquatic furbearer uses of riparian corridors (where facilities are located) are typical of such wildlife associations across the Columbia River Basin. Wildlife commonly associated with forested habitats are described for satellite facilities higher the in Clearwater River basin. No unique or exceptionally high-value habitats are identified. No ESA-listed terrestrial wildlife or bird species are identified as frequenting any habitats near the facilities, but there was note that the higher-elevation facilities could possibly be within the home ranges of wide-ranging species with ESA status or consideration such as Canada lynx, grizzly bear, North American wolverine, or gray wolves. However, no denning or other high-use habitats for these species are identified near any of the facilities.

3.6.2 Effects of the Proposed Action on Wildlife

The effects of the Proposed Action would occur from construction and operational activities at the hatchery, and as a result of the release of juvenile Chinook salmon and reconditioned steelhead kelts. The increases in anadromous fish runs in the Clearwater River basin from the Proposed Action could potentially beneficially affect wildlife populations.

The construction and operational actions at the NPTH are expected to affect few wildlife species since these actions would occur only at the existing hatchery site, which provides little habitat. The habitat affected would be a regularly-mowed field that is far from cover and water, and is surrounded by hatchery and agricultural uses. Few species regularly use habitat like this, though birds such as western meadowlarks, bobolink, grasshopper sparrow, and savannah sparrow; and small mammals such as field mice, voles, and shrews may occupy such sites. Facility construction would eliminate habitat for these species at the construction site. There would be no impacts to critical habitat for listed species or identified priority habitats for any wildlife.

The effects of ongoing activities at satellite facilities (generally within riparian habitats) are discussed in BPA's 1997 NPTH EIS (BPA 1997 at pages 4-49 through 4-54) and incorporated by reference here. The EIS describes effects to wildlife generally from two sources: disturbance of wildlife by human activity during operations, and from the attraction that young fish in ponds would have for piscivorous birds and animals that would lead to conflict between operators and wildlife. Neither of these disturbance sources was considered to be enough to displace wildlife use or occupancy of nearby habitats.

No physical facility changes are proposed for the satellite facilities, thus there would be no effects to wildlife habitat beyond those already evaluated in the 1997 EIS. There would, however, be an increase of 150,000 juvenile fish (a 75% increase) being acclimated and released at both Luke's Gulch and Cedar Flats, and a 300,000 reduction (a 60% decrease) in the number of juvenile fish acclimated and release at the North Lapwai facility. The effects would be the same as described above, since large numbers for juvenile fish would be present both before and after the action, with likely an imperceptible change in predator attraction and conflict between operators and wildlife.

Maintaining the increased anadromous fish runs, however, would continue to provide some level of increased contribution to the food web throughout the Clearwater Basin, as well as in the Columbia River Estuary and ocean environments where these fish might travel. This increased food base would benefit marine birds and mammals in the Pacific Ocean and the Columbia River Estuary as well as piscivorous birds and mammals in the upper reaches of the Clearwater River basin. These effects are discussed in more detail in the 1997 EIS (BPA 1997 as cited above) and NMFS' 2012 EA (NMFS 2012 as cited above).

The installation and operation of the temporary picket weir may increase impacts on wildlife through incidental trapping and drowning or by disrupting migration. It is also possible that carcasses would collect on the weir and may also attract large mammals. The weir would be checked daily, and fish would be passed upstream, and carcasses allowed to move downstream. Because of the daily human activity and limited delays in movement of fish and carcasses, the weir would be unlikely to cause a noticeable change in local wildlife behavior or affect local wildlife populations.

There would be no impacts to wildlife habitat from research, monitoring, or evaluation activities associated with either hatchery operations or the kelt reconditioning program. These activities would not modify wildlife habitats beyond what was described above nor do they require human occupancy of wildlife habitats for more than just transient periods. There may be a potential for short-term, small-scale disturbance of wildlife associated with people conducting habitat and spawning surveys; or by installing and operating screw traps, but those effects would be *de minimus*.

The overall effect of this Alternative's impacts on wildlife would be low.

3.6.3 Effects of the No Action Alternative on Wildlife

Under the No Action alternative, hatchery operations would cease and there would be no more releases of juvenile Chinook salmon or reconditioned steelhead kelts into the Clearwater and Snake Rivers. Returns of adult Chinook salmon to the Clearwater River Basin would likely decrease. Wildlife such as kingfishers, osprey, bald eagles, otter, mink, grizzly bear, and other piscivorous or omnivorous species would experience a decrease in fish food sources.

The No Action alternative would create no new direct impacts to wildlife habitats, and would cease wildlife-disturbing actions at existing facilities. The overall effect of this alternative's impacts on wildlife would be low.

3.7 Socioeconomics and Environmental Justice

The socioeconomic environment potentially affected by operations at the NPTH includes the regional economy along the Columbia, Snake, and Clearwater Rivers as it relates to sport, commercial, and subsistence fisheries; and the local community as it relates to employment income and personal expenditures. Hatchery facilities generate economic activity by providing employment opportunities and through local procurement of goods and services for hatchery

construction and operations. Further, hatchery operations may increase fish available for harvest from the Pacific Ocean, the lower and middle Columbia River, the Snake River, and up into the Clearwater River basin. Other socioeconomic factors include the local tax base, community services (e.g., fire, county sheriff, roads, and utilities), and local business support through construction/operation expenditures (e.g., stores, suppliers, hotels, and restaurants).

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Supporting environmental justice, Executive Order 12898 directs federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects on minority and low-income populations. Census data at the state, county, and census tract levels were used to determine the potential presence of minority or low income populations in the study area.

The study area includes Nez Perce, Lewis, Idaho, and Clearwater Counties for socioeconomic elements and the Clearwater River Basin for impacts related to fisheries.

3.7.1 Affected Environment for Socioeconomic Resources and Environmental Justice

3.7.1.1 Socioeconomic Condition of Surrounding Counties

The 1997 EIS (BPA 1997 at pages 3-61 to 3-66) and the 2012 fall Chinook EA (NMFS 2012 at pages 48-51) together provide an overview of the socioeconomic conditions of the four counties surrounding the action area, and the contribution of fall chinook, the largest contributor to the Columbia and Snake River fisheries, from this hatchery. The general information concerning socioeconomic conditions in this area from these sources is still relevant[36] and is incorporated by reference here. Those documents describe agriculture, including forestry and livestock grazing, as the financial mainstay of these four counties. They also describe the importance of the NPTH to the Nez Perce tribe for both direct employment opportunities (up to 15 jobs) and the indirect economic benefits of that employment to local businesses and communities through direct expenditures and taxes paid.

The larger influence of current ongoing operations, however, is in the contribution the NPTH makes to the returning fish runs in the Clearwater basin and the associated cultural and subsistence benefits from increased fish harvest. Rearing, harvesting, and eating salmon is an important cultural, social, and economic strength of the Nez Perce Tribe (Hillstrom and Hanes 2018).

The table below provides updated socioeconomic data (USCB Quick Facts 2016) to information from multiple tables found in the 1997 EIS.

[36] No major social or economic shift in this area has occurred since the 1997 or 2012 assessments. The growth in Nez Perce County reflects a 40-yr trend of movement into the county following growing employment opportunities in its manufacturing sector (Peterson 2016).

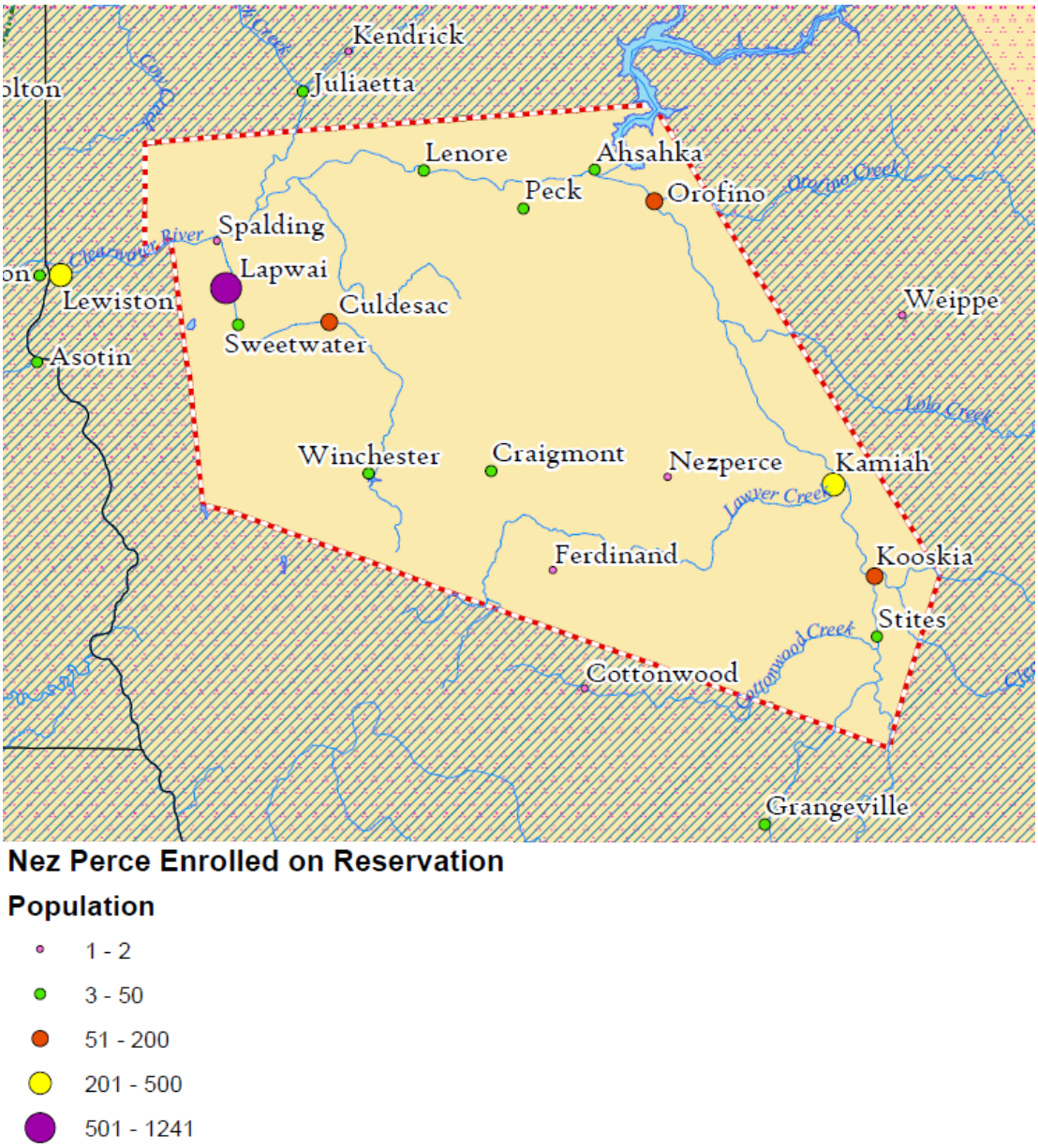
Table 12 Population, income, and employment data for counties near the NPTH

2015 Data on Counties surrounding the Area of the Proposed Action							
County	County size in sq. mi.	Population			Population per square mile	Per capita income	Employment % of population over age 16 employed
		Total	Total Change 2010 to 2016 (estimated)	Native American			
Nez Perce	848	40,369	+2.8%	5.9%	46.3	$25,177	69%
Lewis	478	3,853	+0.8%	6.5%	8.0	$21,152	38%
Idaho	8,477	16,156	-0.7%	2.9%	1.9	$19,611	41%
Clearwater	2,457	8,497	-3%	2.1%	3.6	$20,079	52%

3.7.1.2 Minority Populations

Minority populations comprise less than 5% of the populations in Nez Perce, Lewis, Idaho and Clearwater counties (Table 12). This population is primarily Nez Perce Tribal members, most of whom reside and work on the Nez Perce Reservation. The reservation's largest community is the city of Orofino (population about 3,100, with only 2.1% Native American). Lapwai (population about 1,150) is the seat of tribal government, and has the highest percentage of Nez Perce people as residents, at about 81.4 percent.

