United States Department of the Interior

U.S. Fish and Wildlife Service

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Allyson Purcell, Acting Chief
National Marine Fisheries Service
West Coast Region
1201 NE Lloyd Boulevard, Suite 1100
Portland, Oregon 97232

Subject: National Marine Fisheries Service Authorization for the Continued Operation of the Clearwater Steelhead, Spring/Summer Chinook Salmon, and Coho Salmon Hatchery Programs—Idaho (Clearwater River Basin)—Biological Opinion
In Reply Refer to: 01EIFW00-2017-F-1143

Dear Ms. Purcell:

Enclosed is the U.S. Fish and Wildlife Service-Ecological Service's (Service) Biological Opinion (Opinion) and concurrence on the National Marine Fisheries Service's (NMFS), Bonneville Power Administration's (BPA), the U.S. Fish and Wildlife Service's (FWS-Fisheries [direct funding] and the Lower Snake River Compensation Plan [LSRCP]), and the U.S. Army Corps of Engineers' (Corps), collectively the federal action agencies, determinations of effect on species listed under the Endangered Species Act (Act) of 1973, as amended, for authorizing and funding the continued operation and maintenance of the Clearwater steelhead (*Oncorhynchus mykiss*), spring/summer Chinook salmon (*O. tshawytscha*), and coho salmon (*O. kisutch*) hatchery programs (Programs), encompassing facilities and operations in Idaho.

In an email dated October 19, 2017, and received by the Service on the same day, Idaho Department of Fish and Game (IDFG), on behalf of the federal action agencies, requested formal consultation on the determination under section 7 of the Act that authorization and funding of the Programs is likely to adversely affect bull trout (*Salvelinus confluentus*) and bull trout critical habitat.

The agencies also determined that the proposed actions are not likely to adversely affect Canada lynx (*Lynx canadensis*), North American wolverine (*Gulo gulo luscus*), or northern Idaho ground squirrel (*Spermophilus brunneus brunneus*). We provide our concurrence with these determinations in the enclosed Opinion.

The enclosed Opinion is based primarily on our review of the proposed action, as described in the 2017 Biological Assessment (Assessment), and the anticipated effects of the action on listed species, and was prepared in accordance with section 7 of the Act. Our Opinion concludes that the proposed authorizing and funding of the Programs will not jeopardize the survival and

recovery of bull trout and will not destroy or adversely modify bull trout critical habitat. A complete record of this consultation is on file at this office.

This consultation addresses all aspects of the Programs as outlined in the Hatchery and Genetic Management Plans (HGMPs), and is intended to document compliance with the Act for all associated partners who authorize, fund, or carry out various components of the Programs. In addition to the federal action agencies, these partners include IDFG, the Nez Perce Tribe (NPT), and the Service, as Program operators.

Thank you for your continued interest in the conservation of threatened and endangered species. Please contact Clay Fletcher at 971-701-1497 or Russ Holder at 208-378-5384 if you have questions concerning this Opinion.

Sincerely,

RUSSELL HOLDER Digitally signed by RUSSELL HOLDER Date: 2017.12.15 13:12:29 -07'00'

For Gregory M. Hughes
State Supervisor

Enclosure

cc: NMFS, Portland (Reynolds, Hurst)
BPA, Portland (Grange)
USFWS-LSRCP, Boise (Collins, Robertson)
NPT, Lapwai (Johnson)
USCOE, Walla Walla (Setter)
IDFG, Boise (Hebdon, Leth)

BIOLOGICAL OPINION
FOR THE
AUTHORIZATIONS AND FUNDING OF THE CONTINUED OPERATION, MAINTENANCE, MONITORING, AND EVALUATION OF THE CLEARWATER HATCHERY PROGRAMS

01EIFW00-2017-F-1143

U.S. FISH AND WILDLIFE SERVICE
IDAHO FISH AND WILDLIFE OFFICE
BOISE, IDAHO

Supervisor _____

RUSSELL HOLDER
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Date: 2017.12.15 13:13:12 -07'00'

Date _____

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1. BACKGROUND AND INFORMAL CONSULTATION

1.1 Introduction

The U.S. Fish and Wildlife Service-Ecological Services (Service) has prepared this Biological Opinion (Opinion) and concurrence on the National Marine Fisheries Service's (NMFS), the Bonneville Power Administration's (BPA), the U.S. Fish and Wildlife Service's[1] (FWS-Fisheries and the Lower Snake River Compensation Plan [LSRCP]), and the U.S. Army Corps of Engineers' (Corps), collectively the federal action agencies, determinations of effect on species listed under the Endangered Species Act (Act) of 1973, as amended, from authorizing and funding the continued operation and maintenance of the Clearwater steelhead (*Oncorhynchus mykiss*), spring/summer Chinook salmon (*O. tshawytscha*), and coho salmon (*O. kisutch*) hatchery programs (Programs), which specifically included the following activities in Idaho:

- The NMFS is issuing authorizations for the Clearwater River Coho Salmon Restoration Program that qualify for one of the limits under Section 4(d). The authorization would cover the continued operation and maintenance (and applicable Research, Monitoring, and Evaluation [RM&E]) of the pertinent hatchery programs.
- The USFWS is funding the operation and maintenance, and RM&E of the Clearwater Fish Hatchery Spring and Summer Chinook Salmon Program, South Fork Clearwater (Localized) Steelhead Program, Dworshak National Fish Hatchery Spring Chinook Salmon Program, Kooskia National Fish Hatchery Spring Chinook Salmon Program, and portions of the Nez Perce Tribal Hatchery Spring Chinook Salmon Program through the LSRCP or other funds (FWS-Fisheries).
- The BPA is funding the operation and maintenance, and RM&E of the Nez Perce Tribal Hatchery spring Chinook Salmon Program.
- The Corps is the funding agency for the operation and maintenance, and monitoring and evaluation of the Dworshak National Fish Hatchery Steelhead program.

In an email dated October 19, 2017[2], and received by the Service on the same day, Idaho Department of Fish and Game (IDFG), on behalf of the federal action agencies, requested formal consultation on the determination under section 7 of the Act that authorizing and funding the Programs is likely to adversely affect bull trout (*Salvelinus confluentus*) and bull trout critical habitat. The agencies determined that the proposed actions are not likely to adversely affect the Canada lynx (*Lynx canadensis*), the North American wolverine (*Gulo gulo luscus*), or the northern Idaho ground squirrel (*Spermophilus brunneus brunneus*). The Service's concurrence with these determinations is provided in this Opinion.

[1] USFWS

[2] On October 20, 2017 and October 31, 2017, the Service received separate requests for formal consultation from LSRCP and BPA, respectively, to cover their funding actions.

As described in this Opinion, and based on the Biological Assessment (HDR 2017, entire) developed by HDR consultants on behalf of the action agencies, and other information, the Service has concluded that the actions, as proposed, are not likely to jeopardize the continued existence of bull trout and are not likely to destroy or adversely modify bull trout critical habitat.

This consultation addresses all aspects of the program as outlined in the Hatchery and Genetic Management Plans (HGMPs), and is intended to document compliance with the Act for all associated partners who permit, fund, or carry out various components of the Program. These partners include the federal action agencies, Idaho Department of Fish and Game (IDFG), the Nez Perce Tribe (NPT), and the Service as program operators.

1.2 Consultation History

The Service and action agencies have had the following correspondence and coordination on the continued operation of the Programs.

June 21, 2017: The Service received the draft Assessment from IDFG by email.

July 21, 2017: The Service sent comments on the draft Assessment to IDFG by email.

October 19, 2017: The Service received the final Assessment incorporating all comments from the federal action agencies and Program operators, and request for formal consultation from IDFG by email. The Service also received, by email, requests for formal consultation from the action agencies on this date.

October 31, 2017: The Service sent the draft Opinion, by email, to the federal action agencies and program operators for review. The Service also received a letter from BPA requesting formal consultation, as an email attachment, on this date.

November 8, 2017: The Service received comments on the draft Opinion from NMFS by email.

November 9, 2017: The Service received comments on the draft Opinion from IDFG by email.

November 15, 2017: The Service received comments on the draft Opinion from the Service (LSRCP and Dworshak National Fish Hatchery) by email.

November 17, 2017: The Service received comments on the draft Opinion from BPA by email.

1.3 Informal Consultations

1.3.1 Canada Lynx

Service concurrence with the determination that the Programs are not likely to adversely affect the Canada lynx is based on the following rationales.

1. Although a very limited amount of lynx habitat may be present at some locations in the action area, the proposed action does not include any activities that would remove or disturb that habitat. The proposed action will have insignificant effects on lynx habitat.

2. Lynx occurrence near hatchery facilities is unlikely because of existing infrastructure development and regular human activity. No lynx or denning sites have been observed near any of the Programs' facilities. Therefore the potential for the proposed action to disturb lynx is discountable.
3. Because it is not designated in the action area, the Programs will have no effect on lynx critical habitat.

1.3.2 North American Wolverine

Service concurrence with the determination that the Programs are not likely to adversely affect the wolverine is based on the following rationales.

1. It is unlikely that suitable wolverine denning habitat, which occurs at high elevations,is present at any facilities in the action area; therefore, effects on that habitat would be discountable. In addition, the proposed action does not include any activities that would remove or disturb lower elevation habitat that might support transient wolverine; therefore, effects would be discountable.
2. Wolverine occurrence near hatchery facilities is unlikely because of infrastructure development and regular human activity. No wolverine have been observed near any of the Programs' facilities. Therefore the potential for the proposed action to disturb wolverine is discountable.
3. Because it is not designated in the action area, the Programs will have no effect on wolverine critical habitat.

1.3.2 Northern Idaho Ground Squirrel

Service concurrence with the determination that the Programs are not likely to adversely affect the northern Idaho ground squirrel is based on the following rationale.

1. Except for an unconfirmed sighting documented in 2014 approximately 2 miles west of the Kooskia National Fish Hatchery, no Program facilities are located in the historic range of the northern Idaho ground squirrel and no confirmed sightings have been near any of the facilities. For these reasons the potential for Program activities to disturb the squirrels or modify squirrel habitat is discountable.

2. BIOLOGICAL OPINION

2.1 Description of the Proposed/Ongoing Action

This section describes the proposed Federal action, including any measures that may avoid, minimize, or mitigate adverse effects to listed species or critical habitat, and the extent of the geographic area affected by the action (i.e., the action area). The term "action" is defined in the implementing regulations for section 7 as "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas." The term "action area" is defined in the regulations as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action."

The following sections are adapted from the description of the action contained in the Assessment (HDR 2017, entire).

2.1.1 Background

U.S. Fish and Wildlife Service

Lower Snake River Compensation Plan

The LSRCP Program was authorized by the Water Resources Development Act of 1976 (Public Law 94-587) to mitigate losses caused by the construction and operation of the four Lower Snake River dams (Ice Harbor, Lower Monumental, Little Goose, and Lower Granite). The combined LSRCP mitigation return goals for Idaho, Oregon, and Washington include 293,500 adult Chinook salmon and 165,300 adult steelhead to be produced annually. These return goals assume a 4:1 and 2:1 ratio of catch, downstream of Lower Granite Dam to escapement upstream of Lower Granite Dam, for Chinook salmon and steelhead, respectively. The targets for Clearwater Fish Hatchery include annual returns of 11,915 adult spring Chinook salmon and 14,000 adult summer steelhead to stream reaches upstream of Lower Granite Dam. The goal for Dworshak National Fish Hatchery is annual returns of 9,135 adult spring Chinook salmon to stream reaches upstream of Lower Granite Dam.

Chinook salmon hatchery programs operated in the Clearwater River Subbasin and funded through the LSRCP include the spring and summer Chinook salmon program at Clearwater Fish Hatchery and the spring Chinook salmon program at Dworshak National Fish Hatchery. The only steelhead hatchery program operated in the Clearwater River Subbasin and funded through the LSRCP is the South Fork Clearwater (localized) steelhead program.

Direct U.S. Fish and Wildlife Service Funding (FWS-Fisheries)

The Kooskia National Fish Hatchery was authorized under Public Law 87-122 of August 3, 1961 when Congress appropriated funds to construct a fish hatchery to mitigate losses to anadromous fish runs affected by water development projects in the Columbia River Basin. Since 1969, the Service has funded the spring Chinook salmon program through Congressional appropriation to mitigate the fish losses and maintain Tribal, sport, and commercial fisheries. Adult production and harvest goals were not set when the program was first authorized by Congress in 1961, but

the hatchery was designed to produce 2 million spring Chinook salmon and 1 million steelhead. Program goals have recently been stated as a return of 5,200 adult Chinook salmon to the Clearwater River Subbasin, with approximately 4,080 available for sport and Tribal harvest.

Bonneville Power Administration

Under the Pacific Northwest Power Planning and Conservation Act of 1980, 16 USC § 839 et seq. (Northwest Power Act), BPA provides funding to protect, mitigate, and enhance fish and wildlife and their habitat affected by the development, operation, and management of federal hydroelectric facilities on the Columbia River and its tributaries. Under this authority, BPA funds the operation and maintenance (and any capital expense) of the Nez Perce Tribal Hatchery, and therefore, for the Nez Perce Tribal Hatchery Spring Chinook Salmon Program included under the proposed action.

The Northwest Power Act of 1980 created what is now known as the Northwest Power and Conservation Council (Council). The Council recognized the opportunity to mitigate effects on salmon runs in the Clearwater River Subbasin, and in 1982, authorized design and construction plans for fish production facilities on the Nez Perce Indian Reservation. The Council approved the final design and recommended that the BPA construct the Nez Perce Tribal Hatchery in 2000. Construction was completed in 2002. The goals of the Nez Perce Tribal Hatchery include mitigation, restoration, conservation, augmentation, and research through supplementation of spring Chinook salmon populations in Lolo Creek, Newsome Creek, and Meadow Creek (Selway River).

U.S. Army Corps of Engineers

The Corps funds the Service for operations, maintenance, fish health, monitoring, and evaluation of the Dworshak National Fish Hatchery B-run steelhead program. The Service in turn provides some of this funding to the Nez Perce Tribe, who jointly operate and manage the hatchery under the Snake River Basin Adjudication agreement. The hatchery program is part of the Corps's Dworshak Dam and Reservoir Fish and Wildlife Mitigation Program. The program is designed to replace adult steelhead and rainbow trout lost by the construction and operation of Dworshak Dam and Reservoir on the North Fork Clearwater River.

The mitigation goal for the program was initially described as 30,000 adult steelhead into the Columbia River and 20,000 into the Clearwater River. Subsequent objectives were established to include providing 13,700 adults for State and Tribal fisheries in the Clearwater River, as well as 4,300 broodstock, to perpetuate the Dworshak program and the LSRCP program at the Clearwater Hatchery (USFWS and NPT 2010).

Columbia River Inter-Tribal Fish Commission (CRITFC)

The CRITFC coordinates management policy and provides fisheries technical services for the Yakama Nation, Warm Springs, Umatilla, and Nez Perce Tribes. CRITFC is actively involved in funding a portion of the coho salmon restoration efforts in the Clearwater River Subbasin. The CRITFC program has been critical to the NPT's success in returning previously-extirpated coho salmon to the subbasin. The coho salmon restoration effort in the Clearwater River Subbasin also includes components funded directly by the NMFS through the Pacific Coast Salmon Restoration Fund (PCSRF) and the Mitchell Act; however, only the CRITFC-funded portion of the program is included as part of the proposed action for this Opinion. Other portions

of the program have already been analyzed and covered in the Mitchell Act Environmental Impact Statement (NMFS 2014) and Biological Opinion (NMFS 2017a).

Hatchery and Genetic Management Plans (HGMPs)

The LSRCP Office initiated consultation on May 19, 1998, with the Service Snake River Basin Office for all LSRCP programs under a programmatic Assessment. The Service issued a Biological Opinion on the operation of the LSRCP program (File # 1024.0000, 1-4-99-F-2) on April 8, 1999.

The IDFG, NPT, and LSRCP submitted Hatchery and Genetic Management Plans (HGMPs) to the NMFS in 2002, 2010, 2011, and 2013 requesting coverage under a Biological Opinion for LSRCP-funded summer steelhead and spring/summer Chinook salmon programs in the Clearwater River Subbasin. The BIA submitted the HGMP for the BPA and LSRCP-funded Nez Perce Tribal Hatchery spring/summer Chinook Program in 2013. The NPT has prepared a draft HGMP for the coho salmon restoration program. HGMPs are available upon request from NMFS, IDFG, NPT, or LSRCP. The HGMPs for each program contain detailed descriptions of programs and assessment of effects on salmon and steelhead. The HGMPs reflect the most up-to-date production numbers as captured in the production tables of the *United States v. Oregon* management agreement.

Section 6 Cooperative Agreement for Bull Trout Take Associated with Idaho Department of Fish and Game Research, Monitoring, and Evaluation

IDFG annually prepares a Bull Trout Conservation Program Plan and Take Report that describes its management program to meet the provisions contained in Section 6 of the Act and to comport with the spirit of Section 10(a)1(A). The plan identifies the benefits to bull trout from conservation, management and research conducted or authorized by the state, provides documentation of bull trout take by IDFG, and provides an estimate of take for the coming year. The IDFG submits the plan to the Service, who makes a determination on whether implementation of the program was conducted in accordance with the Act.

This section 7 consultation document is intended to consult on hatchery-related operational and RM&E effects on listed species and their critical habitat associated with the funding, permitting, or undertaking of the programs described herein by the Federal action agencies. RM&E undertaken by IDFG is appropriately addressed via their section 6 agreement with the Service. Unless explicitly identified as agents of the state, section 6 coverage does not extend to the federal action agencies.

Incidental take of listed species (bull trout) has been estimated in Appendix A of the Assessment and is included in Incidental Take Statement of this Opinion.

Nez Perce Tribe Department of Fisheries Resource Management Section 10 Permits

The Nez Perce Tribe Department of Fisheries Resources Management (DFRM) operates research and evaluation studies for Chinook salmon and steelhead. In the course of those studies, researchers have incidentally taken bull trout. This take is currently covered by and through the Bureau of Indian Affairs under Robert Lothrop as the permit signatory. This coverage is

administered under the Service Bull Trout Permit #TE 001598-6, which expires on April 9, 2022. The original application was submitted in 1998, with modifications and/or renewals occurring in 2000, 2002, 2005, 2008, 2012, 2013, and 2017.

The NPT RM&E activities associated with the subject hatchery programs, and currently covered by Permit #TE-001598-6, are part of the proposed action. Therefore, once this consultation is completed, incidental take of bull trout associated with RM&E activities described herein will be covered under this Opinion; the section 7 consultation will replace and supersede RM&E-related take currently addressed via Permit #TE-001598-6.

2.1.2 Action Area

The aquatic portion of the Action Area for Clearwater River hatchery programs included under the proposed action primarily focuses where the program activities occur, including releases of juvenile fish. Therefore, the aquatic portion of the Action Area includes the mainstem Clearwater River, North Fork Clearwater River, Lolo Creek, the South Fork Clearwater River, the Middle fork Clearwater River, the Lochsa River, and the Selway River, downstream of the uppermost release site in each stream (Figure 1). Specific tributaries are also included downstream from the uppermost facility or release site in each stream Tributaries or additional reaches included in the Action Area for each watershed include:

- Mainstem Clearwater River
  - Lapwai Creek
    - Note that the Lapwai Creek seasonal weir is typically used for collection of non-project coho salmon (covered under Mitchell Act Biological Opinion), but is included as a conservative measure in this Opinion if its operation is required for broodstock collection of the CRITFC-funded portion of the coho salmon program. Further, broodstock collected at the Lapwai Creek weir provide eggs for Dworshak.
- North Fork Clearwater River
  - Dworshak Reservoir (as related to surface water withdrawal for Clearwater Hatchery and Dworshak National Fish Hatchery)
- Lolo Creek
  - Yoosa Creek
  - Camp Creek
  - El Dorado Creek
- South Fork Clearwater River
  - Meadow Creek
  - Newsome Creek
  - Crooked River
  - Red River

- Middle Fork Clearwater River
  - Clear Creek
- Lochsa River
  - Walton Creek
- Selway River
  - Meadow Creek

Because ecological interactions are possible between bull trout and out-migrating hatchery juveniles or returning adults in the Snake and Columbia rivers, the Action Area also includes the mainstem Snake and Columbia Rivers.

Fish released from the hatchery programs under the proposed action are also likely to inhabit other portions of the Columbia River Basin and the Pacific Ocean. Because fish from the proposed programs comprise a small proportion of the total numbers of fish in the non-mainstem portions of the Columbia River Basin and the ocean, it is not possible to meaningfully measure, detect, or evaluate the effects of any interactions due to the low likelihood or magnitude of such interactions (NMFS 2012). Therefore, these areas are not part of the Action Area.

The Action Area also includes terrestrial habitat within 0.25 mile of each existing hatchery facility or release site. The terrestrial portion of the Action Area is defined by the geographic extent of impacts from the following:

- Operation and maintenance of all facilities utilized by the Clearwater River Hatchery programs included under the proposed action; and,
- Use of existing haul roads and upland access sites for acclimation and release, as well as upland areas surrounding proposed juvenile acclimation and/or release sites.

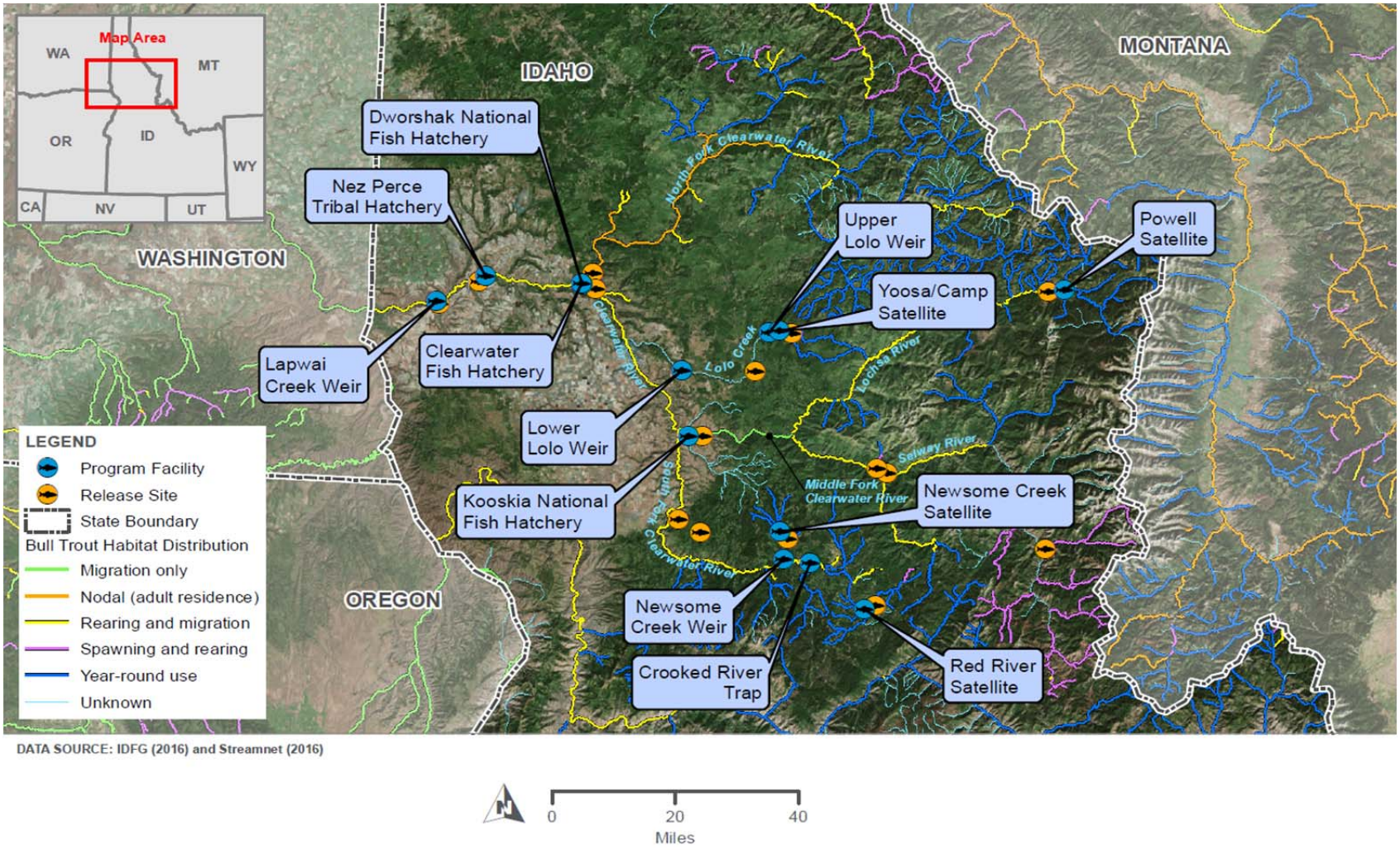

Figure 1. Facilities and release sites associated with Clearwater River Hatchery Programs under the proposed action in relation to bull trout habitat (from Assessment Figure 1-1).

2.1.3 Proposed Actions[3]

The proposed action is the issuance of authorizations under sections 7 and 4(d) of the Act for the continued operation and maintenance of seven hatchery programs that produce Snake River steelhead, Snake River spring/summer Chinook salmon, and Clearwater River coho salmon by NMFS; funding of the programs through the Service (LSRCP and other), BPA, Corps, and CRITFC; and continued operation and maintenance and RM&E of the hatchery programs (Table 1):

1. The proposed action for the NMFS is the issuance of seven authorizations under the Act for indirect take, including Section 7 permits for all programs other than the Clearwater River Coho Salmon Restoration Program funded by CRITFC, which will operate under section 4(d). The permits would cover the continued operation and maintenance (and applicable RM&E) of hatchery programs intended to enhance the propagation and survival of Snake River steelhead, Snake River spring/summer Chinook salmon, and Clearwater River coho salmon.
2. The proposed action for the U.S. Fish and Wildlife Service is the funding of the operation and maintenance, and RM&E of four hatchery programs through the LSRCP, which is approved by the Water Resources Development Act of 1976, (Public Law 94-587, Section 102, 94th Congress), or through other funds. An additional proposed action for the U.S. Fish and Wildlife Service (FWS-Fisheries) is the funding of the operation and maintenance, and RM&E of the Kooskia National Fish Hatchery Spring Chinook salmon program.
3. The proposed action for the BPA is the funding of the operation and maintenance, and RM&E of the Nez Perce Tribal Hatchery spring Chinook salmon program under the Northwest Power Act.
4. The proposed action for the Corps is the funding of the operation and maintenance, and RM&E of the Dworshak National Fish Hatchery steelhead program. Relative to the North Fork B-run Steelhead Program, the majority of smolts are released at the Dworshak hatchery. As a result of collaboration with regional partners, some Dworshak steelhead are outplanted to Lolo Creek, Clear Creek, and the South Fork Clearwater River. Any additional actions associated with such outplants may require specific Congressional authority and will require further coordination between the Corps and regional fish managers.
5. An additional Proposed Action is the potential need for federal authorization for facility maintenance activities that discharge fill materials into waters of the U.S. under Section 404 of the Clean Water Act (CWA). Although many maintenance activities are exempt from discharge authorization, semi-routine discharges (e.g., debris removal) may be required throughout the life of this consultation to maintain infrastructure at the subject hatchery facilities. The Corps regulates and authorizes the discharge of fill materials

[3] This description of the ongoing action is excerpted (with minor modifications) from the Assessment (HDR 2017, pp. 19-65).

under the CWA for activities that are not specifically exempt from permitting requirements under Section 404(f)(1)(B) of the CWA.

Table 1. Clearwater River Hatchery Programs showing Agency Operator, Funding Source, Program associated Fish Hatcheries, and date of current HGMPs (from Assessment Table 1-1).

Program	Agency/ Operator	Funding Source	Fish Hatcheries	Current Hatchery Genetic Management Plan Date
Nez Perce Tribal Hatchery Spring Chinook Salmon	NPT	BPA/LSRCP	Nez Perce Tribal	April 15, 2013
Clearwater Fish Hatchery Spring and Summer Chinook Salmon	IDFG	LSRCP	Clearwater	November 2011
South Fork Clearwater (Localized) Steelhead	IDFG	LSRCP	Clearwater	November 2011
Dworshak National Fish Hatchery Spring Chinook Salmon	FWS-Fisheries; NPT	LSRCP	Dworshak National	December 2010
Dworshak National Fish Hatchery B-run Steelhead	FWS-Fisheries; NPT	Corps	Dworshak National	April 2010
Clearwater River Coho Salmon Restoration	NPT	CRITFC	Kooskia National; Dworshak National	2016 Draft
Kooskia National Fish Hatchery Spring Chinook Salmon	NPT	FWS-Fisheries	Kooskia National; Dworshak National	December 2010

The seven Clearwater River hatchery programs included as part of the proposed action collect adult broodstock at numerous locations throughout the Clearwater River Subbasin. Release of hatchery smolts also occurs at numerous locations throughout the subbasin (Figure 1). Juvenile release targets include approximately 3 million steelhead, 6 million Chinook salmon, and 500,000 coho salmon.

Steelhead are all released as smolts, with about 80 percent being released into the mainstem Clearwater River (North Fork near mainstem) and South Fork Clearwater River watersheds. About 85 percent of the Chinook salmon are released as smolts, distributed throughout the subbasin. Presmolts are released into Lolo Creek and the South Fork Clearwater River watershed, and parr are released into the Selway River watershed. Coho salmon are released as smolts into Lapwai Creek (mainstem Clearwater River watershed) and Clear Creek in the Middle Fork Clearwater River watershed.

The Programs' facilities and general locations are shown in Table 2 and discussed in detail in the sections below.

Table 2. Facilities and general locations used for Clearwater River Hatchery Programs (from Assessment Table 2-2).

Program, Operator	Fish Hatchery or Trap				Release Site by Watershed
	Broodstock Collection	Spawning	Incubation	Rearing/Acclimation	
Nez Perce Tribal Hatchery Spring Chinook Salmon, NPT	Nez Perce Tribal; Lolo Creek Weirs; Newsome Creek Weir; Dworshak National	Nez Perce Tribal; Dworshak National	Nez Perce Tribal; Dworshak National	Nez Perce Tribal; Yoosa/Camp Creek Satellite; Newsome Creek Satellite	Clearwater River: • Nez Perce Tribal Hatchery Lolo Creek: • Yoosa/Camp Creek Satellite • Lolo Creek[a] South Fork Clearwater River: • Newsome Creek Selway River: • Meadow Creek
Clearwater Fish Hatchery Spring and Summer Chinook Salmon, IDFG	Dworshak National; Crooked River Trap; Red River Trap; Kooskia National; Powell Trap	Clearwater; Powell; Dworshak National	Clearwater	Clearwater; Red River Satellite; Powell Satellite	North Fork Clearwater River • Clearwater Fish Hatchery South Fork Clearwater River: • Red River Satellite Middle Fork Clearwater River • Clear Creek at Kooskia National Fish Hatchery Lochsa River: • Powell Satellite (Walton Creek) Selway River: • Lower Selway River
South Fork Clearwater (Localized)Steelhead, IDFG	Dworshak National[b]; South Fork Clearwater River[b]	Dworshak National	Dworshak National; Clearwater	Clearwater	South Fork Clearwater River: • Red House Hole • Meadow Creek • Newsome Creek
Dworshak National Fish Hatchery Spring Chinook Salmon, USFWS	Dworshak National	Dworshak National	Dworshak National	Dworshak National	Clearwater River: • Dworshak National Fish Hatchery Selway River: • Upper Selway River

Program, Operator	Fish Hatchery or Trap				Release Site by Watershed
	Broodstock Collection	Spawning	Incubation	Rearing/Acclimation	
Dworshak National Fish Hatchery B-run Steelhead, USFWS	Dworshak National[b]; South Fork Clearwater River[c]	Dworshak National	Dworshak National	Dworshak National	Clearwater River: • Dworshak National Fish Hatchery Lolo Creek: • El Dorado Creek Bridge South Fork Clearwater River: • Red House Hole Middle Fork Clearwater River • Clear Creek at Kooskia National Fish Hatchery
Clearwater River Coho Salmon Restoration, NPT[d]	Lapwai Creek Weir[d]; Dworshak National; Kooskia National	Dworshak National	Dworshak National; Kooskia National	Dworshak National; Kooskia National Eagle Creek, Oregon[d]	Clearwater River • Lapwai Creek Weir Middle Fork Clearwater River • Clear Creek at Kooskia National Fish Hatchery • Lolo Creek[e]
Kooskia National Fish Hatchery Spring Chinook Salmon, NPT	Kooskia National	Dworshak National	Kooskia National	Kooskia National	Middle Fork Clearwater River • Clear Creek at Kooskia National Fish Hatchery

[a] Exact location of release depends on snowpack and road conditions

[b] Use of broodstock from Dworshak National Fish Hatchery for the South Fork Clearwater River programs has been replaced by use of angler-caught fish from the South Fork Clearwater River.

[c] Collected by volunteer anglers

[d] Includes activities covered in this BA and activities already covered in the Mitchell Act EIS and BiOp (i.e., Eagle Creek, Oregon facility). Note also that the Lapwai Creek weir is typically used for collection of non-project Coho Salmon (covered under Mitchell Act BiOp), but is included as a conservative measure in this BA if its operation is required for broodstock collection of the CRITFC-funded portion of the Coho Salmon program. Further, broodstock collected at the Lapwai Creek weir provide eggs for Dworshak.

[e] Surplus juveniles only

Note: All weirs and traps not at hatcheries are seasonal.

2.1.3.1 Nez Perce Tribal Hatchery Spring Chinook Salmon

The Nez Perce Tribal Hatchery Complex provides mitigation for the effects of the Federal Columbia River Hydropower System on naturally-reproducing salmon in the Clearwater River Subbasin. The overall goal is 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. The spring Chinook salmon program is consistent with the Clearwater Subbasin Plan (Ecovista et al. 2003) and the 2008-2017 *United States v. Oregon* Management Agreement.

The current production goal for spring Chinook salmon includes 380,000 smolts, 225,000 presmolts, and 400,000 parr. Juvenile releases occur in the Clearwater River at the hatchery, in the Lolo Creek watershed at the Yoosa/Camp Satellite facility and Lolo Creek(and at other locations depending on snowpack and road conditions), in the South Fork Clearwater River watershed at the Newsome Creek Satellite facility, and in the Selway River watershed in Meadow Creek and Selway River. Actual or estimated releases have generally been very close to targets.

To meet release targets, it is necessary to collect 478 spring Chinook salmon adults (even number of females and males) at the Nez Perce Tribal Hatchery. Beginning in 2015, additional production became possible by trapping a further 106 adults at Dworshak National Fish Hatchery. Although a number of potential trapping facilities exist, adult salmon trapped at the hatcheries provide eggs for the Meadow Creek program, and also provide some or all of the eggs for the Lolo Creek and Newsome Creek programs. If adults are trapped at either Lolo Creek or Newsome Creek, the number of adults trapped at the hatchery may be reduced accordingly.

Broodstock for the smolts released directly into the Clearwater River and for those released in the Lolo Creek watershed at the mouth of El Dorado Creek are collected at Dworshak National Fish Hatchery; spawning, incubation, and early rearing takes place there, or at Clearwater Fish Hatchery. Fish are transferred to the Nez Perce Tribal Hatchery for final rearing and released the following spring.

The Nez Perce Tribal Hatchery complex is operated by the NPT and includes a number of facilities. Returning adults are collected at the hatchery weir on the mainstem Clearwater River, at weirs on Lolo Creek, and at a weir on Newsome Creek in the South Fork Clearwater River watershed. Spawning, incubation, and rearing all occur at the primary hatchery facility. Facilities used for acclimation and release of juvenile fish, in addition to the primary hatchery, include the Yoosa/Camp Satellite facility in the Lolo Creek watershed and the Newsome Creek Satellite facility in the South Fork Clearwater River watershed. No additional facility is utilized for releases into the Lolo Creek watershed (near the confluence of El Dorado Creek, depending on snowpack and road conditions), or into Meadow Creek in the Selway River watershed.

Water right permits for all Nez Perce Tribal Hatchery facilities are held by the BPA. National Pollutant Discharge Elimination System (NPDES) permits are not required because total production is less than the 20,000-pound annual threshold. However, a NPDES Permit Waste Management Plan was developed for all Nez Perce Tribal Hatchery facilities. Final plans were submitted to the Idaho Department of Environmental Quality and the NPT Water Quality Division in 2001. In 2002, NMFS consulted with the NPT and inspected and approved all intake screens.

2.1.3.1.1 Nez Perce Tribal Hatchery and Trap

The Nez Perce Tribal Fish Hatchery is located at river kilometer (RKM) 35.7 (river mile (RM) 22.2) of the mainstem Clearwater River, between Lapwai Creek and the North Fork of the Clearwater River, east of Lewiston, Idaho. Construction was completed in 2002. The hatchery operates year round and is currently used for broodstock collection, spawning, incubation, rearing, and release of Snake River spring Chinook salmon and Snake River fall Chinook salmon (fall Chinook are covered in a separate Opinion [USFWS 2017a]).

Operation

The Nez Perce Tribal Hatchery includes broodstock collection, holding, and spawning facilities; five incubation rooms; indoor and outdoor rearing facilities; and acclimation/release facilities. Clearwater River surface water is provided by four pumps with a combined capacity of 4,500 gallons per minute (gpm) (10 cubic feet per second [cfs]). The water right held by the BPA is for 35 cfs or 15,708 gpm. The hatchery is also supplied by four groundwater wells with a combined rated capacity of 1,460 gpm (3 cfs) and a current actual combined capacity of 725 gpm (1.6 cfs). The water right held by the BPA is for 7 cfs or 3,142 gpm. Well water and river water are mixed, as appropriate, to achieve desired water temperatures. The distance from surface water diversion via the intake to return via the outfall/fish ladder on the Clearwater River mainstem is approximately 60 feet.

Broodstock collection facilities include a concrete fish ladder (4 feet wide by160 feet long), an adult trap (volume = 1,600 cubic feet), and two holding tanks (total volume = 16,000 cubic feet). Each tank is equipped with upwelling, subsurface inflow, overspray bars, variable depth, jump screens, and a vandal fence.

Water is pumped from the Clearwater River into a packed column head tank prior to distribution to the two tanks, trap, and ladder. The pump has a rated and actual capacity of 1,500 gpm and is used exclusively for adult holding and for trap and ladder water. Oxygen levels are maintained at saturation based on elevation and temperature. The spawning area is a concrete-floored heated building (approximately 30 feet by 30 feet) at the east end of the two adult holding tanks.

Each of the five incubation rooms contains two rearing systems. Each system has its own water supply composed of both well water and filtered, UV-treated and chilled river water, which can be mixed automatically to achieve desired egg/fry rearing temperatures. Each system has its own recirculation system and formalin application system.

Spring Chinook salmon rearing facilities include 38 indoor fiberglass rearing tanks, two "Natures" S-channels with 8,440 cubic feet of rearing space each, and two concrete raceways with 4,025 cubic feet of rearing space each. The raceways serve the purpose of rearing prior to marking, and are used only when logistical constraints warrant.

Approximately 200,000-250,000 juveniles are transferred from Clearwater Hatchery or Dworshak National Fish Hatchery in September each year and are placed in the S-channels for final rearing and acclimation before release directly into the Clearwater River the following April. Water is sourced from the Clearwater River and is provided by the three in-river pumps.

Routine Maintenance

Normal and preventative maintenance of hatchery facility structures and equipment is necessary for proper functionality. Normal activities include pond cleaning, pump maintenance, debris removal from intake and outfall structures, building maintenance, and ground maintenance.

Following periods of high flow, sand and gravel accumulates in front of the water source intake and the entrance to the fish ladder and trap used for capturing adult fish returning to the facility. This sand and gravel accumulation restricts river flow and may encourage bank erosion, resulting in further sedimentation or damage to structures and equipment. The accumulation of sediment and debris also has the potential to restrict the volume of water that can be diverted to the facility. As such, in-river maintenance of the intake structure, intake piping, and fish ladder is a common requirement. Materials must be removed annually as needed to ensure an uninterrupted supply of water for fish trapping operations. Structures may need to be temporarily removed for repair or replacement.

Removal of accumulated sediment or woody debris may at times require heavy equipment, ranging from a clamshell-type excavation bucket mounted to a crane, to a tracked or rubber-tired excavator. Heavy equipment would normally be operated from the streambank, and would therefore not normally enter the stream channel. All excavated material would be removed from the river and loaded into a truck for offsite disposal or spread evenly along the riverbank or used as local dirt parking lot fill.

If the operation of heavy equipment were required, such activities would occur over a matter of hours during the established in-water work window in coordination with the state resource agencies, Service, and NMFS, as described above. If a variance to this window were required, no activities would occur until agency approvals were obtained. Impact minimization measures, including the use of vegetable-based synthetic fuel oil for equipment (e.g., excavators), are described in Section 2.1.5.7.

Semi-routine Maintenance

Semi-routine maintenance may include repairs to the various wooden, steel, and concrete structures at the water source intake and fish ladder, which may become compromised simply from age and exposure to changing weather conditions. Hatchery personnel must periodically complete a visual inspection of the structures by entering the river channel with hip boots, waders, or dry suits with supplied air systems. Access within the wetted perimeter of the stream would normally be limited to workers using hand tools, mud and sand suction dredges, or guiding the operation of heavier equipment.

Minor repairs may be completed in place by workers using hand tools, whereas more extensive repairs may require portions of these structures to be temporarily removed for repair or replacement. Should removal of these structures be necessary, a backhoe/trackhoe or a crane or similar lifting device operated from the streambank would be employed.

2.1.3.1.2 Lolo Creek Weirs

Two weirs on Lolo Creek are located at RKM 21.0 (RM 13.1) below known Chinook salmon spawning habitat, and at RKM 50.5 (RM 31.4) in the upper known spawning habitat. The weirs are operated from May to September each year to collect spring Chinook salmon broodstock.

Operation

The use of adults for broodstock trapped at the Lolo weirs is run-dependent, meaning they are only utilized when forecasted and actual returns to Lolo Creek support capture. In low run years, returning adults are passed to support natural spawning in the stream. The traps at both weirs are picket-style and are expandable when large returns are anticipated.

Employees are stationed at the two weirs on a 7-days-a-week schedule during weir operation. When broodstock collection is approved, fish are removed daily and placed in a transport tank for transport to the Nez Perce Tribal Hatchery. Water in the transport tank is pumped from the holding water source at the Nez Perce Tribal Hatchery.

Routine Maintenance

Routine maintenance includes the removal of sediment from the weir traps. Fine sand and silts accumulate within the trap structure where water velocity is slow. Once or twice each spring Chinook salmon trapping season, hatchery personnel flush this material back to the river channel using high-pressure water hoses. The process is completed in less than 1 day and the trap/ladder is returned to normal operation after completion.

Semi-routine Maintenance

Aside from damages or loss of functionality related to high-water events, the integrity of the adult weir may be compromised simply by age and exposure to changing weather conditions. Personnel must periodically complete a visual inspection of the structures by entering the river channel with hip boots or waders. Minor repairs may be completed in place by workers using hand tools, whereas more extensive repairs may require individual weir panels to be temporarily removed for repair or replacement. Should removal of these structures exceed the lifting capability of personnel, a crane or similar device operated from the streambank would be employed.

In some instances, it may be necessary to use an in-stream excavator to remove weir panels. To minimize impacts to bull trout, all work would be completed within a work window of August 1 – October 30, previously established by the Service for proposed construction of a permanent weir on Lolo Creek (FWS: 01EIFW00-2012-F-0352). If a variance to this window were required, no activities would occur until agency approvals were obtained. Impact minimization measures, including the use of vegetable-based synthetic fuel oil for equipment (e.g., excavators), are described in Section 2.1.5.7.

2.1.3.1.3 Yoosa/Camp Satellite

The Yoosa/Camp Satellite facility is located in the Upper Lolo Creek watershed at RKM 4.6 (RM 2.9) of Yoosa Creek. The facility has the ability to hold broodstock trapped at the two weirs located downstream and to serve as an acclimation facility for presmolts released into the Lolo Creek watershed. The facility is currently operated only from late August/early September through mid-October for acclimation and release of spring Chinook salmon.

Operation

Because of warm water temperatures, no broodstock are currently held at the facility. All adults collected at the weirs are transported to the Nez Perce Tribal Hatchery daily. Presmolts transported from the Nez Perce Tribal Hatchery for acclimation at the Yoosa/Camp Satellite facility are volitionally released over a 1-2 week period.

The adult holding facility includes one tank with a volume of 3,200 cubic feet. The tank is equipped with overspray bars, variable depth, jump screens, and a vandal fence. Juvenile rearing occurs from late August/early September through October in two natural substrate ponds (total volume equals 9,440 cubic feet).

Water is provided through two gravity flow surface water intakes, one in Yoosa Creek and one in Camp Creek. Combined, these intakes have a rated capacity of 1,400–1,800 gpm (3.1-4.0 cfs), although currently the two sources provide around 1,100 gpm (2.5 cfs) for fish production only. The water right held by the BPA is 2.5 cfs for each creek intake (1,122 gpm each). The approximate distance from surface water diversion at the Camp Creek intake to the return location on Yoosa Creek is 200 meters. The distance from the Yoosa Creek intake surface water diversion to the return location on Yoosa Creek is approximately 150 meters.

Fingerlings (approximately 35-40 fish per pound) are trucked to the site in late August/early September. Fish are released as presmolts in October, when natural presmolt emigration is noted at screw traps downstream. A 14-day volitional release period is conducted before fish are forced out.

Employees are stationed at the Yoosa/Camp Satellite 24 hours/day and 7 days/week during fish acclimation and release. Personnel are required to call the Nez Perce Tribal Hatchery twice daily to report operating conditions and to request support as needed.

Routine Maintenance

Normal and preventative maintenance of hatchery facility structures and equipment is necessary for proper functionality. Normal activities include pond cleaning, pump maintenance, debris removal from intake and outfall structures, building maintenance, and ground maintenance.

Following periods of high flow, sand and gravel accumulates in front of the water source intake. This sand and gravel accumulation restricts river flow and may encourage bank erosion, resulting in further sedimentation or damage to structures and equipment. The accumulation of sediment and debris also has the potential to restrict the volume of water that can be diverted to the facility. As such, in-river maintenance of the intake structure and intake piping is a common requirement. Materials must be removed annually to ensure an uninterrupted supply of water for fish trapping operations. Structures may need to be temporarily removed for repair or replacement.

Although instream machinery is not typically placed in the active river channel during debris removal operations, in some instances, the volume of material may require the use of an instream excavator. If the operation of heavy equipment were required, such activities would occur during the established in-water work window in coordination with the state resource agencies, the Service, and NMFS, as described above. If a variance to this window were required, no activities would occur until agency approvals were obtained. Impact minimization measures, including the use of vegetable-based synthetic fuel oil for equipment (e.g., excavators), are described in Section 2.1.5.7.

Semi-routine Maintenance

Semi-routine maintenance may include repairs to the various structures at the water source intake, which may become compromised simply from age and exposure to changing weather conditions. Facility personnel must periodically complete a visual inspection of the structures by entering the river channel with hip boots, waders, or dry suits with supplied air systems. Access within the wetted perimeter of the stream would normally be limited to workers using hand tools, mud and sand suction dredges, or guiding the operation of the heavy equipment.

Minor repairs may be completed in place by workers using hand tools, whereas more extensive repairs may require portions of these structures to be temporarily removed for repair or replacement. Should removal of these structures be necessary, a backhoe/trackhoe or a crane or similar lifting device operated from the streambank would be employed.

Removal of accumulated sediment or woody debris may at times require heavy equipment, ranging from a clamshell-type excavation bucket mounted to a crane, to a tracked or rubber-tired excavator. Heavy equipment would normally be operated from the streambank, and would therefore not normally enter the stream channel. All excavated material would be removed from the river and loaded into a truck for offsite disposal, spread evenly along the riverbank, or used as local dirt parking lot fill.

In some instances, it may be necessary to use an instream excavator to perform weir repairs or debris removal. If the operation of heavy equipment were required, such activities would occur over a matter of hours. To minimize impacts to bull trout, all work would be completed within a work window of August 1 – October 30. Impact minimization measures, including the use of vegetable-based synthetic fuel oil for equipment (e.g., excavators), are described in Section 2.1.5.7.

2.1.3.1.4 Newsome Creek Weir

The Newsome Creek weir is located at RKM 0.1 (RM 0.1) of Newsome Creek in the South Fork Clearwater River watershed. The weir is generally operated from May through September each year to collect spring Chinook salmon broodstock.

Operation

Use of adults for broodstock trapped at the Newsome weir is run dependent, meaning they are only utilized when forecasted and actual returns to Newsome Creek support their capture. In low run years, they are passed to support natural spawning in the stream.

Employees are stationed at the weir on a 7-days-a-week schedule during weir operation. Adults are captured at the seasonal picket-type weir and trap. The trap is expandable when large returns are anticipated. When broodstock collection is approved, fish are removed daily and placed in a transport tank for transport to the Nez Perce Tribal Hatchery. Water in the transport tank is pumped from the holding water source at the Nez Perce Tribal Hatchery.

Routine Maintenance

Routine maintenance includes the removal of sediment from the weir traps. Fine sand and silts accumulate within the trap structure where water velocity is slow. Once or twice each spring Chinook salmon trapping season, hatchery personnel flush this material back to the river channel using high-pressure water hoses. The process is completed in less than 1 day and the trap/ladder is returned to normal operation after completion.

Semi-routine Maintenance

Aside from damages or loss of functionality related to high-water events, the integrity of the adult weir may be compromised simply by age and exposure to changing weather conditions. Personnel must periodically complete a visual inspection of the structures by entering the river channel with hip boots or waders. Minor repairs may be completed in place by workers using hand tools, whereas more extensive repairs may require individual weir panels to be temporarily removed for repair or replacement. Should removal of these structures exceed the lifting capability of personnel, a crane or similar device operated from the streambank would be employed.

In some instances, it may be necessary to use an instream excavator to remove weir panels. If the operation of heavy equipment were required, such activities would occur over a matter of hours during the established in-water work window in coordination with the state resource agencies, Service, and NMFS, as described above. If a variance to this window were required, no activities would occur until agency approvals were obtained. Impact minimization measures, including the use of vegetable-based synthetic fuel oil for equipment (e.g., excavators), are described in Section 2.1.5.7.

2.1.3.1.5 Newsome Creek Satellite

The Newsome Creek Satellite facility is located at RKM 10.9 (RM 6.8) of Newsome Creek in the South Fork Clearwater River watershed. The facility has the ability to hold broodstock trapped at the weir located at RKM 0.1 (RM 0.1; see Section 2.1.3.1.4) and to serve as an acclimation facility for presmolts released into Newsome Creek. The facility is currently operated only from late August/early September through mid-October for acclimation and release of spring Chinook salmon.

Operation

Because of warm water temperatures, no broodstock are currently held at the facility. All adults collected at the downstream weir are transported to the Nez Perce Tribal Hatchery daily. Presmolts transported from the Nez Perce Tribal Hatchery for acclimation at the Newsome Creek Satellite facility are volitionally released over a 1-2 week period.

The adult holding facility includes one tank with a volume of 3,200 cubic feet. The tank is equipped with overspray bars, variable depth, jump screens, and a vandal fence. Juvenile rearing and final acclimation occurs from September through October in a single natural substrate pond (volume = 5,315 cubic feet).

Water is provided through a single surface water intake in Newsome Creek. Current capacity for juvenile fish rearing is 500-700 gpm (1.1-1.6 cfs). The water right held by the BPA is for 763 gpm (1.7 cfs). Surface water diverted at the Newsome Creek surface water intake is returned to the creek about 400 meters downstream of the intake.

Fingerlings (approximately 35-40 fish per pound) are trucked to the site in September as temperatures drop below 60 degrees Fahrenheit (ºF). Presmolt release occurs in October when natural presmolt emigration is noted at a screw trap located near the stream mouth. A 14-day volitional release period is conducted before fish are forced out. A gravity flow pipeline can supply upwards of 1,400 gpm from Newsome Creek.

An employee is stationed at the acclimation facility on a 24-hours-a-day, 7-days-a-week schedule. They are required to call the Nez Perce Tribal Hatchery twice daily by satellite phone to report operating conditions and to request additional support as needed.

Routine Maintenance

Normal and preventative maintenance of hatchery facility structures and equipment is necessary for proper functionality. Normal activities include pond cleaning, pump maintenance, debris removal from intake and outfall structures, building maintenance, and ground maintenance.

Following periods of high flow, sand and gravel accumulates in front of the water source intake. This sand and gravel accumulation restricts river flow and may encourage bank erosion, resulting in further sedimentation or damage to structures and equipment. The accumulation of sediment and debris also has the potential to restrict the volume of water that can be diverted to the facility. As such, in-river maintenance of the intake structure and intake piping is a common requirement. Materials must be removed annually to ensure an uninterrupted supply of water for fish trapping operations. Structures may need to be temporarily removed for repair or replacement.

In some instances, it may be necessary to use an instream excavator to remove debris. To minimize impacts on bull trout, all work would be completed within a work window of July 1 to August 14. If a variance to this window were required, no activities would occur until agency approvals were obtained. Impact minimization measures, including the use of vegetable-based synthetic fuel oil for in-stream equipment (e.g., excavators), are described in Section 2.1.5.

Semi-routine Maintenance

Semi-routine maintenance may include repairs to the various structures at the water source intake, which may become compromised simply from age and exposure to changing weather conditions. Facility personnel must periodically complete a visual inspection of the structures by entering the river channel with hip boots, waders, or dry suits with supplied air systems. Access within the wetted perimeter of the stream would normally be limited to workers using hand tools, mud and sand suction dredges, or guiding the operation of the heavy equipment.

Minor repairs may be completed in place by workers using hand tools, whereas more extensive repairs may require portions of these structures to be temporarily removed for repair or replacement. Should removal of these structures be necessary, a backhoe/trackhoe or a crane or similar lifting device operated from the streambank would be employed.

Removal of accumulated sediment or woody debris may at times require heavy equipment, ranging from a clamshell-type excavation bucket mounted to a crane, to a tracked or rubber-tired excavator. Heavy equipment would normally be operated from the streambank, and would therefore not normally enter the stream channel. All excavated material would be removed from the river and loaded into a truck for offsite disposal, spread evenly along the riverbank, or used as local dirt parking lot fill.

In some instances, it may be necessary to use an instream excavator to remove debris. If the operation of heavy equipment were required, such activities would occur over a matter of hours. To minimize impacts on bull trout, all work would be completed within a work window of July 1 to August 14. Impact minimization measures, including the use of vegetable-based synthetic fuel oil for equipment (e.g., excavators), are described in Section 2.1.5.

2.1.3.2 Clearwater Fish Hatchery Spring/Summer Chinook Salmon

The Clearwater Hatchery program is operated by the IDFG and includes the main Clearwater Fish Hatchery and three satellite facilities. Returning adults are collected at the Crooked River Trap and Red River Satellite in the South Fork Clearwater River watershed, at Kooskia National Fish Hatchery in the Middle Fork Clearwater River watershed, and at the Powell Satellite facility in the Lochsa River watershed. Spawning, incubation, and rearing occur at Clearwater Hatchery. If needed, broodstock may be trapped and spawned at the Dworshak National Fish Hatchery. Facilities used for acclimation and release of juvenile fish include the Clearwater Fish Hatchery, Red River Satellite, Kooskia National Fish Hatchery, and the Powell Satellite. No additional facilities are utilized for releases into the South Fork Clearwater River, Crooked River, or Selway River.

2.1.3.2.1 Clearwater Fish Hatchery

Clearwater Fish Hatchery is located at Ahsahka, Idaho, at the confluence of the North Fork and mainstem Clearwater rivers, approximately 45 miles east of Lewiston, Idaho. Construction was completed in 1991. The hatchery operates year round and is currently used for spawning, incubation, and rearing of Clearwater Fish Hatchery spring and summer Chinook salmon and Clearwater Fish Hatchery summer steelhead. No fish from any programs included in this Opinion are collected at Clearwater Fish Hatchery.

Operation

The Clearwater Fish Hatchery consists of two separate incubation facilities, 24 outdoor raceways for steelhead rearing, 11 outdoor raceways for Chinook salmon rearing, an adult holding and spawning area, residences for 7 permanent employees, and an administration building and dormitory. The hatchery receives water through two supply pipelines from Dworshak Reservoir that pass through Dworshak Dam. Water is carried 1.8 mile downstream, where energy is dissipated through a hydroelectric plant. The water then continues through the two separate pipelines delivering water of two different temperatures to the rearing facility. The delivery of two separate water temperatures allows Clearwater Fish Hatchery to raise both Spring Chinook salmon and summer steelhead at optimum rearing temperatures. On average, 64 cfs are diverted from the reservoir; the maximum surface water diversion is 89 cfs, which complies with the maximum diversion authorized by the Idaho Department of Water Resources water right No. 85-07593.

The warm water intake is attached to a floating platform in Dworshak Reservoir and can be adjusted from 5 feet to 40 feet below the surface. The cool water intake is stationary at 245 feet below the top of the dam. An estimated 10 cfs is provided by the cool water supply and 70 cfs by the warm water supply. The cool water supply has remained fairly constant between 40°F and 45°F. The warm water can reach 80°F, but is adjusted regularly to maintain 56°F for as long as possible throughout the year. When water temperatures drop in the fall, the intake is moved to the warmest water available until water temperatures rise in the spring. All water is gravity fed to the hatchery. Surface water diverted from the Dworshak Reservoir is returned to the North Fork Clearwater River near the mainstem Clearwater River about 3 km downstream of the dam.

Routine Maintenance

Normal and preventative maintenance of hatchery facility structures and equipment is necessary for proper functionality. Normal activities include pond cleaning, pump maintenance, debris removal from intake and outfall structures, building maintenance, and ground maintenance.

Floating debris and algae plug the intake screens, and throughout the year, small woody debris is deposited in the vicinity of the water supply intake structures at both the upper and lower level intake screens. The accumulation of debris has the potential to restrict the volume of water that can be diverted to the hatchery. Materials must be removed from the surface screen of the primary intake annually to ensure an uninterrupted supply of water for fish culture operation. Removal of accumulated woody debris and algae and inspections of screens and piping may only be accomplished using a dive contractor certified and approved through Corps security clearance protocol. A manual pressure washer is used to wash the intake screens. Water supply intakes and supply pipelines would be temporarily shut down and emergency closure valves would be exercised inside the dam and at the hydropower plant while removal activities are underway.

Semi-routine Maintenance

Semi-routine maintenance may include repairs to various wooden, steel, and concrete structures that are part of water source intakes, discharges, or other systems, which may become compromised simply from age and exposure to changing weather conditions or from unique storm events. Although most repairs and debris removals would be conducted using hand-tools or machinery operated from the riverbank, in some instances, it may be necessary to use an instream excavator. If the operation of heavy equipment were required, such activities would occur over a matter of hours. To minimize impacts to bull trout, all work would be completed within a work window of July 1 to August 14 (see Section 2.1.5.7). If a variance to this window were required, no activities would occur until agency approvals were obtained. Impact minimization measures, including the use of vegetable-based synthetic fuel oil for equipment (e.g., excavators), are described in Section 2.1.5.7.

Both intake pipelines for the hatchery cross under the riverbed of the North Fork of the Clearwater River, just upstream of the State Highway 7 bridge. If pipeline maintenance requires heavy equipment working in the streambed, a separate, site-specific consultation would be required to authorize in-water work area isolation (e.g., cofferdams) and streambed excavation.

Materials must be removed from the surface of the deepwater screen about every 5 years, to ensure an uninterrupted supply of water for fish culture operation. Removal of accumulated woody debris and algae and inspections of screens and piping may only be accomplished using a dive contractor certified and approved through Corps security clearance protocol. A manual pressure washer is used to wash the intake screens. Water supply intakes and supply pipelines would be temporarily shut down and emergency closure valves would be exercised inside the dam and at the hydropower plant while removal activities are underway.

2.1.3.2.2 Crooked River Trap

The Crooked River trap facility is located at RKM 1.0 (RM 0.6) of the Crooked River, a tributary to the South Fork Clearwater River at RKM 94 (RM 58.4). The Crooked River trap has been in operation since 1990. The facility generally operates between late May and mid-September to collect Clearwater spring/summer Chinook salmon broodstock.

Operation

Surface water is diverted from the Crooked River at RKM 1.0 (RM 0.6) to operate a broodstock collection trap. At the diversion, a concrete weir with a dam board slot is used to control water level at the facility. From May through September, a water right authorizes the diversion of up to 8.18 cfs from the Crooked River; however, the LSRCP indicates that the facility typically diverts only about 3 cfs. The distance between the intake and outfall is 167 meters (550 feet). Facility infrastructure is undergoing review and will be upgraded in the future, as necessary and determined by NMFS and managers, if not compliant with NMFS (2011, entire) criteria.

Collection of broodstock is accomplished by a weir across the Crooked River, diverting fish into the trapping facility. The facility has no broodstock holding or spawning capability. Adult Chinook salmon trapped at the facility are transported daily to the Red River Satellite holding facility. Only natural-origin returns are passed above the weir. General-production fish that return in excess of broodstock needs are recycled through the sport fishery or out-planted according to management agreements.

Routine Maintenance

The Crooked River flows through a valley that is heavily influenced by logging and historic mining activity. The river transports and deposits a great deal of sediment that can hamper normal facility operations. As a result, in-river maintenance of the adult fish weir, ladder, and trap is common.

Following periods of high flow, sand and gravel accumulates in front of the adult fish weir and the entrance to the fish ladder and trap used for capturing adult fish. This sand and gravel accumulation restricts river flow and may encourage bank erosion, resulting in further sedimentation or damage to structures and equipment. In-river maintenance of the adult fish weir and fish ladder is a common requirement. Materials must be removed annually to ensure an uninterrupted supply of water for fish trapping operations. Structures may need to be temporarily removed for repair or replacement.

Semi-routine Maintenance

Semi-routine maintenance may include repairs to the adult weir if it becomes compromised by age and weather conditions. Personnel must periodically complete a visual inspection by entering the river channel with hip boots, waders, or dry suits with supplied air systems. Access within the wetted perimeter of the stream would normally be limited to workers using hand tools, mud and sand suction dredges, or guiding the operation of the heavy equipment.

Minor repairs may be completed in place by workers using hand tools, whereas more extensive repairs may require portions of these structures to be temporarily removed for repair or replacement. Should removal be necessary, a backhoe/trackhoe or a crane or similar lifting device operated from the streambank would be employed. Although most repairs would be conducted using hand-tools or machinery operated from the riverbank, in some instances, it may be necessary to use an instream excavator. If the operation of heavy equipment were required, such activities would occur over a matter of hours during the established in-water work window in coordination with the state resource agencies, the Service, and NMFS, as described above.

Removal of accumulated sediment or woody debris may at times require heavy equipment, ranging from a clamshell-type excavation bucket mounted to a crane, to a tracked or rubber-tired excavator, or workers operating mud and sand suction dredges. In all cases, excavation

equipment will not enter the stream channel; suction dredges will be mounted on floating devices. Access within the wetted perimeter of the stream will be limited to workers guiding the operation of the crane or excavator, or workers operating mud and sand suction dredges. Excavated material will be loaded into a truck and hauled off site for disposal, spread evenly along the riverbank, or used as local dirt parking lot fill.

To minimize impacts to bull trout, all work would be completed within a work window of July 1 to August 14. If a variance to this window were required, no activities would occur until agency approvals were obtained. Impact minimization measures, including the use of vegetable-based synthetic fuel oil for equipment (e.g., excavators), are described in Section 2.1.5.7.

All facility infrastructure is currently being evaluated relative to compliance with NMFS' 2011 screening/passage criteria. When final assessments are completed, the LSRCP and facility managers/cooperators will coordinate with NMFS to determine compliance levels (e.g., in compliance, in compliance with minor variances, or out of compliance) and develop a strategy to prioritize appropriate/necessary modifications contingent on funding availability, program need, and biological impacts to listed and native fish. If updates to infrastructure are required, in-stream activities would be considered non-routine and would be covered under a separate, project-specific section 7 consultation; upgrades are not part of the proposed action.

2.1.3.2.3 Red River Satellite

The Red River Satellite facility is located at RKM 27 (RM 16.8) of the Red River, a tributary to the South Fork of the Clearwater River at RKM 101 (RM 62.8). The Red River pond was built in 1977, and a permanent adult trapping facility and holding complex was constructed in 1986 as part of the LSRCP. The facility generally operates in March and April for acclimation and release of Clearwater spring/summer Chinook salmon and between late May and mid-September to collect Clearwater spring/summer Chinook salmon broodstock.

Operation

The Red River Satellite facility has an adult trapping and holding facility. Broodstock collection is accomplished by a weir across the Red River, diverting fish into the trapping facility. All fish trapped at the Red River and Crooked River facilities are regularly transferred to the main Clearwater Fish Hatchery for final holding and spawning. Only natural-origin returns are passed above the weirs. General production fish returns in excess of broodstock needs are recycled through the sport fishery or out-planted according to management agreements.

Water for the Red River Satellite is drawn from the South Fork of Red River, where a hand-built diversion directs water into a screen on the bottom of the river, and a pipeline delivers it to the rearing pond and adult facility. The existing facility and associated infrastructure were built to design specifications at the time of construction in 1977 and upgrades were completed in 1986 (IDFG 2011a). Facility infrastructure is undergoing review and will be upgraded in the future, as necessary and determined by NMFS and managers, if not compliant with NMFS (2011, entire) criteria.

The water right for the Red River Satellite authorizes the diversion of 6.6 cfs in compliance with the maximum diversion authorized by the Idaho Department of Water Resources water right No. 82-07156. Although the water right authorizes the diversion of up to 6.6 cfs, on average, a maximum of 4 cfs is diverted from the Red River from May 1 through September 31. The

typical diversion is 3 cfs in most years. Surface water diverted at the Red River surface water intake is returned to the creek about 220 meters downstream of the intake.

The two adult holding ponds have a total volume of 3,600 cubic feet, with a total holding capacity of 400 adult fish, and are supplied with 4.09 cfs of water. The facility also has a covered spawning area with live tanks at the head of each holding pond. The facility has one rearing pond with a volume of 53,550 cubic feet. The rearing pond has a plastic liner with cobblestones placed on the inclined banks to hold the liner in place. The bottom of the pond is bare, which aids in pond vacuuming. Maximum water flow through this pond is 6.24 cfs. A low-water alarm system is installed in the adult holding and acclimation/rearing ponds. A rigorous screen-cleaning schedule has been implemented to ensure that screens stay clear of debris during periods of high discharge.

Routine Maintenance

The Red River flows through a valley that is heavily influenced by logging and historic mining activity. The river transports and deposits a great deal of sediment that can hamper normal operations. As a result, in-river maintenance of the hatchery diversion dam; water source intake; and adult fish weir, ladder, and trap is common.

Following periods of high flow, sand and gravel accumulates in front of the diversion dam, water source intake, adult fish weir and the entrance to the fish ladder and trap used for capturing adult fish returning to the facility. This sand and gravel accumulation restricts river flow and may encourage bank erosion, resulting in further sedimentation or damage to structures and equipment. The accumulation of sediment and debris also has the potential to restrict the volume of water that can be diverted to the facility. As such, in-river maintenance of the diversion dam and intake structure, intake piping, adult fish weir, and fish ladder is a common requirement. Materials must be removed annually to ensure an uninterrupted supply of water for fish trapping operations. Structures may need to be temporarily removed for repair or replacement.

Although most repairs and debris removals would be conducted using hand-tools or machinery operated from the riverbank, in some instances, it may be necessary to use an instream excavator. If the operation of heavy equipment were required, such activities would occur over a matter of hours during the established in-water work window in coordination with the state resource agencies, the Service, and NMFS, as described above. If a variance to this window were required, no activities would occur until agency approvals were obtained. Impact minimization measures, including the use of vegetable-based synthetic fuel oil for equipment (e.g., excavators), are described in Section 2.1.5.7.

Semi-routine Maintenance

Semi-routine maintenance may include repairs to the various wooden, steel, and concrete structures that constitute the diversion dam and water source intake at the Red River Satellite. The integrity of the adult weir may also become compromised by age and weather conditions. Hatchery personnel must periodically complete a visual inspection of the structures by entering the river channel with hip boots, waders, or dry suits with supplied air systems. Access within the wetted perimeter of the stream would normally be limited to workers using hand tools, mud and sand suction dredges, or guiding the operation of the heavy equipment.

Removal of accumulated sediment or woody debris may at times require heavy equipment, ranging from a clamshell-type excavation bucket mounted to a crane, to a tracked or rubber-tired

excavator, or workers operating mud and sand suction dredges. In all cases, excavation equipment will not enter the stream channel; suction dredges will be mounted on floating devices. Access within the wetted perimeter of the stream will be limited to workers guiding the operation of the crane or excavator, or workers operating mud and sand suction dredges. Excavated material will be loaded into a truck and hauled off site for disposal.

To minimize impacts to bull trout, all work would be completed within a work window of July 1 to August 14 (see Section 2.1.5.7). If a variance to this window were required, no activities would occur until agency approvals were obtained. Impact minimization measures, including the use of vegetable-based synthetic fuel oil for equipment (e.g., excavators), are described in Section 2.1.5.7.

All facility infrastructure is currently being evaluated relative to compliance with NMFS' 2011 screening/passage criteria. When final assessments are completed, the LSRCP and facility managers/cooperators will coordinate with NMFS to determine compliance levels (e.g., in compliance, in compliance with minor variances, or out of compliance) and develop a strategy to prioritize appropriate/necessary modifications contingent on funding availability, program need, and biological impacts to listed and native fish. If updates to infrastructure are required, in-stream activities would be considered non-routine and would be covered under a separate, project-specific section 7 consultation; upgrades are not part of the proposed action.

2.1.3.2.4 Kooskia National Fish Hatchery

See Section 2.1.3.6.3.

2.1.3.2.5 Powell Satellite

The Powell Satellite facility is located at the headwaters of the Lochsa River, at the confluence of Crooked Fork Creek and Colt Killed Creek. Construction of the facility was completed in 1989. The facility generally operates in March and April for acclimation and release of Clearwater spring/summer Chinook salmon, and between late May and mid-September to collect Clearwater spring/summer Chinook salmon broodstock.

Operation

Returning adults are attracted to water from Walton Creek, where they were acclimated and released as smolts. Fish trapped at the Powell Satellite are held and spawned there before green eggs are transferred to Clearwater Fish Hatchery. Natural-origin returns are released back into the Lochsa River. General production fish that return in excess of broodstock needs are recycled through the sport fishery or are out-planted according to management agreements.

The water source is from Walton Creek, where a concrete weir structure with sheet pilings and vertical screens diverts water to the rearing pond and adult facility. The existing facility and associated infrastructure were built to design specifications at the time of construction. Facility infrastructure is undergoing review and will be upgraded in the future, as necessary and determined by NMFS and managers, if not compliant with NMFS (2011, entire) criteria.

An average of 5 cfs is diverted from Walton Creek from May 1 through September 31. The maximum diversion is 6.24 cfs, which complies with the maximum diversion authorized by the Idaho Department of Water Resources water right No. 81-07119 (Walton Creek). Another water right is available on Colt Killed Creek (water right No. 81-07118) for emergency backup.

Surface water diverted from Walton Creek is returned to the Lochsa River about 152 meters downstream of the intake.

The Powell facility has two adult ponds with a total volume of 9,500 cubic feet, which are supplied with a maximum of 6.24 cfs of water. The facility has a covered spawning area with live tanks at the head of each holding pond. A rearing pond has a volume of 53,625 cubic feet and is supplied with a water flow of 6.24 cfs. An alarm system is in place to detect low water resulting from an obstructed water intake. A rigorous screen-cleaning schedule has been implemented to ensure that screens stay clear of debris during periods of high discharge. When nightly air temperatures drop below 29˚F, screens are cleaned as often as necessary to maintain constant flow of water to the rearing pond.

Routine Maintenance

Walton Creek flows through a valley that is heavily influenced by logging and historic mining activity. The creek transports and deposits a great deal of sediment that can hamper normal hatchery operation. As such, in-river maintenance of the diversion dam and intake structure, intake piping, adult fish weir, and fish ladder is a common requirement.

Following periods of high flow, sand and gravel accumulates in front of the diversion dam, water source intake, adult fish weir, and the entrance to the fish ladder and trap used for capturing adult fish returning to the facility. This sand and gravel accumulation restricts river flow and may encourage bank erosion, resulting in further sedimentation or damage to structures and equipment. The accumulation of sediment and debris also has the potential to restrict the volume of water that can be diverted to the facility. As such, in-river maintenance of the diversion dam and intake structure, intake piping, adult fish weir, and fish ladder is a common requirement. Materials must be removed annually to ensure an uninterrupted supply of water for fish trapping operations. Structures may need to be temporarily removed for repair or replacement.

Semi-routine Maintenance

Semi-routine maintenance may include repairs to the various wooden, steel, and concrete structures that constitute the diversion dam and water source intakes at the Powell Satellite facility, which may become compromised simply from age and exposure to changing weather conditions. The integrity of the adult weir may also become compromised by age and weather conditions. Hatchery personnel must periodically complete a visual inspection of the structures by entering the river channel with hip boots, waders, or dry suits with supplied air systems. Access within the wetted perimeter of the stream would normally be limited to workers using hand tools, mud and sand suction dredges, or guiding the operation of the heavy equipment.

Minor repairs such as stop-log replacement may be completed in place by workers using hand tools, whereas more extensive repairs may require portions of these structures to be temporarily removed for repair or replacement. Should removal of these structures be necessary, a backhoe/trackhoe or a crane or similar lifting device operated from the streambank would be employed.

Removal of accumulated sediment or woody debris may at times require heavy equipment, ranging from a clamshell-type excavation bucket mounted to a crane, to a tracked or rubber-tired excavator, or workers operating mud and sand suction dredges. In most cases, excavation equipment will not enter the stream channel; suction dredges will be mounted on floating devices. Access within the wetted perimeter of the stream will be limited to workers guiding the

operation of the crane or excavator, or workers operating mud and sand suction dredges. Excavated material will be loaded into a truck and hauled off site for disposal, spread evenly along the riverbank, or used as local dirt parking lot fill.

Although most repairs and debris removals would be conducted using hand-tools or machinery operated from the riverbank, in some instances, it may be necessary to use an instream excavator. If the operation of heavy equipment were required, such activities would occur over a matter of hours during the established in-water work window in coordination with the state resource agencies, the Service, and NMFS, as described above. If a variance to this window were required, no activities would occur until agency approvals were obtained. Impact minimization measures, including the use of vegetable-based synthetic fuel oil for equipment (e.g., excavators), are described in Section 2.1.5.7.

Every 3-5 years the intake pools at the Powell Satellite facility fill in with sediment that needs to be removed. This is accomplished by using a backhoe to reach into the pool and remove the silt. The hoe is the only portion of the machinery that enters the water.

To minimize impacts to bull trout, all work would be completed within a work window of July 1 to August 14 (see Section 2.1.5.7). If a variance to this window were required, no activities would occur until agency approvals were obtained. Impact minimization measures, including the use of vegetable-based synthetic fuel oil for equipment (e.g., excavators), are described in Section 2.1.5.7.

All facility infrastructure is currently being evaluated relative to compliance with NMFS' 2011 screening/passage criteria. When final assessments are completed, the LSRCP and facility managers/cooperators will coordinate with NMFS to determine compliance levels (e.g., in compliance, in compliance with minor variances, or out of compliance) and develop a strategy to prioritize appropriate/necessary modifications contingent on funding availability, program need, and biological impacts to listed and native fish. If updates to infrastructure are required, in-stream activities would be considered non-routine and would be covered under a separate, project-specific section 7 consultation; upgrades are not part of the proposed action.

2.1.3.3 South Fork Clearwater (Localized) Steelhead

The South Fork Clearwater B-run steelhead program utilizes facilities that are also used for the Clearwater Fish Hatchery spring and summer Chinook salmon program and Dworshak National Fish Hatchery spring Chinook salmon program. The program is operated by the IDFG, the Service, and NPT and includes Clearwater Fish Hatchery and Dworshak National Fish Hatchery. Returning adults are collected by anglers in the South Fork Clearwater River and spawned at Dworshak National Fish Hatchery. Incubation and rearing occur at Clearwater Fish Hatchery and Dworshak National Fish Hatchery. In the event of broodstock shortages in the South Fork, broodstock for this program is collected at Dworshak National Fish Hatchery. No additional facilities are utilized for collection of broodstock by anglers in the South Fork Clearwater River or for releases of juvenile fish into the South Fork Clearwater River Watershed (Red House Hole, Meadow Creek, and Newsome Creek).

2.1.3.3.1 Clearwater Fish Hatchery

See Section 2.1.3.2.1.

2.1.3.3.2 Dworshak National Fish Hatchery

See Section 2.1.3.4.1.

2.1.3.4 Dworshak National Fish Hatchery Spring Chinook Salmon

The Dworshak National Fish Hatchery spring Chinook salmon program utilizes Dworshak National Fish Hatchery for broodstock collection, spawning, incubation, rearing, and release. The program is operated by the Service and the NPT.