Figure 9 Distribution of tribal members within communities on the Nez Perce Reservation



3.7.1.3 The Nez Perce Reservation

The Nez Perce Indian Reservation covers approximately 750,000 acres (CRITFC 2018) in north central Idaho, primarily in the Camas Prairie region south of the Clearwater River, in parts of Nez Perce, Lewis, Idaho, and Clearwater counties. The reservation's population at the 2000 census was 17,959.

By area, the reservation is the largest in Idaho, but it is a fraction of its former size (Figure 10). It was created by an 1855 treaty between the Nimi'ipuu (now commonly called Nez Perce) and the United States government, which set 7.5 million acres of land in Idaho and Oregon aside for the tribe. Shortly after the treaty was signed, gold was discovered in Oregon, and a subsequent treaty in 1863 cut the reservation down to its current size (Figure 10). Figure 1 also displays the reservation boundaries. In 1887, the Dawes Act allowed homesteaders to claim land within the reservation.

Today, only about 13 percent of land within the reservation boundaries is owned by the tribe or by tribal members (CRITFC 2018). The remainder is owned by non-tribal settlers.

Figure 10 Nez Perce tribal lands: ancestral lands (brown), original reservation (light green), and current reservation (dark green)

3.7.1.4 Nez Perce Tribe economic factors

Historically, the loss of a viable land base greatly undermined both the traditional Nez Perce economy and their ability to significantly benefit from the market economy of the non-Indians (Hillstrom and Hanes 2018). The tribe won several Indian Claims Commission monetary awards in the latter half of the twentieth century in payment for lost lands (Hillstrom and Hanes 2018). They received $3.5 million for lands ceded in the 1855 treaty and more than $5 million for lands lost in the 1863 treaty and 1893 allotments (Hillstrom and Hanes 2018). Along with several other tribes, the Nez Perce also received compensation for the flooding of a key fishery location on the Columbia River in the 1950s by reservoir construction (Hillstrom and Hanes 2018).

The Nez Perce tribe has occasionally leased approximately 80 percent of its lands to non-Indians (Hillstrom and Hanes 2018). The majority of the reservation was in checker-board ownership by allotments, some of which were owned by individual Nez Perce tribal members and some by non-Indians (NPS 2000). The majority of the reservation acreage was leased to non-Indians for

agricultural purposes; the tribe held only a remnant of the reservation lands (NPS 2000). The tribal economy has been largely based on funding from these leases and a timber program (Hillstrom and Hanes 2018).

Since the tribe holds only a remnant of the reservation lands, reacquisition of tribal lands is a key goal of the tribe. The Nez Perce Tribe is seeking to bring reservation lands back into tribal ownership by an active land purchase program (NPS 2000).

Tourism and other enterprises have grown in their contribution to the Tribe's economic base in recent years. The Clearwater River Casino near Lewiston was constructed in the 1990's, and recently expanded to support over 600 gaming machines, a 50-unit hotel, and a 1,500-person event center. Another, smaller, casino along the South Fork Clearwater River at Kamiah, Idaho is also owned and managed by the tribe. These casinos provide employment opportunities and a source of funding for local educational programs and schools.

A business park of approximately 12,000 square feet is in the engineering phase and will be leased to businesses for industrial use and to support a diverse work force.

3.7.1.5 Nez Perce Tribe cultural, social, and subsistence considerations

As discussed in the socioeconomic section above, the contribution the NPTH makes to the returning fish runs and increased fish harvest in the Clearwater basin is significant to the NPT's cultural values and provides for the subsistence needs of many families Tribe (Hillstrom and Hanes 2018). Rearing, harvesting, and eating salmon is an important cultural, social, and economic strength of the Nez Perce Tribe (Hillstrom and Hanes 2018).

3.7.2 Effects of the Proposed Action on Socioeconomics and Environmental Justice

3.7.2.1 Effects to the surrounding four-county area

Economic effects of hatchery operations (with changes in juvenile fall Chinook release numbers); kelt reconditioning; and research, monitoring, and evaluation for both these programs come from the local employment opportunities and regular operation-related expenditures associated with operations of the NPTH and its satellite facilities. Social effects stem from the long-term economic and cultural benefits of increasing Chinook salmon and steelhead runs into the Clearwater River basin and to downstream communities along the Snake River, Columbia River, and coastal Oregon and Washington. There would also be short-term economic benefits (wages and construction-related local purchases) from the construction activity associated with constructing the steelhead kelt reconditioning facility at the NPTH.

The 1997 EIS (BPA 1997 at pages 4-65 to 4-68) analyzes the local economic benefits of employment and operational expenditures associated with ongoing hatchery operations, and the benefits associated with short-term hatchery construction activity. Construction activity for the currently proposed kelt reconditioning facility is likely a quarter or less of what was discussed in that EIS, but the economic factors and benefits are the same and the information displayed there is relevant to this EA and is thus incorporated here by reference.

The 2012 NMFS EA (NMFS 2012 at pages 90 through 93) provides an analysis of the social and economic effects of restored salmon and steelhead fisheries, and is incorporated here by reference. The EA presents the NPTH as "lightly" increasing the economic input locally from the effects of employing 15 employees, and discusses how an increase in the number of fish available for ocean, Columbia River, and tribal fisheries would provide for increased values of the fisheries for

commercial, recreational, and tribal fisheries; and increased demand for traditional fishing equipment created by local tribal craftsman.

The incremental addition of hatchery operations in support of steelhead kelt reconditioning may add one permanent employee and provide seasonal employment opportunities for one or two others. These effects would benefit specific individuals and families but likely have minimal increased benefit to the larger four-county area.

The overall socioeconomic effect of these actions' impacts would be low, but beneficial.

3.7.2.2 Effects Relevant to Environmental Justice

The Proposed Action retains employment opportunities for those employed by the NPTH (primarily tribal members) and would create one permanent position and a few seasonal positions with the operation of the reconditioning facility. The continued funding for Chinook production and the addition of the kelt reconditioning program would continue to contribute to the restoration of salmon runs to NPT lands providing support for their economy, traditions, and cultural practices. The environmental justice effects of the Proposed Action would be moderately beneficial.

3.7.3 Effects of the No Action Alternative on Socioeconomics and Environmental Justice

The No Action alternative would stop funding of hatchery operations at the NPTH, and all Chinook salmon production operations would cease. It would provide no socioeconomic benefits, but would remove the economic benefits the current programs are already providing. The current employment opportunities would be eliminated, and the annual operational expenditures providing local benefit would cease.

This alternative would eliminate existing employment for at least 15 people at the NPTH (primarily tribal members) and would not create additional employment opportunities associated with the proposed kelt reconditioning program. These losses would disproportionately impact Native American populations as they are on the ones primarily employed (full-time and seasonally) at the hatchery.

The No Action alternative would also reduce the potential for a more rapid return of anadromous fish runs to the Clearwater River basin. At present, the runs are augmented by hatchery production, and if discontinued, the populations restored to date may not persist into the future. Under the No Action alternative, the populations could stagnate or slowly decline. They could, however, also increase over time, but if they do so, it would be more slowly than if augmented.

If the Chinook runs decline there would be a small negative impact to the local economy, but a much larger impact to the NPT's social, cultural, and traditional practices, and adversely impact some families whose subsistence is tied to these runs. This would be moderate to high adverse environmental justice effect.

The overall socioeconomic effect of the No Action alternative would be moderate. It would likely be high in the immediate area, but its overall economic impact on the surrounding counties would be low.

3.8 Land Use and Recreation

3.8.1 Affected Environment of Land Uses and Recreation Resources

Land uses and recreation resources in the areas surrounding the NPTH and its satellite facilities are discussed in the 1997 EIS at pages 3-53 through 3-61, (BPA 1997)and in the June, 2000 Supplement Analysis, page 5 (BPA 2000). Those discussions still represent the land use and recreational resource conditions there as of this writing (2017). Those sections are incorporated by reference. They discuss the predominance of agriculture and grazing in the lower elevations and forestry and mining activities in the upper elevations. They discuss the diverse landownership patterns on the reservation described in Section 3.7.1.3, and the Land and Resource Management Plans (i.e. Forest Plans) of the Nez Perce and Clearwater National Forests that establish goals, objectives, and resource protections for the diverse land allocations on National Forest System Lands those plans created.

Tourism and recreation in the area are focused on outdoor activities such as camping, hiking, sightseeing, fishing, and hunting, with river-oriented recreation activities (swimming, rafting) enjoyed in the Lower Clearwater River near the NPTH. The hatchery program at NPTH has been contributing to fishing opportunities by increasing fishing opportunities by increasing fish runs locally, and contributing to sightseeing opportunities by providing tours of hatchery facilities.

The NPTH includes a description of recreation activities near each of the satellite facilities. These are primarily river-oriented activities such as swimming, fishing, and rafting. Camping, hiking, and big game hunting are also described as occurring near the satellite facilities.

Changes at facility locations to land and recreation uses as a result of the 1997-2000 construction of the NPTH and it satellite facilities have occurred, and operations of those facilities have been conducted in the manner anticipated in the 1997 EIS (BPA 1997 at pages 4-59 through 4-63) and the June 2000 Supplement Analysis (BPA 2000 at pages 5 through 6).

3.8.2 Effects of the Proposed Action on Land Use and Recreation

The Proposed Action makes no changes to land uses by the continued operations of the NPTH and its satellite facilities, from changes in juvenile fall Chinook release locations, or from kelt collection or release activities. The hatchery and associated facilities are in place with no proposal for alteration, and the research, monitoring, and evaluation activities for either the ongoing Chinook production or the proposed kelt reconditioning program require no changes to land use.

The only land alteration would be on the site of the new steelhead kelt reconditioning facility. This site is designated as prime farmland under the Farmland Protection Policy Act (7 U.S.C. 4201 et seq.) and had historically been farmed for hay production. Since its acquisition for construction of the adjacent NPTH, it is now no longer intensively farmed, though it retains that potential. It is now simply mowed for what hay it still produces. There would be a loss of approximately 0.25 acres of this prime farmland at the site of the proposed reconditioning facility.

There would be no effect on adjacent land uses from the use or construction of hatchery facilities; from conduct of hatchery or kelt reconditioning programs; or their associated research, monitoring, and evaluation activities. Hatchery operational activities are not disruptive or inconsistent with local farming and ranching operations.

The steelhead kelt reconditioning program however, could have a low to moderate beneficial effect on local recreation. A more robust steelhead run could provide more opportunity for recreational anglers in the Snake River basin. Kelts are anticipated to be reconditioned from multiple Snake River tributaries, so the benefit would likely extend far beyond the hatchery facility locations in the

Clearwater River Basin. As stated in the fish resource section at 3.5.1 above, reconditioned kelts are larger fish and more productive than first year spawners, and they could potentially have an impact on steelhead runs in the Snake River system.

Similarly, increasing releases of fall Chinook higher in the Clearwater River watershed would provide additional recreational fishing opportunities along the Clearwater River up to those release sites. This would of particular value to the Nez Perce Tribe.

The overall effect of these actions on recreation would be low to moderate beneficial impacts.

3.8.3 Effects of the No Action Alternative on Land Use and Recreation

As with the Proposed Action, the No Action alternative would make no changes to land uses.

The reduced production of spring/summer and fall Chinook, however, would likely reduce the numbers of fish returning up the Columbia, Snake and Clearwater rivers and the recreational opportunities based on fishing would be reduced.

The overall effect of the No Action alternative on land use and recreation would be low.

3.9 Visual Resources

3.9.1 Affected Environment

Visual resources in the areas surrounding the NPTH and its satellite facilities are discussed in the 1997 EIS at pages 3-66 through 3-70, (BPA 1997). Those discussions are incorporated by reference here as they still represent the current scenic conditions today. Those pages include discussions of the scenic character of each facility as experienced from travelers on nearby roads. The scenery for the NPTH, the Lapwai facility, and other lower river facilities is dominated by river, bluff and hillside views typical of the canyons along the Columbia River and its tributaries with middle ground and background views dominating. The NPTH is situated in a 1,200-acre valley bottom along the Clearwater River dominated by agricultural land conditions and activities, with a low density of residences (about 20 within one mile radius of the NPTH). The scenic character at the higher elevation facilities are typical of forested streamside views with foreground perspectives dominating.

Changes at facility locations to visual resources as a result of the 1997-2000 construction of the NPTH and it satellite facilities have occurred, and operations of those facilities have been conducted in the manner anticipated in the 1997 EIS (BPA 1997 at pages 4-68 through 4-72) and with the changes discussed in the June 2000 Supplement Analysis at pages 3 and 4: most of the facilities are fully or partially screened from visibility from major roads, and none are described as conflicting scenically with adjacent views of lands, rivers or forests.

3.9.2 Effects of the Proposed Action on Visual Resources

The Proposed Action makes only a modest change to the visual resource at the NPTH by adding one building to the existing facility. It would replace an open field with a 2,750 square foot pole building. This building would be a bit less than one-fifth the size of the existing hatchery building and would be sited well within the 25-acre facility (not standing out in isolation). Its appearance would be consistent with the other hatchery facilities and would not draw attention to itself as inconsistent or unsightly. It would not change the character of the landscape or the scenic view from local roads or the river.

There would be no change to the satellite facilities or their use patterns. The scenic values there would be unchanged. The research, monitoring, and evaluation activities would not change the scenic landscape and would thus have no effect on visual resources.

The overall effect of these actions' impacts on the visual resource would be low.

3.9.3 Effects of the No Action Alternative on Visual Resources

The No Action alternative would cease operations at the existing facility, but likely not remove the facility from the site. There would be no change to the visual resource.

There would be no effect on visual resources from the No Action alternative.

3.10 Air Quality, Noise, and Public Safety

3.10.1 Existing Condition of Air, Noise, and Public Safety

The NPTH hatchery and its satellite facilities are located in no- or low-density human occupation areas and currently have clean air, quiet surroundings, and are generally safe from human-created hazards. As for the existing air quality throughout the Clearwater River subbasin, all hatchery facility locations have air quality that falls within National Ambient Air Quality Standards. Similarly, there is no problematic 'noise' or 'public safety' condition to which the NPTH facilities are contributing. The hatchery facilities have no machinery or operations that produce routine and excessive loud noise or emissions. The safety concerns at these facilities are operational for employees (who are trained), but create no hazard for the general public or surrounding residents.

The NPTH and its satellite facilities are located in areas without fire protection services other than a rural fire protective service or state and federal resource management agencies. Medical and hazardous material response is available from the city of Lewiston (over 20 miles away) for the NPTH. Emergency medical response is available from the nearby town of Waha for the Sweetwater Springs facility. Lewiston and Orofino have hospitals. Most towns throughout the area have quick response emergency care available. Helicopter transport out of Spokane, Washington is available to serve St. Joseph's Regional Medical Center in Lewiston and Clearwater Valley Hospital in Orofino. State police, County Sheriffs, and tribal and federal agents patrol their respective jurisdictions and cooperatively respond to emergency needs.

3.10.2 Effects of the Proposed Action on Air, Noise, and Public Safety

The emissions, noise, and public safety effects from current levels of operational activity at the NPTH are consistent with those on adjacent and nearby rural agricultural sites along the Clearwater River which can be described as generally quiet as compared to urban or suburban settings. The addition of the kelt reconditioning facility might elevate the amount of these effects slightly, but there would likely be no noticeable increase beyond the increase in fish truck traffic during the narrowly seasonal transport of kelts.

The primary effect would be the short-term impacts of the activities necessary for construction of the steelhead kelt reconditioning facility. Site clearing and excavation would create construction-related noises and raise particulates (dust) for a short time at the construction site. Major earth moving and heavy construction activity may continue for about one month, though noise and dust impacts would decrease as the construction activity shifts to the interior infrastructure.

Construction activities also bring the risk of drips or spills of petroleum-based fluids. Drips of hydraulic oil, transmission oil, brake fluids, motor oil, crankcase oil, gear box oil, and synthetic oil

are possible, though expected to be minor and highly localized. These products, however, can be acutely lethal to fish and can kill them quickly at a 0.4% concentration in water (Prasad et al. 1987). If not managed, some spills may be large enough to travel into the water table bringing with it such toxins as benzene which could infiltrate both soil and drinking water; and runoff from storms can carry spilled or dripped petroleum products into rivers. Equipment operations, however, would adhere to the relevant mitigation measures in Section 2.4, minimizing the potential for spills and the impacts associated with spills as discussed above. There may be a potential for minor drips that would contaminate soil on this site, but the impact is anticipated to be low.

Vehicles used for construction would increase traffic on local roads during construction and emit pollutants which contain carbon monoxide, volatile organic compounds, nitrogen oxides, sulfur oxides, and particulates. The levels produced would be low and are expected to have a low impact on air quality and would not contribute to an exceedance of any air quality standards. The increased traffic from construction activities is expected to be slightly higher than usually encountered on local roads, but not anticipated to be of an amount or duration to create a safety concern or raise complaint among local residents.

The overall effect of the Proposed Action on air quality, noise, and public safety would be low, and would be mitigated by the application of the measures in Section 2.4.

3.10.3 Effects of the No Action Alternative on Air, Noise, and Public Safety

The No Action alternative would cease operations at the existing facility, eliminating all current sources of impact to air quality and noise. There would be no change to public safety since current facilities and operations make no contribution (positively or negatively) to the public safety environment or services.

The overall effect of the No Action alternative on air, noise, and public safety would be low.

3.11 Cultural Resources

The term “cultural resources” refers to a broad range of resources that represent or convey a place’s heritage or help tell the story of a region’s past. Cultural resources are evidence of human occupation or activity in any district, site, building, structure, artifact, ruin, object, work of art, architecture, or natural feature important in human history at the national, state, or local level. Cultural resources are important for their potential to provide an understanding of long-term human adaptation as well as information regarding patterns of history and culture. Cultural resources are recorded as historic properties, which include any prehistoric or historic resources included, or eligible, for inclusion in the National Register of Historic Places (NRHP). Eligible properties include both properties formally determined as such by the Secretary of the Interior and other properties that meet NRHP listing criteria. The National Historic Preservation Act of 1966, as amended (NHPA), requires that these resources be inventoried and evaluated for eligibility for listing on the NRHP and agencies to evaluate and consider effects of their actions on these resources. Cultural resources are evaluated for eligibility in the NRHP using four criteria commonly known as Criterion A, B, C, or D, as identified in 36 CFR Part 60.4(a–d). These criteria include an examination of the cultural resource’s age, integrity, and significance in American culture, among other things. A cultural resource must meet at least one criterion to be eligible for listing in the NRHP.

3.11.1 Affected Environment of Cultural Resources

3.11.1.1 Prehistoric and historical uses and sites

Prior to contact with European settlers, native peoples harvested fish from the Snake and Columbia Rivers and hunted elk, deer, bear, and waterfowl. Salmon are culturally, economically, and symbolically important to the Pacific Northwest. Historically, natural resources have been the mainstay of the economies of the Native Americans in the Columbia basin. Salmon were an important aspect of the cultural life and subsistence of the Indian tribes that occupied the Columbia basin. Hunting, fishing, and gathering have been important to tribes for thousands of years. These activities continue to be important today for commercial, subsistence and ceremonial purposes (NMFS 2012).

When the first traders and settlers entered the basin they harvested salmon for their own use and for trading, but as their populations increased they began harvesting larger numbers of fish. The Hudson Bay Company established the first successful trade in Columbia basin salmon, establishing markets in London, Honolulu, and Valparaiso, Chile in the 1830s and 40s. By the late 1840s, salted Columbia River salmon became known in many parts of the world, and commercial fishing developed into an industry over the next two decades. A canning industry was established in the late 1860s. With establishment of the transcontinental railroad in 1883, frozen salmon (packed in crushed ice) began being shipped eastward (Craig and Hacker 1940).

Increases in capture efficiency using traps and nets, and an increase in fishing intensity provided for a growing industry that ultimately peaked in the 1880s. The catch slowly declined up to the 1930's as a result of intensive fishing and the degradation of migration and spawning habitat from agriculture, mining and logging. Dam, dike, and drainage structure construction for flood control, navigation, irrigation and power production began in the 1930s (Craig and Hacker 1940).

The 1997 EIS (BPA 1997 at pages 3-6 and 3-7) describes the prehistory and history of the project area and includes a description of results of cultural resource surveys conducted prior to construction of the NPTH and its satellite facilities. It describes the NPT as occupying the NPTH area and the Clearwater River basin for at least the past 3,000 years; the passage of Lewis and Clark through the area, development of fur trapping and a mission by the late 1830s, treaty signing in 1855, and ultimately the discovery of gold, trespass by, and conflict, with Euro-Americans, leading to another treaty and the smaller reservation that exist today. That information is incorporated here by reference.

The 1997 EIS reports cultural resource survey findings at the main NPTH site and at the Sweetwater Springs, North Lapwai Valley, Cedar Flats, and Luke's Gulch satellite facility sites. Five pre-historic sites were identified that were eligible for the National Register of Historic places. One archaeological site, 10NP135 a village site, was identified encompassing the NPTH project area. Two historic sites – the Lewis and Clark National Historic Trail runs along the north shore of the Clearwater River immediately south of the project area, and the Northeast Myrtle Bridge which spans Pine Creek, east of the project area. Following the issuance of the 1997 EIS, the NPT conducted two additional archaeological field investigations to further test for the subsurface presence of cultural materials at the NPTH project area prior to construction of the main facilities (Cannell 1999; Lyons 2011). The results of the investigations determined that there were minimal archaeological remains in the area.

3.11.2 Effects of the Proposed Action on Cultural Resources

The only ground-disturbing action in the Proposed Action would be associated with construction activities for the steelhead kelt reconditioning facility. The location identified for this facility,

however, is located on lands that have been previously plowed for agricultural crops, impacted by the construction of hatchery facilities, and are within the larger hatchery 'footprint' that has been surveyed in the past.

No physical facility changes are proposed for the satellite facilities, thus there would be no effects to cultural resources from those types of activities there.

Mitigation measures include having NPT cultural monitors on site during kelt-reconditioning facility construction. Pre-activity surveys were judged to be of little to no value based on the results of previous archaeological inventory efforts. On-site monitors could determine the significance of findings that might result from grading or excavation actions. The overall effect of this Proposed Action on cultural resources would be low.

3.11.3 Effects of the No Action Alternative on Cultural Resources

Under the No Action alternative, where activities ceased but facilities remained, there would be no potential for cultural resources to be disturbed since no construction would occur.

There would be no effect from the No Action alternative on Cultural Resources.

3.12 Climate Change

3.12.1 Affected Environment

The EPA (2014b) defines climate change as any substantial change in measures of climate (such as temperature or precipitation) lasting for an extended period of time (decades or longer). Because climate change is a global concern, the affected environment for climate change is considered at a larger scale, specifically at the state and national scale.

Climate change may result from natural factors and processes or from human activities (EPA 2016c). Greenhouse gas (GHG) emissions caused by human activities represent the most significant driver of climate change since the mid-20th century (EPA 2014a, IPCC 2014). GHGs are chemical compounds found in the earth's atmosphere that absorb and trap infrared radiation or heat in the lower part of the atmosphere. The principle GHGs emitted into the atmosphere through human activities are carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and fluorinated gases (EPA 2014a). Of these four gases, CO2 is the major GHG emitted (EPA 2016b).

Activities in Idaho accounted for approximately 37 million metric tons carbon dioxide equivalent (CO2e) emissions in 2005, an amount equal to about 0.5% of total US gross GHG emissions (based on 2004 US data2), with the principle sources of GHG emissions being transportation and agriculture. Idaho's gross per capita GHG emissions rose faster than those of the nation, having increased 31% from 1990 to 2005, while national emissions rose by only 16% from 1990 to 2004. This increase was driven primarily by emissions growth in the agricultural sector as Idaho's agricultural industry emissions (per capita) are much higher than the national average. (Straight et al 2008).

In recent decades, climate change has had widespread impacts on human and natural systems, including rising sea levels, an increased frequency of extreme weather events (e.g., floods, drought, wildlife, and heat waves), acidification of the ocean, shrinking glaciers and sea-ice retreat, reduced crop yields, and shifting geographic ranges or migration patterns for wildlife species (IPCC 2014).