2.1.3.4.1 Dworshak National Fish Hatchery

Dworshak National Fish Hatchery is located at the confluence of the North Fork and mainstem Clearwater River in Ahsahka, Idaho, 3 miles west of Orofino, Idaho. The hatchery operates year round and is currently used for the collection of adult broodstock for Dworshak National Fish Hatchery B-run steelhead and as a backup broodstock source for South Fork Clearwater River (localized) steelhead, and incubation and rearing of Dworshak National Fish Hatchery B-run steelhead and South Fork Clearwater River (localized) steelhead, in addition to activities associated with Dworshak National Fish Hatchery spring Chinook salmon. The hatchery is also used for collection of broodstock for Little Salmon River summer steelhead and Upper Salmon River B-run steelhead (included in the recently completed Biological Opinion for the hatchery programs in the Salmon River Subbasin [USFWS 2017b]). The hatchery was constructed in 1969.

Operation

Dworshak National Fish Hatchery includes broodstock collection, holding, and spawning facilities, incubation rooms, outdoor raceways, and direct release capabilities. The main water supply is pumped from the North Fork of the Clearwater River. Six pumps are rated at 11,500 gpm (25.6 cfs) each, for a total flow of 69,000 gpm (154 cfs). Surface water diverted from the North Fork Clearwater River (immediately upstream of the hatchery, below the dam) is returned to the North Fork about 275 meters downstream of the intake.

A reservoir water supply source from Dworshak Reservoir provides water for incubation and nursery rearing, and for limited outside final rearing based on availability from Clearwater Fish Hatchery. It consists of a 24-inch, warm water supply line and a 14-inch, cold water supply line from the distribution box for the Clearwater Fish Hatchery. The reservoir supply was designed to convey 6,400 gpm (14 cfs). Surface water diverted from the Dworshak Reservoir is returned to the North Fork Clearwater about 2.7 km (1.7 miles) downstream of the dam.

The broodstock collection system at the hatchery includes a volitional ladder that is not channel-spanning. The holding pond at the top of the ladder has a total volume of 9,000 cubic feet. The trap is operated intermittently, and generally emptied and inventoried weekly or based on holding pond densities. The trap counter is closely monitored to prevent overcrowding. Broodstock are held in concrete ponds, each having a volume of 9,000 cubic feet. From the ponds, they are lifted to an examining table and are checked for ripeness and either spawned or returned to the holding pond for later examination or they are outplanted.

The incubation system includes 116 Heath incubator stacks containing 1,740 trays. All stacks have 54^{o}F water, 42^{o} water, and chilled water at 38^{o} F available for incubation of salmon and steelhead eggs. All incubation water is supplied from the reservoir water supply pipelines.

Early rearing of steelhead occurs in indoor nursery tanks. These tanks are not used for spring Chinook or coho salmon. Steelhead are subsequently reared in up to 84 outside raceways, each with a volume of 1,785 cubic feet. Ten raceways are used for rearing coho salmon, although not more than six can be used for coho rearing at any one time to limit water use. Steelhead are released directly from outside raceways ponds into the Middle Fork Clearwater River, or trucked to offsite release locations. Coho salmon are trucked to Kooskia National Fish Hatchery for final acclimation and release.

Chinook salmon are reared in 30 outdoor raceways, each of which has a volume of 1,600 cubic feet. Chinook salmon are released directly from outside raceways into the North Fork Clearwater River or trucked to offsite release locations.

Discharge from the hatchery is permitted by the Environmental Protection Agency (EPA) NPDES permit program, but currently does not fully meet the requirements of the permit. The LSRCP spring Chinook offline settling basin doesn't remove 90 percent of incoming solids 1-2 months each year (steelhead ponds are treated separately through two other effluent treatment systems that meet requirements). However, EPA is currently drafting a new NPDES Permit for Dworshak, and under that new permit the compliance issue will most likely be resolved. Untreated water from the nursery building and raceways, and treated effluent from the treatment systems is discharged directly into the Clearwater River and North Fork Clearwater River. Direct discharge of unsettled effluent in the Chinook offline settling basin could pose ecological and water quality risks to aquatic species in the mainstem and North Fork Clearwater Rivers if occurring at high enough concentrations. However, although the offline settling basin does not meet the 90 percent solids removal criteria 1-2 months annually, the solids released in those cases are well below suspended solids limits for discharge under the permit. As required in the NPDES permit, a Quality Assurance Plan and a Best Management Plan are written to address NPDES operations.

Routine Maintenance

Normal and preventative maintenance of hatchery facility structures and equipment is necessary for proper functionality. Normal activities include pond cleaning, pump maintenance, debris removal from intake and outfall structures, building maintenance, and ground maintenance.

Following periods of high flow, sand and gravel may accumulate in front of the water source intake, and the entrance to the fish ladder and trap used for capturing adult fish returning to the facility. This sand and gravel accumulation restricts river flow and may encourage bank erosion, resulting in further sedimentation or damage to structures and equipment. The accumulation of sediment and debris also has the potential to restrict the volume of water that can be diverted to the facility. As such, in-river maintenance of the intake structure, intake piping, and fish ladder is a necessary requirement. Materials must be removed occasionally to ensure an uninterrupted supply of water for fish trapping operations. Structures may need to be temporarily removed for repair or replacement.

Semi-routine Maintenance

Semi-routine maintenance may include repairs to the various wooden, steel, and concrete structures at the water source intake and fish ladder, which may become compromised simply from age and exposure to changing weather conditions. Hatchery personnel must periodically complete a visual inspection of the structures by entering the river channel with hip boots,

waders, or dry suits with supplied air systems. Access within the wetted perimeter of the stream would normally be limited to workers using hand tools, mud and sand suction dredges, or guiding the operation of the heavy equipment.

Minor repairs may be completed in place by workers using hand tools, whereas more extensive repairs may require portions of these structures to be temporarily removed for repair or replacement. Should removal of these structures be necessary, a backhoe/trackhoe or a crane or similar lifting device operated from the streambank would be employed.

Removal of accumulated sediment or woody debris may at times require heavy equipment, ranging from a clamshell-type excavation bucket mounted to a crane, to a tracked or rubber-tired excavator. Heavy equipment would normally be operated from the streambank, and would therefore not normally enter the stream channel. All excavated material would be removed from the river and loaded into a truck for offsite disposal, spread evenly along the riverbank, or used as local dirt parking lot fill.

Although most repairs and debris removals would be conducted using hand-tools or machinery operated from the riverbank, in some instances, it may be necessary to use an instream excavator. If the operation of heavy equipment is required, such activities would occur over a matter of hours during the in-water work window of July 1 to August 14. Impact minimization measures, including the use of vegetable-based synthetic fuel oil for equipment (e.g., excavators), are described in Section 2.1.5.7.

2.1.3.5 Dworshak National Fish Hatchery B-Run Steelhead

The Dworshak National Fish Hatchery B-run steelhead program is operated by the Service and the NPT. Broodstock are collected at Dworshak National Fish Hatchery. Spawning, incubation and rearing occur at Dworshak National Fish Hatchery. In addition to direct releases that occur at Dworshak National Fish Hatchery, juvenile fish are released into Clear Creek at Kooskia National Fish Hatchery, into Lolo Creek in the Middle Fork Clearwater River watershed, and into the South Fork Clearwater River watershed at the Red House Hole or Meadow Creek.

2.1.3.5.1 Dworshak National Fish Hatchery

See Section 2.1.3.4.1.

2.1.3.5.2 Lolo Creek Weirs

See Section 2.1.3.1.2.

2.1.3.5.3 Kooskia National Fish Hatchery

See Section 2.1.3.6.3.

2.1.3.6 Clearwater River Coho Salmon Restoration

The CRITFC-funded portion of the Clearwater River Coho Salmon program is operated by the NPT and utilizes facilities at the Kooskia and Dworshak National fish hatcheries. Broodstock are collected at both locations and transported to Dworshak National Fish Hatchery for holding, spawning, and early incubation. A weir on Lapwai Creek downstream of the North Lapwai Valley satellite facility is typically used for collection of non-project coho salmon (i.e., non-CRITFC funding and covered under the Mitchell Act Biological Opinion). However, operation of this weir is included as a conservative measure in this Opinion if broodstock collection of the

CRITFC-funded portion of the coho salmon program is ever needed. Further, broodstock collected at the Lapwai Creek weir provide eggs for Dworshak.

For that portion of the program included as part of the proposed action of this Opinion, coho salmon eggs are transported to Kooskia National Fish Hatchery. Juvenile fish reared at Dworshak and Kooskia national fish hatcheries are acclimated at Kooskia National Fish Hatchery and released directly from the hatchery into Clear Creek.

2.1.3.6.1 Lapwai Creek Weir

The NPT installs a temporary adult fish picket weir just above the mouth of Lapwai Creek to collect adult coho salmon broodstock. The weir is installed on or before October 1 and disassembled around December 20.

Operation

The weir operates 24 hours a day during the trapping season. Passage is blocked and fish are passively pushed into trap boxes. Adults are inventoried, measured, and marked each day for future identification. Broodstock are transported to Kooskia National Fish Hatchery. Adults not needed for broodstock are passed above the weir for natural spawning.

Routine Maintenance

Routine maintenance includes the removal of sediment from the weir traps. Fine sand and silts accumulate within the trap structure where water velocity is slow. Once or twice each spring Chinook salmon trapping season, hatchery personnel flush this material back to the river channel using high-pressure water hoses. The process is completed in less than 1 day and the trap/ladder is returned to normal operation after completion.

Semi-routine Maintenance

Aside from damages or loss of functionality related to high-water events, the integrity of the adult weir may be compromised simply by age and exposure to changing weather conditions. Personnel must periodically complete a visual inspection of the structures by entering the river channel with hip boots or waders. Minor repairs may be completed in place by workers using hand tools, whereas more extensive repairs may require individual weir panels to be temporarily removed for repair or replacement. Should removal of these structures exceed the lifting capability of personnel, a crane or similar device operated from the streambank would be employed.

Although most repairs and debris removals would be conducted using hand-tools or machinery operated from the riverbank, in some instances, it may be necessary to use an instream excavator. If the operation of heavy equipment were required, such activities would occur over a matter of hours during the established in-water work window in coordination with the state resource agencies, the Service, and NMFS, as described above. If a variance to this window were required, no activities would occur until agency approvals were obtained. Impact minimization measures, including the use of vegetable-based synthetic fuel oil for equipment (e.g., excavators), are described in Section 2.1.5.7.

2.1.3.6.2 Dworshak National Fish Hatchery

See Section 2.1.3.4.1.

2.1.3.6.3 Kooskia National Fish Hatchery

Kooskia National Fish Hatchery is located near RKM 1.0 (RM 0.6) on Clear Creek, a tributary to the Middle Fork Clearwater River at RKM 124 (RM 77.1), near Kooskia, Idaho. The hatchery was constructed in 1969 and became part of the Dworshak National Fish Hatchery Complex in 1978. The NPT has assumed full operation of the hatchery from the Service under terms of the Snake River Basin Adjudication agreement. The hatchery operates year round and is used for the collection of adult broodstock and release of juvenile Clearwater spring/summer Chinook salmon, for release of Dworshak National Fish Hatchery B-run steelhead, and for broodstock collection, incubation, rearing, and release of Kooskia National Fish Hatchery spring Chinook salmon, in addition to activities associated with Clearwater River coho salmon restoration project.

Operation

Kooskia National Fish Hatchery operates: a weir on Clear Creek to capture broodstock, an incubation system with chilled well water, and inside and outside rearing facilities including raceways and circular tanks. Water is supplied from three sources: (1) reuse with well water makeup; (2) single pass well water (two wells); and (3) Clear Creek. During fall and winter, water is drawn from Clear Creek for rearing of fry in the raceways and Burrow's ponds. During spring and summer, water temperatures in Clear Creek exceed 70^{o}F, and reuse with the addition of cold, first-pass well water is utilized. Single pass well water is chilled and utilized for egg incubation and early rearing of fry. Makeup well water is pumped at approximately 150 gpm (0.3 cfs) into a chiller, then into the biofilter. Fry are transferred into the six Burrows ponds in June or July, where the water remains on the reuse system. The transfer from well water to creek water usually occurs in late October.

Based on current rearing levels over the past 3 years of operations (2014–2016), the Kooskia National Fish Hatchery diverts a maximum of 13 cfs in March and April and approximately 9 cfs in February and May. During the remaining 8 months of the year, surface water demands range from approximately 3 to 6 cfs. The Service holds a full water-right withdrawal of 16.0 cfs from Clear Creek (certification # 81-02028, from 10-06-1966). The Clear Creek intake is located approximately 0.7 miles upstream of the hatchery. A 42-inch-diameter gravity transmission pipeline runs from the intake diversion structure to the screen chamber / grit basin facility, and a 36-inch-diameter pipeline system conveys effluent water to the hatchery head tank on the southeast corner of the hatchery site (McMillen Jacobs Associates 2017). Effluent is discharged both to Clear Creek and to the Middle Fork Clearwater River under NPDES permit No. IDG131004.

The weir on Clear Creek diverts fish into the trap, which has a volume of 3,375 cubic feet. Natural-origin spring Chinook salmon, steelhead, and other species are returned to the creek above the weir. The trap is operated from February to mid-April to collect adult steelhead, from May through September to collect adult spring Chinook salmon, and from October through late December to collect adult coho salmon. The weir and trap help exclude hatchery-origin steelhead from entering Clear Creek above the weir. However, in most years, the picket weir must be cleaned of debris during high run-off events in April and May by lifting pickets. Passage of hatchery steelhead upstream of the weir during these cleaning events is possible. Hatchery steelhead that enter the Kooskia trap are generally recycled through the sport and tribal fisheries. Chinook salmon are transported to Clearwater Fish Hatchery or Dworshak National

Fish Hatchery once per week for holding and spawning. Coho salmon are held and spawned at Kooskia National Fish Hatchery.

The hatchery has a total of 26 incubation stacks with 15 trays per stack. A prolonged egg incubation is accomplished by chilling well water to 38–40^{o}F. Water flow for the trays is approximately 5 gpm per stack. Facilities include 32 tanks outside and 24 inside for nursery rearing. Clear Creek is the principle source of water used in outside rearing units, which include six raceways.

Steelhead smolts reared at other facilities are released in the adult trap. Spring Chinook salmon are released as smolts directly from outside raceways and ponds into Clear Creek. Smolts are released in late March or early April depending on flow conditions in the Clearwater and Snake Rivers. Coho salmon reared at other facilities may be acclimated for 4 to 6 weeks before being released into Clear Creek, or if no space is available, may be direct released from transport trucks into Clear Creek.

Water for Kooskia National Fish Hatchery is supplied primarily from two wells. Kooskia National Fish Hatchery also has the ability to obtain water from Clear Creek via a water diversion and screening facility located about 1 mile upstream from the hatchery. The existing facility and associated infrastructure were built to design specifications at the time of construction. All facility infrastructure is monitored by the operator for compliance with NMFS' 2011 screening/passage criteria. As a Service owned asset, in the event of a compliance issue the Nez Perce Tribe will coordinate with the Service to develop a strategy to prioritize appropriate/necessary modifications contingent on funding availability, program need, and biological impacts to listed and native fish. If updates to infrastructure are required, NMFS will be consulted in a separate section 7 consultation; upgrades are not part of the proposed action.

A low-head inflatable Obermeyer weir in Clear Creek diverts water from the stream 1 mile upstream from the hatchery into an intake structure located on the east bank. The weir is lowered during high spring runoff to allow gravel to naturally sluice past the intake structure. A metal grate initially screens water across the intake opening, primarily intended to keep large woody debris and other similar materials from entering the intake. However, the grate does not prevent smaller fish from passing through. Water flows from the intake to a screen house about 300 feet downstream. As water enters the screen house, it flows horizontally over a set of finer meshed screens that diverts finer debris and fish into a channel leading back to the creek via a discharge pipe. Water discharge from the hatchery is permitted by the NPDES permitting system and work has begun to fully meet the requirements of the permit.

The existing pollution abatement system consists of a 0.75-acre lagoon for settling out solids. The lagoon is located adjacent to the Middle Fork of the Clearwater River. A dike acts as a barrier between the river and the lagoon. Biological wastes from the reuse biofilters, raceways, and nursery systems drain by gravity flow to the abatement lagoon through a 30-inch drain line. Monthly water samples are taken in accordance with the NPDES permit.

Routine Maintenance

Normal and preventative maintenance of hatchery facility structures and equipment is necessary for proper functionality. Normal activities include pond cleaning, pump maintenance, debris removal from intake and outfall structures, building maintenance, and ground maintenance.

The intake structure poses problems during spring and winter. High flows in the spring result in debris, rocks, sand, and silt potentially blocking the intake entrance and preventing water from going to the hatchery. Recent management practice during the spring runoff has been to dewater the hatchery and lower the Obermeyer weir, allowing stream debris to sluice past the intake structure. Personnel manually check the intake structure twice daily in the spring and summer to remove any debris that accumulates. In the winter, ice and slush flows can accumulate on the inclined screens, blocking the water flow to the hatchery. In severe winters, hatchery personnel will observe the screen chamber 24 hours a day and physically remove ice and slush from inclined screens. Inclined screens are lifted to prevent ice formation on the structure and to maintain water flow to the hatchery.

Semi-routine Maintenance

Semi-routine maintenance may include repairs to the various wooden, steel, and concrete structures at the water source intake and fish ladder, which may become compromised simply from age and exposure to changing weather conditions. Hatchery personnel must periodically complete a visual inspection of the structures by entering the river channel with hip boots, waders, or dry suits with supplied air systems. Access within the wetted perimeter of the stream would normally be limited to workers using hand tools, mud and sand suction dredges, or guiding the operation of the heavy equipment.

Minor repairs may be completed in place by workers using hand tools, whereas more extensive repairs may require portions of these structures to be temporarily removed for repair or replacement. Should removal of these structures be necessary, a backhoe/trackhoe or a crane or similar lifting device operated from the streambank would be employed.

Removal of accumulated sediment or woody debris may at times require heavy equipment, ranging from a clamshell-type excavation bucket mounted to a crane, to a tracked or rubber-tired excavator. Heavy equipment would normally be operated from the streambank, and would therefore not normally enter the stream channel. All excavated material would be removed from the river and loaded into a truck for offsite disposal, spread evenly along the riverbank, or used as local dirt parking lot fill. Although most repairs and debris removals would be conducted using hand-tools or machinery operated from the riverbank, in some instances, it may be necessary to use an instream excavator. If the operation of heavy equipment were required, such activities would occur over a matter of hours during the established in-water work window of July 1 to August 1. If a variance to this window were required, no activities would occur until agency approvals were obtained. Impact minimization measures including, the use of vegetable-based synthetic fuel oil for equipment (e.g., excavators), are described in Section 2.1.5.7.

2.1.3.7 Kooskia National Fish Hatchery Spring Chinook Salmon

The Kooskia National Fish Hatchery spring Chinook salmon program is operated by the Service and the NPT and utilizes facilities at Kooskia and Dworshak National fish hatcheries. Broodstock are collected at Kooskia National Fish Hatchery in the Middle Fork Clearwater River watershed and transported to Dworshak National Fish Hatchery for holding and spawning. Eggs are transported back to Kooskia National Fish Hatchery for incubation and rearing. Juvenile fish are released directly from Kooskia National Fish Hatchery into Clear Creek.

2.1.3.7.1 Kooskia National Fish Hatchery

See Section 2.1.3.6.3

2.1.3.7.2 Dworshak National Fish Hatchery

See Section 2.1.3.4.1.

2.1.4 Research, Monitoring, and Evaluation

Unlike other hatchery programs in the Clearwater River Subbasin, the Nez Perce Tribal Hatchery programs include monitoring and evaluation activities directly related to hatchery activities. RM&E activities associated with the Nez Perce Tribal Hatchery Spring Chinook salmon Program are funded by BPA, and are therefore included as part of the proposed action. Specific RM&E activities include spawning mortality, spawning ground, and carcass surveys throughout the Clearwater River Subbasin; use of downstream migrant screw traps to collect migrating juvenile fish; and electrofishing, snorkeling, and hook and line surveys.

In the Clearwater River Subbasin, the NPT conducts RM&E activities in Lolo Creek (mainstem Clearwater River Shared FMO habitat), the South Fork Clearwater River (South Fork Core Area) Newsome Creek (South Fork Core Area), Meadow Creek (Selway Core Area), and the Selway River (Selway Core Area). Electrofishing surveys may potentially be conducted in all Clearwater River tributaries, all South Fork Clearwater River tributaries located between the river mouth and Butcher Creek, and Maggie Creek (tributary to the Middle Fork Clearwater River).

Spawning ground surveys (i.e., redd counts), carcass surveys, and juvenile abundance surveys are conducted in numerous Clearwater River streams (Table 3). Multiple-pass pre-spawning mortality, spawning ground, and carcass surveys are conducted in the Clearwater River Subbasin to encompass all known spawning habitats. Surveys are conducted from July through September to determine natural spawning abundance and distribution, and density and proportion of hatchery-origin and natural-origin fish in key natural spawning areas. Surveys are conducted 3-10 times per year to bracket spawning timing, increase redd count accuracy, and maximize adult carcass collections on each stream.

Table 3. Location of NPT RM&E spawning ground, carcass, and juvenile abundance surveys.

Stream	Survey Type	Typical Dates	Location	GPS Coordinates
Lolo Creek	Ground (Spawning Surveys and Juvenile Abundance Surveys)	July 1 – October 15	GPM Snorkel Site 0 sign to mouth of Yoosa Creek	46.28029, -115.77329 to 46.39251, -115.68398
Yoosa Creek	Ground	July 1 – October 15	Mouth of Yoosa to mouth of Camp Creek	46.39251, -115.68398 to 46.39702, -115.64738
Eldorado Creek	Ground	July 1 – October 15	Mouth of Eldorado Creek to old weir site	46.29473, -115.75077 to 46.28572, -115.72031
Newsome Creek	Ground	July 1 – October 15	Mouth of Newsome Creek to Glory Hole	45.82865, -115.61534 to 45.92752, -115.64008
South Fork. Clearwater River	Ground	July 1 – October 15	Mouth of Leggett Creek to mouth of Newsome Creek	45.82664, -115.62705 to 45.82865, -115.61534
Meadow Creek (Selway)	Aerial	July 1 – October 15	Mouth of Meadow Creek to Fourmile Creek	46.04537, -115.29637 to 45.72618, -115.16726
Fishing Creek	Ground	July 1 – October 15	Mouth of Fishing Creek to 1st culvert above the confluence of West Fork	46.49227, -114.85765 to 46.54126, -114.86246
Legendary Bear Creek	Ground	July 1 – October 15	Mouth of Legendary Bear Creek to confluence of East and West Fork	46.51148, -114.76134 to 46.53504, -114.76608

Surveys are completed from the ground by experienced surveyors who walk along the stream, crossing when necessary, avoiding redds, counting redds, and observing live fish and carcasses. Personnel initiate surveys at midday to ensure adequate light conditions, and proceed up or down the stream channel on opposing sides. Chinook salmon redds are enumerated and marked (on streambank) with flagging and with a Global Positioning System (GPS) unit, so that the number of new redds can be determined with each additional survey. Flagging is removed during the final survey. Encounters of bull trout during spawning ground surveys are rare, and if encountered, surveyors avoid the area to prevent disturbance.

Floating rotary screw traps are used to capture emigrating juvenile salmonids in Lolo Creek (RKM 21.0), South Fork Clearwater River (RKM 9.0; new trapping facility first deployed in 2016), Newsome Creek (RKM 0.1), and Meadow Creek (Selway; RKM 1.8) from February through November each year. The screw traps are attached to a cable suspension system anchored by eco blocks and gabion baskets, which allow side-to-side and upstream/downstream

movement of the trap. This setup permits the trap to be fished in the optimum position during most flow conditions. The traps consist of a trapping cone (1.5-meter diameter) supported by a metal A-frame, live box, two 6-meter by 1-meter pontoons for flotation, and a clean-out drum.

Trap operation is planned to be continuous during the survey season; however, there are times when traps cannot be operated due to low flow or freezing conditions, excessive flow or debris, or mechanical breakdowns. The live boxes of the screw traps are checked every morning (several times throughout each night and day during high water, storms, or ice events). Piscivorous fish and large numbers of incidentally captured fish are removed from the live box, separated from target fish, and scanned for PIT tags. Mortality due to trapping is noted and recorded.

Electrofishing, snorkeling, and hook- and- line sampling may be conducted from June through October. Electrofishing efforts conform to NMFS guidelines to minimize disturbance and injury. Disturbance of fish associated with snorkeling is generally limited to forcing individuals to seek cover, and is a short duration effect. Snorkeling surveys are conducted when stream temperatures are low to minimize potential for stress and incidental mortality.

2.1.5 Impact Minimization Measures

As part of ongoing and proposed facility operations, the IDFG, NPT, and Service undertake a number of measures at each facility, as applicable, to minimize impacts of the programs on aquatic species, including listed species and their habitat.

2.1.5.1 Broodstock Collection

Measures applied to minimize potential effects during broodstock collection activities include:

- Direct and coordinate all program adult collection activities through annual planning meetings.
- Operate all traps in accordance with their design standards to minimize risk to all fish in general and non-target species in particular.
- Check the adult traps at least daily and more often during peak steelhead, Chinook salmon, and coho salmon returns. Remove fish quickly from the trap and return all non-target fish to the stream immediately with minimal holding and handling.
- Ensure that fish ladders receive sufficient flow in all seasons to attract and effectively pass fish of all life stages.
- Handle all fish in accordance with adult handling criteria (NMFS 2008; USFWS 2012).

2.1.5.2 Release of Hatchery Juveniles

The following measures are recommended to minimize potential resource competition and predation effects during juvenile release activities while also acknowledging potential benefits to bull trout from these releases:

- With the exception of limited parr releases (Meadow Creek and Upper Selway sites in the Selway River core area):
    - Release all hatchery fish as smolts (yearlings and subyearlings) that are

physiologically ready to migrate to minimize the potential for competition with naturally produced juvenile bull trout in freshwater.

- Operate hatcheries such that hatchery fish are reared to sufficient size that smoltification occurs in nearly the entire population.
- Release all hatchery fish as actively migrating smolts through volitional release practices so that the fish migrate quickly seaward, limiting the duration of interaction with any co-occurring natural-origin fish downstream of the release site.

- Where appropriate and consistent with the final bull trout recovery plan, evaluate potential benefits to bull trout from intentional early life stage releases and other releases of surplus hatchery parr and presmolts.

2.1.5.3 Research, Monitoring, and Evaluation

Research, monitoring and evaluation activities under the proposed action are those directly-related to hatchery operations and are limited to those associated with the Nez Perce Tribal Hatchery. Impact minimization measures for RM&E actions are provided below and include the terms and conditions of the newly issued TE-001598-6 Bull Trout Permit.

- RM&E activities will be conducted in accordance with the approved study plans.
- If sampling is done in multiple subbasins (4th field hydrologic unit code [HUC] watersheds), boots and sampling equipment intended for use in the water will be disinfected and air-dried prior to use in each location. Water containing chemicals used in handling fish and water that was used for disinfecting equipment must not be allowed to enter the waterbody being sampled.
- Investigators may observe fish using snorkeling methods but will avoid displacing individuals from the original encounter site during observations.
- Where angling is included as a fish collection or sampling method, such angling will be conducted in a manner consistent with state rules and regulations.
- Bull trout will not be used for rotary screw trap "trapping catch efficiency" or "containment" studies. Bull trout will be released on the appropriate side of the trap to accommodate the apparent direction of travel of individual fish.
- All survey, capture, retention, handling, and observation activities will be implemented at times that avoid temperature stress to fish being sampled. At locations that have potential to contain bull trout, sampling will not be done if water temperature exceeds 18 degrees Celsius (°C) (64°F). The Service recommends sampling be done at water temperatures less than 15°C (59°F) where possible. However, some rivers and lakes may be warmer than this, particularly on hot summer days. In these circumstances, it may be necessary to conduct the activities listed above in the morning or evening to avoid temperature stress to captured fish.
- All sampling and observation methods will be implemented at times that will avoid disturbance of spawning fish. Any purposeful take of bull trout that are actively spawning or are near bull trout spawning sites is prohibited. Surveyors will minimize collection, survey, and sampling activities near spawning areas and will not physically

disturb bull trout redds during these activities.

- Disturbance of or impacts to bull trout habitat will be minimized during project activities. Since redds of resident and small fluvial bull trout may be difficult to see due to their small size, surveyors will take precautions to avoid stepping in areas that may be potential redd locations (e.g., small gravel deposits behind boulders; under overhanging vegetation; near wood debris or logs; or areas of hydraulic influence such as confluences of tributaries, springs, seeps, pool tail crests, or edges of pools).
- If bull trout are captured or handled the following measures will be followed:
  - Authorized personnel will ensure that their hands are free of sunscreen, lotion, or insect repellent prior to conducting activities that may involve handling bull trout.
  - Any captured bull trout that appears healthy and able to maintain itself will be released as soon as possible, and as close as possible, to the point of capture.
  - Any captured bull trout that shows signs of stress or injury will only be released when it is able to maintain itself. It may be necessary to nurture the fish in a holding tank until it has recovered. The holding tank water will be conducive to bull trout health (i.e., clean, cool water with ample dissolved oxygen).
  - Because bull trout are aggressive predators and are known to be cannibalistic, investigators will attempt to partition captured fish individually or by size class and should avoid holding numerous bull trout in the same live-well.
  - A healthy environment must be provided for bull trout held in holding tanks, and the holding time must be minimized. Water-to-water transfers, the use of shaded or dark containers and supplemental oxygen will all be considered in the design of fish handling operations. Bull trout may be held for up to 1 hour during electrofishing operations.
  - Bull trout will be closely monitored in holding tanks if the ambient water temperature in these tanks is greater than 15°C (59°F). All operations will cease if fish show signs of stress, or if ambient water temperatures rise above 18°C (64°F).
  - Holding tanks will be non-toxic plastic, aluminum, or stainless steel containers. Do not use metal containers that have lead or zinc coatings.
  - Fish statistics (e.g., length, weight, sex, ripeness, scale sample, mark, condition/health, angling injury) may be collected from captured bull trout. Handling and measurement of captured fish will follow commonly accepted techniques for salmonid field sampling. If stream temperatures are greater than 15°C (59°F), the collection of fish statistics will be limited to fish length only, to avoid over-stressing captured fish.
  - If a non-lethal bio-sample (i.e., fin clip or punch) is taken for genetic analyses, it will not exceed 0.75 square centimeters in size.
  - Bull trout may be marked via a non-lethal fin clip during mark-recapture population surveys. This fin clip may be used as a bio-sample as indicated above.
  - To reduce stress on captured bull trout, handling of the same individual multiple times during permitted activities will be avoided, to the extent possible.

- A colored fish key with all char, trout, and salmon species that are known to, or may possibly be in the system, will be on hand when identifying fish. Captured bull trout and unidentified fish that may be bull trout will be photographed for verification in areas where bull trout occur infrequently or if identification of the fish is difficult.
- For electrofishing activities: electrofishing will be conducted using the methods outlined in NMFS guidelines (available at http://www.westcoast.fisheries.noaa.gov/publications/reference_documents/esa_refs/section4d/electro2000.pdf). Electrofishing equipment will be operated at the lowest possible effective equipment settings to minimize injury or death to bull trout.
- Electrofishing will be avoided in areas such as the mouths of rivers when adult bull trout may be staging as part of their spawning migration.
- Electrofishing will not be conducted when the water conditions are turbid and visibility is poor (i.e., when the sampler cannot see the stream bottom in 1 foot of water).
- Any electrofishing conducted during the bull trout spawning season (typically August 15 to December 1) will only be performed in areas where adult bull trout (305 millimeters total length or larger for fluvial bull trout or 160 millimeters total length or larger for resident bull trout) or their redds have not been observed.
- Outside the bull trout spawning season, visual or snorkel surveys for bull trout will be conducted prior to electrofishing, where conditions allow. If bull trout are documented in visual surveys, moving to a new sample location should be considered if possible. However, electrofishing is permitted in areas where bull trout are present if there is no alternative that is consistent with the study plan.
- Because electrofishing during the spring in bull trout habitat runs the risk of injuring or killing alevins or fry that remain in or near the gravels, if salmonid alevins or fry are seen during spring electrofishing, the electrofishing activity will immediately cease until the alevins or fry can be identified. If they are determined to be bull trout, electrofishing will be terminated at the site until after fry have fully emerged.

- PIT tagging bull trout will adhere to the following impact minimization measures:
  - Before inserting a PIT tag into a captured bull trout, the fish must be scanned for the presence of an existing functional PIT tag. If a PIT tag is detected, the fish will not be tagged with an additional tag.
  - All PIT tagging activities will cease when stream water temperature exceeds 18°C (64°F).
  - Any captured bull trout showing signs of injury or considerable stress prior to tagging will not be tagged with a PIT tag. The fish will be placed in a holding tank and released upon showing signs of adequate recovery.
  - Overcrowding of fish in holding and recovery tanks must not occur during PIT tagging operations. Additional tanks will be set up as needed, or tagging operations will cease until the fish can be safely released back to the stream and overcrowding conditions are no longer a concern.

  - If PIT tag injectors are used, the needles and pushrods will be disinfected between fish in a 70 to 80 percent ethyl alcohol or 60 to 80 percent isopropyl alcohol solution for a minimum of 10 minutes. All PIT tags will also be disinfected in this same manner before insertion into bull trout.

- If bull trout are anesthetized during PIT tag insertions the following measures will be followed:
  - Tricaine methanesulfonate (MS-222) or another anesthetic approved for use on fish (e.g., electronarcosis) may be used to anesthetize bull trout during PIT tag insertions.
  - Bull trout will only be anesthetized if they can be processed within several minutes of capture. The period of time bull trout are anesthetized will be minimized to the extent possible, and will not exceed 5 minutes.
  - It is advisable to monitor the effect of anesthesia on a few fish to determine how individual fish will react under local ambient conditions (e.g., water temperature, water pH, etc.). Use the lowest dose/level needed to affect the level of anesthesia required to complete tagging.
  - All fish placed under anesthesia must have recovered sufficiently from the anesthesia to avoid predation once they are released back to the stream at the point of capture. Anesthetized fish will be allowed to recover in a recovery tank for a time sufficient to ensure full recovery based on observations in the recovery tank. If electronarcosis is used, fish may be released immediately and not held longer than necessary.
  - Surgical equipment will be sanitized with a betadine solution (or appropriate substitute) between each surgery.
- When conducting macroinvertebrate, water, and sediment sampling, investigators will take precautions in known or potential bull trout spawning areas. If salmonid alevins or fry are seen or captured, the activity will cease immediately until the alevins or fry can be identified. If they are determined to be bull trout, the activity will be moved to an alternate site or suspended until alevins and fry are no longer present.
- Investigators may collect fish statistics (length, weight, sex, ripeness, scale sample, mark, condition/health, angling injury, etc.) from captured bull trout, consistent with above identified measures.
- All in-river spawner surveys are conducted in known spawning reaches of target species.
- Fish trapping, trap maintenance, fish handling, fish anesthesia, and fish PIT tagging protocols are followed explicitly and all staff are trained in their use and application before working under field conditions.
- Active weirs and traps will be monitored at least once daily. Traps will be checked more frequently when crowding produced by an increasing catch rate or high debris loading results in a higher probability of injury or mortality to bull trout being held in a weir or trap
  - Field-staff conduct regular checks of the traps and live boxes to ensure that traps are maintained and that no mortalities occur. Trap check intervals are determined by the stream conditions and numbers of fish being trapped.

- Smolt trap cones and debris drums are also regularly checked to ensure that traps are not causing fish impingement or descaling and that fine debris is removed from the traps.
- Water temperatures and stream discharge are regularly monitored to ensure safe capture and handling of all fish.

2.1.5.4 Water Withdrawls into Hatchery Facilities

The following measures are to be applied to minimize potential effects of water withdrawals:

- Facilities operate within their water right with respect to maximum withdrawal from surface and/or ground water sources.
- All surface water intakes were designed to meet NMFS fish screening criteria to reduce and/or eliminate the risk of fish impingement and entrainment across the range of expected flow conditions at the time of construction. In the event of noncompliance, operators will seek funding to modify screens to meet current criteria.
- All withdrawal structures are sited, designed, and operated to prevent barriers to fish passage.

2.1.5.5 Hatchery Effluent

The following measures are to be applied to minimize potential effects of hatchery effluent:

- Where required, all facilities operate under an applicable EPA NPDES permit, which includes periodic water quality sampling for compliance.
- Proper feeding volume and application is performed to reduce non-utilized feed.
- All pond-cleaning activities use pollution abatement structures to reduce the suspended sediment from these activities.
- All hatchery maintenance performed on “watered” or “in-water” facilities will be performed to minimize potential effects to hatchery effluent, i.e., sediment disturbance, water temperature, and chemical composition.
- While EPA NPDES standards have not been adequately assessed for potential impacts to bull trout, the Programs will continue to monitor requirements under the permits and adjust as new data/criteria becomes available.

2.1.5.6 Fish Disease Management

The following measures are to be applied to minimize disease introduction, amplification, and transmission:

- Administration of therapeutic drugs and chemicals to fish and eggs reared at program facilities is performed only when necessary to effectively prevent, control, or treat disease conditions.
- All treatments are administered according to label directions in compliance with the Food and Drug Administration (FDA) and EPA regulations for the use of aquatic animal drugs and chemicals. FDA and EPA consider the environmental effects acceptable when the

therapeutic compounds are used according to the label.

- Pre-release/Transfer Examination: Program staff notifies program Fish Health staff at least 6 weeks prior to a release or transfer of fish from the hatchery. Tissue samples are collected on 60 fish of the stock being transferred or released. The pathogens screened for include: infectious hematopoietic necrosis virus (IHNV); infectious pancreatic necrosis virus (IPNV); viral hemorrhagic septicemia virus (VHSV); *Renibacterium salmoninarum*, *Aeromonas salmonicida*, *Yersinia ruckeri*, and under certain circumstances other pathogens such as *Myxobolus cerebralis* and *Ceratonova shasta*.

2.1.5.7 Hatchery Maintenance

The following measures are to be applied to avoid, minimize, or mitigate effects from hatchery maintenance (Routine and Semi-routine):

- Except for emergency instances, all normal maintenance activities will occur in the daytime, during normal working hours.
- Continue cataloging and prioritizing LSRCP funded structures that do not meet Anadromous Salmonid Passage Facility Design criteria and guidelines (NMFS 2011, or most current, entire) for upgrades as funding becomes available.
- Herbicide application, to control noxious weeds, is small in scale, follows manufacturer's label guidelines, and occurs only during dry weather conditions (i.e., not raining) to prevent runoff into surface waters. Roundup® may be used around buildings and landscapes that are more than 300 feet from the river. Rodeo®, or a similar aquatic-approved herbicide, may be used around rearing ponds, adult collection ponds, and surface water intakes, which are in closer proximity to the water. All application of herbicides utilize the following risk reduction measures:
    - Only selective spot treatment of aquatic-approved formulations of glyphosate or imazapyr will be made within 15 feet of live waters (e.g., flowing ditches, streams, ponds, springs, etc., and will only be applied when wind speeds are less than or equal to 5 mph. No live water will be directly sprayed with herbicides, although some limited drift may occur when spot spraying.
    - Only ground-based spot/selective applications of herbicides rated as having a low level of concern for aquatic species will be authorized from 15 to 100 feet from live waters and within riparian areas (whichever is greater), and will only be applied when wind speeds are less than or equal to 8 mph.
    - A spill cleanup kit will be available whenever herbicides are transported or stored.
    - A spill contingency plan will be developed prior to all herbicide applications. Individuals involved in herbicide handling or application will be instructed on the spill contingency plan and spill control, containment, and cleanup procedures.
    - Herbicide applications will only treat the minimum area necessary for the control of noxious weeds.
    - No herbicide mixing will be authorized within 100 feet of any live waters. Mixing and loading operations must take place in an area where an accidental spill would not contaminate a stream or body of water before it could be contained.

  - Authorized spray equipment will include pick-up- and 4-wheeler-mounted spray rigs (hand spot-gun only), backpack sprayers, hand pump sprayers, hand-spreading granular formulations, and wicking (e.g., also includes wiping, dipping, painting, or injecting target species).
  - Equipment used for transportation, storage, or application of chemicals will be maintained in a leak-proof condition.
  - Only the quantity of herbicides needed for 1 day's operation will be transported from the storage area.

- Minimize impacts to riparian vegetation at the work sites, and upon completion of the work, grade and replant disturbed areas to match the landscape and existing vegetation at the site.
- Install silt barriers at the site during ground disturbing work to prevent/reduce sediment from entering the river.
- All normal hatchery maintenance performed on "watered" or "in-water" facilities will be performed at times and with methods to minimize potential effects to hatchery effluent, i.e., sediment disturbance, water temperature, and chemical composition.
- Non-routine maintenance that includes significant in-stream work that could result in additional effects to listed species and/or their critical habitat, including major repair, construction, or reconstruction of in-river hatchery structures (i.e., surface water diversion and hatchery outfall structures), are not considered in this Opinion. These types of work would require a separate consultation with the Service.
- Unless otherwise approved in writing by the appropriate state agency and the Services, and to the extent practicable, complete all in-water work requiring the use of heavy equipment on the streambank or, if required, in the active channel during the allowable freshwater work window for the Clearwater River Subbasin of July 1 – August 14. This timing includes work in the Dworshak Reservoir. Exceptions to this work window include the following activities:
  - Debris removal on intakes, seasonally-operated adult collection weirs and traps, and screw traps. Such removal may occur at any time during operations to maintain facility operations under the condition that all in-water work is completed without the entry of heavy equipment in the active channel, and that debris removal activities are completed in the minimum time possible.
  - Minor maintenance activities accomplished by hand at weirs and traps (e.g., minor fill of scour holes that develop between the streambed and picket barriers).
  - In Lolo Creek, Yoosa Creek, and Lapwai Creek, the suggested in-water work window is August 1 – October 30. This window was approved for a previously-proposed weir project on Lolo Creek (FWS: 01EIFW00-2012-F-0352). These streams are not designated as critical habitat for bull trout and occurrence is rare.
- Prepare and implement a pollution and erosion control plan to prevent pollution related to maintenance activities. The plan will be made available for inspection on request by the BPA, NMFS, and the Service. The pollution and erosion control plan will address

equipment and materials storage sites, fueling operations, staging areas, cement mortars and bonding agents, hazardous materials, spill containment and notification, and debris management.

- Select equipment that will have the least adverse effects on the environment (e.g., minimally sized rubber tires, etc.) when heavy equipment must be used.
- Have the proper approved oils/lubricants when working below the ordinary high water mark (OHWM).
- Operate all equipment above the OHWM, or in the dry, whenever possible to reduce impacts.
- Clean all materials used prior to placement below the OHWM.
- Make absorbent material available on site to collect any lubricants in the case of a pressurized line failure. Dispose of all used materials in the proper manner.
- Stage and fuel all equipment in appropriate areas above the OHWM (at least 100 feet from streambanks).
- Cease operations if, at any time, fish are observed in distress as a result of action activities.
- Clean all equipment to ensure it is free of vegetation, external oil, grease, dirt, and mud before equipment is brought to the site and prior to removal from the project area.
- Involve local habitat entities with the maintenance actions and notify them prior to and following the completion of all activities.
- Ensure that all work meets State and Federal fish passage requirements.
- Dispose of all discharge water created by maintenance tasks (e.g., debris removal operations, vehicle wash water) at an adjacent upland location. No discharge water will be allowed to return to the adjacent waterbodies unless specifically approved by the Services.
- Obtain all appropriate state and federal permits before work is initiated (i.e., Corps discharge permits for semi-routine maintenance activities that are not exempt from Clean Water Act Section 404 permitting).
- Install straw bales and/or geo-textile filtration traps to the outlet channel when dredging to catch any sediment exiting the subject waterbody.
- Filter pumped water through straw bale sediment traps to remove any sediment prior to re-entering waterbodies.
- All sediment generating activities will meet state water quality standards.

2.2 Analytical Framework for the Jeopardy and Adverse Modification Determinations

2.2.1 Jeopardy Determination

In accordance with policy and regulation, the jeopardy analysis in this Opinion relies on four components:

1. The *Status of the Species*, which evaluates the bull trout's rangewide condition, the factors responsible for that condition, and its survival and recovery needs.
2. The *Environmental Baseline*, which evaluates the condition of the bull trout in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the bull trout.
3. The *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the bull trout.
4. *Cumulative Effects*, which evaluates the effects of future, non-Federal activities reasonably certain to occur in the action area on the bull trout.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the bull trout's current status, taken together with cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the bull trout in the wild.

Recovery Units (RUs) for the bull trout were defined in the final *Recovery Plan for the Coterminous United States Population of [the] Bull Trout* (USFWS 2015a, entire). Pursuant to Service policy, when a proposed Federal action impairs or precludes the capacity of a RU from providing both the survival and recovery function assigned to it, that action may represent jeopardy to the species. When using this type of analysis, the biological opinion describes how the proposed action affects not only the capability of the RU, but the relationship of the RU to both the survival and recovery of the listed species as a whole.

The jeopardy analysis for the bull trout in this biological opinion considers the relationship of the action area and affected core areas (discussed below under the *Status of the Species* section) to the RU and the relationship of the RU to both the survival and recovery of the bull trout as a whole as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Within the above context, the Service also considers how the effects of the proposed Federal action and any cumulative effects impact bull trout local and core area populations in determining the aggregate effect to the RU(s). Generally, if the effects of a proposed Federal action, taken together with cumulative effects, are likely to impair the viability of a core area population(s), such an effect is likely to impair the survival and recovery function assigned to a RU(s) and may represent jeopardy to the species (USFWS 2005a, 70 FR 56258).

2.2.2 Adverse Modification Determination

Section 7(a)(2) of the Act requires that Federal agencies ensure that any action they authorize, fund, or carry out is not likely to destroy or to adversely modify designated critical habitat. A final rule revising the regulatory definition of "destruction or adverse modification of critical habitat" was published on February 11, 2016 (USFWS and NMFS 2016, 81 FR 7214). The final rule became effective on March 14, 2016. The revised definition states: "Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features."

The destruction or adverse modification analysis in this biological opinion relies on four components:

1. The *Status of Critical Habitat*, which describes the range-wide condition of designated critical habitat for the bull trout in terms of the key components of the critical habitat that provide for the conservation of the bull trout, the factors responsible for that condition, and the intended value of the critical habitat overall for the conservation/recovery of the bull trout.
2. The *Environmental Baseline*, which analyzes the condition of the critical habitat in the action area, the factors responsible for that condition, and the value of the critical habitat in the action area for the conservation/recovery of the listed species.
3. The *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated and interdependent activities on the key components of critical habitat that provide for the conservation of the listed species, and how those impacts are likely to influence the value of the affected critical habitat units for the conservation/recovery of the listed species.
4. The *Cumulative Effects*, which evaluate the effects of future non-Federal activities that are reasonably certain to occur in the action area on the key components of critical habitat that provide for the conservation of the listed species and how those impacts are likely to influence the value of the affected critical habitat units for the conservation/recovery of the listed species.

For purposes of making the destruction or adverse modification determination, the effects of the proposed Federal action, together with any cumulative effects, are evaluated to determine if the value of the critical habitat rangewide for the conservation/recovery of the listed species would remain functional or would retain the current ability for the key components of the critical habitat that provide for the conservation of the listed species to be functionally re-established in areas of currently unsuitable but capable habitat.

Note: Past designations of critical habitat have used the terms "primary constituent elements" (PCEs), "physical or biological features" (PBFs) or "essential features" to characterize the key components of critical habitat that provide for the conservation of the listed species. The new critical habitat regulations (USFWS and NMFS 2016, 81 FR 7214) discontinue use of the terms "PCEs" or "essential features" and rely exclusively on use of the term PBFs for that purpose because that term is contained in the statute. To be consistent with that shift in terminology and

in recognition that the terms PBFs, PCEs, and essential habit features are synonymous in meaning, we are only referring to PBFs herein. Therefore, if a past critical habitat designation defined essential habitat features or PCEs, they will be referred to as PBFs in this document. This does not change the approach outlined above for conducting the ‘‘destruction or adverse modification’’ analysis, which is the same regardless of whether the original designation identified PCEs, PBFs or essential features.

2.3 Status of the Species and Critical Habitat

2.3.1 Bull Trout

2.3.1.1 Listing Status

The coterminous United States population of the bull trout was listed as threatened on November 1, 1999 (USFWS 1999, 64 FR 58910-58933). The threatened bull trout occurs in the Klamath River Basin of south-central Oregon; the Jarbidge River in Nevada; the Willamette River Basin in Oregon; Pacific Coast drainages of Washington, including Puget Sound; major rivers in Idaho, Oregon, Washington, and Montana, within the Columbia River Basin; and the St. Mary-Belly River, east of the Continental Divide in northwestern Montana (Bond 1992, p. 2; Brewin and Brewin 1997, p. 215; Cavender 1978, pp. 165-166; Howell and Buchanan 1992, entire; Leary and Allendorf 1997, pp. 716-719; USFWS 1999, 64 FR 58910).

The final listing rule for the United States coterminous population of the bull trout discusses the consolidation of five Distinct Population Segments (DPSs) into one listed taxon and the application of the jeopardy standard under section 7 of the Endangered Species Act (Act) relative to this species, and established five interim recovery units for each of these DPSs for the purposes of Consultation and Recovery (USFWS 1999, 64 FR 58930).

The 2010 final bull trout critical habitat rule (USFWS 2010a, 75 FR 63898-64070) identified six draft recovery units based on new information that confirmed they were needed to ensure a resilient, redundant, and representative distribution of bull trout populations throughout the range of the listed entity. The final bull trout recovery plan (RP) (USFWS 2015a, pp. 36-43) formalized these six recovery units: Coastal, Klamath, Mid-Columbia, Columbia Headwaters, Saint Mary, and Upper Snake. The final recovery units replace the previous five interim recovery units and will be used in the application of the jeopardy standard for Section 7 consultation procedures.

2.3.1.2 Reasons for Listing and Emerging Threats

Throughout its range, the bull trout is threatened by the combined effects of habitat degradation, fragmentation, and alterations associated with dewatering, road construction and maintenance, mining, grazing, the blockage of migratory corridors by dams or other diversion structures, poor water quality; incidental angler harvest; entrainment (a process by which aquatic organisms are pulled through a diversion or other device) into diversion channels; and introduced non-native species (USFWS 1999, 64 FR 58910).

Since the time of coterminous listing the species (64 FR 58910) and designation of its critical habitat (USFWS 2004a, 69 FR 59996; USFWS 2005a, 70 FR 56212; USFWS 2010a, 75 FR

63898) a great deal of new information has been collected on the status of bull trout. The Service's Science Team Report (Whitesel et al. 2004, entire), the bull trout core areas templates (USFWS 2005a, entire; 2009, entire), Conservation Status Assessment (USFWS 2005c, entire), and 5-year Reviews (USFWS 2008, entire; 2015h, entire) have provided additional information about threats and status. The final RP lists many other documents and meetings that compiled information about the status of bull trout (USFWS 2015a, p. 3). As did the prior 5-year review (2008), the 2015 5-year status review maintains the listing status as threatened based on the information compiled in the final bull trout RP (USFWS 2015a, entire) and the Recovery Unit Implementation Plans (RUIPs) (USFWS 2015b-g, entire).

When first listed, the status of bull trout and its threats were reported by the Service at subpopulation scales. In 2002 and 2004, the draft recovery plans (USFWS 2002a, entire; 2004a, entire; 2004b, entire) included detailed information on threats at the recovery unit scale (i.e. similar to subbasin or regional watersheds), thus incorporating the metapopulation concept with core areas and local populations. In the 5-year Reviews, the Service established threats categories (i.e. dams, forest management, grazing, agricultural practices, transportation networks, mining, development and urbanization, fisheries management, small populations, limited habitat, and wild fire) (USFWS 2008, pp. 39-42; USFWS 2015h, p. 3). In the final RP, threats and recovery actions are described for 109 core areas, forage/migration and overwintering areas, historical core areas, and research needs areas in each of the six recovery units (USFWS 2015a, p 10). Primary threats are described in three broad categories: Habitat, Demographic, and Nonnative Fish for all recovery areas within the coterminously listed range of the species.

The 2015 5-year status review references the final RP and the RUIPs and incorporates by reference the threats described therein (USFWS 2015h, pp. 2-3). Although significant recovery actions have been implemented since the time of listing, the 5-year review concluded that the listing status should remain as "threatened" (USFWS 2015h, p. 3).

New or Emerging Threats

The 2015 RP (USFWS 2015a, entire) describes new or emerging threats such as climate change and other threats. Climate change was not addressed as a known threat when bull trout was listed. The 2015 bull trout RP and RUIPs summarize the threat of climate change and acknowledge that some bull trout local populations and core areas may not persist into the future due to anthropogenic effects such as climate change. The RP further states that use of best available information will ensure future conservation efforts that offer the greatest long-term benefit to sustain bull trout and their required coldwater habitats (USFWS 2015a, pp. vii, 17-20).

Mote et al. (2014, pp. 487-513) summarized climate change effects in the Pacific Northwest to include rising air temperature, changes in the timing of streamflow related to changing snowmelt, increases in extreme precipitation events, lower summer stream flows, and other changes. A warming trend in the mountains of western North America is expected to decrease snowpack, hasten spring runoff, reduce summer stream flows, and increase summer water temperatures (Poff et al. 2002, p. 34; Koopman et al. 2009, entire; Point Reyes Bird Observatory (PRBO) Conservation Science 2011, p. 13). Lower flows as a result of smaller snowpack could reduce habitat, which might adversely affect bull trout reproduction and survival. Warmer water temperatures could lead to physiological stress and could also benefit nonnative fishes that prey on or compete with bull trout. Increases in the number and size of forest fires could also result from climate change (Westerling et al. 2006, p. 940) and could adversely affect watershed

function by resulting in faster runoff, lower base flows during the summer and fall, and increased sedimentation rates. Lower flows also may result in increased groundwater withdrawal for agricultural purposes and resultant reduced water availability in certain stream reaches occupied by bull trout (USFWS 2015c, p. B-10).

Although all salmonids are likely to be affected by climate change, bull trout are especially vulnerable given that spawning and rearing are constrained by their location in upper watersheds and the requirement for cold water temperatures (Rieman et al. 2007, p. 1552). Climate change is expected to reduce the extent of cold water habitat (Isaak et al. 2015, p. 2549, Figure 7), and increase competition with other fish species (lake trout, brown trout, brook trout, and northern pike) for resources in remaining suitable habitat. Several authors project that brook trout, a fish species that competes for resources with and predates on the bull trout, will continue increasing their range in several areas (an upward shift in elevation) due to the effects from climate change (e.g., warmer water temperatures) (Wenger et al. 2011, p. 998, Figure 2a, Isaak et al. 2014, p. 114).

2.3.1.3 Species Description

Bull trout, member of the family Salmonidae, are char native to the Pacific Northwest and western Canada. The bull trout and the closely related Dolly Varden (*Salvelinus malma*) were not officially recognized as separate species until 1980 (Robins et al. 1980, p. 19). Bull trout historically occurred in major river drainages in the Pacific Northwest from the southern limits in the McCloud River in northern California (now extirpated (Rode 1990, p. 1)), Klamath River basin of south central Oregon, and the Jarbidge River in Nevada to the headwaters of the Yukon River in the Northwest Territories, Canada (Cavender 1978, pp. 165-169; Bond 1992, pp. 2-3). To the west, the bull trout's current range includes Puget Sound, coastal rivers of British Columbia, Canada, and southeast Alaska (Bond 1992, p. 2-3). East of the Continental Divide bull trout are found in the headwaters of the Saskatchewan River in Alberta and the MacKenzie River system in Alberta and British Columbia (Cavender 1978, p. 165-169; Brewin and Brewin 1997, pp. 209-216). Bull trout are wide spread throughout the Columbia River basin, including its headwaters in Montana and Canada.

2.3.1.4 Life History

Bull trout exhibit resident and migratory life history strategies throughout much of the current range (Rieman and McIntyre 1993, p. 2). Resident bull trout complete their entire life cycle in the streams where they spawn and rear. Migratory bull trout spawn and rear in streams for 1 to 4 years before migrating to either a lake (adfluvial), river (fluvial), or, in certain coastal areas, to saltwater (anadromous) where they reach maturity (Fraley and Shepard 1989, p. 1; Goetz 1989, pp. 15-16). Resident and migratory forms often occur together and it is suspected that individual bull trout may give rise to offspring exhibiting both resident and migratory behavior (Rieman and McIntyre 1993, p. 2).

Bull trout have more specific habitat requirements than other salmonids (Rieman and McIntyre 1993, p. 4). Watson and Hillman (1997, p. 248) concluded that watersheds must have specific physical characteristics to provide habitat requirements for bull trout to successfully spawn and rear. It was also concluded that these characteristics are not necessarily ubiquitous throughout these watersheds, thus resulting in patchy distributions even in pristine habitats.

Bull trout are found primarily in colder streams, although individual fish are migratory in larger, warmer river systems throughout the range (Fraley and Shepard 1989, pp. 135-137; Rieman and McIntyre 1993, p. 2 and 1995, p. 288; Buchanan and Gregory 1997, pp. 121-122; Rieman et al. 1997, p. 1114). Water temperature above 15°C (59°F) is believed to limit bull trout distribution, which may partially explain the patchy distribution within a watershed (Fraley and Shepard 1989, p. 133; Rieman and McIntyre 1995, pp. 255-296). Spawning areas are often associated with cold water springs, groundwater infiltration, and the coldest streams in a given watershed (Pratt 1992, p. 6; Rieman and McIntyre 1993, p. 7; Rieman et al. 1997, p. 1117). Goetz (1989, pp. 22, 24) suggested optimum water temperatures for rearing of less than 10°C (50°F) and optimum water temperatures for egg incubation of 2 to 4°C (35 to 39°F).

All life history stages of bull trout are associated with complex forms of cover, including large woody debris, undercut banks, boulders, and pools (Goetz 1989, pp. 22-25; Pratt 1992, p. 6; Thomas 1992, pp. 4-5; Rich 1996, pp. 35-38; Sexauer and James 1997, pp. 367-369; Watson and Hillman 1997, pp. 247-249). Jakober (1995, p. 42) observed bull trout overwintering in deep beaver ponds or pools containing large woody debris in the Bitterroot River drainage, Montana, and suggested that suitable winter habitat may be more restrictive than summer habitat. Bull trout prefer relatively stable channel and water flow conditions (Rieman and McIntyre 1993, p. 6). Juvenile and adult bull trout frequently inhabit side channels, stream margins, and pools with suitable cover (Sexauer and James 1997, pp. 368-369).

The size and age of bull trout at maturity depend upon life history strategy. Growth of resident fish is generally slower than migratory fish; resident fish tend to be smaller at maturity and less fecund (Goetz 1989, p. 15). Bull trout normally reach sexual maturity in 4 to 7 years and live as long as 12 years. Bull trout are iteroparous (they spawn more than once in a lifetime), and both repeat- and alternate-year spawning has been reported, although repeat-spawning frequency and post-spawning mortality are not well documented (Leathe and Graham 1982, p. 95; Fraley and Shepard 1989, p. 135; Pratt 1992, p. 8; Rieman and McIntyre 1996, p. 133).

Bull trout typically spawn from August to November during periods of decreasing water temperatures. Migratory bull trout frequently begin spawning migrations as early as April, and have been known to move upstream as far as 250 kilometers (km) (155 miles (mi)) to spawning grounds (Fraley and Shepard 1989, p. 135). Depending on water temperature, incubation is normally 100 to 145 days (Pratt 1992, p.1) and, after hatching, fry remain in the substrate. Time from egg deposition to emergence may exceed 200 days. Fry normally emerge from early April through May depending upon water temperatures and increasing stream flows (Pratt 1992, p. 1).

The iteroparous reproductive system of bull trout has important repercussions for the management of this species. Bull trout require two-way passage up and downstream, not only for repeat spawning, but also for foraging. Most fish ladders, however, were designed specifically for anadromous semelparous (fishes that spawn once and then die, and therefore require only one-way passage upstream) salmonids. Therefore, even dams or other barriers with fish passage facilities may be a factor in isolating bull trout populations if they do not provide a downstream passage route.

Bull trout are opportunistic feeders with food habits primarily a function of size and life history strategy. Resident and juvenile migratory bull trout prey on terrestrial and aquatic insects, macro zooplankton and small fish (Boag 1987, p. 58; Goetz 1989, pp. 33-34; Donald and Alger 1993,

pp. 239-243). Adult migratory bull trout are primarily piscivores, known to feed on various fish species (Fraley and Shepard 1989, p. 135; Donald and Alger 1993, p. 242).

2.3.1.5 Population Dynamics

Population Structure

As indicated above, bull trout exhibit both resident and migratory life history strategies. Both resident and migratory forms may be found together, and either form may produce offspring exhibiting either resident or migratory behavior (Rieman and McIntyre 1993, p. 2). Resident bull trout complete their entire life cycle in the tributary (or nearby) streams in which they spawn and rear. The resident form tends to be smaller than the migratory form at maturity and also produces fewer eggs (Goetz 1989, p. 15). Migratory bull trout spawn in tributary streams where juvenile fish rear 1 to 4 years before migrating to either a lake (adfluvial form), river (fluvial form) (Fraley and Shepard 1989, p. 138; Goetz 1989, p. 24), or saltwater (anadromous form) to rear as subadults and to live as adults (Brenkman and Corbett 2005, entire; McPhail and Baxter 1996, p. i). Bull trout normally reach sexual maturity in 4 to 7 years and may live longer than 12 years. Repeat- and alternate-year spawning has been reported, although repeat-spawning frequency and post-spawning mortality are not well documented (Fraley and Shepard 1989, p. 135; Leathe and Graham 1982, p. 95; Pratt 1992, p. 8; Rieman and McIntyre 1996, p. 133).

Bull trout are naturally migratory, which allows them to capitalize on temporally abundant food resources and larger downstream habitats. Resident forms may develop where barriers (either natural or manmade) occur or where foraging, migrating, or overwintering habitats for migratory fish are minimized (Brenkman and Corbett 2005, pp. 1075-1076; Goetz et al. 2004, p. 105; Starcevich et al. 2012, p. 10; Barrows et al. 2016, p. 98). For example, multiple life history forms (e.g., resident and fluvial) and multiple migration patterns have been noted in the Grande Ronde River (Baxter 2002, pp. 96, 98-106) and Wenatchee River (Ringel et al. 2014, pp. 61-64). Parts of these river systems have retained habitat conditions that allow free movement between spawning and rearing areas and the mainstem rivers. Such multiple life history strategies help to maintain the stability and persistence of bull trout populations to environmental changes.

Benefits of connected habitat to migratory bull trout include greater growth in the more productive waters of larger streams, lakes, and marine waters; greater fecundity resulting in increased reproductive potential; and dispersing the population across space and time so that spawning streams may be recolonized should local populations suffer a catastrophic loss (Frissell 1999, pp. 861-863; MBTSG 1998, p. 13; Rieman and McIntyre 1993, pp. 2-3). In the absence of the migratory bull trout life form, isolated populations cannot be replenished when disturbances make local habitats temporarily unsuitable. Therefore, the range of the species is diminished, and the potential for a greater reproductive contribution from larger size fish with higher fecundity is lost (Rieman and McIntyre 1993, p. 2).

Whitesel et al. (2004, p. 2) noted that although there are multiple resources that contribute to the subject, Spruell et al. (2003, entire) best summarized genetic information on bull trout population structure. Spruell et al. (2003, entire) analyzed 1,847 bull trout from 65 sampling locations, four located in three coastal drainages (Klamath, Queets, and Skagit Rivers), one in the Saskatchewan River drainage (Belly River), and 60 scattered throughout the Columbia River Basin. They concluded that there is a consistent pattern among genetic studies of bull trout, regardless of whether examining allozymes, mitochondrial DNA, or most recently microsatellite loci. Typically, the genetic pattern shows relatively little genetic variation within populations, but

substantial divergence among populations. Microsatellite loci analysis supports the existence of at least three major genetically differentiated groups (or evolutionary lineages) of bull trout (Spruell et al. 2003, p. 17). They were characterized as:

i. "Coastal", including the Deschutes River and all of the Columbia River drainage downstream, as well as most coastal streams in Washington, Oregon, and British Columbia. A compelling case also exists that the Klamath Basin represents a unique evolutionary lineage within the coastal group.

ii. "Snake River", which also included the John Day, Umatilla, and Walla Walla rivers. Despite close proximity of the John Day and Deschutes Rivers, a striking level of divergence between bull trout in these two systems was observed.

iii. "Upper Columbia River" which includes the entire basin in Montana and northern Idaho. A tentative assignment was made by Spruell et al. (2003, p. 25) of the Saskatchewan River drainage populations (east of the continental divide), grouping them with the upper Columbia River group.

Spruell et al. (2003, p. 17) noted that within the major assemblages, populations were further subdivided, primarily at the level of major river basins. Taylor et al. (1999, entire) surveyed bull trout populations, primarily from Canada, and found a major divergence between inland and coastal populations. Costello et al. (2003, p. 328) suggested the patterns reflected the existence of two glacial refugia, consistent with the conclusions of Spruell et al. (2003, p. 26) and the biogeographic analysis of Haas and McPhail (2001, entire). Both Taylor et al. (1999, p. 1166) and Spruell et al. (2003, p. 21) concluded that the Deschutes River represented the most upstream limit of the coastal lineage in the Columbia River Basin.

More recently, the USFWS identified additional genetic units within the coastal and interior lineages (Ardren et al. 2011, pp. 519-523). Based on a recommendation in the USFWS's 5-year review of the species' status (USFWS 2008, p. 45), the USFWS reanalyzed the 27 recovery units identified in the 2002 draft bull trout recovery plan (USFWS 2002a, p. 48) by utilizing, in part, information from previous genetic studies and new information from additional analysis (Ardren et al. 2011, entire). In this examination, the USFWS applied relevant factors from the joint USFWS and NMFS Distinct Population Segment (DPS) policy (USFWS and NMFS 1996, 61 FR 4722-4725) and subsequently identified six draft recovery units that contain assemblages of core areas that retain genetic and ecological integrity across the range of bull trout in the coterminous United States. These six recovery units were used to inform designation of critical habitat for bull trout by providing a context for deciding what habitats are essential for recovery (USFWS 2010a, 75 FR 63898). These six recovery units, which were identified in the final bull trout recovery plan (USFWS 2015a) and described further in the RUIPs (USFWS 2015b-g) include: Coastal, Klamath, Mid-Columbia, Columbia Headwaters, Saint Mary, and Upper Snake.

Population Dynamics

Although bull trout are widely distributed over a large geographic area, they exhibit a patchy distribution, even in pristine habitats (Rieman and McIntyre 1993, p. 4). Increased habitat fragmentation reduces the amount of available habitat and increases isolation from other populations of the same species (Saunders et al. 1991, entire). Burkey (1989, entire) concluded that when species are isolated by fragmented habitats, low rates of population growth are typical

in local populations and their probability of extinction is directly related to the degree of isolation and fragmentation. Without sufficient immigration, growth for local populations may be low and probability of extinction high (Burkey 1989, entire).

A metapopulation is an interacting network of local populations with varying frequencies of migration and gene flow among them (Meefe and Carroll 1994, pp. 189-190). For inland bull trout, metapopulation theory is likely most applicable at the watershed scale where habitat consists of discrete patches or collections of habitat capable of supporting local populations; local populations are for the most part independent and represent discrete reproductive units; and long-term, low-rate dispersal patterns among component populations influences the persistence of at least some of the local populations (Rieman and Dunham 2000, entire). Ideally, multiple local populations distributed throughout a watershed provide a mechanism for spreading risk because the simultaneous loss of all local populations is unlikely. However, habitat alteration, primarily through the construction of impoundments, dams, and water diversions has fragmented habitats, eliminated migratory corridors, and in many cases isolated bull trout in the headwaters of tributaries (Rieman and Clayton 1997, pp. 10-12; Dunham and Rieman 1999, p. 645; Spruell et al. 1999, pp. 118-120; Rieman and Dunham 2000, p. 55).

Human-induced factors as well as natural factors affecting bull trout distribution have likely limited the expression of the metapopulation concept for bull trout to patches of habitat within the overall distribution of the species (Dunham and Rieman 1999, entire). However, despite the theoretical fit, the relatively recent and brief time period during which bull trout investigations have taken place does not provide certainty as to whether a metapopulation dynamic is occurring (e.g., a balance between local extirpations and recolonizations) across the range of the bull trout or whether the persistence of bull trout in large or closely interconnected habitat patches (Dunham and Rieman 1999, entire) is simply reflective of a general deterministic trend towards extinction of the species where the larger or interconnected patches are relics of historically wider distribution (Rieman and Dunham 2000, pp. 56-57). Research does, however, provide genetic evidence for the presence of a metapopulation process for bull trout, at least in the Boise River Basin of Idaho (Whiteley et al. 2003, entire). Whitesel et al. (2004 pp. 14-23) summarizes metapopulation models and their applicability to bull trout).

2.3.1.6 Status and Distribution

The following is a summary of the description and current status of the bull trout within the six recovery units (RUs) (shown in Figure 2, below). A comprehensive discussion is found in the Service's 2015 RP for the bull trout (USFWS 2015a, entire) and the 2015 RUIPs (USFWS 2015b-g, entire). Each of these RUs is necessary to maintain the bull trout's distribution, as well as its genetic and phenotypic diversity, all of which are important to ensure the species' resilience to changing environmental conditions.

Coastal Recovery Unit

The Coastal RUIP describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015b, entire). The Coastal RU is located within western Oregon and Washington. The RU is divided into three regions: Puget Sound, Olympic Peninsula, and the Lower Columbia River Regions. This RU contains 20 core areas comprising 84 local populations and a single potential local population in the historic Clackamas River core area where bull trout had been extirpated and were reintroduced in 2011, and identified four historically occupied core areas that could be re-established (USFWS 2015a,

p. 47; USFWS 2015b, p. A-2). Core areas within Puget Sound and the Olympic Peninsula currently support the only anadromous local populations of bull trout. This RU also contains ten shared FMO habitats which are outside core areas and allows for the continued natural population dynamics in which the core areas have evolved (USFWS 2015b, p. A-5).

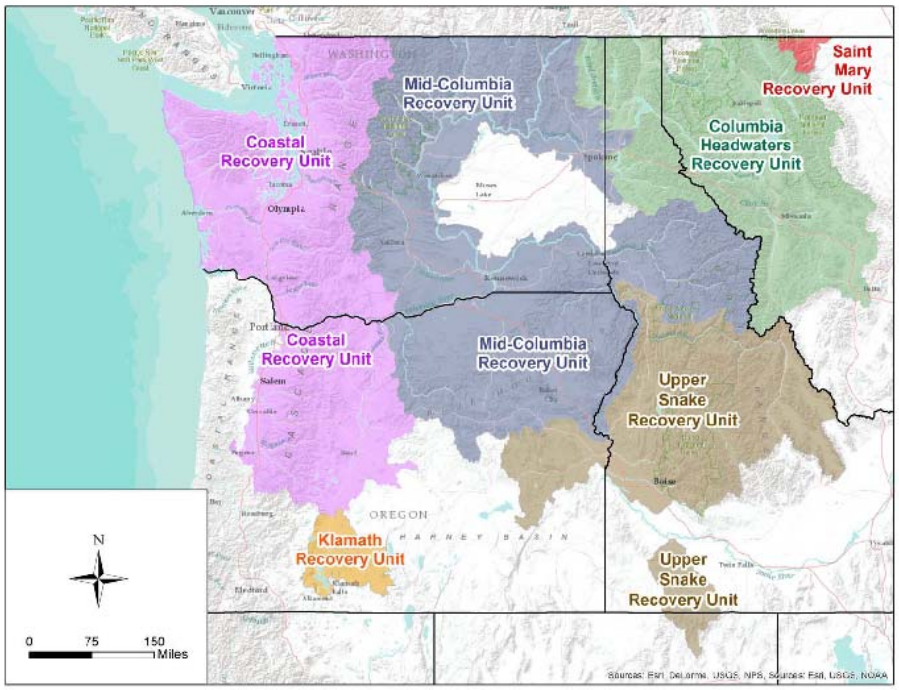

Figure 2. Map showing the location of the six bull trout Recovery Units.

There are four core areas within the Coastal RU that have been identified as current population strongholds: Lower Skagit, Upper Skagit, Quinault River, and Lower Deschutes River (USFWS 2015a, p.79). These are the most stable and abundant bull trout populations in the RU.

Most core areas in the Puget Sound region support a mix of anadromous and fluvial life history forms, with at least two core areas containing a natural adfluvial life history (Chilliwack River core area [Chilliwack Lake] and Chester Morse Lake core area). Overall demographic status of core areas generally improves as you move from south Puget Sound to north Puget Sound. Although comprehensive trend data are lacking, the current condition of core areas within the Puget Sound region are likely stable overall, although some at depressed abundances. Most core areas in this region still have significant amounts of headwater habitat within protected and relatively pristine areas (e.g., North Cascades National Park, Mount Rainier National Park, Skagit Valley Provincial Park, Manning Provincial Park, and various wilderness or recreation areas).

Within the Olympic Peninsula region, demographic status of core areas is poorest in Hood Canal and Strait of Juan de Fuca, while core areas along the Pacific Coast of Washington likely have the best demographic status in this region. The connectivity between core areas in these disjunct regions is believed to be naturally low due to the geographic distance between them. Internal

connectivity is currently poor within the Skokomish River core area (Hood Canal) and is being restored in the Elwha River core area (Strait of Juan de Fuca). Most core areas in this region still have their headwater habitats within relatively protected areas (Olympic National Park and wilderness areas).

Across the Lower Columbia River region, status is highly variable, with one relative stronghold (Lower Deschutes core area) existing on the Oregon side of the Columbia River. The Lower Columbia River region also contains three watersheds (North Santiam River, Upper Deschutes River, and White Salmon River) that could potentially become re-established core areas within the Coastal Recovery Unit. Adult abundances within the majority of core areas in this region are relatively low, generally 300 or fewer individuals.

The current condition of the bull trout in this RU is attributed to the adverse effects of climate change, loss of functioning estuarine and nearshore marine habitats, development and related impacts (e.g., flood control, floodplain disconnection, bank armoring, channel straightening, loss of instream habitat complexity), agriculture (e.g., diking, water control structures, draining of wetlands, channelization, and the removal of riparian vegetation, livestock grazing), fish passage (e.g., dams, culverts, instream flows) residential development, urbanization, forest management practices (e.g., timber harvest and associated road building activities), connectivity impairment, mining, and the introduction of non-native species.

The RP identifies three categories of primary threats[4]: Habitat (upland/riparian land management, instream impacts, water quality), demographic (connectivity impairment, fisheries management, small population size), and nonnatives (nonnative fishes). Of the 20 core areas in the Coastal RU, only one (5 percent), the Lower Deschutes River, has no primary threats identified (USFWS 2015b, Table A-1).

Conservation measures or recovery actions implemented in this RU include relicensing of major hydropower facilities that have provided upstream and downstream fish passage or complete removal of dams, land acquisition to conserve bull trout habitat, floodplain restoration, culvert removal, riparian revegetation, levee setbacks, road removal, and projects to protect and restore important nearshore marine habitats. For more information on conservation actions see section 2.3.1.7 below.

Klamath Recovery Unit

The Klamath RUIP describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015c, entire). This RU is located in southern Oregon and northwestern California. The Klamath RU is the most significantly imperiled RU, having experienced considerable extirpation and geographic contraction of local populations and declining demographic condition, and natural re-colonization is constrained by dispersal barriers and presence of nonnative brook trout (USFWS 2015a, p. 39). This RU currently contains three core areas and eight local populations (USFWS 2015a, p. 47; USFWS 2015c, p. B-1). Nine historic local populations of bull trout have become extirpated (USFWS

[4] Primary Threats are factors known or likely (i.e., non-speculative) to negatively impact bull trout populations at the core area level, and accordingly require actions to assure bull trout persistence to a degree necessary that bull trout will not be at risk of extirpation within that core area in the foreseeable future (4 to 10 bull trout generations, approximately 50 years).

2015c, p. B-1). All three core areas have been isolated from other bull trout populations for the past 10,000 years (USFWS 2015c, p. B-3).

The current condition of the bull trout in this RU is attributed to the adverse effects of climate change, habitat degradation and fragmentation, past and present land use practices, agricultural water diversions, nonnative species, and past fisheries management practices. Identified primary threats for all three core areas include upland/ riparian land management, connectivity impairment, small population size, and nonnative fishes (USFWS 2015c, Table B-1).

Conservation measures or recovery actions implemented include removal of nonnative fish (e.g., brook trout, brown trout, and hybrids), acquiring water rights for instream flows, replacing diversion structures, installing fish screens, constructing bypass channels, installing riparian fencing, culvert replacement, and habitat restoration. For more information on conservation actions see section 2.3.1.7 below.