According to the U.S. Global Change Research Program, U.S. average temperature has increased by 1.3° to 1.9°F since recordkeeping began in 1895; most of this increase has occurred since 1970 and the most recent decade was the nation's warmest on record (Walsh, et al. 2014). The resulting

impacts of rising temperatures in the U.S. include an increased length of the growing (frost-free) season, increased average precipitation (with localized examples of increases and decreases), and an increase in the frequency and intensity of extreme weather events (e.g., heavy downpours, heat waves, hurricanes, droughts). In the interior Pacific Northwest, the most notable impacts of climate change have been changes in the timing of spring snowmelt and streamflow, widespread forest mortality due to increased wildfire, insect outbreaks and tree diseases, and an increasing vulnerability of the agricultural industry as a result of reduced water supply (Mote et al. 2014).

As average temperatures in the U.S. are expected to continue to rise, the resulting impacts are also expected to continue into the future. Although there is uncertainty about the specific magnitude and timing of future changes, regional climate models for the Pacific Northwest generally predict continued increases in air temperature, stream temperature, and likelihood of wildfire, reductions in spring snowmelt and the supply of freshwater, and a shift in the timing of seasonal streamflow. In the Pacific Northwest, the primary climate-related concerns are an increased likelihood for wildfires and mountain pine beetle outbreaks, reduced availability of habitat for salmon and steelhead due to warming stream temperatures and altered flow regimes, and the long-term impact of reduced water supply on the agricultural industry (Lawler and Mathias 2007, Littell et al. 2009, EPA 2016c).

3.12.2 Effect of the Proposed Action on Climate Change

The Proposed Action's contribution to climate change would be from the release of exhaust gases from construction vehicles and from vehicles necessary for ongoing operations. There would be no increase from the ongoing operations of the hatchery for Chinook salmon production. Operations of the kelt reconditioning program would increase truck use to transport kelts to and from the NPTH reconditioning facility. This would increase greenhouse gas emissions from the few trucks operating at those times. Impacts from construction activities would be short-term (less than six months) and come from only a few construction and worker transport vehicles.

The contribution of greenhouse gas emissions to climate change effects from vehicles associated with these actions would be very low and the overall effect of these actions' impacts on climate change would be low.

3.12.3 Effects of the No Action Alternative on Climate Change

The No Action alternative would make no new greenhouse gas contribution to the atmosphere since there would be no operation of construction equipment for the kelt reconditioning facility. There would also be no increased equipment operations in support of the steelhead kelt reconditioning program, and no additional greenhouses gases produced. The existing greenhouse gas contributions from facility and equipment activity that supports current operations would also cease.

The overall effect of the No Action alternative on Climate Change would be low.

Chapter 4. Cumulative Effects

Cumulative effects are effects on the environment which result from the incremental effects of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Current actions are those projects, developments, and other actions that are underway because they are either under construction or occurring on an ongoing basis. Reasonably foreseeable future actions generally include those actions formally proposed or in the planning stages. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

For the purposes of this cumulative effects assessment, two actions will be assessed: funding the ongoing Chinook production, with changes to release locations in the South Fork Clearwater River; and funding the kelt reconditioning program (including the facility construction). Both of these programs are intended to increase the number of anadromous fish returning to the Snake and Clearwater River basins. The cumulative effects associated with these actions that will be addressed here are 1) the increase in anadromous fish runs in the Snake River and Clearwater River basins; and 2) the socioeconomic and cultural effects of those fish runs.

4.1 Scope, Time Frame, Actions, and Baseline

The geographic scope for these actions will be the Clearwater River basin for both the ongoing Chinook production action and the steelhead kelt reconditioning program. The Clearwater River basin was selected because the effects of the incremental addition of juvenile releases and returning adults from NPTH hatchery production and the kelt reconditioning program would impact these waters most. Its recognized that steelhead kelts, collected at Lower Granite Dam and reconditioned at the NPTH could have come from, and would likely return to, spawning areas in the Clearwater, Salmon, Grande Ronde, or Imnaha River basins, but the numbers are expected to be small and unlikely to be meaningfully assessed at the larger scale of the Snake River basin. It is also recognized that though both the Chinook salmon and steelhead actions taken here would have some effect on Columbia River and ocean fisheries and environments, their impacts there are difficult to quantify and qualify. The cumulative effects are most meaningfully analyzed and discussed in the more localized Clearwater River subbasin.

The past, present, and reasonably foreseeable future actions considered in this assessment include:

- The operation of the dams and associated reservoirs and other infrastructure of the Federal Columbia River Power System.
- The installation and operation of irrigation diversions and smaller dams that have altered natural flow patterns and blocked some fish from their historical spawning grounds.
- Human activities, including land management and transportation development (railroads and highways) that have reduced the connection between river and riparian habitats, increased sedimentation in streams, and altered floodplain function. Land development has resulted in the straightening of rivers and creeks, armoring or other modification of river banks, and dewatering with irrigation diversions. This has caused some waterbodies to become straighter, wider, and shallower with elevated temperatures.
- The multiple anadromous fish hatchery programs in the Snake and Columbia River basins with their cumulative effects to date being increasing runs of ESA-listed salmon and steelhead and other anadromous fish in the Columbia River Basin. As described in the NMFS 2012 EA for fall Chinook production (NMFS 2012, pages 99 and 100) these programs are operated with an adaptive management approach where adjustments are made to

address the cumulative effects of hatchery programs, fisheries, pinniped predation on salmonids, ocean conditions, and other conservation efforts on the attainment of recovery goals.

- The multiple steelhead kelt reconditioning programs operating in the Columbia Basin. Reconditioning programs are in place in the Snake River Basin (research scale activity at Dvorshak National Fish Hatchery and the NPTH); the Okanogan Subbasin (at Cassimer Bar Hatchery); the Mid-Columbia River basins of the Methow, Entiat, and Wenatchee Rivers (at Wells Fish Hatchery); the Yakama River (at Prosser Fish Hatchery); the Deschutes River (at the Warm Springs National Fish Hatchery); and the Hood River (at the Parkdale Fish Facility).
- Recreational, commercial, and tribal fish harvest, as well as incidental catches of ESA-listed fish in the Snake River Basin.
- Ongoing public and private initiatives and actions for the recovery or increase of fish populations throughout the Columbia Basin.

4.2 Actions Considered

The primary action considered in this discussion, is the continued BPA funding of the ongoing hatchery production and release of fall and spring/summer Chinook salmon (including the proposed increase in numbers of juvenile fall Chinook released at Luke's Gulch and Cedar Flats and the corresponding decrease at North Lapwai). From a cumulative effects consideration, this is not introducing a new variable into the environment, but rather, maintaining the current environmental condition for the most part. The Proposed Action does not change the numbers of juvenile fish released into the Clearwater River Basin. For the purposes of this discussion, however, this analysis will consider maintaining this ongoing production and release in light of what the effects might be if it were a new action. This is consistent with how effects are described in the above sections.

The primary hatchery action with cumulative effects implications is the continued release of thousands of hatchery-reared fish into the Clearwater River basin (with no increase or decrease in numbers). In-hatchery operational impacts are *de minimus* when considering all the past, present, and likely future agricultural, industrial, forestry, and mining activities ongoing in the Clearwater River basin. The release of thousands of juvenile fish with the intent of building even larger populations over time can have a cumulative effect on natural resources and the ecosystem as well as on human communities as discussed below.

The Proposed Action also includes the kelt reconditioning program (including facility construction). The goal of these actions is likewise intended to increase numbers of juvenile and adult fish in the Snake River and Clearwater River basins, albeit through improved reproductive fitness and specific steelhead life-history preservation rather than releasing juvenile fish in large numbers.

For this cumulative effects assessment, the focus will therefore be on the effects of continued releases of hatchery-reared juvenile fish and the resulting increase in adult fish returns to the Snake and Clearwater River basins.

4.2.1 Cumulative Effects on Resources and Ecosystems:

A number of hatchery programs are operating in the Clearwater River basin producing and releasing thousands of spring/summer and fall Chinook salmon. Table 13 displays the number of programs here and their relative contribution to these releases.

Table 13 Hatchery programs and releases in the Clearwater River basin

Clearwater River Basin hatcheries (operators and funding entities)	Juvenile releases (goals)			
	fall Chinook	*% of fall Chinook releases*	*spring/ summer Chinook*	*% of spring/summer releases*
Lyons Ferry (operated by WDFW; Funded by USFWS)	*3,050,000*[2]	*54%*	*0*	*0%*
Irrigon Hatchery - Idaho Power Co. (IPC operator and funder)	*1,200,000*[2]	*21%*	*0*	*0%*
Nez Perce Tribal Hatchery (operated by NPT; funded by BPA)	*1,400,000*[2]	*25%*	*825,000*[1]	*12%*
Clearwater Hatchery (operated by IDFG; funded by USFWS)	*0*	*0%*	*3,750,000*[1]	*52%*
Dworshak Hatchery National Fish Hatchery (funded and operated by USFWS)	*0*	*0%*	*1,950,000*[1]	*27%*
Kooskia National Fish Hatchery (operated by NPT; funded by USFWS)	*0*	*0%*	*650,000*[1]	*9%*
totals	*5,650,000*	*100%*	*7,175,000*	*100%*

Sources:

1 – 2017 NMFS Biological Opinion "Five Clearwater River Basin Spring/Summer Chinook Salmon and Coho Salmon Hatchery Programs", NMFS Consult Number: WCR-2017-7303

2 – 2018 NMFS "DRAFT Proposed Action for Five Hatchery Programs in the Clearwater"

4.2.1.1 Restoring Anadromous Fish Runs

BPA funds the NPTH to produce and release 25% of the 5.65 million juvenile fall Chinook every year, and 12% of the 7.175 million spring/summer Chinook throughout the Clearwater River basin (Table 13). Those are appreciable proportions, especially for fall Chinook. Without this cumulative addition, it is likely that growth and recovery of these populations would require a longer time-frame than otherwise, if they remain stable at all. With continued rearing and release, this cumulative addition to other programs' fish provides greater potential for restoration of these populations than without. The role of hatchery production was determined to be an important element in the recovery of Snake River Chinook salmon (both fall and spring/summer runs) and Snake River Basin steelhead (NMFS 2017).

Conversely, hatchery fish have the potential for negative effects on wild populations (e.g. genetic transfer of domestic traits, resource competition, increased predator attraction, and pathogen transfer) and this cumulative addition to other fish releases increases the likelihood these effects would manifest with a moderate adverse effect.

4.2.1.2 Density Dependence Issues

There are also cumulative effects on growth and survival rates of both hatchery and wild fish that come into play with increasing numbers of fish. Habitats for spawning, rearing, and overwintering have been degraded or lost overtime such that current conditions may not be suitable to support increased numbers of fish (either juveniles or returning adults) (NMFS 2017). Density-dependent[37] factors concerning habitat availability now seem to be limiting fish numbers (Walters et al 2013). As more fish are added to the river system, the more likely these effects are to be triggered.