Mid-Columbia Recovery Unit

The Mid-Columbia RUIP describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015d, entire). The Mid-Columbia RU is located within eastern Washington, eastern Oregon, and portions of central Idaho. The Mid-Columbia RU is divided into four geographic regions: Lower Mid-Columbia, Upper Mid-Columbia, Lower Snake, and Mid-Snake Geographic Regions. This RU contains 24 occupied core areas comprising 142 local populations, two historically occupied core areas, one research needs area, and seven FMO habitats (USFWS 2015a, p. 47; USFWS 2015d, p. C-1 – C4).

The current demographic status of bull trout in the Mid-Columbia Recovery Unit is highly variable at both the RU and geographic region scale. Some core areas, such as the Umatilla, Asotin, and Powder Rivers, contain populations so depressed they are likely suffering from the deleterious effects of small population size. Conversely, strongholds do exist within the RU, predominantly in the Lower Snake geographic area. The Imnaha, Wenaha, Wenatchee, and Clearwater River basins currently contain the healthiest and most stable bull trout populations in the recovery unit and should be particularly managed to maintain these populations and prevent introduction of new threats (USFWS 2015d). These populations are all completely or partially within the bounds of protected wilderness areas and have some of the most intact habitat in the recovery unit. More detailed description of bull trout distribution, trends, and survey data within individual core areas is provided in Appendix II of the RUIP (USFWS 2015d).

The current condition of the bull trout in this RU is attributed to the adverse effects of climate change, agricultural practices (e.g., irrigation, water withdrawals, livestock grazing), fish passage (e.g. dams, culverts), nonnative species, forest management practices, and mining. Of the 24 occupied core areas, six (25 percent) have no identified primary threats (USFWS 2015d, Table C-2).

Conservation measures or recovery actions implemented include road removal, channel restoration, mine reclamation, improved grazing management, removal of fish barriers, and instream flow requirements. For more information on conservation actions see section 2.3.1.7 below.

Columbia Headwaters Recovery Unit

The Columbia Headwaters RUIP describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015e, entire). The Columbia Headwaters RU is located in western Montana, northern Idaho, and the northeastern corner of Washington. The RU is divided into five geographic regions: Upper Clark Fork, Lower Clark Fork, Flathead, Kootenai, and Coeur d'Alene Geographic Regions (USFWS 2015e, pp. D-2 – D-4). This RU contains 35 bull trout core areas; 15 of which are complex core areas as they represent larger interconnected habitats and 20 simple core areas as they are isolated headwater lakes with single local populations. The 20 simple core areas are each represented by a single local population, many of which may have persisted for thousands of years despite small populations and isolated existence (USFWS 2015e, p. D-1). Fish passage improvements within the RU have reconnected some previously fragmented habitats (USFWS 2015e, p. D-1), while others remain fragmented. Unlike the other RUs in Washington, Idaho and Oregon, the Columbia Headwaters RU does not have any anadromous fish overlap. Therefore, bull trout within the Columbia Headwaters RU do not benefit from the recovery actions for salmon (USFWS 2015e, p. D-41).

Conclusions from the 2008 5-year review (USFWS 2008, Table 1) were that 13 of the Columbia Headwaters RU core areas were at High Risk (37.1 percent), 12 were considered At Risk (34.3 percent), 9 were considered at Potential Risk (25.7 percent), and only 1 core area (Lake Koocanusa; 2.9 percent) was considered at Low Risk. Simple core areas, due to limited demographic capacity and single local populations were generally more inherently at risk than complex core areas under the model. While this assessment was conducted nearly a decade ago, little has changed in regard to individual core area status in the interim (USFWS 2015e, p. D-7).

The current condition of the bull trout in this RU is attributed to the adverse effects of climate change, mostly historical mining and contamination by heavy metals, expanding populations of nonnative fish predators and competitors, modified instream flows, migratory barriers (e.g., dams), habitat fragmentation, forest practices (e.g., logging, roads), agriculture practices (e.g. irrigation, livestock grazing), and residential development. Of the 34 occupied core areas, nine (26 percent) have no identified primary threats (USFWS 2015e, Table D-2).

Conservation measures or recovery actions implemented include habitat improvement, fish passage, and removal of nonnative species. For more information on conservation actions see section 2.3.1.7 below.

Upper Snake Recovery Unit

The Upper Snake RUIP describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015f, entire). The Upper Snake RU is located in central Idaho, northern Nevada, and eastern Oregon. The Upper Snake RU is divided into seven geographic regions: Salmon River, Boise River, Payette River, Little Lost River, Malheur River, Jarbidge River, and Weiser River. This RU contains 22 core areas and 207 local populations (USFWS 2015a, p. 47), with almost 60 percent being present in the Salmon River Region.

The population trends for the 22 core areas in the Upper Snake RU are summarized in Table E-2 of the Upper Snake RUIP (USFWS 2015f, pp. E-5 – E-7): six are classified as increasing, two

are stable; two are likely stable; three are unknown, but likely stable; two are unknown, but likely decreasing; and, seven are unknown.

The current condition of the bull trout in this RU is attributed to the adverse effects of climate change, dams, mining, forest management practices, nonnative species, and agriculture (e.g., water diversions, grazing). Of the 22 occupied core areas, 13 (59 percent) have no identified primary threats (USFWS 2015f, Table E-3).

Conservation measures or recovery actions implemented include instream habitat restoration, instream flow requirements, screening of irrigation diversions, and riparian restoration. For more details on conservation actions in this unit see section 2.3.1.7 below.

St. Mary Recovery Unit

The St. Mary RUIP describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015g). The Saint Mary RU is located in Montana but is heavily linked to downstream resources in southern Alberta, Canada. Most of the Saskatchewan River watershed which the St. Mary flows into is located in Canada. The United States portion includes headwater spawning and rearing habitat and the upper reaches of FMO habitat. This RU contains four core areas (St. Mary River, Slide Lake, Cracker Lake, and Red Eagle Lake), and seven local populations (USFWS 2015g, p. F-1) in the U.S. headwaters.

Current status of bull trout in the Saint Mary River complex core area (U.S.) is considered strong. The three simple core areas (Slide Lake, Cracker Lake, and Red Eagle Lake) appear to be self-sustaining and fluctuating within known historical population demographic bounds. Note: the NatureServe status assessment tool ranks this RU as imperiled (Figure 2).

The current condition of the bull trout in this RU is attributed primarily to the outdated design and operations of the Saint Mary Diversion operated by the Bureau of Reclamation (e.g., entrainment, fish passage, instream flows), and, to a lesser extent habitat impacts from development and nonnative species. Of the four core areas, the three simple core areas (all lakes) have no identified primary threats (USFWS 2015g, Table F-1).

For more information on conservation actions see section 2.3.1.7 below.

Status Summary

The Service applied the NatureServe status assessment tool[5] to evaluate the tentative status of the six RUs. The tool rated the Klamath RU as the least robust, most vulnerable RU and the Upper Snake RU the most robust and least vulnerable recovery unit, with others at intermediate values (Figure 3).

[5] This tool consists of a spreadsheet that generates conservation status rank scores for species or other biodiversity elements (e.g. bull trout Recovery Units) based on various user inputs of status and threats (see USFWS 2015, p. 8 and Faber-Langendoen et al. 2012, entire, for more details on this status assessment tool).

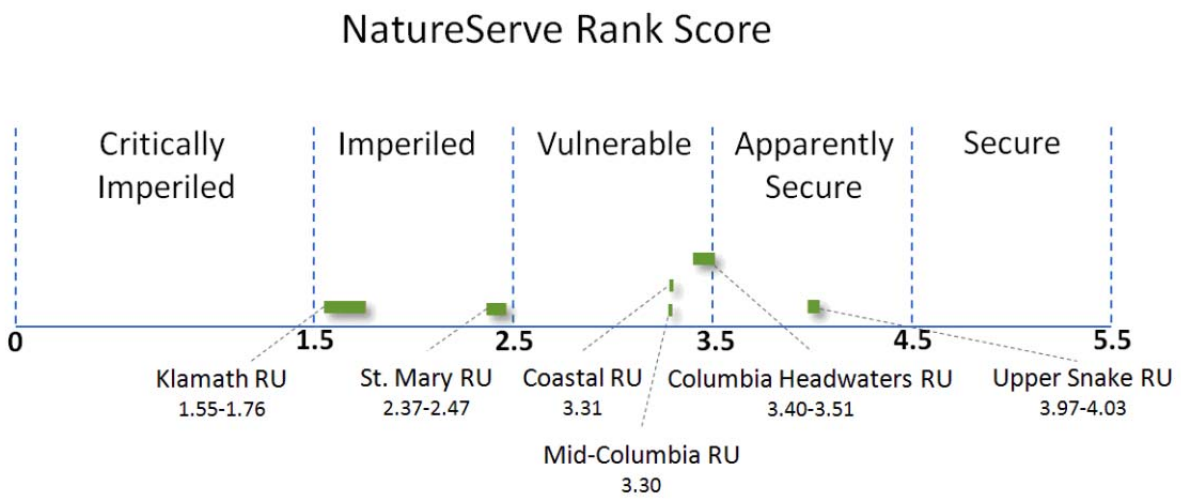

Figure 3. NatureServe status assessment tool scores for each of the six bull trout recovery units. The Klamath RU is considered the least robust and most vulnerable, and the Upper Snake RU the most robust and least vulnerable (from USFWS 2015a, Figure 2).

2.3.1.7 Conservation Needs

The 2015 RP for bull trout established the primary strategy for recovery of bull trout in the coterminous United States: (1) conserve bull trout so that they are geographically widespread across representative habitats and demographically stable in six RUs; (2) effectively manage and ameliorate the primary threats in each of six RUs at the core area scale such that bull trout are not likely to become endangered in the foreseeable future; (3) build upon the numerous and ongoing conservation actions implemented on behalf of bull trout since their listing in 1999, and improve our understanding of how various threat factors potentially affect the species; (4) use that information to work cooperatively with our partners to design, fund, prioritize, and implement effective conservation actions in those areas that offer the greatest long-term benefit to sustain bull trout and where recovery can be achieved; and (5) apply adaptive management principles to implementing the bull trout recovery program to account for new information (USFWS 2015a, p. 24.).

Information presented in prior draft recovery plans published in 2002 and 2004 (USFWS 2002a, entire; 2004b, entire; 2004c, entire) provided information that identified recovery actions across the range of the species and to provide a framework for implementing numerous recovery actions by our partner agencies, local working groups, and others with an interest in bull trout conservation. Many recovery actions were completed prior to finalizing the RP in 2015.

The 2015 RP (USFWS 2015a, entire) integrates new information collected since the 1999 listing regarding bull trout life history, distribution, demographics, conservation successes, etc., and integrates and updates previous bull trout recovery planning efforts across the coterminous range of the bull trout.

The Service has developed a recovery approach that: (1) focuses on the identification of and effective management of known and remaining threat factors to bull trout in each core area; (2) acknowledges that some extant bull trout core area habitats will likely change (and may be lost) over time; and (3) identifies and focuses recovery actions in those areas where success is likely

to meet our goal of ensuring the certainty of conservation of genetic diversity, life history features, and broad geographical representation of remaining bull trout populations so that the protections of the Act are no longer necessary (USFWS 2015a, p. 45-46).

To implement the recovery strategy, the 2015 RP establishes three categories of recovery actions for each of the six RUs (USFWS 2015a, pp. 50-51):

1. Protect, restore, and maintain suitable habitat conditions for bull trout.
2. Minimize demographic threats to bull trout by restoring connectivity or populations where appropriate to promote diverse life history strategies and conserve genetic diversity.
3. Prevent and reduce negative effects of nonnative fishes and other nonnative taxa on bull trout.
4. Work with partners to conduct research and monitoring to implement and evaluate bull trout recovery activities, consistent with an adaptive management approach using feedback from implemented, site-specific recovery tasks, and considering the effects of climate change.

Bull trout recovery is based on a geographical hierarchical approach. Bull trout are listed as a single DPS within the five-state area of the coterminous United States. The single DPS is subdivided into six biological-based recovery units: (1) Coastal Recovery Unit; (2) Klamath Recovery Unit; (3) Mid-Columbia Recovery Unit; (4) Columbia Headwaters Recovery Unit (5) Upper Snake Recovery Unit; and (6) Saint Mary Recovery Unit (USFWS 2015a, p. 23). A viable recovery unit should demonstrate that the three primary principles of biodiversity have been met: representation (conserving the genetic makeup of the species); resiliency (ensuring that each population is sufficiently large to withstand stochastic events); and redundancy (ensuring a sufficient number of populations to withstand catastrophic events) (USFWS 2015a, p. 33).

Each of the six recovery units contain multiple bull trout core areas, 109 total, which are non-overlapping watershed-based polygons, and each core area includes one or more local populations. Currently there are 109 occupied core areas, which comprise 611 local populations (USFWS 2015a, pp. 3, 47, Appendix F). There are also six core areas where bull trout historically occurred but are now extirpated, and one research needs area where bull trout were known to occur historically, but their current presence and use of the area are uncertain (USFWS 2015a, p. 3). Core areas can be further described as complex or simple (USFWS 2015a, p. 3-4). Complex core areas contain multiple local bull trout populations, are found in large watersheds, have multiple life history forms, and have migratory connectivity between spawning and rearing habitat and foraging, migration, and overwintering habitats (FMO). Simple core areas are those that contain one bull trout local population. Simple core areas are small in scope, isolated from other core areas by natural barriers, and may contain unique genetic or life history adaptations.

A core area is a combination of core habitat (i.e., habitat that could supply all elements for the long-term security of bull trout) and a core population (a group of one or more local bull trout populations that exist within core habitat) and constitutes the basic unit on which to gauge recovery within a recovery unit. Core areas require both habitat and bull trout to function, and the number (replication) and characteristics of local populations inhabiting a core area provide a relative indication of the core area's likelihood to persist. A core area represents the closest

approximation of a biologically functioning unit for bull trout. Core areas are presumed to reflect the metapopulation structure of bull trout.

A local population is a group of bull trout that spawn within a particular stream or portion of a stream system (USFWS 2015a, p. 73). A local population is considered to be the smallest group of fish that is known to represent an interacting reproductive unit. For most waters where specific information is lacking, a local population may be represented by a single headwater tributary or complex of headwater tributaries. Gene flow may occur between local populations (e.g., those within a core population), but is assumed to be infrequent compared with that among individuals within a local population.

2.3.1.8 Federal, State, and Tribal Conservation Actions Since Listing

Since our listing of bull trout in 1999, numerous conservation measures that contribute to the conservation and recovery of bull trout have been and continue to be implemented across its range in the coterminous United States. These measures are being undertaken by a wide variety of local and regional partnerships, including State fish and game agencies, State and Federal land management and water resource agencies, Tribal governments, power companies, watershed working groups, water users, ranchers, and landowners.

In many cases, these bull trout conservation measures incorporate or are closely interrelated with work being done for recovery of salmon and steelhead, which are limited by many of the same threats. These include removal of migration barriers (culvert removal or redesign at stream crossings, fish ladder construction, dam removal, etc.) to allow access to spawning or FMO habitat; screening of water diversions to prevent entrainment into unsuitable habitat in irrigation systems; habitat improvement (riparian revegetation or fencing, placement of coarse woody debris in streams) to improve spawning suitability, habitat complexity, and water temperature; instream flow enhancement to allow effective passage at appropriate seasonal times and prevent channel dewatering; and water quality improvement (decommissioning roads, implementing best management practices for grazing or logging, setting pesticide use guidelines) to minimize impacts from sedimentation, agricultural chemicals, or warm temperatures.

At sites that are vulnerable to development, protection of land through fee title acquisition or conservation easements is important to prevent adverse impacts or allow conservation actions to be implemented. In several bull trout core areas, fisheries management to manage or suppress non-native species (particularly brown trout, brook trout, lake trout, and northern pike) is ongoing and has been identified as important in addressing effects of non-native fish competition, predation, or hybridization.

A more comprehensive overview of conservation successes since 1999, described for each recovery unit, is found in the Summary of Bull Trout Conservation Successes and Actions since 1999 (Available at: (http://www.fws.gov/pacific/ecoservices/endangered/recovery/documents/USFWS_2013_summary_of_conservation_successes.pdf).

2.3.1.9 Consulted on Effects

Consulted-on effects are those effects that have been analyzed through Section 7 consultation as reported in a biological opinion. These effects are an important component of objectively characterizing the current condition status of the species.

Projects subject to section 7 consultation under the Act have occurred throughout the range of bull trout. Singly or in aggregate, these projects could affect the species' status. The Service reviewed 137 opinions produced by the Service from the time of listing in June 1998 until August 2003 (Nuss 2003, entire). The Service analyzed 24 different activity types (e.g., grazing, road maintenance, habitat restoration, timber sales, hydropower, etc.). Twenty opinions involved multiple projects, including restorative actions for bull trout.

The geographic scale of projects analyzed in these opinions varied from individual actions (e.g., construction of a bridge or pipeline) within one basin, to multiple-project actions, occurring across several basins. Some large-scale projects affected more than one recovery unit.

The Service's assessment of opinions from the time of listing until August 2003 (137 opinions), confirmed that no actions that had undergone Section 7 consultation during this period, considered either singly or cumulatively, would appreciably reduce the likelihood of survival and recovery of the bull trout or result in the loss of any (sub) populations (USFWS 2006, pp. B-36 – B-37).

Between August 2003 and July 2006, the Service issued 198 additional opinions that included analyses of effects on bull trout (USFWS 2006). These opinions also reached "no-jeopardy" determinations, and the Service concluded that the continued long-term survival and existence of the species had not been appreciably reduced range-wide due to these actions (USFWS 2006).

Since July 2006, a review of the data in our national Tracking and Integrated Logging System (TAILS) reveal this trend has changed. One biological opinion, the Idaho Water Quality Standards for Numeric Water Quality Criteria for Toxic Pollutants completed in 2015 (USFWS Ref # 14-F-0223) resulted in a "jeopardy" determination and issued Reasonable and Prudent Alternatives.

2.3.2 Bull Trout Critical Habitat

2.3.2.1 Legal Status

Ongoing litigation resulted in the U.S. District Court for the District of Oregon granting the Service a voluntary remand of the 2005 critical habitat designation. Subsequently the Service published a proposed critical habitat rule on January 14, 2010 (USFWS 2010b, 75 FR 2260) and a final rule on October 18, 2010 (USFWS 2010a, 75 FR 63898). The rule became effective on November 17, 2010. A justification document was also developed to support the rule and is available on our website (http://www.fws.gov/pacific/bulltrout). The scope of the designation involved the species' coterminous range within the Coastal, Klamath, Mid-Columbia, Columbia Headwaters, Upper Snake, and St. Mary recovery units[6].

[6] Note: the adverse modification analysis does not rely on recovery units.

Rangewide, the Service designated reservoirs/lakes and stream/shoreline miles in 32 critical habitat units (CHU) as bull trout critical habitat (see Table 4). Designated bull trout critical habitat is of two primary use types: (1) spawning and rearing; and (2) foraging, migrating, and overwintering (FMO).

Table 4. Stream/shoreline distance and reservoir/lake area designated as bull trout critical habitat by state.

State	Stream/Shoreline Miles	Stream/Shoreline Kilometers	Reservoir/ Lake Acres	Reservoir/ Lake Hectares
Idaho	8,771.6	14,116.5	170,217.5	68,884.9
Montana	3,056.5	4,918.9	221,470.7	89,626.4
Nevada	71.8	115.6	-	-
Oregon	2,835.9	4,563.9	30,255.5	12,244.0
Oregon/Idaho	107.7	173.3	-	-
Washington	3,793.3	6,104.8	66,308.1	26,834.0
Washington (marine)	753.8	1,213.2	-	-
Washington/Idaho	37.2	59.9	-	-
Washington/Oregon	301.3	484.8	-	-
Total	**19,729.0**	**31,750.8**	**488,251.7**	**197,589.2**

Compared to the 2005 designation, the final rule increases the amount of designated bull trout critical habitat by approximately 76 percent for miles of stream/shoreline and by approximately 71 percent for acres of lakes and reservoirs.

This rule also identifies and designates as critical habitat approximately 1,323.7 km (822.5 miles) of streams/shorelines and 6,758.8 ha (16,701.3 acres) of lakes/reservoirs of unoccupied habitat to address bull trout conservation needs in specific geographic areas in several areas not occupied at the time of listing. No unoccupied habitat was included in the 2005 designation. These unoccupied areas were determined by the Service to be essential for restoring functioning migratory bull trout populations based on currently available scientific information. These unoccupied areas often include lower mainstem river environments that can provide seasonally important migration habitat for bull trout. This type of habitat is essential in areas where bull trout habitat and population loss over time necessitates reestablishing bull trout in currently unoccupied habitat areas to achieve recovery.

The final rule continues to exclude some critical habitat segments based on a careful balancing of the benefits of inclusion versus the benefits of exclusion. Critical habitat does not include: (1)

waters adjacent to non-Federal lands covered by legally operative incidental take permits for habitat conservation plans (HCPs) issued under section 10(a)(1)(B) of the Endangered Species Act of 1973, as amended, in which bull trout is a covered species on or before the publication of this final rule; (2) waters within or adjacent to Tribal lands subject to certain commitments to conserve bull trout or a conservation program that provides aquatic resource protection and restoration through collaborative efforts, and where the Tribes indicated that inclusion would impair their relationship with the Service; or (3) waters where impacts to national security have been identified (USFWS 2010a, 75 FR 63898). Excluded areas are approximately 10 percent of the stream/shoreline miles and 4 percent of the lakes and reservoir acreage of designated critical habitat. Each excluded area is identified in the relevant CHU text, as identified in paragraphs (e)(8) through (e)(41) of the final rule. It is important to note that the exclusion of waterbodies from designated critical habitat does not negate or diminish their importance for bull trout conservation. Because exclusions reflect the often complex pattern of land ownership, designated critical habitat is often fragmented and interspersed with excluded stream segments.

2.3.2.2 Conservation Role and Description of Critical Habitat

The conservation role of bull trout critical habitat is to support viable core area populations (USFWS 2010a, 75 FR 63943). The core areas reflect the metapopulation structure of bull trout and are the closest approximation of a biologically functioning unit for the purposes of recovery planning and risk analyses. CHUs generally encompass one or more core areas and may include FMO areas, outside of core areas, that are important to the survival and recovery of bull trout.

As previously noted, 32 CHUs within the geographical area occupied by the species at the time of listing are designated under the final rule. Twenty-nine of the CHUs contain all of the physical or biological features identified in this final rule and support multiple life-history requirements. Three of the mainstem river units in the Columbia and Snake River basins contain most of the physical or biological features necessary to support the bull trout's particular use of that habitat, other than those physical and biological features associated with Physical and Biological Features (PBFs) 5 and 6, which relate to breeding habitat (see list below).

The primary function of individual CHUs is to maintain and support core areas, which (1) contain bull trout populations with the demographic characteristics needed to ensure their persistence and contain the habitat needed to sustain those characteristics (Rieman and McIntyre 1993, p. 19); (2) provide for persistence of strong local populations, in part, by providing habitat conditions that encourage movement of migratory fish (MBTSG 1998, pp. 48-49; Rieman and McIntyre 1993, pp. 22-23); (3) are large enough to incorporate genetic and phenotypic diversity, but small enough to ensure connectivity between populations (MBTSG 1998, pp. 48-49; Rieman and McIntyre 1993, pp. 22-23); and (4) are distributed throughout the historic range of the species to preserve both genetic and phenotypic adaptations (MBTSG 1998, pp. 13-16; Rieman and Allendorf 2001, p. 763; Rieman and McIntyre 1993, p. 23).

The Olympic Peninsula and Puget Sound CHUs are essential to the conservation of anadromous bull trout, which are unique to the Coastal-Puget Sound population segment. These CHUs contain marine nearshore and freshwater habitats, outside of core areas, that are used by bull trout from one or more core areas. These habitats, outside of core areas, contain PBFs that are critical to adult and subadult foraging, migrating, and overwintering.

In determining which areas to propose as critical habitat, the Service considered the physical and biological features that are essential to the conservation of bull trout and that may require special

management considerations or protection. These features are the PBFs laid out in the appropriate quantity and spatial arrangement for conservation of the species. The PBFs of designated critical habitat are:

1. Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.
2. Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including, but not limited to, permanent, partial, intermittent, or seasonal barriers.
3. An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.
4. Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.
5. Water temperatures ranging from 2 to 15 °C (36 to 59 °F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.
6. In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.
7. A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departures from a natural hydrograph.
8. Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.
9. Sufficiently low levels of occurrence of nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.

2.3.2.3 Current Rangewide Condition of Bull Trout Critical Habitat

The condition of bull trout critical habitat varies across its range from poor to good. Although still relatively widely distributed across its historic range, the bull trout occurs in low numbers in many areas, and populations are considered depressed or declining across much of its range (USFWS 2002b, 67 FR 71240). This condition reflects the condition of bull trout habitat.

The primary land and water management activities impacting the physical and biological features essential to the conservation of bull trout include timber harvest and road building, agriculture

and agricultural diversions, livestock grazing, dams, mining, urbanization and residential development, and nonnative species presence or introduction (USFWS 2010b, 75 FR 2282).

There is widespread agreement in the scientific literature that many factors related to human activities have impacted bull trout and their habitat, and continue to do so. Among the many factors that contribute to degraded PBFs, those which appear to be particularly significant and have resulted in a legacy of degraded habitat conditions are as follows:

1. Fragmentation and isolation of local populations due to the proliferation of dams and water diversions that have eliminated habitat, altered water flow and temperature regimes, and impeded migratory movements (Dunham and Rieman 1999, p. 652; Rieman and McIntyre 1993, p. 7).
2. Degradation of spawning and rearing habitat and upper watershed areas, particularly alterations in sedimentation rates and water temperature, resulting from forest and rangeland practices and intensive development of roads (Fraley and Shepard 1989, p. 141; MBTSG 1998, pp. ii - v, 20-45).
3. The introduction and spread of nonnative fish species, particularly brook trout and lake trout, as a result of fish stocking and degraded habitat conditions, which compete with bull trout for limited resources and, in the case of brook trout, hybridize with bull trout (Leary et al. 1993, p. 857; Rieman et al. 2006, pp. 73-76).
4. In the Coastal-Puget Sound region where anadromous bull trout occur, degradation of mainstem river FMO habitat, and the degradation and loss of marine nearshore foraging and migration habitat due to urban and residential development.
5. Degradation of FMO habitat resulting from reduced prey base, roads, agriculture, development, and dams.

The bull trout critical habitat final rule also aimed to identify and protect those habitats that provide resiliency for bull trout use in the face of climate change. Over a period of decades, climate change may directly threaten the integrity of the essential physical or biological features described in PBFs 1, 2, 3, 5, 7, 8, and 9. Protecting bull trout strongholds and cold water refugia from disturbance and ensuring connectivity among populations were important considerations in addressing this potential impact. Additionally, climate change may exacerbate habitat degradation impacts both physically (e.g., decreased base flows, increased water temperatures) and biologically (e.g., increased competition with nonnative fishes).

2.4 Environmental Baseline of the Action Area

This section assesses the effects of past and ongoing human and natural factors that have led to the current status of the species, its habitat and ecosystem in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area that have already undergone section 7 consultations, and the impacts of state and private actions which are contemporaneous with this consultation.

2.4.1 Bull Trout

2.4.1.1 Status of the Bull Trout in the Action Area

The Clearwater River hatchery programs included under the proposed action occur within the Mid-Columbia Bull Trout RU over a total of three core areas, as well as within shared foraging, migratory, and overwintering (FMO) habitat in the Clearwater River. In addition, adult and juvenile fish reared at Clearwater River program facilities migrate through the Coastal RU on their way to and from the ocean. Core areas within the Mid-Columbia RU provide SR habitat as well as FMO habitat for bull trout. The Coastal RU provides FMO habitat for bull trout that migrate to and from facilities included under the proposed action. Habitat types are defined as:

- **Spawning and Rearing (SR) habitat**: Stream reaches and the associated watershed areas that provide all habitat components necessary for spawning and juvenile rearing for a local bull trout population. SR habitat generally supports multiple year-classes of juvenile resident or migratory fish, and may also support subadults and adults from local populations of resident bull trout.
- **Foraging, Migrating, and Overwintering (FMO) habitat:** Relatively large streams and mainstem rivers, including lakes or reservoirs, estuaries, and nearshore environments, where subadult and adult migratory bull trout forage, migrate, mature, or overwinter. This habitat is typically downstream from SR habitat and contains all the physical elements to meet critical overwintering, spawning migration, and subadult and adult rearing needs. Although use of FMO habitat by bull trout may be seasonal or very brief (as in some migratory corridors), it is a critical habitat component.

2.4.1.1.1 Mid-Columbia Recovery Unit

The Mid-Columbia RU is located within eastern Washington, eastern Oregon, and portions of Idaho. Major drainages include the Yakima River, John Day River, Umatilla River, Walla Walla River, Grande Ronde River, Imnaha River, Powder River, Clearwater River, and small drainages along the Snake and Columbia rivers (USFWS 2015a). The Mid-Columbia RU includes 24 core areas in 4 geographic regions. The only geographic region containing facilities that support Clearwater River programs is the Lower Snake River geographic region. Within the Lower Snake geographic region, Clearwater River program facilities occur in the South Fork Clearwater River, Selway River, and Lochsa River core areas. Though sited on the North Fork Clearwater River (Streamnet 2016), the Dworshak National and Clearwater fish hatcheries are located downstream from Dworshak Dam near the mainstem Clearwater River. Therefore, reaches adjacent to these facilities are categorized as part of shared FMO habitat in the Clearwater River. Although the Dworshak National and Clearwater fish hatcheries are not located within the North Fork Clearwater core area, both facilities withdraw surface water via intakes located in the Dworshak Reservoir. As such, infrastructure for both facilities overlaps with the North Fork Clearwater core area.

In addition to the Clearwater River, the mainstem Columbia River from its mouth upstream to the Snake River, and the mainstem Snake River from its mouth upstream to Lower Monumental Dam, provide migration corridors for fish produced at facilities under the proposed action. The mainstem Columbia and Snake Rivers are not designated as core areas, but provide important FMO habitat for bull trout. The lower mainstem Columbia River, from its mouth upstream to

John Day Dam, is part of the Coastal RU. The mainstem Columbia upstream of John Day Dam to the confluence with the Snake River, and the Snake River from its mouth to Brownlee Dam are part of the Mid-Columbia RU, and provide FMO habitat for bull trout (USFWS 2015a).

Recent work concluded that despite declines from historical levels, Idaho bull trout are presently widely distributed, relatively abundant, and apparently stable (High et al. 2008). High et al. (2008) further concluded that the former Clearwater River Bull Trout RU (now part of the Mid-Columbia RU) exhibited an overall increasing trend, with three of four available post-1994 abundance trends significantly positive in this subbasin.

The Clearwater River hatchery programs included under the proposed action occur in the South Fork Clearwater River, Selway River, and Lochsa River core areas. Adult and juvenile fish from the programs migrate through shared FMO habitat in the Clearwater River, as well as FMO habitat in the mainstem Columbia and Snake Rivers.

As previously noted, the Dworshak National and Clearwater fish hatcheries are located on the North Fork Clearwater River near the confluence of the mainstem Clearwater River. The North Fork Clearwater River downstream of Dworshak Dam is not part of the North Fork Clearwater core area, and therefore, reaches near the facilities function similarly to FMO habitat on the mainstem Clearwater River. Surface water intakes for both facilities are located in the Dworshak Reservoir, which is part of the North Fork Clearwater core area.

Clearwater River Shared FMO Habitat

The mainstem Clearwater River, Middle Fork Clearwater River, and their tributaries comprise the Clearwater River shared FMO habitat, which encompasses about 664,000 hectares (1,640,500 acres). Adult and subadult bull trout use the Lower (mainstem) Clearwater River, Middle Fork Clearwater River, and their tributaries primarily as foraging, migratory, subadult rearing, and overwintering habitat, although the extent of use is unclear. Bull trout abundance is very low throughout the Clearwater River shared FMO area (USFWS 2002b); however, the area provides access to core areas in the Clearwater River Subbasin, providing essential FMO habitat and connectivity. As described in the next section, several hatchery facilities under the proposed action are located in this shared FMO habitat, both on the mainstem Clearwater River and its tributaries (USFWS 2015b).

The mainstem Clearwater River flows 119.6 km (74.3 miles) from the confluence of the Middle and South Forks to the confluence with the Snake River near Lewiston, Idaho. It flows through Nez Perce, Latah, Lewis, and Clearwater counties. The Middle Fork Clearwater River is formed by the confluence of the Selway and Lochsa rivers near Lowell, Idaho, and flows westerly for 37 km (23 miles) until it converges with the South Fork near Kooskia, Idaho.

Bull trout use of the mainstem Clearwater River is seasonal, as summer water temperatures exceed those preferred by bull trout. The factors limiting bull trout in the Clearwater River Subbasin include habitat degradation, loss of prey species, passage barriers, hybridization and competition with exotics, and harvest (CBBTTAT 1998a). During late spring and summer water is released from lower levels of the Dworshak reservoir to help cool water temperatures in the Lower Snake River downstream of the Clearwater and Snake River confluence. These cooler waters improve thermal conditions for endangered salmon in the Lower Snake River (Cook and Richmond 2004).

Mainstem Facilities

The Nez Perce Tribal Hatchery, Kooskia National Fish Hatchery, Dworshak National Fish Hatchery, and Clearwater Fish Hatchery are not located in bull trout core areas. Rather, they occur in reaches along the mainstem Clearwater River shared FMO area. The Nez Perce Tribal Hatchery is located on the mainstem Clearwater River at RKM 35.7 (RM 22.2). The Kooskia National Fish Hatchery is located at RKM 1.0 (RM 0.6) on Clear Creek, a tributary to the Middle Fork Clearwater River.

At the Nez Perce Tribal Hatchery, bull trout are rarely captured in the trap (NPT 2013), and no bull trout have been collected at the hatchery in over 10 years.

The Dworshak National and Clearwater fish hatcheries are located at the confluence of the North Fork and the mainstem Clearwater River at RKM 65 (RM 40), downstream from Dworshak Dam (Figure 1). The North Fork Clearwater River core area, which is in Clearwater, Idaho and Shoshone counties, includes the North Fork Clearwater River and all its tributaries upstream of Dworshak Dam. The hatcheries are, therefore, not within the core area, and habitat at both the Dworshak National and Clearwater hatcheries is functionally disconnected from the North Fork Clearwater core area. As such, it is appropriate to characterize the hatcheries along shared FMO habitat for the Clearwater River. Dworshak Dam has isolated bull trout from fish in the remainder of the Clearwater River since the dam was completed in 1971 (USFWS 2002b).

Dworshak National Fish Hatchery is located in low elevation mainstem habitat that would typically only be used by bull trout as a migration corridor or possibly winter holding for adults and sub-adults. Because of summer flow augmentations required from releases above Dworshak Dam, the North Fork may provide a summer refuge from the warmer mainstem Clearwater River. Daily average water temperatures have been commonly measured at 23 to 25ºC during July and August in the mainstem above the confluence with the North Fork (NPT, unpublished data in USFWS and NPT 2010). Historically, records have not been kept on collections of bull trout at Dworshak National Fish Hatchery. However, staff biologists estimate zero to several may be collected during trapping of steelhead and again during trapping of spring Chinook salmon annually (Robertson 2017, *in litt*). Most, if not all bull trout residing in the North Fork Clearwater River below Dworshak Dam are the result of entrainment through the dam from Dworshak Reservoir. The Service does not believe that the North Fork Clearwater River below Dworshak Dam provides suitable spawning habitat for natural production of bull trout (USFWS and NPT 2010).

Adult and subadult bull trout use the Lower (mainstem) Clearwater River, Middle Fork Clearwater River, and their tributaries primarily as foraging, migratory, subadult rearing, and overwintering habitat, although the extent of use is unknown (USFWS 2008). Deep pools in the Middle Fork may support overwintering and provide thermal refugia (USFWS 2002b). No tributary streams within this shared FMO habitat are currently documented to support bull trout spawning (BLM 2000). Clear Creek was previously reported to potentially support SR habitat for bull trout (USFWS 2002b); however, spawning and rearing has not been documented (CBBTTAT 1998c; 1998d) and Clear Creek most likely functions currently as subadult and adult migration and rearing habitat. In the late 1990s, two to four bull trout were reportedly collected annually, on average, at the adult trap during spring Chinook salmon trapping operations from May through September. Captured bull trout ranged from 254 to 356 mm in length (IDFG 2011a, b). Bull trout do not use Lower Clear Creek near the Kooskia National Fish Hatchery

during late summer to early fall because of high water temperatures (USFWS and NPT 2010). No bull trout have been collected at the Clear Creek adult trap at Kooskia National Fish Hatchery in the last 10 years.

Tributary Facilities

Riverine habitat at the Lapwai Creek weir site and the Lolo Creek weir and acclimation sites is part of Clearwater River shared FMO habitat (USFWS 2015a). The Lapwai Creek seasonal weir is located at RKM 1.2 (RM 0.7) and the Lower and Upper Lolo Creek seasonal weirs are at RKM 21.3 (RM 13.2) and RKM 50.5 (RM 31.3), respectively. The Lapwai Creek seasonal weir is typically used for collection of non-project coho salmon (covered under Mitchell Act Biological Opinion), but is included as a conservation measure in this Opinion if its operation is required for broodstock collection of the CRITFC-funded portion of the coho salmon program. Further, broodstock collected at the Lapwai Creek weir provide eggs for Dworshak.

The weir sites on Lapwai and Lolo creeks and the Yoosa/Camp Satellite (on Lolo Creek) are not located within bull trout core areas. No bull trout have been collected at the Lapwai weir (HDR 2017). Lolo Creek was previously considered part of the Lower-Middle Clearwater River core area, but is now part of the mainstem Clearwater River FMO habitat (USFWS 2015a). This previous core area designation was rescinded because it was determined that Lolo Creek is not a local population, which therefore left no local populations in the previous Lower-Middle Clearwater River core area.

Although no longer part of a core area, the Lolo Creek watershed was likely within the historical range of bull trout, but poor habitat conditions and warmer temperature regimes have limited bull trout production in the Lolo Creek drainage. Bull trout have not been observed in the Eldorado Creek or Yoosa Creek drainages (USFS 2011). Very few bull trout were observed during snorkeling and electrofishing surveys conducted in the Lolo Creek watershed from 1974 to 2007. A total of 21 bull trout were observed during Service, BLM, IDFG, and NPT monitoring efforts in the mainstem Lolo Creek and at the NPT's juvenile trapping facility (upstream of Eldorado Creek) in 1987, 1990, 1993-1995, 1998-2000, and 2003-2010 (USFS 2011). A summary of available data indicates that between 1985 and 2007, juvenile or subadult bull trout were observed at 11 of 675 sites snorkeled in mainstem Lolo Creek. No bull trout have been documented in 363 monitoring stations located in tributary streams in the watershed (USFS 2011).