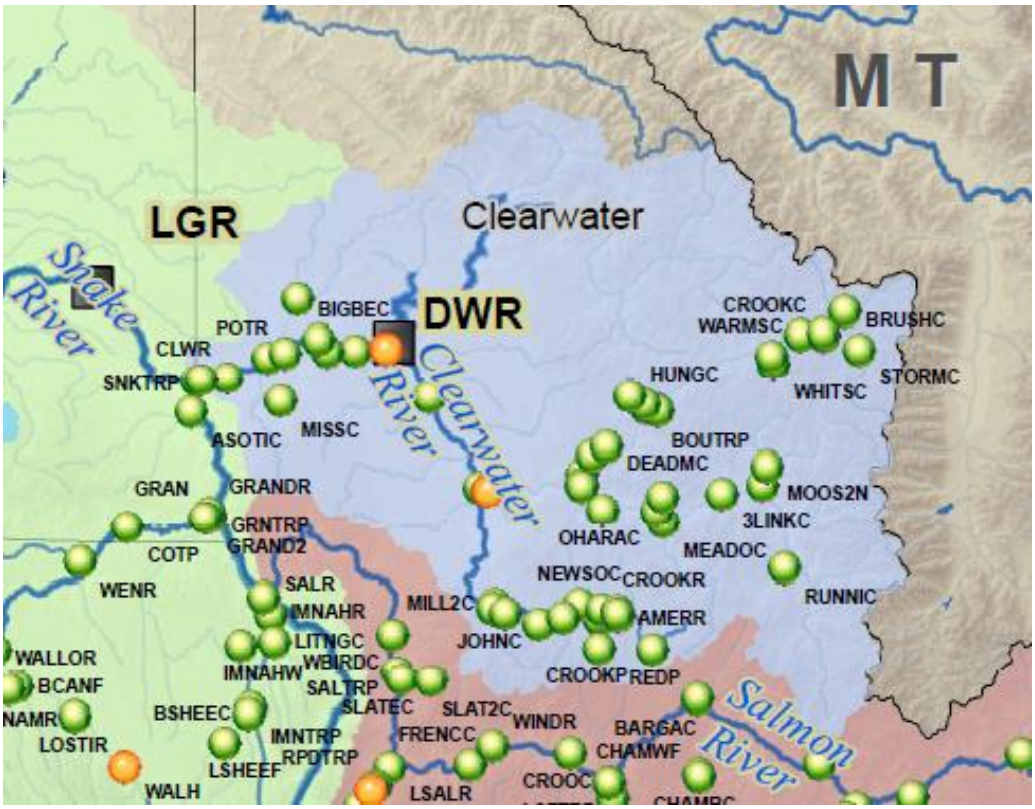
Studies are showing that overwinter mortality, spatial clustering of redds, and limited resource availability are potentially important limiting factors contributing to density-dependent mortality in Snake River Chinook salmon populations, limiting these populations to their present low levels (by comparison to historical levels)(Walters et al 2103). Walters (2013) found that density-dependent limiting factors were in effect in all study populations of Snake River fall Chinook, even though population abundances of spawning fish are substantially below historical levels. In effect, habitat conditions may not be available for increasing fish numbers, and habitat improvements are necessary to capitalize on the capability of hatcheries to produce increasing numbers of fish (NMFS 2017). The addition of hatchery fish into limiting habitats where density dependence is at play can have adverse effects on both wild and hatchery fish. The more hatchery fish consistently released, the greater such impacts would be to wild fish, especially during times of environmental stress (AFS 2017). The cumulative effect of these additional fish triggering density dependence issues would be moderate.

4.2.1.3 Effects on Wild Fish

Figure 11 displays the large number of release sites for millions of hatchery-reared salmonids across the Clearwater River basin, demonstrating the magnitude and extent of these releases. Density-dependent effects and adverse hatchery-to-wild fish effects can be anticipated to increase with cumulative increases of hatchery-reared fish being released.

[37] "Density dependence" is a term describing factors that limit population sizes whose effect, or intensity of effect, is dependent on the number of individuals in the population.

Figure 11 Juvenile salmonid release sites in Clearwater River basin (blue area)*



* from Fish Passage Center website at http://fpc.org/documents/css_relsites_map_forweb.pdf

These effects are only relevant, however, if the intent is to restore naturally spawning populations. If the goal is simply to increase numbers of fish for catch higher in the South Fork Clearwater (recreational, cultural, or subsistence) then this may not be of much concern. However, these cumulative hatchery efforts to increase fish releases are intended to achieve both goals (BPA 1997), and monitoring with adaptive management over time is planned to refine these hatchery actions to achieve them.

Additionally, these hatchery programs and their associated fisheries are managed based on their impacts on ESA-listed fish in the Columbia River Basin. Numbers and effects are closely monitored to ensure that if the effects of hatchery programs, fisheries, predation, habitat restoration, ocean conditions, and conservation efforts do not allow sufficient escapement of returning adult salmon and steelhead to the Clearwater River Basin to meet recovery goals, then adjustments to fisheries and to the hatchery production levels would likely be proposed. Given this adaptive management approach, the overall cumulative effect on wild fish would be low.

4.2.1.4 Marine-derived Nutrients

There would also be a meaningful cumulative benefit by the increased addition of marine-derived nutrients from the increasing numbers of returning adult Chinook and steelhead anticipated. This nutrient input, along with upstream habitat restoration efforts, would amplify the productivity and carrying capacity of these habitats.

4.2.1.5 Conclusion on Cumulative Effects to Resources and Ecosystems

In conclusion, the cumulative effect of the NPTH program with its increased releases would be beneficially high from a Chinook population restoration perspective, though moderately adverse for naturally-spawning wild Chinook from the cumulative genetic, competition, and pathogen impacts. The cumulative effects would be low for other fish species since these additions to existing levels of rapidly migrating juveniles would not meaningfully increase competition for resources because of the short time they share habitats. The cumulative benefit from the increased marine-derived nutrients to habitat productivity could be moderate. Overall, the cumulative effect on natural resources would be moderate and beneficial.

4.2.2 Cumulative Effects on Human Communities

The local economy within the Clearwater River basin is diverse and not dependent on fisheries. Nez Perce County is economically diversified and dependent on regional retail, health care, media, government and transportation (Idaho Dept. of Labor 2018). The hatchery actions would likely not cumulatively impact socioeconomics.

Most of this economic diversity and strength, however, is focused in the Lewiston/Clarkston area. Continued operation of the hatchery would continue to provide for the 15 workers and their families, but this is a low number of families, considering the population of the Lewiston/Clarkston cities (over 40,000) where it would not have much of a cumulative socioeconomic impact. But it may have an impact within the smaller and less economically diverse communities in the Clearwater River Basin where cumulative economic benefits are more likely to be realized.

Outlying communities such as Lapwai, Culdesac, and Peck, however, are far smaller, much less economically diverse, and populated by a higher proportion of tribal members (Figure 9). These communities could be impacted by of the cumulative addition of these fish from the NPTH fisheries program. The effect would likely be mostly cultural through the added benefit of an increasing subsistence fishery. The effect of these actions, when combined with the effects of other past, present, and reasonably foreseeable future basin-wide restoration projects, hatchery facilities, and monitoring efforts aimed at increasing salmon returns, could have a moderate, long-term beneficial cumulative impact on subsistence fisheries and tribal families over time, depending on the success of the efforts.

The cumulative effect of the fisheries actions on human communities economically would be slightly beneficial. Socially and culturally, however, the cumulative addition of these fish could be beneficial over time as they increase in support of the social and cultural values of the NPT.

Chapter 5. Environmental Consultation, Review, and Permit Requirements

This chapter addresses statutes, implementing regulations, and executive orders applicable to the Proposed Action. This EA is being sent to tribes, federal agencies, state agencies, and state and local governments as part of the consultation process for the Proposed Action. Persons, tribes, and agencies consulted are included in the list in Chapter 6, Agencies, Tribes, Organizations, and Persons Contacted.

5.1 National Environmental Policy Act

This EA was prepared pursuant to regulations implementing NEPA (42 U.S.C. 4321 et seq.), which requires federal agencies to assess the impacts that their actions may have on the environment. NEPA requires preparation of an EIS for major federal actions significantly affecting the quality of the human environment. BPA prepared this EA to determine if the Proposed Action would create any significant environmental impacts that would warrant preparing an EIS, or if a Finding of No Significant Impact is justified.

5.2 Fish and Wildlife

5.2.1 Endangered Species Act

The ESA and its amendments (16 U.S.C. 1531 et seq.) require federal agencies to ensure that the actions they authorize, fund, and carry out do not jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat. The effects on species listed under the ESA are discussed in Chapter 3 of this EA, specifically in Section 3.5.14, “Fish”; and Section 3.6.1 “Wildlife”.

ESA consultation with NMFS and USFWS for production and release of spring/summer and fall Chinook have been completed as displayed in Table 10, Section 3.5.1.4. ESA consultation with NMFS for the operation of the kelt reconditioning program has also be completed as displayed in Table 10. ESA consultation with the USFWS for operation of the kelt reconditioning program in ongoing.

5.2.2 Fish and Wildlife Conservation Act and Fish and Wildlife Coordination Act

The Fish and Wildlife Conservation Act of 1980 (16 U.S.C. 2901 *et seq*.) encourages federal agencies to conserve and promote conservation of non-game fish and wildlife and their habitats. The Fish and Wildlife Coordination Act (16 U.S.C. 661 *et seq*.) requires federal agencies with projects affecting water resources to consult with USFWS and the state agency responsible for fish and wildlife resources. The analysis in Section 3.5, “Fish”, and 3.6, “Wildlife”, of this EA indicates that the alternatives would have limited impacts on fish and wildlife, with implementation of appropriate mitigation.

5.2.3 Magnuson-Stevens Fishery Conservation and Management Act of 1976

The National Marine Fisheries Service is responsible for ensuring compliance with the Magnuson-Stevens Fishery Conservation and Management Act of 1975. Public Law 104–297, the Sustainable Fisheries Act of 1996, amended the Magnuson-Stevens Fishery Conservation and Management Act to establish new requirements for evaluating and consulting on adverse effects to essential fish habitat (EFH). Under Section 305(b) (4) of the act, BPA is required to consult with NMFS for actions that adversely affect EFH; in turn, NMFS is required to provide EFH conservation and enhancement

recommendations. As discussed in Section 3.5.2, "Fish", the Proposed Action would not result in any direct or indirect effects on EFH. Effects on EFH were evaluated in the consultations documented in Table 10.

5.2.4 Migratory Bird Treaty Act

The Migratory Bird Treaty Act, as amended, implements various treaties and conventions between the United States and other countries, including Canada, Japan, Mexico, and the former Soviet Union, for the protection of migratory birds (16 U.S.C. 703–712). Under the act, taking, killing, or possessing migratory birds, or their eggs or nests, is unlawful. The act classifies most species of birds as migratory, except for upland and non-native birds such as pheasant, chukar, gray partridge, house sparrow, European starling, and rock dove.

The Department of Energy and USFWS have a memorandum of understanding to address migratory bird conservation in accordance with Executive Order 13186 (Responsibilities to Federal Agencies to Protect Migratory Birds). This order directs each federal agency taking actions that may affect migratory birds to work with the USFWS to develop an agreement to conserve those birds. The memorandum of understanding addresses how both agencies can work cooperatively to address migratory bird conservation, and includes specific measures to consider implementing during project planning and implementation.

As discussed in Section 3.3.2 there would be a loss of open mowed-field habitat with the construction of the reconditioning facility, and short-term disturbance to birds during its construction. No native habitat for migratory birds would be affected. The habitat loss, however, was of value to a limited range of migratory birds as it was simply a plowed and leveled field. Such habitat (mowed field) provides foraging habitat to a few species of migratory songbirds but is likely not suitable for nesting. No migratory birds are anticipated to be at risk from this project.

Fish collection and release activities (in riparian habitats) would have few effects to nesting or foraging migratory birds, though some minor and temporary disturbance of birds is likely. The level of effect on these species is low and not in violation of the Migratory Bird Treaty Act.

5.2.5 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 U.S.C. 668–668d) addresses "take" of eagles, which includes both the disturbance of eagles or killing eagles. Bald eagles would not be taken or otherwise harmed as a result of the Proposed Action, and could benefit in the long term from an increased source of food in the form of steelhead.

5.3 Wetlands, Floodplains, and Water Resources

As part of the NEPA review, U.S. Department of Energy NEPA regulations require that impacts on floodplains and wetlands be assessed and alternatives for protection of these resources be evaluated in accordance with Compliance with Floodplain/Wetlands Environmental Review Requirements (10 CFR 1022.12), Executive Order 11988, Floodplain Management, and Executive Order 11990, Protection of Wetlands. Evaluation of impacts of the Proposed Action on floodplains and wetlands is discussed in detail in Section 3.4, "Wetlands and Floodplains", of this EA. The evaluation determined that the Proposed Action would not result in adverse impacts to wetlands or floodplains.

Wetland and waterway management, regulation, and protection are addressed in several sections of the Clean Water Act, including Sections 401, 402, and 404.

5.3.1 Clean Water Act Section 401

A federal permit to conduct an activity that causes discharges into navigable waters is issued only after the affected state certifies that existing water quality standards would not be violated if the permit were issued. Idaho Department of Environmental Quality (IDEQ) would review the project's Section 402 and Section 404 permit applications for compliance with Idaho's water quality standards and grant certification if the permits comply with these standards.

5.3.2 Clean Water Act Section 402

This section authorizes National Pollutant Discharge Elimination System (NPDES) permits for the discharge of pollutants, such as stormwater or hatchery effluent discharges. The EPA, Region 10, has a general permit for federal facilities for discharges from construction activities. NPT would issue a Notice of Intent to obtain coverage under this general permit, and would prepare a Stormwater Pollution Prevention Plan to address stabilization practices, structural practices, stormwater management, and other controls.

As discussed in Section 3.2.1, the NPTH is not required to obtain coverage under an upland finfish rearing NPDES permit because total production is less than the 20,000-pound annual threshold. However, the NPT developed a NPDES Permit Waste Management Plan for all its facilities, including the NPTH. Final plans were submitted to IDEQ and the NPT Water Quality Division (NPT 2013).

5.3.3 Clean Water Act Section 404

Authorization from the US Army Corps of Engineers (Corps) is required in accordance with the provisions of Section 404 of the Clean Water Act when dredged or fill material is discharged into waters of the United States. There would be no impact on wetlands, and thus no need to coordinate with the Corps to obtain a Section 404 permit.

5.4 Heritage Conservation and Cultural Resources Protection

Laws and regulations governing the management of cultural resources include:

- Antiquities Act of 1906 (16 U.S.C. 431–433),
- Historic Sites Act of 1935 (16 U.S.C. 461–467),
- Section 106 of the NHPA (54 U.S.C. § 300108), as amended,
- Archaeological Data Preservation Act of 1974 (16 U.S.C. 469 a–c),
- Archaeological Resources Protection Act of 1979 (16 U.S.C. 470 et seq.), as amended,
- Native American Graves Protection and Repatriation Act (25 U.S.C. 3001 et seq.),
- Executive Order 13007 Indian Sacred Sites, and
- American Indian Religious Freedom Act of 1978 (PL 95-341, 92 Stat. 469, 42 U.S.C. 1996, 1996a).

Section 106 of the NHPA requires federal agencies to consider the effects of their actions on historic properties and provides a process for assessing impacts on historic properties. BPA is consulting with the Idaho SHPO and the Nez Perce Tribe by providing information about the Proposed Action's "Area of Potential Effect" and requesting their recommendations on the proposed level and type of evaluation efforts, and for available information regarding pre-historic resources. BPA has recommended that impacts to cultural resources could be mitigated by having cultural monitors on site during kelt reconditioning facility construction. Pre-activity surveys were judged to be of little to no value since the site has been plowed annually for agricultural production for decades. On-site

monitors could determine the significance of findings that might result from grading or excavation actions.

5.5 State, Area-Wide, and Local Plan Consistency

Construction of the reconditioning facility would be on Tribal trust (non-fee) lands within the Nez Perce Indian reservation lands. Land use actions there are not subject to state, area-wide or local land use plans.

5.6 Noise and Public Health and Safety

The Federal Noise Control Act of 1972 (42 U.S.C. 4901 et seq.) requires that federal actions, such as the Proposed Action, comply with state and local noise requirements. The analysis in Section 3.10, Air, Noise, and Public Health and Safety, of this EA indicates that the Proposed Action would have low potential for temporary noise impacts during construction, and would meet applicable noise requirements.

5.7 Executive Order on Environmental Justice

In February 1994, Executive Order 12898, Federal Actions to Address Environmental Justice in Minority and Low-Income Populations, was released to federal agencies. This order states that federal agencies shall identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. As discussed in Section 3.7, Socioeconomics and Environmental Justice, the Proposed Action would not cause disproportionately high and adverse impacts on minority and low-income populations. The Proposed Action, to the degree to which it is successful, would have positive effects on Native American communities with interests in the Clearwater River basin and restored anadromous fish runs there.

5.8 Air Quality

The federal Clean Air Act, as amended (42 U.S.C. 7401 et seq.), requires the EPA and individual states to carry out a wide range of regulatory programs intended to assure attainment of the NAAQS. Air quality impacts from this action would include limited temporary fugitive dust and vehicle emissions from construction, and negligible effects from operation, as discussed in Section 3.10, Air Quality, Noise, and Public Safety.

5.9 Climate Change

Gases that absorb infrared radiation and prevent heat loss to space are called greenhouse gases (GHGs). As a response to concerns over the predicted increase of global GHG levels, various federal and state mandates address the need to reduce GHG emissions. Executive Orders 13423 and 13514 require federal agencies to measure, manage, and reduce GHG emissions by agency-defined target amounts and dates. Proposed Action activities that would produce GHG emissions include “soil carbon” emissions produced through the removal and/or disturbance of natural vegetation and soils during construction; the use of gasoline and diesel powered vehicles and equipment during construction; and the use of gasoline and diesel powered vehicles for employee commuting, supply deliveries, and transport of kelts before and after reconditioning. These activities would make minimal contributions to the GHG emissions associated with climate change, as discussed in Section 3.12 of this EA.

5.10 Farmland Protection Policy Act

The Farmland Protection Policy Act (7 U.S.C. 4201 et seq.) directs federal agencies to identify and quantify adverse impacts of federal programs on farmlands. The purpose of this Act is to minimize the number of federal programs that contribute to the unnecessary and irreversible conversion of agricultural land to non-agricultural uses. Three types of farmland are recognized by the Act: prime farmlands, unique farmlands, and farmland of statewide or local importance.

The entire hatchery is on former irrigated farmland that had been used to grow hay and has been designated as prime farmland by the Natural Resource Conservation Service. This reconditioning facility would remove approximately 0.25 acres of prime farm land, but its proximity to an existing hatchery facility, level terrain, and land availability within a site already removed from agricultural production make this an appropriate location for this facility rather than locating the facility elsewhere. Additionally, nearby sites with similar features do not affect farmland of lower value than the NPTH site.

5.11 Resource Conservation and Recovery Act, Toxic Substances Control Act, and Federal Insecticide, Fungicide and Rodenticide Act

The Resource Conservation and Recovery Act (42 U.S.C. 6901 et seq.) regulates the disposal of hazardous wastes. The Toxic Substances Control Act (15 U.S.C. 2601-2692) gives authority to the Environmental Protection Agency to regulate substances that present unreasonable risks to public health and the environment. The Federal Insecticide, Fungicide and Rodenticide Act (7 U.S.C. 136(a-y)) authorizes the Environmental Protection Agency to prescribe conditions for use of pesticides.

Construction, operation, and maintenance of the facilities operate under prescribed mitigation measures (Section 2.4) to minimize spill and spread of toxic substances that provide direction for use, handling, storage, and disposal of hazardous substances. Regulated pesticide products would not be used.

Chapter 6. Agencies, Tribes, Organizations, and Persons Contacted

The project mailing list contains about 93 stakeholders, including tribes; local, state, and federal agencies; local governments; interest groups; libraries; and potentially interested or affected landowners. They have directly received or have been given instructions on how to receive project information made available, and will have the opportunity to review and comment on the draft EA.

Tribes or Tribal Groups

- Nez Perce Tribe
- Columbia River Inter-Tribal Fish Commission
- Upper Snake River Tribes Foundation

Federal Agencies and Elected Officials

- Environmental Protection Agency, Region 10, Environmental Review; Seattle, WA
- National Marine Fisheries Service
- U.S. Fish and Wildlife Service
- U.S. Army Corps of Engineers
- U.S. Senators and Representatives from Idaho and Washington State

Idaho State Agencies and Elected Officials

- Idaho Department of Fish and Game, Clearwater Region, Lewiston, Idaho Office
- Idaho Department of Environmental Quality
- Idaho Department of Water Resources
- State of Idaho House and Senate members for Districts encompassing the project area
- State of Washington House and Senate members for Districts encompassing the project area
- Idaho Governor's office – Senior Special Assistant for Natural Resources
- Idaho Office of Species Conservation

Local Government

- Nez Perce County Board of Commissioners
- Whitman County Board of Commissioners

Libraries and Newspapers

- Lewiston City Library
- Washington State Library
- Idaho State University Library
- University of Idaho Library
- Moscow Public Library
- Nez Perce County Library – Lewiston
- Nez Perce County Library – Lapwai

Business, Special Interests and Organizations

- Native Fish Society
- Trout Unlimited
- Save our Salmon Coalition
- Northwest Sportfishing Industry Association
- Snake River Salmon Solutions
- Idaho Steelhead and Salmon Unlimited
- Idaho Conservation League
- RedFish/BlueFish
- Association of Northwest Steelheaders
- Idaho Rivers United
- Upper Salmon Basin Watershed Council
- Idaho Power

Landowners

- Twelve landowners with properties surrounding or near the NPTH

Chapter 7. References

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Public Health Statement, Total Petroleum Hydrocarbons. Department of Health and Human Services, Public Health Service. September 1999.

Arnsberg, B., Groves, P., Mullins, F., Milks, D. 2015. 2014 Snake River Fall Chinook Salmon Spawning Summary; http://www.fpc.org/documents/fachin_planningteam/2015CooperativeFallChReddSummary.pdf

Barrows, M.G., D.R. Anglin, P.M. Sankovich, J.M. Hudson, R.C. Koch, J.J. Skalicky, D.A. Wills and B.P. Silver. 2016. Use of the Mainstem Columbia and Lower Snake Rivers by Migratory Bull Trout. Data Synthesis and Analyses. Final Report. U.S. Fish and Wildlife Service, Columbia River Fisheries Program Office, Vancouver, Washington. 276 pp.

Bellerud, B., R. Graves, and G. Fredricks. 2007. Assessment of the likely survival improvement resulting from enhancement strategies for steelhead kelts (B-run kelts in particular). NOAA Fisheries Kelt Analysis Memorandum to Bruce Suzumoto, September 25, 2007.

Bergheim, A., and T, Åsgård. 1996. Chapter 3. Waste Production from Aquaculture. IN: Aquaculture and Water Resource Management, Donald J. Baird, et al. (eds). Blackwell Science, Ltd. Oxford, England. Pages 50 to 80

Bonneville Power Administration (BPA) and Army Corps of Engineers (Corps). 2013. 2012-2018 Kelt Management Plan. July 9, 2013

BPA (Bonneville Power Administration). 1997. Final Environmental Impact Statement Nez Perce Tribal Hatchery Program. Bonneville Power Administration U.S. Department of Energy Bureau of Indian Affairs U.S. Department of the Interior Nez Perce Tribe. July 1997.

BPA. 2000. Supplement Analysis For the Nez Perce Tribal Hatchery Program Final Environmental Impact Statement. Available at https://www.bpa.gov/efw/Analysis/NEPADocuments/Pages/Nez-Perce-Hatchery.aspx

Bonneville Power Administration (BPA), 2003. Fish and Wildlife Implementation Plan Final EIS. Available at https://www.bpa.gov/efw/Analysis/NEPADocuments/Pages/Implementation-Plan.aspx

BPA. 2009. Supplement Analysis for Nez Perce Tribal Hatchery Program Environmental Impact Statement, Release of Spring Chinook Juveniles into the Clearwater River (DOE/EIS-0213-SA-02). Available at https://www.bpa.gov/efw/Analysis/NEPADocuments/Pages/Nez-Perce-Hatchery.aspx

Boxall, A.B., L.A. Fogg, P.A. Blackwell, P. Kay, E.J. Pemberton, and A. Croxford. 2004. Veterinary medicines in the environment. Rev Environ Contam Toxicol. 2004: 1 to 91.

Busby, P., T. Wainwright, G. Bryant, L. Lierheimer, R. Waples, F. Waknitz, and I. Lagomarsino. 1996. Status Review of West Coast Steelhead from Washington, Oregon and California. NOAA Technical Memorandum NMFS-NWFSC-27. National Marine Fisheries Service: Seattle, Washington. Available online: http://www.nwr.noaa.gov/Publications/Biological-Status-Reviews/upload/SR1997-steelhead0.pdf

Cannell, K.. 1999. Allotment 1705 Fish Hatchery Survey. Nez Perce Tribe, Lapwai. Accession No. 20172044.