The extent of bull trout spawning and production in Lolo Creek is assumed to be low to nonexistent. From 2002 through 2016, only two adult bull trout have been observed at the Lower Lolo Creek weir during the current operational period (mid-May through September): one on June 12, 2003 and another on August 30, 2004 (Sprague 2011). The Lolo Creek weir is staffed 24 hours a day, 7 days a week. No mortalities have been reported.

Bull trout juveniles have rarely been collected at the current NPT screw trap (Table 5), which is annually installed just upstream or downstream of the Lolo Creek bridge (immediately upstream of the seasonal Lower Lolo Creek weir at RKM 21.0 [RM 12.9]).

Table 5. Juvenile and subadult bull trout captured at the NPT screw trap located in lower Lolo Creek, 2005 – 2016 (from Assessment Table 6-3).

Collection Year and Date	Fork Length (mm)	Weight (g)
2005		
May 15	No data	No data
May 20	117	13
May 23	93	7
May 29	166	42
May 30	96	9
May 31	225	140
June 1	212	96
2006		
April 1	151	37
April 21	No data	No data
2007		
May 10	94	8
2010		
September 12	No data	No data
2011		
2 (no date)	No data	No data
2012-2106		
None collected	NA	NA

North Fork Clearwater Core Area

The Service identified 12 local populations of bull trout in the North Fork Clearwater core area including the Kelly Creek Complex, Cayuse Creek Complex, Moose Creek Complex, Upper North Fork Clearwater River Complex, Weitas Creek Complex, Quartz Creek, Skull Creek, Isabella Creek, Little North Fork Clearwater River Complex, Floodwood Creek, Fourth of July Creek, and Fish Lake. With the exception of Fish Lake, all of these local populations are stream complexes that have multiple stream reaches with suitable habitat for bull trout spawning and rearing. Dworshak Reservoir provides overwintering, rearing, and foraging habitat for subadult and adult fish that occupy the reservoir (USFWS 2002b; CSS 2001). The IDFG has radio-tagged bull trout captured in Dworshak Reservoir and documented their spawning migration into headwater tributaries of the North Fork Clearwater River and their return to the reservoir for overwintering; adult bull trout migrate out of the reservoir starting mid-June and return mid-October (Cochnauer et al. 2001, Shriever and Schiff 2002, and Schiff and Shriever 2004).

Although the reservoir provides overwintering and foraging habitat, Dworshak Dam isolates bull trout populations from the Middle/Lower Clearwater, South Fork Clearwater, Lochsa, and Selway Rivers (USFWS 2005a). Prior to the construction of Dworshak Dam, bull trout likely

migrated into the mainstem Clearwater River to overwinter, and mixed with individuals from the Lochsa, Selway, and South Fork Clearwater River core areas (USFS 2000). The mainstem portion of the North Fork Clearwater River from Dworshak Reservoir slack water upstream to the confluence with Kelly Creek supports subadult and adult rearing and migration, although current bull trout densities in this area are low (less than 0.5 fish per 100 square meters) (CBBTTAT 1998a). Although bull trout are currently distributed throughout the North Fork Clearwater core area, they are considered depressed compared to their historic distribution and abundance in most of the tributaries of the North Fork Clearwater watershed (USFS 2000, CSS 2001).

South Fork Clearwater River Core Area

The South Fork Clearwater River screw trap, Newsome Creek weir and trap, Newsome Creek screw trap, Crooked River trap, and satellite facilities on Newsome Creek and the Red River are located in the South Fork Clearwater River core area in Idaho County, Idaho (Table 1). In addition, under the proposed action juvenile hatchery fish are released from four locations in the core area: Red House Hole, Meadow Creek, Newsome Creek, and Red River Satellite. This core area encompasses about 304,522 ha (752,474 acres), and extends from the confluence with the Middle Fork Clearwater River at Kooskia, Idaho to the headwaters above Elk City and the Red River. Major tributaries within the core area include the American, Red, and Crooked Rivers, and Mill, Newsome, Johns, Tenmile, Meadow, Leggett, Cougar-Peasley, Silver, Wing, and Twentymile Creeks (USFWS 2015b).

The mainstem South Fork River provides subadult and adult rearing habitat as well as FMO habitat, and the core area provides connectivity for local populations within and among other core areas. The lower reaches of large tributaries in the core area provide thermal refuge in summer months (USFWS 2005a). IDFG (2001) has conducted juvenile distribution studies in most tributaries and headwater streams of the core area. These studies have confirmed that bull trout are widely distributed throughout the South Fork Clearwater River (USFS 2014a). Local populations currently use SR habitat in five stream complexes within the South Fork Clearwater River including the Red River Complex, Crooked River Complex, Newsome Creek Complex, Tenmile Creek Complex, and Johns Creek Complex (USFWS 2015b).

The Red River historically provided highly productive habitat for bull trout in the mid to upper reaches; however, a 1993 survey by IDFG documented densities of 0.75 bull trout per 100 meters in the Red River watershed (CBBTTAT 1998d). Since 1985, spawning and rearing is known to occur in the upper and mainstem Red River and a number of its higher order tributaries. Subadult and adult rearing occurs in the Lower Red River (CBBTTAT 1998d; IDFG 2001; USFWS 2002b). The Red River Satellite is operated from May to mid-September to collect Chinook salmon broodstock and acclimate juveniles prior to release. From 2007 through 2016, a total of 62 bull trout were collected at the trap. During that period, the annual number of captured bull trout ranged from 0 in 2008 to 20 in 2013, with an average of 6. Most bull trout were captured in June and July. From 2007 through 2016, one bull trout was captured in May and none were captured in August or September (HDR 2017). From 2005 to 2016, one bull trout mortality was recorded in 2013 (IDFG 2011a, b).

IDFG biologists have not observed bull trout spawning near the Red River weir during Chinook salmon collections in August and September. Further, they do not expect bull trout to spawn in the vicinity of the Red River weir as water temperatures during the September spawning period

are not indicative of bull trout spawning. Migratory fluvial bull trout would be present in the spring and summer (HDR 2017).

The Crooked River contains the greatest numbers of migratory bull trout in the watershed; a 1993 survey by IDFG documented densities of 0.89 bull trout per 100 meters (CBBTTAT 1998a). The Upper Crooked River (East Fork and West Fork Crooked rivers) is considered a stronghold for bull trout spawning and early rearing (USFWS 2015b). Currently, bull trout are known to spawn and rear in the middle and Upper Crooked River and several of its tributaries; subadult and adult rearing occurs in the Lower Crooked River (CBBTTAT 1998d, IDFG 2001, USFWS 2002b). The Crooked River trap is operated from May to mid-September to collect Chinook salmon broodstock. From 2007 through 2016, a total of 290 bull trout were collected at the trap. The annual number of bull trout collected at the Crooked River trap has ranged from 14 in 2015 to 49 in 2007, with an average of 29 collections during the trapping period. The majority of bull trout were collected in June and July. No bull trout have been collected in May or September; only three bull trout have been collected in August, all in 2011 (HDR 2017). No mortalities have been reported since 2005 (IDFG 2011a, b).

Newsome Creek bull trout are primarily resident fish; migratory individuals are thought to be in low abundance (USFWS 2002b). From 1999 through 2001, the U.S. Forest Service (USFS) located only two redds in Upper Newsome Creek (USFWS 2002b). Currently, bull trout spawn and rear in Upper Newsome Creek and three of its tributaries whereas subadult and adult rearing occurs in Lower Newsome, Mule, and Bear creeks (CBBTTAT 1998d, IDFG 2001, USFWS 2002b). Bull trout are occasionally collected during weir operations from May through September. High instream temperatures are reported in the creek from mid-June through August (USFS 2002). From 2002 through 2010, 16 bull trout were captured at the weir, ranging from 0 in 2007, 2009, and 2010 to 6 in 2005 (NPT 2013). From 2010 through 2016, only four adult bull trout were captured at the trap (HDR 2017). No mortalities have been reported since 2005.

The Newsome Creek screw trap is located immediately downstream of the weir and adult trap. From 2010 to 2016, 105 juvenile bull trout were collected at the screw trap during annual trapping conducted from February through November. During this period, the average annual capture of juvenile bull trout was 15 individuals. Screw trap captures have ranged from a low of 3 individuals in 2015 to a high of 34 individuals in 2010. Captured individuals ranged in size from 100 mm to 375 mm. Per Dambacher and Jones (1997), and for the purposes of this assessment, juveniles are all fish less than 170 mm. Bull trout were primarily trapped from late September thru November; captures were rare at other times of the operational period (HDR 2017).

Adult and rearing bull trout have been documented sporadically in Meadow Creek, although habitat is degraded (CBBTTAT 1998d; USFWS 2002b). Meadow Creek likely never supported a strong population of bull trout because of low quality bull trout habitat (HDR 2017). From 2010 to 2016, no juvenile bull trout were captured at the juvenile screw trap in Meadow Creek (HDR 2017).

The South Fork Clearwater core area is a priority watershed for stream restoration (USFWS 2015b). The USFS and BLM have conducted culvert barrier removals on many tributaries (e.g., East Fork American River) as well as in-stream and riparian habitat restoration (e.g., Crooked River) through the placement of large woody debris, boulders, and other structures (USFWS 2008).

Selway River Core Area

The Selway River originates in the Bitterroot Mountains on the Idaho-Montana border and joins the Lochsa River at Lowell, Idaho, to form the Middle Fork Clearwater River. The Selway River core area is located in Idaho and Clearwater counties and includes the Selway River and all its tributaries. The core area encompasses approximately 520,242 ha (1,285,516 acres), about 85 percent of which occurs in the Selway-Bitterroot and Frank Church-River of No Return Wilderness Areas (USFS 2001). Although no facilities under the proposed action are located in the Selway River core area, hatchery juveniles are released from several sites in the core area, including the Upper and Lower Selway River mainstem and Meadow Creek.

The Selway River provides FMO habitat for 10 local populations of bull trout in the core area, and provides connectivity for populations in other core areas of the Lower Snake River geographic region (USFWS 2005a, 2015b). Local populations are well-connected within this core area (USFS 2001) and include the Meadow Creek Complex, Moose Creek Complex, Little Clearwater River Complex, Running Creek Complex, White Cap Creek Complex, Bear Creek Complex, Deep Creek Complex, Indian Creek Complex, Magruder Creek, and Upper Selway River Complex. The Selway River core area supports a metapopulation of fluvial bull trout that are widely distributed in variable densities; resident local populations are present in some upper tributary reaches.

Subadult and adult bull trout have been observed in the Selway River (CBBTTAT 1998a) and use it for FMO. Bull trout occupancy has been verified by USFS stream surveys (USFS 2009) and individuals are likely to use all accessible areas of the Selway River core area. High water temperatures may preclude use in some reaches during low flow, summer months (USFWS 2005a).

Lochsa River Core Area

The Lochsa River core area is located in Idaho County and encompasses an area of about 303,024 ha (748,773 acres). The Powell Satellite facility and release site are located along Walton Creek in the Lochsa River core area. The core area extends from the confluence of the Lochsa and Selway Rivers to the headwaters of Colt Killed and Crooked Fork creeks, which converge to form the Lochsa River. The Lochsa River provides important FMO habitat for the local populations within the core area and connectivity to populations in other core areas of the Clearwater River Basin (USFWS 2015b).

Seventeen local populations of bull trout are currently known to use SR habitat throughout the Lochsa River core area including Fishing, Legendary Bear, Boulder, Fox, Shotgun, Crooked Fork/Hopeful, Rock, Haskell, Colt Killed (White Sands), Beaver, Storm, Brushy Fork, Spruce, Twin, Walton, and Lower Warm Springs creeks and Fish Lake (USFWS 2015d, CBBTTAT 1998c, Watson and Hillman 1997). Adults and subadults are suspected to use nearly all accessible areas of the core area for FMO and rearing (CBBTTAT 1998c), and the lower reaches of multiple tributaries provide thermal refuge from high summer in-stream temperatures in the mainstem Lochsa River.

Walton Creek supports adult and subadult bull trout rearing (USFS 1999a), and adults are suspected to spawn in Walton Creek (CBBTTAT 1998b), however, no spawning occurs in the vicinity of the Powell Satellite facility weir and trap, or below it (Barnett 2017). The Powell Satellite facility on Walton Creek is operated from May to mid-September to collect Chinook

salmon broodstock. From 2007 through 2016, a total of 170 bull trout were collected at the trap during operations. The annual number of bull trout collections has ranged from 0 in 2008 to 35 in 2012, with an average of 17. No bull trout have been captured in May, and only two individuals have been captured in June, one each in 2015 and 2016. The majority of bull trout are collected in July and August and the number of captures decreases rapidly in September (HDR 2017). Captured individuals are released upstream. The picket spacings on the weir are sufficiently wide to allow juvenile downstream passage.

Mainstem Snake River FMO Habitat (mouth to Brownlee Dam)

The mainstem Snake River is not a designated core area, but provides FMO habitat for bull trout in the Lower Snake geographic region. This geographic region includes all core areas that flow into the Snake River between its confluence with the Columbia River and Hells Canyon Dam, as well as mainstem Snake River FMO habitat.

The Snake River up to Hells Canyon Dam provides migratory habitat for local populations residing in tributaries to the Snake River between Hells Canyon Dam and Lower Granite Dam. Four local populations are located on the Oregon side of the Snake River in the Imnaha River Subbasin (Imnaha River and Upper Big Sheep, Lower Big Sheep, and McCully Creeks) and two are on the Idaho side (Granite and Sheep Creeks).

Fluvial radio-tagged bull trout from the Imnaha River have migrated upstream in the Snake River until they reach Hells Canyon Dam (Chandler et al. 2003). These migrations occur post-spawning after about October, and the majority of migratory bull trout return to their natal watershed the following spring (IDFG 2011b). Bull trout from other core areas may also migrate up the Snake River to Hells Canyon Dam. In both 2012 and 2013, one bull trout (>300 mm) was detected at the Hells Canyon trap (IDFG 2016).

Bull trout have been incidentally observed at all of the Lower Snake River dams, smolt monitoring traps, juvenile fish facilities, and fish ladders (USFWS 2010a, b). Radio telemetry studies in the Snake River have shown that bull trout migrate between FMO habitat in the Snake River and SR habitat in its tributaries (Hemmingsen et al. 2001).

Mainstem Columbia River (upstream of John Day Dam to confluence with Snake River)

Although not designated as a core area, the mainstem Columbia River upstream of John Day Dam to the confluence with the Snake River is part of the Mid-Columbia RU, and provides FMO habitat for bull trout (USFWS 2015b). Bull trout may reside in the mainstem Columbia River year round as subadults and adults (USFWS 2010a, b). No Clearwater River programs under the proposed action are located in mainstem Columbia River FMO habitat.

Viability Ratings

Although bull trout are widely distributed throughout the North Fork Clearwater core area, up until 2000, bull trout were considered depressed compared to their historic distribution and abundance in most of the tributaries of the North Fork Clearwater watershed (USFS 2000, CSS 2001). However, recent redd count data for the North Fork Clearwater core area suggests that populations have been stable since 2001, and results from redd counts in 2014 generally indicate a continued increase for most index reaches that were surveyed (Hand et al. 2015 in USFWS 2015b). In the mainstem Clearwater River, High et al. (2008) concluded that overall abundance was increasing.

Trend data for the South Fork Clearwater River core area indicates that bull trout are declining (Meyer et al. 2014); however, total abundance for local populations in most of this core area is currently unknown. The Service concluded that the core area is at risk of extirpation (USFWS 2008).

In the Selway River core area, the bull trout population is considered strong. Although total abundance is unknown, stream survey data collected in 1997 suggest that fish density is relatively high (USFS 1999a, b), and numbers are estimated to be near historic levels (USFWS 2015b, ICRB 1997). The core area likely contains bull trout populations consisting of several thousand individuals in each stream, with at least 500 adults in each stream (USFWS 2015b).

Trend data from redd counts, snorkeling surveys, and screw traps captures, indicates that the Lochsa River core area is increasing over the long term (Meyer et al. 2014). Total abundance for local populations in most of this core area is currently unknown (USFWS 2015b).

2.4.1.1.2 Coastal Recovery Unit

The lower mainstem Columbia River, from its mouth upstream to John Day Dam, is part of the Coastal RU. The lower mainstem provides bull trout FMO habitat (USFWS 2015d). No Clearwater hatchery programs included under the proposed action occur in the Coastal RU; however, adults and juvenile spring/summer Chinook salmon and steelhead migrate to and from the Clearwater program sites via the mainstem Columbia River and Snake River.

The Coastal RU's Lower Columbia River major geographic region includes the lower mainstem Columbia River, an important migratory waterway essential for providing habitat and population connectivity in the region. The lower mainstem river is designated as migratory habitat, but does not contain any bull trout core areas.

Adult bull trout are occasionally observed within the lower mainstem Columbia River, but any further migration by bull trout in this region to the Pacific Ocean is largely unknown (USFWS 2015d). Historically, the Lower Columbia River region is believed to have largely supported the fluvial life history form; however, hydroelectric facilities built in a number of the core areas have isolated or fragmented watersheds and largely replaced the fluvial life history with the adfluvial form.

In the Lower Columbia River region of the Coastal RU, the mainstem Columbia River provides productive foraging habitats and critical connectivity among core areas for potential gene flow and population refounding. Bull trout use, abundance, and periodicity in the lower section of the Columbia River are largely unknown and data are limited due to infrequent detections (USFWS 2015d).

Viability Rating

Although currently fragmented by dams, the mainstem Lower Columbia River provides FMO habitat that may facilitate interactions among bull trout populations. No local populations reside in the lower mainstem Columbia River shared FMO area (USFWS 2015d).

2.4.1.2 Factors Affecting the Bull Trout in the Action Area

2.4.1.2.1 Mid-Columbia Recovery Unit

Bull trout in Clearwater River shared FMO habitat and the North Fork Clearwater core area are threatened by sedimentation from mining, grazing, and forest practices; roads; transportation corridors; increased water temperature; lost connectivity and entrainment at Dworshak Dam; reduced prey base; and competition and hybridization with nonnative brook trout (*Salvelinus fontinalis*) (USFWS 2015b). More recently, the Service (USFWS 2015b) identified no primary threats to bull trout in the North Fork Clearwater River core area.

In the South Fork Clearwater River core area, primary threats are considered substantial and imminent (USFWS 2015b). Primary threats to bull trout in this core area include habitat degradation from grazing, forest practices, roads, and mining. Such activities have contributed to a loss of in-stream woody debris, pool reduction, and sedimentation (USFWS 2015b).

The Selway River is designated as a Wild and Scenic River, and virtually the entire core area lies within national forests (USFS 1999a). Because of this, the core area is relatively protected and no primary threats are currently identified. However, other threats to bull trout in the Selway River core area include presence of brook trout and reduced prey base due to low abundance of anadromous fish (USFWS 2015d, p. C-328).

About 60 percent of the Lochsa River core area is within designated wilderness and roadless areas, and the mainstem is a Wild and Scenic River. Because of these designations, much of the core area is protected from alterations to maintain its free-flowing and scenic characteristics. The USFWS (2015b) identifies no primary threats to bull trout in the Lochsa River core area, however, other threats from forest practices and legacy roads have led to in-stream sedimentation, large woody debris reduction, and channel degradation in some SR habitats. Elevated surface water temperatures degrade some FMO habitat in the summer, and the core area suffers from a reduced salmonid prey base and, subsequently, low levels of marine-derived nutrients.

2.4.1.2.2 Coastal Recovery Unit

In the lower mainstem Columbia River, primary limiting factors and threats to bull trout include habitat degradation and fragmentation, blocked migratory corridors, poor water quality, entrainment into diversion channels and dams, and introduced nonnative species.

2.4.1.2.3 Climate Change

Changes in hydrology and temperature caused by changing climate have the potential to negatively impact aquatic ecosystems in the action area, with salmonid fishes being especially sensitive. Average annual temperature increases due to increased carbon dioxide are affecting snowpack, peak runoff, and base flows of streams and rivers (Mote et al. 2003, p. 45). Increases in water temperature may cause a shift in the thermal suitability of aquatic habitats (Poff et al. 2002, p. iii). For species that require colder water temperatures to survive and reproduce, warmer temperatures could lead to significant decreases in available suitable habitat. Increased frequency and severity of flood flows during winter can affect incubating eggs and alevins in the streambed and over-wintering juvenile fish. Eggs of fall spawning fish, such as bull trout, may suffer high levels of mortality when exposed to increased flood flows (Independent Scientific Advisory Board (ISAB) 2007, p. iv).

Isaak et al's 2010 (p. 1350) study of changing stream temperatures over a 13 year period in the Boise River basin estimated an 11 to 20 percent loss of suitable coldwater bull trout spawning and early juvenile rearing habitats. These results suggest that a warming climate is already affecting suitable bull trout in-stream habitats. This is consistent with Rieman et al. (2007, p. 1552) and Wenger et al. (2011, p. 988) conclusions that bull trout distribution is strongly influenced by climate, and predicted warming effects could result in substantial loss of suitable bull trout habitats over the next several decades. Bull trout already seem to inhabit the coldest available streams in study areas (Wenger et al. 2011, p. 1002), and in several watersheds bull trout do not have the potential to shift upstream with warming stream temperatures at lower elevations.

2.4.2 Bull Trout Critical Habitat

2.4.2.1 Status of Bull Trout Critical Habitat in the Action Area

The majority of hatchery-related facilities included under the proposed action, including adult collection sites, acclimation sites, and release sites occur in the Clearwater River CHU. Lolo Creek and Lapwai Creek are not designated as critical habitat for bull trout (USFWS 2010a), and are therefore not part of the Clearwater CHU.

In addition to the Clearwater River CHU, the mainstem Upper Columbia River CHU (from John Day Dam to Chief Joseph Dam) and the mainstem Snake River CHU (from its mouth upstream to the upper end of Brownlee Reservoir) provide migratory habitat for juveniles and adults migrating from/to the Clearwater River facilities included under the proposed action. Both mainstem river CHUs are designated as FMO habitat for bull trout, and are part of the Mid-Columbia RU.

The lower mainstem Columbia River, from its mouth upstream to John Day Dam, is part of the Coastal RU. The lower mainstem provides bull trout FMO habitat (USFWS 2015d). No Clearwater hatchery programs included under the proposed action occur in the Coastal RU; however, adults and juvenile spring/summer Chinook salmon and steelhead migrate to and from the Clearwater program sites via the mainstem Columbia River and Snake River.

2.4.2.1.1 Mid-Columbia River Recovery Unit

Clearwater River Critical Habitat Unit

The Clearwater River CHU (Unit 21) consists of 2,702.1 km (1,679.0 miles) of streams, as well as portions of some lakes and reservoirs. The CHU is located in north-central Idaho and extends to the Montana border. It represents the easternmost extent of the Mid-Columbia RU and includes the Clearwater River and numerous tributaries including the South Fork, Middle Fork, and North Fork Clearwater rivers. The majority of Clearwater River hatchery programs included under the proposed action occur in the Clearwater River CHU. However, neither Lolo Creek nor Lapwai Creek are designated as critical habitat for bull trout. Therefore, facilities on Lolo Creek (upper and lower weirs, Yoosa/Camp Creek site) and Lapwai Creek (weir) do not overlap with critical habitat for bull trout.

The Clearwater River CHU includes five critical habitat subunits (CHSUs): Middle–Lower Fork Clearwater River, South Fork Clearwater River, Selway River, Lochsa River (and Fish Lake), and the North Fork Clearwater River (and Fish Lake).

Middle-Lower Fork Clearwater River CHSU

The Nez Perce Tribal Hatchery, Dworshak National Fish Hatchery, and Clearwater Fish Hatchery are located in the Middle-Lower Fork Clearwater River CHSU. This CHSU includes the Clearwater River from its confluence with the Snake River upstream to its confluence with the South Fork Clearwater River, and the Middle Fork Clearwater River from its confluence with the South Fork upstream to the confluence of the Lochsa and Selway Rivers. This CHSU also includes FMO habitat in the North Fork Clearwater River from its confluence with the Clearwater River upstream 3.1 km (2.0 miles) to the base of Dworshak Dam.

Both the mainstem and Middle Fork Clearwater Rivers provide FMO habitat and connectivity to other Mid-Columbia bull trout populations. Both subadult and adult bull trout have been documented in the Clearwater River mainstem near its mouth, as well as near the mouth of the North Fork (Basham 2000, USFWS 2010a).

The Kooskia National Fish Hatchery is located near RKM 1.0 (RM 0.6) on Clear Creek, a tributary to the Middle Fork Clearwater River at RKM 124, near Kooskia, Idaho. Clear Creek is not designated as critical habitat for bull trout (USFWS 2010a, b). Because of the proximity of Clear Creek to shared FMO habitat, it is presumed that Clear Creek provides similar FMO function for bull trout.

North Fork Clearwater River CHSU

Both the Dworshak National and Clearwater fish hatcheries withdraw surface water from intakes located in the Dworshak Reservoir. Therefore, operation of these surface water diversion structures overlap with habitat in the North Fork Clearwater CHSU. Dworshak Reservoir (6,653.4 ha [16,441.0 acres]) provides FMO habitat (USFWS 2010b).

South Fork Clearwater River CHSU

The South Fork Clearwater River CHSU includes the entire stream network of the South Fork Clearwater River (USFWS 2010b). The South Fork Clearwater River screw trap; the Newsome Creek screw trap, weir, and satellite facilities; the Crooked River trap; and the Red River Satellite are located in the South Fork Clearwater River CHSU. In addition, under the proposed

action, juvenile hatchery fish (Chinook salmon and steelhead) are released from four locations in the CHSU including the Red House Hole, Meadow Creek, Newsome Creek, and the Red River Satellite. This CHSU provides habitat for foraging and thermal refuge for bull trout that disperse from other CHSUs into the Clearwater River CHU.

Within this CHSU, the South Fork Clearwater River, from its confluence with the Clearwater River upstream 100.3 km (62.3 miles) to the confluence of the Red River and the American River, provides FMO habitat. The American River, from its confluence with the Red River upstream to RKM 27.4 (RM 17.0), provides FMO habitat. One hatchery juvenile release site (Red House Hole) is located on mainstem FMO habitat in the South Fork Clearwater River. Although hatchery juveniles were formerly released into the American River, the practice has been discontinued.

From its confluence with the South Fork Clearwater River upstream to RKM 12.5 (RM 7.7), Newsome Creek provides FMO habitat; SR habitat occurs upstream an additional 7.1 km (4.4 miles), with presumed SR habitat also occurring upstream an additional 5.6 km (3.5 miles) to its headwaters (USFWS 2010b). The lower portion of Newsome Creek was identified as having current (post-1985) bull trout use as subadult/adult rearing habitat (CBBTTAT 1998d). The Newsome Creek weir, located at RKM 0.1 (RM 0.06), and the Newsome Creek Satellite, located at RKM 10.9 (RM 6.8), are therefore operated in FMO habitat for bull trout.

Within this CHSU, the Crooked River, from its confluence with the South Fork Clearwater River upstream 3.5 km (2.2 miles), provides FMO habitat; SR habitat occurs upstream an additional 15.3 km (9.6 miles). The lower portion of Crooked River was identified as having current (post-1985) bull trout use as subadult/adult rearing habitat (CBBTTAT 1998d). The Crooked River trap is located at RKM 1 (RM 0.6) of Crooked River, and is therefore within FMO habitat for bull trout.

In this CHSU, the Red River, from its confluence with the American River upstream to RKM 18.7 (RM 11.6), provides FMO habitat; SR habitat occurs upstream an additional 27.2 km (16.9 miles). The lower portion of Crooked River was identified as having current (post-1985) bull trout use as subadult/adult rearing habitat (CBBTTAT 1998d). In upper reaches, the Red River supports spawning and early rearing (CBBTTAT 1998d), and small bull trout have been found in the mainstem (IDFG 2001). The Red River Satellite, located at RKM 27.0 (RM 16.8), operates in SR habitat.

Under the proposed action, Meadow Creek receives hatchery program juvenile releases. In the South Fork, Meadow Creek is not designated as critical habitat for bull trout (USFWS 2010a). Reach-specific habitat delineation is not available.

Selway River CHSU

The Selway River CHSU provides habitat to relatively robust bull trout populations in the Selway River core area. The Selway River CHSU includes the entire stream network of the Selway River. From its confluence with the Lochsa River upstream 130.0 RKM (80.7 miles) to Deep Creek, the Selway River provides FMO habitat; SR habitat occurs upstream an additional 29.0 km (18.0 miles).

Under the proposed action, hatchery juveniles are released at three sites in the Selway River CHSU. Two of the release sites are located in FMO habitat in the mainstem Selway River. The remaining release site is within the lower 32 km (20 miles) of Meadow Creek. Meadow Creek,

from its confluence with the Selway River upstream 44.1 km (27.4 miles), provides FMO habitat; SR habitat occurs upstream an additional 23.7 km (14.8 miles) (USFWS 2010b). Program hatchery parr are therefore released into FMO habitat in Meadow Creek.

Lochsa River CHSU

The Lochsa River CHSU is essential to bull trout conservation because it has relatively few individuals, but many local populations or population complexes distributed throughout much of the upper portion of the CHSU. The entire Lochsa River stream network is part of the CHSU. From its confluence with the Selway River upstream 110.6 km (68.7 miles) to its origin at the confluence of Crooked Fork and Cold Killed creeks, the Lochsa River functions as FMO habitat for bull trout. The Powell Satellite facility and release site are located on Walton Creek near the confluence of Brushy Fork Creek and Colt Killed Creek in the Lochsa River CHSU. Walton Creek, from its mouth upstream 4.4 km (2.7 miles), provides SR habitat. The collection and release of hatchery salmonids at the Powell Satellite facility, therefore, occurs in SR habitat in Walton Creek, and hatchery salmonids migrate through FMO habitat in the Lochsa River to and from the release/collection site.

Physical or Biological Features

The existing condition of bull trout PBFs near Clearwater River hatchery programs included under the proposed action in the Clearwater River CHU are generally described below. Where available, information is provided for specific CHSUs.

PBF 1. Springs, seeps, groundwater sources.

Relative to bull trout habitat, PBF 1 is present near some hatchery program facilities in the Mid-Columbia RU. However, the extent of contribution of spring sources to in-stream habitat for bull trout is unknown in reaches adjacent to and downstream from program facilities under the proposed action.

PBF 2. Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.

PBF 2 is present in the vicinity of all facilities. Adult collections, water withdrawal, juvenile acclimation, and in-water maintenance activities may all influence migratory habitat. Several channel-spanning weirs are seasonal passage barriers to bull trout during hatchery adult collection periods in the South Fork Clearwater CHSU (at Newsome Creek, Crooked River, Red River) and in the Lochsa River CHSU (Walton Creek). At Kooskia National Fish Hatchery, a hydraulic weir is a seasonal barrier to bull trout on Clear Creek, which is not designated as critical habitat.

In the South Fork Clearwater CHSU, fish culverts have contributed to fragmented habitat conditions within some watersheds. Dworshak Dam is a barrier to passage and population commingling in the North Fork CHSU and the Middle-Lower Clearwater CHSU.

PBF 3. An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.

PBF 3 is present and functional in waterbodies near all facilities. Juvenile releases provide increased food base in some reaches in the Action Area. In the South Fork

Clearwater CHSU, anadromous salmonid prey items have been reduced compared to historic conditions (USFWS 2015b). A reduced anadromous salmonid prey base is also reported for the North Fork Clearwater, Lochsa, and Selway CHSUs (USFWS 2015b).

PBF 4. Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.

PBF 4 is impaired in FMO habitats near the Nez Perce Tribal, Clearwater, and Dworshak National fish hatcheries. Ongoing hatchery water withdrawals may reduce connectivity to complex side-channel and shoreline habitats. However, rearing and spawning does not occur near the program hatcheries, which may limit the effect. On-going in-water facility maintenance actions have locally degraded some reaches adjacent to existing facilities. In the South Fork Clearwater CHSU, forest practices, roads, and legacy mining have resulted in the loss of large woody debris and subsequent pool reduction in some SR habitats (USFWS 2015b).

PBF 5. Water temperatures ranging from 2 to 15 °C (36 to 59 °F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.

PBF 5 may become impaired at facilities that divert water during low-flow periods in the summer. Hatchery diversions, though non-consumptive, result in diversion reaches that reduce flow between the intake and outfall. Reduced flow during low-flow periods could alter in-stream temperatures. Over the period of on-going hatchery operations, climate change may exacerbate the effect of hatchery surface withdrawals on PBF 5, and, in turn, PBFs 2 and 8.

In the South Fork Clearwater CHSU, elevated in-stream temperatures have contributed to fragmented habitat conditions within some watersheds (USFWS 2015b). Elevated in-stream temperatures are reported in reaches throughout the Clearwater River CHU.

PBF 6. In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.

This PBF is not present in waterbodies near the Nez Perce Tribal, Dworshak National, or Clearwater fish hatcheries. SR habitat is mapped along the reaches containing the Red River and Powell Satellites; however, no spawning occurs at either location.

PBF 7. A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.

Dworshak National Fish Hatchery and Clearwater Fish Hatchery are downstream of dams

and experience impaired hydrographs. Hatchery facilities divert water from adjacent streams, and therefore alter the natural hydrograph between water intakes and outflows. Similarly, acclimation/trapping/holding facilities seasonally reduce instream flows in diversion reaches. Over the period of operations, climate change may result in decreased base flows in hatchery diversion reaches.

PBF 8. Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.

The reach of the North Fork Clearwater River downstream of Dworshak Dam and the mainstem Clearwater River near the confluence with the North Fork are 303(d) listed for dissolved gas supersaturation (IDEQ 2014). Dworshak Reservoir has a major role in nutrient cycling in the North Fork Clearwater bull trout core area (USFWS 2002b).

In the North Fork and South Fork Clearwater CHSUs, elevated sedimentation has reduced water quality in FMO habitats near roads and grazing activities (USFWS 2015b). Roads constructed for logging and mining are a constant source of sediment in the Red River, American and Crooked rivers, and Newsome Creek (USFWS 2015b). For all hatchery sites excluding the Kooskia National Fish Hatchery, effluent is returned to designated critical habitat (FMO) for bull trout. Satellite and acclimation sites including Red River and Powell also discharge a minor amount of effluent during juvenile rearing into SR habitat (though no bull trout spawning occurs near the facilities).

PBF 9. Low levels of occurrence of nonnative predators, interbreeding, or competing species.

Nonnative species are a concern in many reaches in the CHSUs in the Action Area. However, it is not known to what degree these species diminish this PBF. In the South Fork Clearwater CHSU, brook trout in some SR tributaries (e.g., Upper Crooked and Red Rivers) and mainstem FMO habitats contribute to competition and possible hybridization with bull trout (USFWS 2015b). Brook trout are reported as a nonprimary threat in the North Fork CHSU and a minor threat in the Loschsa and Selway rivers CHSUs (USFWS 2015b).

Mainstem Upper Columbia River Critical Habitat Unit

The mainstem Upper Columbia River CHU, Unit 22, is essential for maintaining bull trout distribution within a unique geographic region of the Mid-Columbia RU. It functions to conserve the fluvial, migratory, life history types exhibited by many of the populations from adjacent core areas. The CHU includes the mainstem Columbia River from John Day Dam, upstream to Chief Joseph Dam. Several studies in the Upper Columbia and Lower Snake rivers indicate that bull trout migrate between the mainstem Upper Columbia River CHU and core areas, generally during periods of cooler water temperatures (USFWS 2010a).

This CHU provides a migratory corridor for juvenile and adult spring Chinook salmon and steelhead reared at Clearwater River hatcheries. However, no Clearwater River program facilities are located in the CHU. The only bull trout critical habitat PBF that could be affected by the proposed action is PBF 3 because of potential effects of hatchery fish migrations from programs in the Clearwater River Subbasin:

PBF 3. An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.

The release of juveniles reared at Clearwater River hatcheries could increase the overall availability of prey items to piscivorous adult and subadult bull trout in this CHU.

Mainstem Snake River Critical Habitat Unit

The mainstem Snake River CHU, Unit 23, includes the Snake River from its confluence with the Columbia River upstream to Brownlee Dam (Figure 1). The CHU consists of 451.7 km (280.6 miles) of mainstem habitat in the Snake River; no CHSUs are designated for this CHU. The CHU occupies portions of southeastern Washington, northeastern Oregon, and west-central Idaho. In Idaho, all reaches of the Snake River upstream to Brownlee Dam are included in the CHU (75 FR 64033). In this CHU, Clearwater River hatchery program adults and juveniles utilize the mainstem Snake River as a migratory corridor to and from the ocean.

The mainstem Snake River CHU is essential because it maintains bull trout distribution both within the Mid-Columbia River RU and between the Mid-Columbia River RU and Upper Snake RU, portions of which are also part of the CHU. The CHU functions to maintain and allow genetic exchange and to ensure connectivity among populations and at least ten bull trout core areas. The entire reach of the Snake River, from the mouth to the upper end of Brownlee Reservoir, is considered essential and provides FMO habitat for bull trout populations.

No Clearwater River hatchery programs included under the proposed action occur in the Snake River CHU. The only bull trout critical habitat PBF that could be affected by the proposed action in the mainstem Snake River CHU is PBF 3 because of the potential effects of hatchery fish migrations from programs in the Clearwater River Subbasin:

PBF 3. An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.

The release of juveniles reared at Clearwater River programs could increase the overall availability of prey items to piscivorous adult and subadult bull trout in this CHU.

No other PBFs would be affected by the proposed action. Downstream effects of these programs (e.g., water quality/quantity) cannot be meaningfully measured in the Snake River CHU, therefore, no other PBFs are likely to be affected.

2.4.2.1.2 Coastal Recovery Unit

The mainstem Lower Columbia River CHU is used as a migration corridor for juveniles and adults from Clearwater River hatchery programs included under the proposed action. The CHU includes Clatsop, Columbia, Multnomah, Hood River, Wasco, and Sherman counties in Oregon and Pacific, Wahkiakum, Cowlitz, Clark, Skamania, and Klickitat counties in Washington. The Columbia River, from the Pacific Ocean upstream to John Day Dam, is essential for maintaining bull trout distribution and provides essential FMO habitat for conservation of Lower Columbia River core areas in the Coastal RU (USFWS 2010b).

No Clearwater River hatchery programs included under the proposed action occur in the Coastal RU, nor any of the CHUs delineated in the RU. The only bull trout critical habitat PBF that could be affected by the proposed action in the mainstem Lower Columbia River CHU is PBF 3, because of potential effects of hatchery fish migrations from programs in Clearwater River

Subbasin:

PBF 3. An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.

The release of juveniles reared at Clearwater River programs could increase the overall availability of prey items to piscivorous adult and subadult bull trout in this CHU.

2.4.2.2 Factors Affecting Bull Trout Critical Habitat in the Action Area

The same threats described above for bull trout in section 2.4.1.2 also apply to bull trout critical habitat, including climate change.

With a warming climate, thermally suitable bull trout spawning and rearing areas are predicted to shrink during warm seasons, in some cases very dramatically, becoming even more isolated from one another under moderate climate change scenarios (Rieman et al. 2007, pp. 1558–1562; Porter and Nelitz 2009, pp. 5–7). Climate change will likely interact with other stressors, such as habitat loss and fragmentation (Rieman et al. 2007, pp. 1558–1560; Porter and Nelitz 2009, p. 3); invasions of nonnative fish (Rahel et al. 2008, pp. 552–553); diseases and parasites (McCullough et al. 2009, p. 104); predators and competitors (McMahon et al. 2007, pp. 1313–1323; Rahel et al. 2008, pp. 552–553); and flow alteration (McCullough et al. 2009, pp. 106–108), rendering some current spawning, rearing, and migratory habitats marginal or wholly unsuitable. Over a period of decades, climate change may directly threaten the integrity of the essential physical or biological features described in section 2.4.2.1 (PBFs 1, 2, 3, 5, 7, 8 and 9).

2.5 Effects of the Proposed Action

Effects of the action considers the direct and indirect effects of an action on the listed species and/or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action. These effects are considered along with the environmental baseline and the predicted cumulative effects to determine the overall effects to the species. Direct effects are defined as those that result from the proposed action and directly or immediately impact the species or its habitat. Indirect effects are those that are caused by, or will result from, the proposed action and are later in time, but still reasonably certain to occur. An interrelated activity is an activity that is part of the proposed action and depends on the proposed action for its justification. An interdependent activity is an activity that has no independent utility apart from the action under consultation.

2.5.1 Bull Trout

Information Applicable to all Programs

The actions of the Clearwater River hatchery programs included under the proposed action occur within or adjacent to rivers that contain bull trout and within critical habitat that has been designated for bull trout. The facilities and release sites are widely dispersed through the Mid-Columbia RU in the state of Idaho.

Disturbance to bull trout will primarily occur in proximity to existing hatchery and adult collection facilities, and where released salmon and steelhead overwinter and/or migrate to the ocean. Potential effects of the proposed action on bull trout in SR habitat are limited to those facilities that are located in SR habitat. Those include adult collection and smolt release sites on the Crooked River, Red River, and Walton Creek (Powell Satellite). All other facilities are located below bull trout SR habitat in the Action Area. The effects to FMO habitats will be generally localized near facility locations and extend into FMO habitat during release of salmon and steelhead.

Disturbance of bull trout may occur from hatchery operation activities (adult collection, holding, spawning, incubation, juvenile rearing, and routine or semi-routine on-station maintenance), fish health activities, water withdrawals, discharge of effluent, releases of juvenile salmon and steelhead, installation, removal and operation of streamside incubators, and upland or in-water maintenance actions. The IDFG- and Service-operated Clearwater River programs are not directed at the take of bull trout; however, the potential exists for incidental take from the operation of hatchery programs.

The only RM&E activities that are part of the proposed action are those directly related to monitoring hatchery success for the Nez Perce Tribal Hatchery.

Fish Health

Fish health monitoring and testing is and will be conducted in accordance with Integrated Hatchery Operations Team (IHOT), Pacific Northwest Fish Health Protection Committee (PNFHPC), American Fisheries Society (AFS), and Office International des Epizooties (OIE) protocols and standards to limit the introduction of disease from hatchery fish to natural bull trout populations. Effects on fish health related to disease transfer from hatchery fish to bull trout are discussed in Section 2.5.1.

Water Withdrawal

Most hatchery facilities associated with Clearwater River programs withdraw surface water from adjacent streams to facilitate fish holding, spawning, incubation, and rearing. Such water withdrawals reduce the quantity of water between the diversion point and the point of return (i.e., discharge), and could contribute to elevated in-stream temperatures and reduced dissolved oxygen levels. To estimate the potential impact of surface water diversions on listed species and their habitat, IDFG used the closest gauge data available to compare the maximum flow diversion for each facility to average monthly flows. This data was then used to determine the percentage of streamflow remaining in the diversion reach associated with each facility.

The percentage of remaining flow was assessed to determine the suitability of in-stream habitat for use by bull trout life stages that may occur in each diversion reach. To facilitate this analysis, this Opinion applies the “Montana method" (Tennant 1976), which is a reconnaissance-level habitat evaluation based on historic discharge records. This method has been applied to warm and coldwater streams in the Midwest, Great Plains, and Intermountain West, and is based on measured pre- and post-diversion stream widths, average depths, and average velocities in 11 streams in Montana, Wyoming, and Nebraska. The results of these measurements indicated that the quality of in-stream habitat changed more rapidly from a flow of 10 percent of the average to no flow, than it did in any higher range. As a result of these measurements, Tennant (1976) concluded that 10 percent of the average annual flow is the minimum instantaneous flow needed

to sustain short-term survival. At this flow, Tennant found that depths and velocities were significantly reduced, substrate was one-third exposed, gravel bars were dewatered, streambank cover was diminished, fish were crowded into deeper pools, and riffles were too shallow for larger fish to pass. A flow of 30 percent of the average annual flow was required to maintain good habitat for aquatic life; at this flow, widths, depths, and velocities were generally satisfactory, streambanks provided some cover, and larger fish could pass most riffles. Optimum habitat was provided by flows of 60-100 percent of the average annual flow. Flushing flows occurred at 200 percent of the average annual flow.

For the purposes of this Opinion, a hatchery-related surface water withdrawal "may affect" bull trout when diversions remove water from the subject reach. A facility is not likely to adversely affect bull trout if it diverts up to 40 percent of average annual flow, resulting in the retention of 60-99 percent of average annual flow through the diversion reach. A facility is likely to adversely affect bull trout when it diverts more than 40 percent of average annual flow, resulting in the retention of less than 60 percent of average annual flows through the diversion reach.

Fish Passage

In July 2011, the NMFS published new Anadromous Salmonid Passage Facility Design Criteria. The document provides criteria, rationale, guidelines, and definitions for the purpose of designing proper fish passage facilities for the safe, timely, and efficient upstream and downstream passage of anadromous salmonids at impediments created by artificial structures, natural barriers (where provision of fish passage is consistent with management objectives), or altered in-stream hydraulic conditions. This document provides fishway facility design standards for actions in the Northwest Region under the various authorities and jurisdictions of the NMFS, including Section 18 of the Federal Power Act (FPA), the Act, and the Magnuson-Stevens Fishery Conservation and Management Act (MSA).

The fish passage facilities described in this document include various fish ladders, exclusion barriers, trap and haul facilities, fish handling and sorting facilities, in-stream structures, and juvenile fish screens. The existing facilities and any subsequent structures (as applicable) were built to design specifications at the time of construction. Structures owned by the LSRCP are currently being evaluated relative to compliance with NMFS's 2011 Screening/Passage Criteria. When final assessments are completed, the LSRCP and facility managers and cooperators will coordinate with NMFS to determine compliance levels (e.g., in compliance, in compliance with minor variances, or out of compliance) and develop a strategy to prioritize appropriate/necessary modifications contingent on funding availability, program need, and biological impacts to listed and native fish. Such modifications would require separate Section 7 consultations.

Impact Minimization Measures

To reduce impacts to bull trout and bull trout critical habitat, all programs will adhere to the minimization measures described in section 2.1.5.

Mid-Columbia River Recovery Unit

2.5.1.1 Broodstock Collection

All Clearwater River programs require the collection of returning steelhead, Chinook salmon or coho salmon adults for broodstock. If listed fish were captured in collection traps, they would be subject to physical handling, which can promote stress in fish and may result in post-capture

mortality (Sharpe et al. 1998). Accepted standard operating procedures (IDFG et al. 2015) will be followed for handling of bull trout.

Primary contributing factors to stress and death from handling include differences in water temperatures (between the river and holding vessel), dissolved oxygen conditions, the amount of time fish are held out of the water, and physical trauma (NMFS 2016). Debris buildup at traps can also kill or injure fish if the traps are not monitored and cleared regularly. The co-managers of the facilities have extensive experience capturing, handling, and releasing listed species in these areas, and have demonstrated low bull trout mortality rates through past implementation. The IDFG section 6 report consistently shows less than 1 percent mortality for bull trout handled in research and monitoring activities (excluding gill net sampling; Leitzinger 2016).

Under the proposed action, 10 adult broodstock collection facilities are located in the Mid-Columbia RU:

- Nez Perce Tribal Hatchery Spring Chinook Salmon
  - Nez Perce Tribal Hatchery trap
  - Lower Lolo Creek weir
  - Upper Lolo Creek weir
  - Newsome Creek weir
  - Dworshak National Fish Hatchery trap (as needed)
- Clearwater Spring and Summer Chinook Salmon
  - Crooked River trap
  - Red River Satellite trap
  - Powell Satellite trap
  - Kooskia National Fish Hatchery
  - Dworshak National Fish Hatchery trap (as needed)
- South Fork Clearwater (Localized) Steelhead
  - Dworshak National Fish Hatchery trap
- Dworshak National Fish Hatchery Spring Chinook
  - Dworshak National Fish Hatchery trap
- Dworshak National Fish Hatchery B-run Steelhead
  - Dworshak National Fish Hatchery trap
- Clearwater River Coho Salmon Restoration
  - Lapwai Creek weir
  - Dworshak National Fish Hatchery trap

- Kooskia National Fish Hatchery trap

- Kooskia National Fish Hatchery Spring Chinook Salmon
  - Kooskia National Fish Hatchery trap

Each of these traps is operated at intermittent periods throughout the year for broodstock collection for specific programs (Table 6). In addition to these traps, broodstock for the South Fork Clearwater (localized) steelhead program are collected by anglers in the South Fork Clearwater River.

Table 6. Bull trout presence and adult collection periods for hatchery programs in the Mid-Columbia Recovery Unit (typical and approximate) (from Assessment Table 8-2).

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Bull Trout Migration or Foraging													
Facility	**Program**	**Adult Collection Period**											
Nez Perce Tribal Hatchery trap	Nez Perce Spring Chinook Salmon												
Lower Lolo Weir	Nez Perce Spring Chinook Salmon												
Upper Lolo Weir	Nez Perce Spring Chinook Salmon												
Newsome Creek Weir	Nez Perce Spring Chinook Salmon												
Dworshak Hatchery trap	South Fork Clearwater B-Run Steelhead												
	Dworshak National Fish Hatchery Spring Chinook Salmon[a]												
	Dworshak National Fish Hatchery B-run Steelhead												
	Clearwater River Coho Salmon Restoration												
South Fork Clearwater River Angling	South Fork Clearwater (localized) Steelhead (angling)												
Lapwai Creek Weir[b]	Clearwater River Coho Salmon Restoration												
Crooked River Trap	Clearwater Spring and Summer Chinook Salmon												

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Bull Trout Migration or Foraging													
Red River Trap	Clearwater Spring and Summer Chinook Salmon												
Powell Trap	Clearwater Spring and Summer Chinook Salmon												
Kooskia Hatchery Trap and Weir	Clearwater Spring/Summer Chinook Salmon												
	Clearwater River Coho Salmon Restoration												
	Kooskia National Fish Hatchery Spring Chinook Salmon												

[a] Broodstock for the Clearwater Fish Hatchery spring Chinook salmon program are collected at Dworshak National Fish Hatchery, if needed. The timing of collection is identical to that for the Dworshak Chinook salmon program. At times, if needed, the Dworshak ladder may be operated in January.

[b] Note that Lapwai Creek weir collections conservatively included if needed for broodstock for CRITFC-funded portion of program.

The ongoing operation of adult collection facilities may affect bull trout by blocking or delaying migration to and from spawning reaches, altering spawn timing, or modifying local bull trout distribution. Trapped individuals may also be subject to stress from confinement and handling. Although the operation of the adult collection facilities may alter the temporal and spatial distribution of bull trout on a local scale, the level of effects relative to migration throughout the Middle Columbia River RU is unknown. Larger adult and subadult bull trout traveling upstream are typically captured in traps, however, smaller bull trout may move through weir panels.

To minimize potential effects on bull trout in the Middle Columbia River RU, trap facilities and weirs are maintained on a regular basis during trapping periods, and all bull trout captured in traps are counted and immediately released above the weir with minimal handling. Bull trout are harassed and delayed during these activities, but as discussed in the following sections, mortality associated with operation of the traps and weir facilities in the Middle Columbia River RU has been minimal.

2.5.1.1.1 Nez Perce Tribal Hatchery Spring Chinook Salmon Program

Nez Perce Tribal Hatchery Ladder and Trap

As presented in Section 2.1.3.1.1 and depicted in Table 3, the Nez Perce Tribal Hatchery ladder and trap operates from May through September to collect broodstock for the Nez Perce Tribal Hatchery Spring Chinook Program. The trap is located along the north (right) bank of the Clearwater River, immediately downstream of the Nez Perce Tribal Hatchery at RKM 35.4 (RM 22). It is a volitional ladder and does not prevent other species from entering the trap; therefore, bull trout may be collected.

The capture of bull trout is rare (NPT 2013), and no bull trout have been collected at the Nez Perce Tribal Hatchery in over 10 years. Although the potential to capture bull trout at the Nez

Perce Tribal Hatchery trap is low, the likelihood that an individual may enter the trap is not entirely discountable because of the volitional nature of the trap. Therefore, trapping operations may affect bull trout. If an individual enters the trap, it would be subject to adverse effects including passage delay and handling stress. To minimize the potential for such stress, all non-target fish are enumerated and immediately released back into the Clearwater River.

The Nez Perce Tribal Hatchery trap is adjacent to Clearwater River shared FMO habitat; SR habitat is not present. Therefore, trapping operations do not impact spawning habitat or rearing juveniles. In summary, although the likelihood to capture bull trout at the Nez Perce Tribal Hatchery trap is low, there is potential that capture and subsequent handling could occur, resulting in adverse effects.

Lolo Creek Weirs (Seasonal)

Portions of broodstock for the Nez Perce Tribal Hatchery Spring Chinook program are collected at two temporary picket weirs and traps that are annually placed in Lolo Creek at RKM 21.0 (RM 13.0) and RKM 50.5 (RM 31.4). The Lolo Creek traps are installed in May and collect Chinook salmon through September. Lolo Creek is not designated as critical habitat for bull trout. Although not collected in over 13 years, adult bull trout have been trapped at the lower weir, indicating a low level of use. Installation and removal of the Lolo Creek weirs may affect migrating bull trout because the presence of weir operators could temporarily displace individuals, or haze them from the area. Impacts during installation and removal are likely discountable, however, because bull trout are highly unlikely to be present in Lolo Creek. Bull trout have not been observed spawning in Lolo Creek; therefore, installation and removal would have no effect on redds, eggs, alevins, or young-of-the-year bull trout.

The channel-spanning weirs on Lolo Creek are upstream and downstream passage barriers. Since 2002, only two adult bull trout have been captured in the trap (one each in 2002 and 2003; NPT 2013). No mortalities have been reported. Based on past collection data, the potential to capture bull trout at the Lolo Creek traps is low, though not entirely discountable. If an individual enters the traps, it would be subject to adverse effects including passage delay and handling stress. To minimize the potential for stress-related take, all non-target fish are enumerated and released within 24 hours of capture, either upstream or downstream of the weirs (dependent on direction of travel), with minimal handling.

Lolo Creek is not designated as FMO or SR habitat. However, as recently as 2011, bull trout less than 170 mm in length have been collected at the screw trap operated just downstream of the lower weir (Table 8). These individuals may be the result of unknown bull trout spawning in Lolo Creek, or juveniles from the mainstem seeking refuge. For the purposes of this Opinion, it is assumed that fish less than 170 mm are juveniles (Dambacher and Jones 1997). Although the potential is low, if juvenile bull trout encounter the weir, movement could be delayed. Small juveniles may move downstream through the pickets, depending on size, and scale abrasion is possible. Therefore, on an individual level, operation of the weir is likely to adversely affect juvenile bull trout, though the potential to encounter juveniles is quite low.

Newsome Creek Weir (Seasonal)

Portions of broodstock for the Nez Perce Tribal Hatchery Spring Chinook program are collected at a temporary picket weir and trap that is annually placed in Newsome Creek at RKM 0.1 (RM

0.1). At the weir location, Newsome Creek provides FMO habitat. The Newsome Creek weir and trap is installed in May and collects Chinook salmon through September.

The Newsome Creek weir is staffed 24 hours per day, 7 days per week, and nontarget species are released within 24 hours of capture, either upstream or downstream of the weir trap (dependent on direction of travel), with minimal handling. Bull trout are occasionally collected during weir operations from May through September (see Section 2.4.1.1.1), and trapping operations are, therefore, likely to adversely affect individuals from passage delay and holding/handling stress.

Data from 2010 to the present indicate that juvenile bull trout are collected at the Newsome Creek screw trap located immediately downstream of the weir and trap (see section 2.4.1.1.1). The collection of juveniles in the screw trap suggests that juveniles could also be present at the weir site. Although smaller juveniles could likely pass through the picket weir during May through September operations, if individuals cannot swim through the picket panel spacings, adverse effects from downstream delay are possible.

2.5.1.1.2 Clearwater Spring and Summer Chinook Salmon

From May through mid-September, spring and summer Chinook salmon for the Clearwater River Hatchery program are collected at five facilities, as described below. Operation of trapping facilities for this program may affect bull trout.

Dworshak National Fish Hatchery Ladder and Trap

Dworshak National Fish Hatchery operates a left bank, volitional fish ladder on the North Fork Clearwater River that attracts fish via attraction flow, and traps them at the hatchery. If captured at the trap, direct effects on individual bull trout could occur and would be similar to those described above for the Nez Perce Hatchery trap. The trap is located on a reach of the North Fork Clearwater River downstream of Dworshak Dam, along a reach that functions as FMO habitat.

Few bull trout have been collected at the Dworshak National Fish Hatchery volitional ladder in the last 10 years; however, no records were kept. Staff biologists estimate that zero to a few adults have been collected during both steelhead and Chinook salmon trapping seasons annually (Robertson 2017, *in litt*). Once discovered, all bull trout were immediately released unharmed, and operators do not recall any lethal take during this time period. Collections would result in adverse effects (from handling stress, passage delay) on an individual level. Ongoing and future trapping operations at the Dworshak National Fish Hatchery trap, as related to the subject programs in this Opinion, are not expected to limit future bull trout population growth rates (High et al. 2008). Additionally, a new protocol for handling bull trout at Dworshak National Fish Hatchery has been developed to minimize impacts (see Appendix A of this Opinion).

Kooskia National Fish Hatchery Weir and Trap

The Kooskia National Fish Hatchery adult trap operates from May through September to collect spring and summer Chinook salmon. Fish enter the trap after encountering an Obermeyer weir that is inflated during the adult collection period and lies flat against the streambed when not in use.

As presented in Section 2.4.1.1.1, although historically collected in the 1990s, no bull trout have been collected at the adult trap on Clear Creek in the past 10 years (IDFG 2011a, b). Bull trout

do not use Lower Clear Creek near the Kooskia National Fish Hatchery during late summer to early fall because of high water temperatures (USFWS and NPT 2010).

Because no bull trout have been collected at Clear Creek in the past 10 years, the potential that weir operations from May through early July will encounter bull trout is remote. In the rare event that an individual is captured, the individual would be adversely affected in the form of passage delay and holding/handling stress. No mortalities have been reported (USFWS and NPT 2010).

For the purposes of this Opinion, it is assumed that fish less than 170 mm are juveniles (Dambacher and Jones 1997). The Kooskia trap is located in FMO habitat, well downstream of SR habitat, and bull trout less than 170 mm in size have not been collected at the trap (USFWS and NPT 2010). Therefore, the potential that juveniles are affected by trapping operations is discountable.

Seasonal Weirs and Traps

Installation and removal of seasonal picket weirs on the Crooked River, Red River, and Walton Creek in May and September may affect bull trout because the presence of weir operators could temporarily displace individuals, or haze them from the area. Effects on mobile adults, subadults, and juveniles during installation and removal are likely insignificant, however, because displacement would be temporary, and individuals could move to avoid workers.

No bull trout spawning or rearing occurs in the Crooked River in the vicinity of the trap, therefore, installation and removal would have no effect on redds, eggs, alevins, or young-of-the-year bull trout. Similarly, no bull trout spawning occurs in the vicinity of the Powell Satellite facility weir and trap, or below it (HDR 2017), therefore, installation and removal would have no effect on redds, eggs, alevins, or young-of-the-year bull trout. SR habitat is provided at the Red River location. Although the installation of the seasonal weir in May has no potential to affect bull trout redds, removal in September could possibly result in adverse effects to redds downstream of the seasonal weir from sedimentation during removal.

Following weir installation, adverse effects are likely from passage delays and potential holding stress in the traps, as discussed for each facility below.

Crooked River Trap

The Crooked River Trap is located along FMO habitat at RKM 1 (RM 0.6) of the Crooked River, and is operated from May to mid-September to collect Chinook salmon broodstock. During the adult collection period, a channel-spanning seasonal weir and trap operates continuously and forms a complete barrier to upstream migration during operations.

As discussed in Section 2.4.1.1.1, from 2007-2016, an average of 29 bull trout were collected annually at the trap, primarily in June and July. Collected individuals may be adversely affected from migratory delay, handling or holding stress, or potential mortalities. From 2007-2016, no mortalities were reported.

Currently, bull trout are known to spawn and rear in the Middle and Upper Crooked River and several of its tributaries; subadult and adult rearing occurs in the Lower Crooked River (CBBTTAT 1998d; IDFG 2001; USFWS 2002a). Because SR habitats are mapped just 3 RKM upstream of the trapping site, rearing juveniles could potentially encounter the trap during operations. Such encounters could delay passage if juveniles are too large to swim through the

pickets. Summer in-stream temperatures in August and September likely preclude usage by rearing juveniles, and therefore, the potential for adverse impacts from passage delay during those periods is likely discountable.

Red River Trap

The Red River Satellite facility is located in SR habitat at RKM 26.9 (RM 16.7) of the Red River. It is operated from May to mid-September to collect Chinook salmon broodstock. Collection is accomplished using a seasonal weir across Red River, diverting fish into the trapping facility.

Installation, removal, and operation of the trap have the potential to affect bull trout. Operations would result in direct, adverse effects on individuals if they were captured at the weir. From 2007 through 2016, the annual number of bull trout collected during operations has ranged from 0 in 2008 to 20 in 2013, with an average of six collections. During this collection period, one bull trout was collected in May and all other collections occurred in June and July (HDR 2017). In 2013 one bull trout mortality was reported at the Red River Satellite trap (HDR 2017).

Because the Red River Satellite is located along SR habitat, weir operations have the potential to affect spawning habitat. As presented in Section 2.4.1.1.1, bull trout do not spawn in the immediate vicinity of the weir, and in-stream temperatures in the reach near the weir are highly unlikely to support spawning. Therefore, operation of the weir, including seasonal removal in late September, is not likely to adversely affect spawning habitat from disturbance and potential sedimentation. Because spawning occurs upstream, rearing juveniles may be adversely affected during operations. If individual bull trout encounter the weir and cannot swim through the picket spacings, their downstream movement would be delayed for the duration of weir operations. A summary of anticipated bull trout effects from operation of the Red River trap is presented in Appendix A of the Assessment.

Powell Trap

The Powell Satellite facility is located at the headwaters of the Lochsa River along SR habitat on Walton Creek (RKM 0). Bull trout are routinely collected at the Powell Satellite facility (see Section 2.4.1.1.1) and, therefore, have the potential to be affected during weir installation and removal, as well as during adult collections from May through mid-September. Collected subadults and adults (including spawning migrants) may be adversely affected from passage delays at the trap, and individuals may alter migratory behaviors in response to holding. Individuals may also be subject to stress during temporary holding periods.

From 2007 through 2016, the annual number of bull trout collected during operations ranged from 0 in 2008 to 35 in 2012, with an average of seventeen collections. The majority of bull trout are collected in July and August. Few are collected in September (HDR 2017), and captured individuals are released upstream.

No bull trout spawning occurs in the vicinity of the Powell Satellite facility weir and trap, or below it (HDR 2017). Therefore, effects on redds, incubating eggs and alevins are discountable. However, the Powell facility is located along SR habitat and bull trout do move upstream of the site to spawn in Walton Creek. Because Walton Creek supports spawning upstream, rearing juveniles may be adversely affected during operations. The picket spacings on the weir are sufficiently wide to allow juvenile passage. If, however, juveniles encounter the weir and cannot swim through the picket spacings, their downstream movement would be delayed for the

duration of weir operations. A summary of anticipated bull trout take from operation of the Powell Satellite facility trap is presented in Appendix A of the Assessment.

2.5.1.1.3 South Fork Clearwater (Localized) Steelhead

Dworshak National Fish Hatchery Ladder and Trap

Few bull trout have been collected at the Dworshak National Fish Hatchery volitional ladder in the last 10 years; however, no records were kept. Staff biologists estimate that zero to a few adults have been collected during both steelhead and Chinook salmon trapping seasons annually (Robertson 2017, *in litt*). Once discovered, all bull trout were immediately released unharmed, and operators do not recall any lethal take during this time period. Collections would result in adverse effects (from handling stress, passage delay) on an individual level. Ongoing and future trapping operations at Dworshak National Fish Hatchery trap, as related to the subject programs in this Opinion, are not expected to limit future bull trout population growth rates (High et al. 2008).

South Fork Clearwater River Angling

Steelhead broodstock are collected by anglers in the South Fork Clearwater River, and backfilled by broodstock collected at Dworshak National Fish Hatchery as needed for both the South Fork Clearwater (localized) and Dworshak National Fish Hatchery B-run programs. In 2015 and 2016, all broodstock for this program were collected in the South Fork Clearwater River via angling between the mouth and Mount Idaho Grade Road, located at RKM 39.5 of the South Fork Clearwater River (HDR 2017). Angling takes place from January through April. The South Fork Clearwater River, from its confluence with the Clearwater River upstream 100.3 RKMs (62.3 miles) provides FMO habitat for bull trout. Therefore, volunteer angling efforts in the lower mainstem are not likely to adversely affect SR habitat or sensitive life stages (i.e., redds, eggs, alevins, young-of-the-year juveniles).

Angling in FMO habitat from January through April is likely to adversely affect migratory adult and subadult bull trout. Piscivorous adults and subadults could be incidentally angled and suffer holding/handling stress or potential mortality. To minimize holding and migratory delay, all nontarget listed species are released immediately (IDFG 2011b).

2.5.1.1.4 Dworshak National Fish Hatchery Spring Chinook Salmon Program

Dworshak National Fish Hatchery Ladder and Trap

Dworshak National Fish Hatchery operates a left bank, volitional fish ladder on the North Fork Clearwater River that attracts fish via attraction flow, and traps them at the hatchery. If captured at the trap, direct effects on individual bull trout could occur and would be similar to those described above for the Nez Perce Tribal Hatchery trap. The trap is located on the North Fork Clearwater River downstream of Dworshak Dam, along a reach that functions as FMO habitat.

Few bull trout have been collected at the Dworshak National Fish Hatchery volitional ladder in the last 10 years; however, no records were kept. Staff biologists estimate that zero to a few adults have been collected during both steelhead and Chinook salmon trapping seasons annually (Robertson 2017, *in litt*). Once discovered, all bull trout were immediately released unharmed, and operators do not recall any lethal take during this time period. Collections would result in adverse effects (from handling stress, passage delay) on an individual level. Ongoing and future trapping operations at Dworshak National Fish Hatchery trap, as related to the subject programs

in this Opinion, are not expected to limit future bull trout population growth rates (High et al. 2008).

2.5.1.1.5 Dworshak National Fish Hatchery B-run Steelhead

Dworshak National Fish Hatchery Ladder and Trap

Potential effects on bull trout from operation of the Dworshak trap, for collection of B-run steelhead for the Dworshak program, would be identical to those described previously for the South Fork Clearwater (localized) steelhead program.

2.5.1.1.6 Clearwater River Coho Salmon Restoration

Lapwai Creek Weir

The Lapwai Creek seasonal weir is located at RKM 1.2 (RM 0.7) and operates from October through December to collect coho salmon. Lapwai Creek is not designated as critical habitat and no bull trout have been collected at the Lapwai weir (HDR 2017*)*. Therefore, the occurrence of bull trout use is highly unlikely. As a result, installation, removal, and operation of the Lapwai Creek weir are anticipated to have no effect on bull trout.

Kooskia National Fish Hatchery Weir and Trap

In addition to operating from May through September to collect Spring Chinook salmon, the Kooskia National Fish Hatchery adult trap operates from October through November to collect coho salmon on Clear Creek. Fish enter the trap after encountering an Obermeyer weir that is inflated during the adult collection period and lies flat against the streambed when not in use.

Bull trout may be captured at the trap during the fall coho salmon trapping period and subject to adverse effects from passage delay and holding/handling stress. As presented in Section 2.4.1.1.1, two to four bull trout were historically collected per year during spring Chinook salmon trapping in the 1990s (IDFG 2011a, b); however, no bull trout have been collected in the past 10 years. In the unlikely event a bull trout is captured, individuals are immediately released into the bypass channel to continue their upstream migration (USFWS and NPT 2010).

For the purposes of this Opinion, it is assumed that fish less than 170 mm are juveniles (Dambacher and Jones 1997). The Kooskia trap is located in FMO habitat, well downstream of SR habitat, and bull trout less than 170 mm in size have not been collected at the trap (USFWS and NPT 2010). Therefore, the potential that juveniles are affected by trapping operations is discountable.

2.5.1.1.7 Kooskia National Fish Hatchery Spring Chinook Salmon

Kooskia National Fish Hatchery Weir and Trap

As previously described, the Kooskia National Fish Hatchery adult trap operates from May through September to collect spring Chinook salmon. The potential adverse effects on bull trout would be similar to those described in Section 2.5.1.1.2. Operation of the Kooskia trap from May through early July may adversely affect individual bull trout from passage delay and holding/handling stress, in the unlikely event that bull trout are present. No bull trout have been collected at the Clear Creek trap in 10 years. High summer/early fall in-stream temperatures likely preclude bull trout occurrence in August and September, and impacts are likely discountable during the latter stages of the trapping period. In the event a bull trout is captured,

data is recorded and then the fish is immediately released into the bypass channel to continue its upstream migration. No mortalities have been reported (USFWS and NPT 2010).

For the purposes of this Opinion, it is assumed that fish less than 170 mm are juveniles (Dambacher and Jones 1997). The Kooskia trap is located in FMO habitat, well downstream of SR habitat, and bull trout less than 170 mm in size have not been collected at the trap (USFWS and NPT 2010). Therefore, the potential that juveniles are affected by trapping operations is discountable.

2.5.1.2 Acclimation and Release

As described in Section 2.1.3, several acclimation sites are operated to support the Clearwater River Hatchery programs under the proposed action. Juveniles are either acclimated and released, or direct-released into tributaries throughout the Clearwater River Subbasin (Table 7).

Table 7. Juvenile release locations for Clearwater River Hatchery Programs (from Assessment Table 8-7).

Program	Acclimation and/or Release Location		Release Date
	Core Area/FMO Habitat	Site	
Nez Perce Tribal Hatchery Spring Chinook Salmon	Clearwater River Shared FMO	Nez Perce Tribal Hatchery	April
	Clearwater River Shared FMO	Yoosa/Camp Satellite[a;] El Dorado Creek[b] (tributaries to Lolo Creek)	October
	South Fork Clearwater River Core Area	Newsome Creek Satellite[a]	October
	Selway River Core Area	Meadow Creek[b]	Mid-June
		Upper Selway River[b]	Mid-June
Clearwater Spring and Summer Chinook Salmon	South Fork Clearwater River Core Area	Red River Satellite	March to Early April
	Clearwater River Shared FMO	Kooskia National Fish Hatchery North Fork Clearwater River	March to Early April
	Selway River Core Area	Lower Selway River	March to Early April
	Lochsa River Core Area	Powell Satellite (on Walton Creek)	March to Early April
South Fork Clearwater (Localized) Steelhead	South Fork Clearwater River Core Area	Red House Hole	April
		Meadow Creek	April
		Newsome Creek	April

Program	Acclimation and/or Release Location		Release Date
	Core Area/FMO Habitat	Site	
Dworshak National Fish Hatchery Spring Chinook Salmon	Clearwater River Shared FMO	Dworshak National Fish Hatchery	Late March to April
Dworshak National Fish Hatchery B-run Steelhead	Clearwater River Shared FMO	Dworshak National Fish Hatchery	April
	Clearwater River Shared FMO	El Dorado Creek (tributary to Lolo Creek)	April
	South Fork Clearwater River Core Area	Red House Hole	April
	Clearwater River Shared FMO	Kooskia National Fish Hatchery	April
Clearwater River Coho Salmon Restoration	Clearwater River Shared FMO	Lapwai Creek Weir	Early March
	Clearwater River Shared FMO	Kooskia National Fish Hatchery	Early April
Kooskia National Fish Hatchery Spring Chinook Salmon	Clearwater River Shared FMO	Kooskia National Fish Hatchery	Mid to Late March

[a] Presmolts
[b] Release site varies depending on snowpack and road conditions.
[c]Parr
Note: All are smolts are released in the spring unless otherwise noted.

Within the Mid-Columbia RU, Nez Perce Tribal Hatchery spring Chinook salmon are released from numerous sites into Clearwater River shared FMO habitat, as well as three core areas: the South Fork Clearwater River, Lochsa River, and Selway River. The majority of releases occur in FMO habitat, downstream of SR habitat. Released hatchery juveniles may affect listed bull trout through competition for resources as well as predation on bull trout juveniles. The magnitude of effect is dependent upon the duration of exposure of individual bull trout to ecological interactions, as well as the potential overlap of juvenile hatchery fish with young bull trout. The duration of exposure will be greater for programs that release parr (i.e., Meadow Creek and Upper Selway River) than for those that release smolts.

Spring Chinook salmon from the Nez Perce Tribal Hatchery Program are released as "presmolts" into the Lolo and Newsome creek drainages in mid-October. These juvenile Chinook salmon rear in the release tributary until they out-migrate as smolts the following spring. Although presmolts remain in each release tributary for a longer duration than smolts, Lolo Creek has a rare to nonexistent bull trout presence, and Newsome Creek provides FMO habitat at the release location. Therefore, it is highly unlikely that juvenile bull trout are exposed to ecological interactions with presmolt releases. The potential that presmolt Chinook salmon prey upon, or compete with juvenile bull trout in these drainages is, therefore, discountable.

2.5.1.2.1 Overview of Ecological Interactions

Competition

Hatchery Smolt Releases

Competition between and among fish species occurs when two or more individuals use the same resources, particularly when the resource is limited (YSFWPB 2005). In the Mid-Columbia RU, hatchery-reared smolts may compete with other fish species for rearing habitat and feeding opportunities. Direct competition for resources between hatchery smolts and bull trout may occur in SR habitat and within FMO habitat used as a bull trout migration corridor. Potential competition is greatest in spawning and nursery areas and near juvenile release areas with the highest insitu fish (bull trout) density (BAMP 1998 as cited in NMFS et al. 2014).

With the exception of the Red River Satellite and Powell Satellite (on Walton Creek) juvenile release locations, smolt release sites under the proposed action are located in FMO habitat. Smolts released into FMO habitat are unlikely to encounter juvenile bull trout, but would encounter piscivorous adults and subadults as they out-migrate. Such releases, therefore, are not likely to adversely affect bull trout as effects would be considered beneficial.

The river reaches adjacent to the Red River and Powell satellites provide SR habitat (USFWS 2010c), and bull trout adults are typically collected during annual trapping operations in the late spring and early summer at these locations (see Section2.4.1.1.1). However, no bull trout spawning occurs in the vicinity of or below either facility (HDR 2017). Primary spawning areas are located upstream of both facilities.

Based on the lack of site-specific bull trout spawning observations at both the Red River and Powell satellite release locations, potential exposure of rearing juvenile bull trout to hatchery smolt releases is likely low. On an individual level, the potential is not entirely discountable given the proximity of the Red River and Powell satellites to SR habitat. As a result, juvenile releases from these facilities have the potential to adversely affect individual bull trout because hatchery smolts may be released into habitat occupied by rearing juvenile bull trout. If the species overlap in time and space, competition may result for space, food, and shelter. Refer to Appendix A of the Assessment for facility-specific effects determinations relative to ecological effects on bull trout from hatchery smolt acclimation and release.

The potential for adverse effects on bull trout from smolt releases from the Red River and Powell satellite sites is minimized because IDFG releases smolts that are physiologically ready to out-migrate upon release in the spring and during flow conditions that encourage outmigration. This strategy reduces the period of time when hatchery smolts and bull trout may overlap in the same system, and therefore, reduces the potential for inter-species interaction (NMFS 1995).

The rapid outmigration of smolts from the Clearwater River Subbasin suggests limited residency in release tributaries, further reducing the potential for predation on bull trout juveniles. 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). Competition with bull trout may continue to occur at an unknown, though lesser level, as smolts move downstream from release sites and through their outmigration corridor (BAMP 1998).

Steelhead, Chinook salmon, coho salmon, and bull trout evolved sympatrically in the Clearwater River Subbasin. Therefore, some form of resource partitioning would be expected where species overlap both geographically and in microhabitats in streams. Hatchery programs have been ongoing for decades in the Clearwater River Subbasin, and the Service (USFWS 2015d) does not list competition between bull trout and hatchery-released smolts as a primary limiting factor for bull trout populations in any of the project-affected core areas.

Hatchery Parr Releases

Chinook salmon parr are released into Meadow Creek and the Upper Selway River. These fish remain in the system for about 1 year before migrating downstream as smolts. During this time, competition for resources with rearing juvenile bull trout is possible. Although both the Meadow Creek and Upper Selway River parr release locations are mapped as FMO habitat (USFWS 2010c), Streamnet (2017) indicates year-round rearing and migration at the Meadow Creek sites. Considering this, parr releases may affect juvenile bull trout. The exposure of individuals to Chinook salmon parr is temporary, considering the limited freshwater rearing residency of Chinook salmon.