Colotelo AHA, RA Harnish, BW Jones, AC Hanson, DM Trott, MJ Greiner, GA Mcmichael, KD Ham, Z Deng, RS Brown, MA Weiland, X Li, and T Fu. 2014. Passage Distribution and Federal Columbia River Power System Survival for Steelhead Kelts Tagged Above and at Lower Granite Dam, Year 2. PNNL-23051 Rev.1, Pacific Northwest National Laboratory, Richland, WA.

Columbia River Inter-Tribal Fish Commission (CRITFC). 2015. Snake River Fall Chinook Recovery. A Tribal Success Story. Available at http://www.critfc.org/fish-and-watersheds/fish-and-habitat-restoration/restoration-successes/snake-river-fall-chinook/

CRITFC. 2017. Personal communications and response to written questions from BPA regarding kelt reconditioning program details.

CRITFC. 2018. CRITFC Website on Nez Perce Tribe. Accessed at http://www.critfc.org/member_tribes_overview/nez-perce-tribe/ on March 29, 2018.

Craig, J.A., and R.L. Hacker. 1940. The history and development of the fisheries of the Columbia River. United States Bureau of Fisheries. Washington, [D.C.] : U.S. Govt. Print. Off., 1940.

Cripps, S.J. 1995. Serial particle size fractionation and characterization of an aquacultural effluent. Aquaculture, 133: 323-339.

Ecovista. 2003. Clearwater Subbasin Assessment. Prepared for Nez Perce Tribe Watershed Division, in cooperation with the Clearwater Policy Advisory Committee. www.nwcouncil.org

Environmental Protection Agency. 2014a Climate Change Indicators in the U.S., 2014. Third Ed. EPA 430-R-14-004. Available online at: www.epa.gov/climatechange/indicators

EPA. 2014b U.S. EPA Air Quality System Data Mart [internet database] Annual Summary Data 2014. Available via https://www.epa.gov/outdoor-air-quality-data. Accessed July 20, 2016.

EPA. 2016b Causes of Climate Change. 2016. Available online at: https://www3.epa.gov/climatechange/science/causes.html

EPA. 2016c. What Climate Change Means for Idaho. EPA 430-F-16-014. Available online at: https://www.epa.gov/sites/production/files/2016-09/documents/climate-change-id.pdf

Evans, A.F., and R.E. Beaty. 2001a. Identification and enumeration of steelhead (Oncorhynchus mykiss) Kelts in the juvenile collection systems of Lower Granite and Little Goose dams, 2000. Ann. Rep. To US army Corps of Engineers, Walla Walla District, for Contract No. DACW-00-R-0016. Prepared by the Columbia River Inter-Tribal Fish Commission, Portland, OR.

Evans, A. F., R. E. Beaty, D. R. Hatch, J. Blodgett, and D. Fast. 2001b. Kelt reconditioning: a research project to enhance iteroparity in Columbia Basin steelhead (Oncorhynchus mykiss). 2000 Annual Report to the Bonneville Power Administration, Project 2000-017, Portland, Oregon.Finger, T.R. 1982. Interactive Segregation among Three Species of Sculpins (*Cottus*) *Copeia*, Vol. 1982, No. 3 (Aug. 10, 1982), pp. 680-694.

FPC (Fish Passage Center). 2016. Columbia Basin Fishery Agencies and Tribes Fish Passage Center online query page. Available at http://www.fpc.org/ (accessed May 2016).

FPC. 2012. DRAFT Fish Passage Center 2011 Annual Report. Fish Passage Center of the Columbia Basin Fish & Wildlife Authority. June 2012 available at http://www.fpc.org/documents/annual_FPC_report/FPC2011_Annual_Report-DRAFT.pdf

Froese, R. 2006. Cube law, condition factor, and weight-length relationships: history, meta-analysis, and recommendations. Journal of Applied Ichthyology. 22:241-253.

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. Commer., NOAA Tech. Memo. NMFS-NWFSC-66, 598 p.

Grant, J.W.A., Imrie, I., 2013. Patterns of density-dependent growth in juvenile stream-dwelling salmonids. Journal of Fish Biology (2005) 67 (Supplement B), 100–110 doi:10.1111/j.1095-8649.2005.00916.x, available online at http://people.auc.ca/imre/Patterns%20of%20density%20dependent%20growth.pdf

Harnish, R.A., Ham, K.D., Colotelo, A.H., Deng, Z.D., Li, X., Green, E., Fu, T. 2015. Factors Affecting Route Selection and Survival of Steelhead Kelts at Snake River Dams in 2012 and 2013. Prepared for the U.S. Department of Energy under Contract DE-ACOS-76RL01830. March 2015.

Hatch, D., Branstetter, R., and Price, A. 2011. Steelhead Kelt Reconditioning and Reproductive Success. 2010 Annual Report. CRITFC Technical Report 11-22. June 29, 2011

Hatch, D., Fast D., Bosch W., Blodgett, J., Trammell, J., Peirce, A., Everett, S., Branstetter, R., Stephenson, J., Matala, A., Graham, N., Penney, Z., 2015. Steelhead Kelt Reconditioning and Reproductive Success Studies in the Columbia River Basin. American Fisheries Society Presentation. August 9, 2015.

Hatch, D., Branstetter, R., Stephenson, R., and Johnson, R. 2016. Kelt Reconditioning and Reproductive Success Evaluation Research: 2015 Annual Report. Bonneville Power Administration Annual Report, 2007-401-00. March 2106

Hatch, D., R. Branstetter, J. Stephenson, A. Pierce, J. Newell, W. Bosch, S. Everett, N. Graham, L. Medeiros, L. Jenkins, T. Tall Bull, J. Goodwin, N. Hoffman, T. Cavileer, J. Nagler, M. Fiander, C. Frederickson, J. Blodgett, D. Fast, R. Lessard, J. Whiteaker, and R. Johnson. Kelt Reconditioning and Reproductive Success Evaluation Research. 2017. 1/1/2016 – 12/31/16 Bonneville Power Administration Annual Report, 2007-401-00.

Hatchery Scientific Review Group (HSRG). 2005. Hatchery reform in Washington State: principles and emerging issues. Fisheries 30(6):1-23.

Heath, D. D., J. W. Heath, C. A. Bryden, R. M. Johnson, and C. W. Fox. 2003. Rapid evolution of egg size in captive salmon. Science 299:1738–1740.

Hillstrom, Laurie C. and Hanes, Richard. 2018. Countries and their Cultures/Nez Perce. Referenced online on March 29, 2018 at http://www.everyculture.com/multi/Le-Pa/Nez-Perc.html

HSRG. 2009. Columbia River hatchery reform system wide report. Available from, http://www.hatcheryreform.us/hrp/reports/system/welcome_show.action ICTRT (Interior Columbia Technical Recovery Team). 2003. Independent populations of Chinook, steelhead, and sockeye for listed Evolutionarily Significant Units within the interior Columbia River domain. Working draft.

Horner, N. J. 1978. Survival, densities and behavior of salmonid fry in stream in relation to fish predation. M.S. Thesis, University of Idaho, Moscow, Idaho. 115p.

Idaho Department of Environmental Quality (IDEQ) 2011. Idaho Department of Environmental Quality Final 2010 Integrated Report. Boise, Idaho.

IDFG (Idaho Department of Fish and Game). 2005. Idaho Comprehensive Wildlife Conservation Strategy. Appendix B: Idaho Species of Greatest Conservation Need. Idaho Conservation Data Center, Idaho Department of Fish and Game, Boise, ID. Available at http://fishandgame.idaho.gov/public/wildlife/cwcs/ (accessed May 11, 2012)

IDFG. 2011. Clearwater Spring and Summer Chinook Salmon (Clearwater Fish Hatchery) Hatchery Genetic Management Plan. November 2011.

Idaho Department of Water Resources (IDWR). 2012. online Critical Groundwater Areas page - - https://www.idwr.idaho.gov/water-rights/critical-ground-water-areas/designated.html (accessed April 4, 2017)

Idaho State Department of Agriculture. 2004. Synoptic Evaluation of Pesticide Concentrations Clearwater River Basin, Central Idaho. Idaho State Department of Agriculture Water Quality Technical Report W-12.

Idaho Department of Labor. 2017. Regional Information website. Accessed on 6/11/18 at https://lmi.idaho.gov/Portals/0/2018/WorkforceTrends/NezPerceProfile.pdf

IDWR. 2017. Online well log search page http://www.idwr.idaho.gov/apps/appswell/searchwc.asp (accessed May 4, 2017)

Intergovernmental Panel on Climate Change (IPCC). 2014. Climate Change 2014: Synthesis Report Summary for Policymakers. Contribution of Working Groups I, II, and III to the Fifth Assessment Report of the Intergovernmental panel on Climate Change [Core writing team, R. K. Pachauri and L. A. Meyer (eds.)]. IPCC Geneva Switzerland, 151 pp. Available online at: https://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf

ISEMP/CHaMP. 2015. Combined Annual Report for the Integrated Status and Effectiveness Monitoring Program and Columbia Habitat Monitoring Program: 2014. Prepared by ISEMP and CHaMP for the Bonneville Power Administration. Published by Bonneville Power Administration. https://www.researchgate.net/publication/292604884_Combined_Annual_Technical_Report_for_the_Integrated_Status_and_Effectiveness_Monitoring_Program_and_Columbia_Habitat_Monitoring_Program

Jenkins, L. 2016. Reproductive performance in reconditioned female steelhead kelts. Available online at www.ykfp.org/Par16/Presentations/pdf/Jenkins_Yakima2016.pdf

Kendra, W. 1991. Quality of salmonid hatchery effluents during a summer low-flow season. Transactions of the American Fisheries Society 120: 43-51.

Kiefer, S., M. Rowe and K. Hatch. 1992. Stock Summary Reports for Columbia River Anadromous Salmonids Volume V: Idaho Final Draft for The Coordinated Information System. Idaho Department of Fish and Game.

Kolodziej, E.P., T. Harter, and D.L. Sedlak . 2004. Dairy wastewater, aquaculture, and spawning fish as sources of steroid hormones in the aquatic environment. Environ Sci Technol. 38:6377-6384.

Kostow, K. 2009. Factors that Contribute to the Ecological Risks of Salmon and Steelhead Hatchery Programs and Some Mitigating Strategies. Reviews in Fish Biology and Fisheries 19:9-13.

Krohn, D. C. 1968. Production of the reticulate sculpin (*Cottus perplexus*) and its predation on salmon fry in three Oregon streams. M. S. Thesis, Oregon St. Univ., Corvallis. 78 p.

Lawler J. J. and M. Mathias. 2007. Climate Change and the Future of Biodiversity in Washington. Report prepared for the Washington Biodiversity Council. Available online at: http://www.rco.wa.gov/documents/biodiversity/WA-Climate-BiodiversityReport.pdf

Leth, Brian, Cassineli, John, and Knipper, Shane. 2010. Clearwater River Spring Chinook Salmon. Idaho Department of Fish and Game. Available at

http://www.fws.gov/lsnakecomplan/Meetings/2010%20Spring%20Chinook%20Symposium/3%20Upper%20Salmon%20River%20Spring%20Chinook%20Salmon.pdf

Littell, J.S., M. McGuire Elsner, L.C. Whitely Binder, and A.K. Snover (eds). 2009. The Washington Climate Change Impacts Assessment: Evaluating Washington's Future in a Changing Climate - Executive Summary. In The Washington Climate Change Impacts Assessment: Evaluating Washington's Future in a Changing Climate, Climate Impacts Group, University of Washington, Seattle, Washington. Available online at: www.cses.washington.edu/db/pdf/wacciaexecsummary638.pdf

Lothrop, Robert C. 2016. Columbia River Inter-Tribal Fish Commission (CRITFC) letter to Henry Lorenzen Northwest Power and Conservation Council, November 7, 2016, page 3.

Lyon, J. 2001. Archaeological Testing of the Allotment 1705 Project Area, Report Number (99-01), Nez Perce Tribe, BPA Project. Nez Perce Tribe Cultural Resource Program, Lapwai, ID. Accession No. 20172048

Maret, T. R., C. Robinson, and G. Minshall. 1997. Fish Assemblages and Environmental Correlates in Least-Disturbed Streams of the Upper Snake River Basin, Transactions of the American Fisheries Society, 126:2, 200-216.

Martínez-Bueno, M.J., M.D. Hernando, A. Agüera, and A.R. Fernández-Alba. 2009. Application of passive sampling devices for screening of micro-pollutants in marine aquaculture using LC-MS/MS. Talanta. 77:1518-1527.

Mathews, G.M. and R.S. Waples. 1991. Status review of Snake River spring and summer Chinook salmon. U.S. Department of Commerce, NOAA Technical Memorandum, NMFS F/FWC-200. Seattle, WA.

McIlraith Brian J.,Kennedy, Brian P., PeeryChristopher A. , Keefer,Seasonal Migration Behaviors and Distribution of Adult Pacific Lampreys in Unimpounded Reaches of the Snake River Basin. Pages 123-134, Published online 05 Feb 2015.

Michael, J.H., Jr. 2003. Nutrients in salmon hatchery wastewater and its removal through the use of wetland constructed to treat off-line settling pond effluent. Aquaculture, 226: 213- 225.

Missildine, B.R., R.J. Peters, G. Chin-Leo, and D. Houck. 2005. Polychlorinated biphenyl concentrations in adult Chinook salmon (*Oncorhynchus tshawytscha*) returning to coastal and Puget Sound hatcheries of Washington State. Environmental Science and Technology. 39: 6944-6951

Mote, P., A.K. Snover, S. Capalbo, S.D. Eigenbrode, P. Glick, J. Little, R. Raymondi, and S. Reeder 2014 Climate Change Impacts in the U.S.: The Third National Climate Assessment. Ch. 21: Northwest, pp. 487-513. U.S. Global Change Research Program. Available online at: http://nca2014.globalchange.gov/downloads

Muir, W.D., and T.C. Coley. 1996. Diet of Yearling Chinook salmon and feeding success during downstream migration in the Snake and Columbia Rivers. Northwest Science, 70(4): 298-305

National Park Service. 2000. Nez Perce National Historical Park Administrative History, Chapter One: Origins of Nez Perce National Historical Park. Available at https://www.nps.gov/nepe/adhi/adhi1b.htm

Narum, S., D. Hatch, A. Talbot, P. Moran, and M. Powell. 2008. Interoparity in complex mating systems of steelhead Oncorhynchus mykiss (Walbaum). Journal of Fish Biology 72(1): 45-60.

National Marine Fisheries Service (NMFS). 1999. Designated critical habitat; revision of critical habitat for Snake River spring/summer Chinook salmon. Final rule. Federal Register 64:205(25 October 1999):57399-57403.

NMFS. 2005. Endangered and threatened species; designation of critical habitat for 12 evolutionarily significant units of West Coast salmon and steelhead in Washington, Oregon, and California. Final rule. Federal Register 70:170(2 September 2005):52630-52858.

NMFS. 2011. Anadromous Salmonid Passage Facility Design. National Marine Fisheries Service - Northwest Region. July 2011. http://www.nwr.noaa.gov/Salmon-Hydropower/FERC/upload/Fish-Passage-Design.pdf

NMFS. 2012. Final Environmental Assessment To Analyze Impacts of a NOAA's National Marine Fisheries Service Issuance of two Permits for the Hatchery Genetic Management Plans Submitted by the Washington Department of Fish and Wildlife, the Idaho Department of Fish and Game, the Oregon Department of Fish and Wildlife, and the Nez Perce Tribe Under Section 10 of the Endangered Species Act. October 2012

NMFS. 2014a. Final Environmental Impact Statement to Inform Columbia River Basin Hatchery Operations and the Funding of Mitchell Act Hatchery Programs. September 2014.

NMFS. 2014b. Snake River Sockeye Salmon Recovery Plan Summary. June 2014

NMFS. 2016. Proposed ESA Recovery Plan: Snake River Idaho Spring/Summer Chinook Salmon and Steelhead, October 2016

NMFS. 2017. Snake River Chinook and Steelhead Recovery Plans. Available at http://www.westcoast.fisheries.noaa.gov/publications/recovery_planning/salmon_steelhead/domains/interior_columbia/snake/12.5.2017_salmon_recovery_matrix.pdf

Northwest Power and Conservation Council (NPCC). 2016. Decision Memorandum, Step 1 review of the Snake River Basin Steelhead Kelt Reconditioning Facility Master Plan, Project # 2007-401-00, Kelt Reconditioning and Reproductive Success Evaluation Research. November 8, 2016.

Nez Perce County. 2015. A Resolution to Amend the Nez Perce County Comprehensive Plan for Nez Perce County, State of Idaho, And Further Providing for an Effective Date. Rsolution No. 2015-04-035. April 27, 2015

Nez Perce Tribe (NPT). 2009. Nez Perce Tribe Water Quality Assessment Clean Water Act Section 305(b) Report prepared by: Jenifer Harris, Nez Perce Tribe Water Resources Division. December 31, 2009.

NPT. 2011. Snake River Stock Fall Chinook Nez Perce Tribal Hatchery Hatchery and Genetic Management Plan. Submitted Under ESA Section 10(a)(1)(A). May 11, 2011.

NPT. 2012. Hesse, Jay, and Becky Johnson. Nez Perce Tribe. May 21, 2012. Personal communication, letter to Craig Busack (NMFS) regarding South Fork Clearwater River Fall Chinook Salmon Broodstock Collection Facilities and Methods Clarification.

NPT. 2013. Hatchery and Genetic Management Plan, Spring Chinook Salmon, Clearwater Subbasin, Mountain Snake Province. 15 april 2013

NPT and Columbia Inter-Tribal Fish Commission (CRITFC). 2016. Snake River Basin Steelhead Kelt Reconditioning Facility Master Plan. July , 2016.

Nez Perce Tribe and Idaho Department of Fish and Game. 1990. Clearwater River Subbasin Salmon and Steelhead Production Plan. Funded by the Northwest Power Planning Council; Columbia Basin Fish and Wildlife Authority.

NPT and WDFW (Washington Department of Fish and Wildlife). 2011. Addendum to Snake River Fall Chinook HGMPs for Lyons Ferry Hatchery Fall Chinook Acclimation Project Idaho Power Company, and Nez Perce Tribal Hatchery. Submitted Under ESA Section 10(a)(1)(A). May 11, 2011.

Peterson, Steven. 2016. Key Indicators of Nez Perce County, 2016 Report onNez Perce County. Sponsored by Port of Lewiston. June 1, 2016.

Piry, S., A. Alapetite, J.M. Cornuet, D. Paetkau, L. Baudouin, and A. Estoup. 2004. GeneClass2: A Software for Genetic Assignment and First-Generation Migrant Detection. Journal of Heredity. 95:536-539.

Polacek, M.C., C.M. Baldwin, and K. Knuttgen. 2006. Status, Distribution, Diet, and Growth of Burbot in Lake Roosevelt, Washington. Northwest Science. Vol. 80. No. 3.

Pouliquen, H., C. Thorin, J. Haury, M. Larhantec-Verdier, M.L. Morvan, R. Delépée, H. Le Bris. 2008. Comparison of water, sediment and plants for the monitoring of antibiotics: a case study on a river dedicated to fish farming. Environ Toxicol Chem. 2008 Nov 3:1.

Prasad, M. S.; Kumari, K. (1987). "Toxicity of Crude Oil to the Survival of the Fresh Water FishPuntius sophore (HAM.)". Acta Hydrochimica et Hydrobiologica. 15: 29. doi:10.1002/aheh.19870150106.

Rondorf, D.W. G. A. Gray, and R. B. Fairley. 1990. Feeding ecology of subyearling Chinook salmon in riverine and reservoir habitats of the Columbia River. Transactions of the American Fisheries Society 119(1): 16-24

Sparrow, R.A.H. 1981. Hatchery Effluent Water Quality in British Columbia. Bio-Engineering Symposium for Fish Culture (FCS Publ. 1): 162-166.

Stevens, P., Courter, I., Caudill, C., Peery, C. 2015. Evaluation ofAdult Pacific Lamprey Passage at Lower Snake River Dams. 2015 Final Report. Cramer Fish Sciences, University of Idaho College of Natural Resources, U.S. Fish and Wildlife Service. Prepared for U.S. Army Corps of Engineers under contract W912EF-14-P-5061. April 15, 2016

Straight ,R, Roe, S, Bailie, A, Lindquist, H, and Jamison,A. 2008. Idaho Greenhouse Gas Inventory and Reference Case Projections 1990-2020. Center for Climate Strategies. Spring 2008. Available online at: https://www.deq.idaho.gov/media/345475-ghg_inventory_idaho_sp08.pdf

U.S. Census Bureau. 2016. Quick Facts, United States. Accessed June 13, 2017 at https://www.census.gov/quickfacts/table/PST045216/00

U.S. Fish and Wildlife Service (USFWS). 2002. Bull Trout (*Salvelinus confluentus*) Draft Recovery Plan. Fish and Wildlife Service, Portland, Oregon. Available at http://ecos.fws.gov/docs/recovery_plan/021129.pdf Accessed May 9, 2012.

USFWS. 2005. Bull Trout Core Area Conservation Status Assessment. U.S. Fish and Wildlife Service Portland, Oregon. February - April, 2005

USFWS. 2008. 5-Year Status Review: Summary and Assessment of Bull Trout (*Salvelinus confluentus*). Fish and Wildlife Service, Portland, Oregon. Available at http://ecos.fws.gov/docs/five_year_review/doc1907.pdf (accessed May 9, 2012).

USFWS. 2010. Flow-Habitat Relationships for Spring and Fall-Run Chinook salmon and Steelhead/Rainbow Trout Spawning in the Yuba River. U. S. Fish and Wildlife Service Energy Planning and Instream Flow Branch. Sacramento Fish and Wildlife Office. Available at http://www.fws.gov/stockton/afrp/documents/yubaspawn.pdf (accessed May 18, 2012).

USFWS. 2015. Recovery plan for the coterminous United States population of bull trout (Salvelinus confluentus). Portland, Oregon. xii + 179 pages.

Walsh, J., D. Wuebbles, K. Hayhoe, J. Kossin, K. Kunkel, G. Stephens, P Thorne, R. Vose, M. Wehner, J. Willis, D. Anderson, S. Doney, R. Feely, P. Hennon, V. Kharin, T. Knutson, F. Landerer, T. Lenton, J. Kennedy, and R. Somerville. 2014. Climate Change Impacts in the U.S.: The Third National Climate Assessment. Chapter 2: Our Changing Climate, pp. 19-67. U.S. Global Change Research Program. Available online at: http://nca2014.globalchange.gov/downloads

Walters , A.W., Copeland, T., Venditti, D.A. 2013. The density dilemma: limitations on juvenile production in threatened salmon populations. Ecology of freshwater Fish 2013:22: 508-519.

Ward, D. L., J. H. Petersen, and J. J. Loch. 1995. Index of predation on juvenile salmonids by northern squawfish in the lower and middle Columbia River and in the lower Snake River. Transactions of the American Fisheries Society 124:321-334.

Washington Department of Fish and Wildlife (WDFW). 2012. List of Species of Concern in Washington State. Available at http://wdfw.wa.gov/conservation/endangered/All/ (accessed May 11, 2012).

Washington Department of Ecology (WDOE). 1989. Quality and Fate of Fish Hatchery Effluents during the Summer Low Flow Season. Publication No. 89-17. Prepared by Will Kendra, Washington Department of Ecology, Environmental Investigations and Laboratory Services Program, Surface Water Investigations Section, Mail Stop PV-11, Olympia, Washington 98504. May 1989.

Wertheimer, R. H., Evans, A. F. 2005 Downstream Passage of Steelhead Kelts through Hydroelectric Dams on the Lower Snake and Columbia Rivers. Transactions of the American Fisheries Society. 134:853-865.

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