If Chinook salmon parr residualize rather than out-migrate as smolts, they would continue to compete for resources (e.g., food, rearing space, preferred habitats) with bull trout. Such competition would continue throughout the lifetime of each residual. However, because these species evolved sympatrically in the Clearwater River Subbasin, some form of resource partitioning would be expected. In addition, Chinook salmon residualism is suspected to be an uncommon life history strategy (IDFG 2011a). Therefore, although competition for resources may take place on an individual level resulting in adverse effects on individual bull trout, potential competition from parr releases is not expected to be a primary limiting factor for bull trout populations in the Clearwater River Subbasin. Hatchery programs have been ongoing for decades in the Clearwater River Subbasin, and the Service (USFWS 2015d) does not list competition between bull trout and hatchery-released pre-smolts as a primary limiting factor for bull trout populations in any of the program-affected core areas.

Predation

Hatchery Smolt Releases

Predation by hatchery fish on wild fish can occur anywhere the two stocks exist in the same space and time, and risks to wild fish are increased when hatchery fish, particularly larger smolts, are released during periods when vulnerable newly emergent wild fry are present. Some reports suggest that hatchery fish can prey on fish that are up to half their length (Pearsons and Fritts 1999, HSRG 2004); however, studies reviewed by Busack et al. (2006) indicated that the range may extend from approximately 38 percent (steelhead) to 75 percent (Coho). The Service (USFWS 1994) and NMFS (1999) concluded that juvenile salmonids can consume prey up to 33 percent (one-third) of their body length.

The impact of direct predation by the majority of program juvenile releases is expected to be minimal because (1) juvenile spring/summer Chinook salmon, coho salmon, and steelhead primarily feed on insects (Bjornn and Reiser 1991); (2) hatchery-reared smolts will be similar in size to naturally-reared smolts; and (3) smolt outmigration has been shown to occur immediately after direct release (Rabe and Nelson 2009). Under the proposed action, smolts are released at a time and size designed to optimize the percentage of smolts migrating out of the system and to

minimize interaction with bull trout. With the exception of the Powell and Red River satellite facilities, all smolt releases would occur in FMO habitat for bull trout, thereby reducing the potential for predation on juvenile bull trout by hatchery-released smolts. As described above, the rapid outmigration of smolts from the Clearwater River Subbasin suggests limited residency in release tributaries, further reducing the potential for predation on bull trout juveniles.

Predation could occur if hatchery smolts residualize or stray into tributary habitats during their outmigration. Chinook salmon residualism is suspected to be an uncommon life history strategy (IDFG 2011a). Rates of steelhead residualism are currently unknown; however, steelhead residualism in the Upper Salmon River appeared to be about 4 percent in 1992 (IDFG 1993).

Predation-related effects on bull trout are expected to be low, and associated only with releases that occur within or in close proximity to SR habitat for bull trout (Powell and Red River satellites). Therefore, juvenile releases from these facilities are likely to adversely affect bull trout only on an individual level. All other release locations are well downstream of SR habitat and are not likely to adversely affect bull trout, should smolts residualize.

Refer to Appendix A of the Assessment for facility-specific effects determinations relative to ecological effects on bull trout from the acclimation and release of hatchery smolts.

Hatchery Parr Releases

Hatchery fish have the potential to prey upon fish from the local natural population during juvenile rearing. In general, the threat from predation is greatest when natural populations of Chinook salmon are at low abundance, when spatial structure is already reduced, when habitat is limited, and when environmental conditions favor high visibility (NMFS 2013). Spring Chinook salmon parr released into FMO habitat in Meadow Creek and the Upper Selway River will remain in the system for about 1 year before migrating downstream as smolts.

Although categorized as FMO habitat, Meadow Creek is indicated to provide year-round rearing (Streamnet 2017). If rearing Chinook salmon encounter rearing bull trout juveniles, interactions are possible. However, in their freshwater stage, Chinook salmon primarily feed on plankton, insects, terrestrial drift, and benthic aquatic invertebrates (Utz et al. 2012). Considering this, and because juveniles are released into the lower 32 km (20 miles) of Meadow Creek in FMO habitat, predation on bull trout by Chinook salmon in Meadow Creek is likely to be low, but not discountable (see Appendix A of the Assessment).

Beneficial Effects

Release of juvenile hatchery Chinook salmon, coho salmon, and steelhead likely provides increased prey items for migratory adult and subadult bull trout, which are highly piscivorous. This may be considered a beneficial effect of smolt releases on foraging bull trout, particularly in areas that provide SR habitat (i.e., the Powell Satellite on Walton Creek and the Red River Satellite). The existing practice of releasing smolts below SR habitat (excluding the Powell and Red River satellites, as discussed above), when they are expected to quickly out-migrate to the ocean, reduces the potential for ecological interactions with bull trout. In some instances, the benefits of additional forage in FMO would improve conditions for bull trout.

2.5.1.3 Research, Monitoring, and Evaluation

The Nez Perce Tribal Hatchery Spring Chinook Salmon program includes RM&E activities directly related to the monitoring of hatchery fish. Therefore, RM&E activities associated with

the Nez Perce Tribal Hatchery Spring Chinook Salmon Program are included under the proposed action. Monitoring and evaluation of other programs (not receiving Federal funds) is not directly related to hatchery programs and is, therefore, not part of the proposed action.

In the Clearwater River Subbasin, the NPT conducts RM&E activities in Lolo Creek (mainstem Clearwater River Shared FMO habitat), the South Fork Clearwater River (South Fork core area) Newsome Creek (South Fork core area), Meadow Creek (Selway core area), and the Selway River (Selway core area). Electrofishing surveys may potentially be conducted in all Clearwater River tributaries, all South Fork Clearwater River tributaries located between the river mouth and Butcher Creek, and Maggie Creek (tributary to the Middle Fork Clearwater River).

During RM&E activities, surveyors occasionally encounter bull trout. The number of encounters is minimal, and as a result, the level of mortality is expected to be less than 10 juvenile bull trout per tributary per year (NPT 2013). Potential effects on bull trout from RM&E activities include the following:

- **Spawning Surveys**. Spring/summer Chinook salmon spawning ground surveys are conducted from July through September in the Clearwater River Subbasin. Experienced surveyors walk along the stream, crossing when necessary, counting redds, and observing live fish and carcasses.
    - Individual bull trout may occasionally be encountered during these activities. Encounters are rare (NPT 2013). If encountered, bull trout could be temporarily harassed by the presence of foot-based surveyors. Although part of the proposed action, surveyors conducting RM&E for the Nez Perce Tribal Hatchery Spring/Summer Chinook Program would abide by all applicable terms and conditions in the current Service Section 10 permit (TE#001598-6) issued to the NPT for ongoing and future RM&E actions in the Clearwater River Subbasin (these terms and conditions are included as impact minimization measures in the proposed action; see Section 2.1.5.3).
    - Surveys are currently, and would continue to be, conducted in a manner that would avoid touching, capturing, or intentionally disturbing bull trout. Experienced surveyors would avoid all redds. Any information gathered on bull trout from these surveys would be forwarded to USFWS at the end of the season.
- **Juvenile Screw Trap Surveys**. The NPT operates several screw traps in the Clearwater River Subbasin to monitor juvenile production and abundance in waterbodies outplanted with juvenile hatchery fish from the Nez Perce Tribal Hatchery Spring/Summer Chinook Salmon Program.
    - Lolo Creek screw trap: The Lolo Creek screw trap is operated from February through November. Juvenile bull trout have occasionally been collected in the trap. The most recent bull trout collections occurred in 2011 (Table 8). Although the potential to encounter bull trout in this trap is low, if an individual were to enter the trap, it would be adversely affected through passage delay and holding/handling stress.
    - South Fork Clearwater mainstem screw trap: Trap operation started in fall of 2016 and runs from February through November. Although the potential exists for bull trout to be captured in the trap, no bull trout were collected in the South

Fork Clearwater mainstem screw trap in the fall of 2016 and so far in 2017 (Table 8). Although the potential to encounter bull trout in this trap is low, if an individual were to enter the trap, it would be adversely affected through passage delay and holding/handling stress.

- Newsome Creek screw trap: The Newsome Creek screw trap is operated from February through November. From 2010 to 2016, an average of 15 juvenile bull trout were collected in the screw trap (Table 8). Screw trap collections at Newsome Creek may affect juveniles and subadults from passage delay, potential predation stress, and stress and potential mortality or injury from holding.
- Meadow Creek screw trap: The Meadow Creek screw trap is operated from February through November. Although the potential exists for bull trout to be captured in the trap, no bull trout were collected in the Meadow Creek screw trap from 2010 to 2016. Although the potential to encounter bull trout in this trap is low, if an individual were to enter the trap, it would be adversely affected through passage delay and holding/handling stress.

Table 8. Bull trout captures and observed mortalities during juvenile spring chinook salmon screw trap operations in Lolo and Newsome Creeks and the South Fork Clearwater River (2004-2016) (from Assessment Table 8-8).

Year	Lolo Creek		Newsome Creek		South Fork Clearwater River	
	Captured/ Passed	Mortalities	Captured/ Passed	Mortalities	Captured/ Passed	Mortalities
2004	0	0	27	0	--	--
2005	0	0	2	0	--	--
2006	0	0	0	0	--	--
2007	1	0	16	0	--	--
2008	0	0	19	0	--	--
2009	0	0	34	0	--	--
2010	2	0	34	0	--	--
2011	2	0	19	0	--	--
2012	0	0	28	0	--	--
2013	0	0	5	0	--	--
2014	0	0	12	0	--	--
2015	0	0	3	0	--	--
2016	0	0	4	0	0	0

- **Electrofishing, snorkeling, and hook-and-line sampling**. These surveys would occur during the summer (June - October), which overlaps with bull trout spawning migrations

and staging periods in streams in the subbasin. These activities may occur in Big Canyon Creek and tributaries (Clearwater River), Lapwai Creek and tributaries (Clearwater River), Lolo Creek and tributaries (Clearwater River), Clear Creek and tributaries (Middle Fork Clearwater River), Meadow Creek and tributaries (South Fork Clearwater River), and Mill Creek and tributaries (South Fork Clearwater River). During these surveys, bull trout may be encountered. If encountered, the following effects may occur:

- Electrofishing would result in temporary, adverse effects on juvenile bull trout via temporary disturbance, displacement, and trauma. Stress could also result from temporary holding in the form of high fish densities, potential predation, and decreased oxygen. Lethal mortality could also occur. To minimize potential effects on bull trout, electrofishing efforts conform to NMFS electro-fishing guidelines (NMFS 2000) and bull trout would be immediately released unharmed back to the river if encountered.
- Snorkeling may startle adults or subadults and disturb rearing juveniles. Disturbance typically includes forcing individuals to seek cover; the duration of impact is short-term. Snorkeling counts by habitat type are the main sampling tool used to determine density and relative abundance of juvenile Chinook salmon and steelhead of natural and hatchery origin, as well as other coexisting species. Snorkeling observations are conducted in areas of representative habitat types in Lolo Creek, Newsome Creek, Meadow Creek, and the Selway River, and multiple transects are surveyed at each location. Snorkelers move slowly, but steadily upstream in an assigned lane. The number of snorkelers is dependent upon visibility and width of the stream. Snorkelers move slowly and steadily upstream in an assigned lane, assembled in a "V" formation (rather than a single line perpendicular to the stream). Snorkeling surveys are conducted when stream temperatures are low, to minimize potential for stress and incidental mortality to listed fish.
- Volunteer angling efforts are not likely to adversely affect SR habitat and sensitive life stages (i.e., redds, eggs, alevins, young-of-the-year juveniles). Angling from June to October would overlap with the bull trout spawning migration period and, is therefore, likely to adversely affect adult and subadult bull trout. Piscivorous adults and subadults could be incidentally angled and suffer holding/handling stress or potential mortality. To minimize holding and migratory delay, all nontarget species are released immediately.
- Electrofishing, snorkeling, and hook-and-line sampling would avoid river mouths and lower reaches of tributaries where adult bull trout may be staging as part of their spawning migration. If an adult bull trout is captured in any sampling location during the staging period, activity will cease at the site and move to an alternate location.
- It is currently unknown how many bull trout may be encountered during these sampling activities. The NPT would minimize encounters by sampling only in shallower stream margins and avoiding deeper pools and locations with extensive large woody debris. Any bull trout encountered would be returned to the stream with minimal handling. All encounters will be recorded for annual take reporting.

- Data on numbers, dates and times of capture, and estimated lengths would be reported to the Service. NMFS Electrofishing Guidelines (NMFS 2000) would be followed, and all electrofishing would be conducted by experienced fish biologists.

The NPT 2017 application for renewal of the Service's Section 10 permit (TE#001598-5) provided summaries of take and impacts to bull trout associated with RM&E activities under the proposed action, as related to the Nez Perce Tribal Hatchery Spring/Summer Chinook salmon Program. Encounters of bull trout during RM&E activities have been very low with very little mortality.

2.5.1.4 Water Withdrawals/Diversions

Water withdrawals for hatchery program operations in the Mid-Columbia RU have the potential to affect individual bull trout via water quality or quantity habitat loss or degradation. Water diversion could affect bull trout with outcomes as benign as a minor migratory delay to outcomes as severe as injury or mortality. Facility water intakes have the potential to affect bull trout by reducing water levels in the river between the facility intake and outfall, resulting in the potential loss of rearing habitat and/or blockage of passage for both adults and juveniles. Improperly screened diversions may also result in fish being diverted and entrained into the facilities' water system and could impinge bull trout juveniles.

In this section, facility-specific water diversions are discussed rather than program-specific effects because several programs operate at more than one facility and water diversions, are therefore, associated with more than one program.

2.5.1.4.1 Nez Perce Tribal Hatchery

Surface water is diverted from the Clearwater River into the Nez Perce Tribal Hatchery near RKM 35.4 (RM 22). This reach of the river provides FMO habitat for bull trout in the mainstem, and is well downstream of SR habitat in tributaries throughout the subbasin. BPA holds a water right to divert up to 7 cfs of surface water for hatchery operations. This right is typically near-fully utilized in May and June (Table 9). The in-river distance between the intake diversion and the discharge location at the fish ladder is about 18.2 meters (60 feet).

Year-round surface water diversions at the Nez Perce Tribal Hatchery comprise a relatively small portion of the average monthly stream flow in the Clearwater River, ranging from a low of 2.1 cfs in July to a high of 6.9 cfs in June. Considering the relatively high average monthly river flows, surface water diversion is not likely to adversely affect bull trout use or occurrence in this FMO reach of the mainstem Clearwater River. Measurable effects on in-stream habitat in the mainstem river because of hatchery surface water withdrawals, including changes in wetted width and depth, are highly unlikely to be detectable, and are therefore discountable. Because the facility is located well downstream of spawning habitat, diversions would have no effect on incubating eggs, alevins, or young-of-the-year rearing habitat. Juvenile rearing is highly unlikely in the mainstem near the hatchery.

Table 9. Average monthly surface water diversion (cfs) at Nez Perce Tribal Fish Hatchery relative to mainstem Clearwater River stream flows (cfs) (from Assessment Table 8-3).

Month	Average Intake Diversion (cfs)	River Flow[a] (cfs)	% River Diverted
January	3.9	~8,689	< 0.5
February	5.4	~10,366	< 0.5
March	6.0	~15,045	< 0.5
April	5.9	~23,436	< 0.5
May	6.6	~35,050	< 0.5
June	6.9	~30,905	< 0.5
July	2.1	~14,767	< 0.5
August	3.3	~9,076	< 0.5
September	4.1	~6,742	< 0.5
October	6.0	~4,001	< 0.5
November	6.1	~6,229	< 0.5
December	5.3	~7,843	< 0.5

[a.] Mainstem Clearwater River flows estimated by subtracting USGS gauges 13341570 Potlach River below Little Potlach Creek near Spalding and 13342450 Lapwai Creek near Lapwai, Idaho from USGS gauge 13342500 Clearwater River at Spalding, Idaho. Other inputs such as Catholic Creek and Cottonwood Creek are not accounted for, therefore, flows in the table are approximate and may be underestimated.

Although adults and subadults could be present during year-round operations, sufficient flow remains in the channel between the intake and outfall to allow for foraging, overwintering and migration. Based on the diversion quantities presented above and the Montana method assessment approach, hatchery surface water diversions at the Nez Perce Tribal Hatchery are not likely to adversely affect bull trout because the facility diverts less than 0.5 percent of average flows. Under all monthly diversions, suitable in-stream habitat conditions persist over the hydrograph through the 18.2-meter (60-foot) diversion reach.

In 2002, the NPT consulted with NMFS regarding the intake screens. On-going hatchery review will determine if the facility is in compliance with current (2011) NMFS screening criteria and whether future upgrades may be required. If the facility is out of compliance with NMFS (2011) juvenile screening criteria, potential effects on juvenile bull trout are discountable. The intake is sited along an FMO habitat reach of the mainstem Clearwater River, well downstream from SR habitat. Therefore, juvenile bull trout impingement or entrainment is highly unlikely.

2.5.1.4.2 Clearwater Fish Hatchery

The Clearwater Fish Hatchery receives water through two supply pipelines from Dworshak Reservoir. The warmwater intake is attached to a floating platform and can be adjusted from 5 feet to 40 feet below the surface. The cool water intake is stationary at 245 feet below the top of the dam. On average, 64 cfs are diverted from the reservoir. The maximum surface water diversion is 89 cfs (Table 10), which complies with the maximum diversion authorized by the

Idaho Department of Water Resources water right No. 85-07593. The in-river distance between the intake diversions and the discharge location is about 3.0 km (1.9 miles).

Table 10. Maximum monthly surface water diversion (ac-ft; cfs) at Clearwater Fish Hatchery relative to Dworshak Reservoir average end-of month storage (ac-ft) (from Assessment Table 8-4).

Month	Maximum Intake Diversion		Average End-of-Month Storage (ac-ft)[a]	% Reservoir Diverted
	cfs	Ac-ft per month		
January	89	5372.99	2,295,288.89	< 0.5
February	89	5372.99	2,284,888.89	< 0.5
March	89	5372.99	2,311,377.78	< 0.5
April	89	5372.99	2,517,200.00	< 0.5
May	89	5372.99	3,067,976.74	< 0.5
June	89	5372.99	3,370,222.22	< 0.5
July	89	5372.99	3,102,777.78	< 0.5
August	89	5372.99	2,766,200.00	< 0.5
September	89	5372.99	2,532, 533.33	< 0.5
October	89	5372.99	2,449,108.70	< 0.5
November	89	5372.99	2,427,391.30	< 0.5
December	89	5372.99	2,381,695.65	< 0.5

During year-round operations, maximum surface water diversions from the Dworshak Reservoir remove much less than 1 percent of the average monthly storage volume (Table 10). Effects are discountable; therefore, hatchery-related reservoir withdrawals are highly unlikely to result in measurable effects on bull trout habitat in the reservoir. No measurable reductions, and therefore, adverse effects on FMO habitat and bull trout usage in the reservoir, are anticipated to result from hatchery diversions. Ample FMO habitat is available in the reservoir year round.

Bull trout do not spawn in the reservoir and juvenile rearing is highly unlikely in the deeper waters near the Clearwater Fish Hatchery intakes. Therefore, hatchery surface water diversion is anticipated to have no effect on rearing juveniles, eggs, alevins, or young-of-the-year bull trout. Because the hatchery withdraws far less than 1 percent of reservoir monthly volumes, no loss of shoreline rearing habitats is anticipated, in the unlikely event that such habitats provide rearing for juvenile bull trout. The potential presence of juvenile bull trout is so remote as to be discountable.

Based on the diversion quantities presented above and the water quantity assessment approach presented above (Montana Method), hatchery surface water diversions from the Dworshak Reservoir would retain 60 to 99 percent of average reservoir volumes and, are therefore, not likely to adversely affect bull trout.

Because juvenile bull trout do not rear in the vicinity of the intakes in the reservoir, operation of potentially out of compliance intakes would have no effect on juvenile bull trout. Bull trout do not spawn in the reservoir and juvenile rearing is highly unlikely in the deeper waters near the Clearwater Fish Hatchery intake. Mobile adults or subadults are not likely to be adversely affected by operation of the intakes.

2.5.1.4.3 Dworshak National Fish Hatchery

Dworshak National Fish Hatchery diverts surface water for holding and spawning of the hatchery's spring Chinook salmon and B-run steelhead programs, as well as operation of the adult collection ladder and holding areas for other programs. The main supply for the hatchery is river water pumped from the North Fork of the Clearwater River. Approximately 153 cfs of water from the North Fork Clearwater River is available for hatchery use; however, monthly surface water diversions are often less (Table 11). The in-river distance between the intake diversion and the discharge location is 275 meters (902 feet).

Table 11. Monthly surface water diversion (cfs) at Dworshak National Fish Hatchery relative to North Fork Clearwater River flows (cfs) (Assessment Table 8-5).

Month	Monthly Surface Water Diversion (cfs)	River Flow[a] (cfs)	% River Diverted
January	153.3	4,484.00	3.43
February	153.7	4,760.00	3.23
March	152.8	6,624.00	2.32
April	115.8	7,952.00	1.45
May	21.6	6,391.00	0.33
June	52.7	6,342.00	0.83
July	90.6	8,036.00	1.13
August	101.7	7,080.00	1.44
September	136.9	4,947.00	2.77
October	153.3	1,938.00	7.91
November	153.3	2,881.00	5.32
December	153.3	3,753.00	4.08

[a] Dworshak Dam outflow at Ahsahka, Idaho, March 1973 through March 2017.

The intake screens on the North Fork Clearwater River do not comply with current (2011) NMFS screening criteria for juvenile salmonids. Improperly screened diversions may result in impingement of bull trout juveniles. Bull trout do not spawn in the North Fork Clearwater River below Dworshak Reservoir and no juveniles rear near the intake. Therefore, the potential for juvenile entrainment or impingement on the intake is discountable. Adults or subadults are stronger swimmers and are not likely to be adversely affected by operation of the intake.

The hatchery is also connected to a reservoir supply source from Dworshak Reservoir for incubation and rearing. The amount of water available for diversion from the reservoir varies from a low of 10.73 cfs from October through April, to a high of 55.14 cfs in May and June. The hatchery typically withdraws less than those quantities for incubation and early rearing (Table 11). The in-river distance between the intake diversion and the discharge location is approximately 2.7 km (1.7 miles).

During year-round operations, maximum surface water diversions at Dworshak National Fish Hatchery range from a low of about 0.3 percent to a high of about 7.9 percent of average monthly streamflows as measured at the gauge immediately upstream of the hatchery intake (Table 12). Maximum surface water diversions in October coincide with bull trout spawning migration periods. Bull trout do not spawn in the North Fork Clearwater River below Dworshak Dam, and therefore hatchery diversions would have no effect on spawning life histories, incubating eggs, alevins, or young-of-the-year. Juvenile rearing is highly unlikely and the effect of water withdrawal on juvenile rearing habitat is discountable.

Few bull trout have been collected at the Dworshak National Fish Hatchery volitional ladder in the last 10 years; however, no records were kept (Robertson 2017, *in litt*). Because the North Fork Clearwater River would retain 60 to 99 percent of average flows in the diversion reach, hatchery surface water diversions would result in insignificant effects on bull trout and their habitat downstream of the dam. Surface water diversions into the Dworshak National Fish Hatchery from the North Fork Clearwater River are not likely to adversely affect bull trout.

Table 12. Monthly surface water diversion at Dworshak National Fish Hatchery relative to Dworshak Reservoir average end-of-month storage (Assessment Table 8-6).

Month	Maximum Intake Diversion		Average End-of-Month Storage (ac-ft)[1]	% Reservoir Diverted
	cfs	Ac-ft per month		
January	9.6	580	2,295,288.89	< 0.1
February	0.7	42	2,284,888.89	< 0.1
March	3.6	219	2,311,377.78	< 0.1
April	7.9	482	2,517,200.00	< 0.1
May	16.7	1008	3,067,976.74	< 0.1
June	26.6	1607	3,370,222.22	< 0.1
July	29.0	1748	3,102,777.78	< 0.1
August	27.9	17	2,766,200.00	< 0.1
September	21.6	1303	2,532, 533.33	< 0.1
October	10.0	602	2,449,108.70	< 0.1
November	10.0	602	2,427,391.30	< 0.1
December	10.0	602	2,381,695.65	< 0.1

During year-round operations, monthly surface water diversions to Dworshak National Fish Hatchery from Dworshak Reservoir remove much less than 1 percent of the average monthly

storage volume (Table 12). Therefore, although hatchery-related reservoir withdrawals may have a minor effect on local surface water temperatures near the intakes in the reservoir, the effect on bull trout from hatchery surface water diversions is likely to be insignificant. No measurable reductions, and therefore no adverse effects on FMO habitat or bull trout usage in the reservoir is anticipated from Dworshak National Fish Hatchery diversions. Ample FMO habitat is available in the reservoir year round.

Bull trout do not spawn in the reservoir and juvenile rearing is highly unlikely in the deeper waters near the Dworshak National Fish Hatchery intake. Therefore, hatchery surface water diversion would have no effect on rearing juveniles, eggs, alevins, or young–of-the-year bull trout. Because the hatchery withdraws far less than 1 percent of reservoir monthly volumes, no significant loss of shoreline rearing habitats is anticipated, in the unlikely event that such areas provide rearing habitat for juvenile bull trout. Based on the diversion quantities presented above and using the water quantity assessment (Montana Method), Dworshak Hatchery surface water diversions from the reservoir are not likely to adversely affect bull trout because they would retain 60 to 99 percent of average reservoir volumes.

The reservoir intake screens do not comply with current (2011) NMFS screening criteria for juvenile salmonids (NPT 2016). Therefore, in the highly unlikely event that rearing juvenile bull trout were present near the surface water pumps, unscreened diversions may result in bull trout being diverted and entrained into the facilities' water system. Improperly screened diversions may result in impingement of bull trout juveniles. Bull trout do not spawn in the reservoir and juvenile rearing is highly unlikely in the deeper waters near the Dworshak National Fish Hatchery intake. Therefore, operation of the intakes would have no effect on juvenile bull trout. The potential for juvenile entrainment or impingement on the intake in the reservoir is discountable. Adults or subadults are stronger swimmers and are not likely to be adversely affected by operation of the intakes.

2.5.1.4.4 Kooskia National Fish Hatchery

The Service holds a full water-right withdrawal of 16.0 cfs from Clear Creek (certification # 81-02028, from 10-06-1966). The Clear Creek intake is located approximately 0.7 miles upstream of the hatchery. Water is returned to either Clear Creek or the Middle Fork Clearwater River immediately downstream of the hatchery.

Based on current rearing levels at the site over the past 3 years of operations (2014–2016), the current surface flow requirements include a peak monthly demand of 13 cfs in March and April and a peak demand of approximately 9 cfs in February and May. The remaining 8 months of the year typically have surface water demands ranging from approximately 3 to 6 cfs. Gauge data for Clear Creek is not available; however, the USFWS and NPT (2010) report that the surface water withdrawal has the potential to dewater Clear Creek for approximately 100 meters under low flow conditions in the late summer and early fall. Further, peak demand months in the late winter and early spring are likely to divert greater than 40 percent of average monthly flows, based upon qualitative observations of the Clear Creek system. Given this, surface water diversion from Clear Creek may adversely affect migratory adults and subadults that may enter the creek from the mainstem Middle Fork during peak demand months from February through May, and again during low flow periods in late summer and early fall. However, the likelihood for adverse effects on bull trout from dewatering in the late summer and early fall is discountable because dewatering occurs when in-stream temperatures typically preclude bull trout occurrence

in the affected reach. During July and August, mean surface water temperatures over the past 10 years have been 66.2ºC and 67.8ºC, respectively (McMillen Jacobs Associates 2017). Temperatures are lower, and suitable for bull trout use, in all other months. Bull trout presence during the winter and early spring (when greater than 40 percent of Clear Creek may be diverted) is also unlikely given that no bull trout have been collected at the hatchery in the past 10 years, and Clear Creek contains no designated SR or FMO habitat. For these reasons water diversions from Clear Creek are not likely to adversely affect bull trout.

The water intake which is located on Clear Creek is screened to prevent fish and debris from entering the pumping chamber; however, the screens do not comply with current (2011) NMFS screening criteria for juvenile salmonids. McMillen Jacobs Associates (2017) have recently developed alternatives for intake designs that would comply with current criteria; however, intake renovation (e.g., screen replacement) or new construction is not part of the proposed action. Regardless, Clear Creek is not designated as critical habitat for bull trout and is not located in proximity to SR habitat. Therefore, the potential that juvenile bull trout may be adversely affected at the screens via entrainment or impingement is so remote as to be discountable.

2.5.1.4.5 Seasonal Acclimation and Trapping Sites

Yoosa/Camp Creek Satellite

The Yoosa/Camp Creek Satellite facility consists of an upper and lower pond, both of which divert surface water from Yoosa Creek near RKM 8.1 (RM 5). The ponds are supplied with surface water during acclimation of presmolts from September through mid-October. At both sites, surface water enters an intake structure upstream of the acclimation pond. The in-river distance between the intake and discharge structures at the upper and lower ponds is 200 meters (656 feet) and 150 meters (492 feet), respectively. The maximum flow diverted at each intake is 1.22 cfs in September and 1.28 cfs in October, for a total diversion of 2.44 to 2.56 cfs.

Yoosa Creek lacks a stream gauge, and average monthly flow data for Yoosa Creek was not available for analysis. In the Final Environmental Impact Statement (FEIS) completed for the Nez Perce Tribal Hatchery Program, BPA et al. (1997) determined that up to 2.24 cfs were needed to operate the Yoosa/Camp acclimation ponds. The FEIS stated that minimum in-stream flows in Yoosa Creek were 6.77 cfs and, therefore, sufficient flows existed to meet the facility's needs (BPA et al. 1997). Applying this data to both the upper and lower ponds, an approximate 36- to 38-percent diversion rate was calculated for September through mid-October. Based on this information, Yoosa Creek would retain 60 to 99 percent of average flows in September and October in the diversion reach. Diversions are therefore, not likely to adversely affect bull trout. Further, the acclimation ponds are located on Yoosa Creek, a tributary to Lolo Creek. Lolo Creek and its tributaries are not designated as critical habitat for bull trout (USFWS 2010a), and are not documented to provide FMO or SR habitat (USFWS 2010c). Therefore, diversions are highly unlikely to affect any bull trout life stages during the September to October operational period.

Current, on-going hatchery review will determine if the facility is in compliance with current (2011) NMFS screening criteria and whether future upgrades may be required. If the facility is out of compliance with NMFS (2011) juvenile screening criteria, potential effects on juvenile bull trout (e.g., entrainment or impingement) are discountable because these fish are highly unlikely to be present in the Lolo Creek watershed.

Newsome Creek Satellite

The Newsome Creek Satellite diverts surface water from Newsome Creek at RKM 8.1 (RM 5). This reach of Newsome Creek provides FMO habitat for bull trout, as well as year-round migration and adult and subadult rearing habitat. The facility diverts surface water during acclimation of presmolts in September and October. Surface water enters an intake structure upstream of the hatchery. The in-river distance between intake and discharge is about 400 meters (1,312 feet). The maximum flow diverted is 1.07 cfs in September and 1.17 cfs in October.

Newsome Creek does not have a stream gauge and average monthly flow data for Newsome Creek was not available for this Opinion. In the FEIS completed for the Nez Perce Tribal Hatchery Program, BPA et al. (1997) stated that minimum in-stream flows in Newsome Creek were 5.6 cfs and that the creek had sufficient flow to meet the facility's needs. From this data, an approximate 21-percent diversion rate was calculated for diversions of 1.07 to 1.17 cfs from September to mid-October. Based on this information, surface water diversions at the Newsome Creek Satellite retain 60 to 99 percent of average flows in September and October and, are therefore, not likely to adversely affect bull trout.

Because the facility is located well downstream of bull trout spawning habitat, diversions would have no effect on incubating eggs, alevins, and young-of-the-year. From 1999 through 2001, the USFS located only two redds in Upper Newsome Creek (USFWS 2002a). Currently, bull trout spawn and rear in Upper Newsome Creek and three of its tributaries; subadult and adult rearing occur in Lower Newsome, Mule, and Bear Creeks (CBBTTAT 1998d, IDFG 2001, USFWS 2002a). Based on screw trap data, juvenile rearing may occur in the lower portion of Newsome Creek. Although the number of juveniles captured in the Newsome Creek screw trap has been low in recent years, their potential presence cannot be discounted.

On-going hatchery review will determine if the facility is in compliance with current (2011) NMFS screening criteria and whether future upgrades may be required. If the facility is out of compliance with NMFS (2011) juvenile screening criteria, there is potential that juveniles could be adversely affected via entrainment or impingement.

Crooked River Trap

Surface water is diverted from the Crooked River at RKM 1.0 (RM 0.6) to operate the trap. At the diversion, a concrete weir with a dam board slot is used to control water level at the facility. From May through September, up to 8.18 cfs is diverted from the Crooked River; however, the LSRCP indicates that the facility typically diverts only about 3 cfs (HDR 2017). The distance between the intake and outfall is 167 meters (550 feet).

Gauge data is not available for the Crooked River. In the absence of monthly flow data, Crooked River baseflow (low flow) estimates (RDG et al. 2012) were used to assess potential effects of surface water diversion on bull trout and their habitat. It should be noted that the use of the maximum water right and baseflows present a worst-case low flow scenario, and likely overestimates the effects of withdrawal during most periods. For the Crooked River, baseflow statistics were estimated using the regional regression equations presented in USGS SIR-2006-5035, which utilize drainage area, mean annual precipitation, and percent of developed land. RDG et al. (2012) estimated the 30-Day Q_5 baseflows for the Crooked River, which is the average sustained flow calculated over a 30-day period that would occur once every 5 years.

These flows were calculated to determine minimum water availability for fish passage under extreme conditions and to evaluate the risk of channel dewatering. The estimated flow for the 30-day, 5-year flow return interval was 10.6 cfs, with a range of 7.6-13.5 cfs (USFS 2015). Although this estimate does not represent any particular month, it does estimate expected low flow conditions and is, therefore, a useful surrogate for a measured monthly average flow during the May to September adult collection period. Based on these estimates, surface water diversions at the Crooked River trap would divert 60 to 100 percent of 30-day baseflows. Using the average baseflow of 10.6 cfs over 30 days, during baseflow periods, the facility would divert about 76 percent of flow from the Crooked River.

Considering the diversion quantity presented above compared to baseflows, the facility could divert substantially more than 40 percent of 30-Day Q_5 baseflows. Based on the assessment approach presented above (Montana Method), hatchery surface water diversions during low-flow periods at the Crooked River trap are likely to adversely affect bull trout in this FMO reach of the Crooked River. Migrating adults and subadults could be affected by reduced depths and wetted widths, thereby reducing the quality and quantity of migratory habitat within the 167-meter diversion reach. Because the facility is located well downstream of spawning habitat, diversions would have no effect on incubating eggs, alevins, or young-of-the-year rearing habitat. Juvenile rearing is not documented near the facility; however, if juveniles are present in the diversion reach, the amount of rearing habitat would be reduced during operations in low flow years, particularly along the stream margins. This could force juveniles to suboptimal habitat, and make them vulnerable to predation.

In addition to the baseflow data presented above, RDG et al. (2012) also assessed Crooked River bankfull discharge using multiple methods for hydraulic geometry as well as measured field data for observed bankfull indicators. Estimates of bankfull discharge using field-surveyed bankfull indicators ranged from 142 to 225 cfs, with mean depths ranging from 1.4 to 1.6 feet in several subject reaches. Based on bankfull flows, facility use of 8.18 cfs for the trap would divert much less than 40 percent of flows. Therefore, during higher flow years, surface water diversions into the Crooked River trap are not likely to affect bull trout.

As of publication of the 2011 HGMP for the Clearwater River Spring and Summer Chinook program (IDFG 2011a), the intake screens were in compliance with NMFS screening criteria. However, draft reports provided to LSRCP indicate that screens at the diversion no longer meet all of NMFS' 2011 screening criteria (HDR 2017). Relative concerns and potential remedies regarding screen compliance will be coordinated with NMFS and co-managers in the near future under separate consultation. Even if the facility is out of compliance with NMFS (2011) juvenile screening criteria, potential effects on juvenile bull trout (e.g., entrainment or impingement) are likely discountable. The Crooked River trap is located along FMO habitat, and rearing juveniles are unlikely to be present during trapping operations from May through September.

Red River Satellite Facility

The water source for the Red River Satellite is the South Fork of the Red River, where a hand-built diversion directs water into a screen on the bottom of the river and a pipeline delivers it to the rearing pond and adult facility. From May through September, 6.6 cfs are diverted from the Red River along a diversion reach of 220 meters (720 feet).

Although a USFS gauge (No. 170603050104) is reported to monitor flows in the Lower Red River, gauge data was not readily available. However, flood frequency estimates (RDG et al.

2012) based on gauge 170603050104 appear similar to bankfull flow estimates for the Crooked River (see previous section). The 1.5-year, 2-year, and 5-year flood flow estimates were 157, 187, and 247 cfs, respectively. Based on this information, it is assumed that the hydraulic profile in the vicinity of the Red River Satellite facility is similar to that along the Crooked River near the trap. Therefore, the effects of water diversion on bull trout are assumed to be similar at both sites, and surface water diversions during low flow periods would divert more than 40 percent of flow. Therefore, surface water diversions from the Red River during low-flow periods are likely to adversely affect bull trout.

Although mapped as SR habitat, it is highly unlikely that spawning habitat is affected by diversions in August and September because high in-stream temperatures likely preclude spawning. Migratory fluvial adults and subadults could be adversely affected by a reduction in wetted width and depth through the 167-meter diversion reach. If juveniles were present, they would similarly be adversely affected through a reduction of stream margin rearing habitat during low-flow periods.

Based on the flood flow estimates presented by RDG et al. (2012), which ranged from 157 to 247 cfs for recurrence intervals of 1.5, 2, and 5 years, facility use of 6.6 cfs for the trap would divert much less than 40 percent of flows. Therefore, during higher flow years, surface water diversions into the Red River trap are not likely to affect bull trout.

As of publication of the 2011 HGMP for the Clearwater River Spring and Summer Chinook Program (IDFG 2011a), the intake screens were in compliance with NMFS screening criteria. However, draft reports provided to LSRCP indicate that screens at the diversion no longer meet all of NMFS' 2011 screening criteria (HDR 2017). Relative concerns and potential remedies regarding screen compliance will be coordinated with NMFS and co-managers in the near future under separate consultation. If indeed the facility is out of compliance with NMFS (2011) juvenile screening criteria, potential effects on juvenile bull trout (e.g., entrainment or impingement) are likely. The Red River Satellite is located along designated SR habitat. However, as discussed previously, due to high in-stream temperatures, spawning does not occur near the facility, but rearing juveniles could be present during operation of the intake. Therefore, operation of an out of compliance intake is likely to adversely affect juvenile bull trout.

Powell Satellite Facility

Water for the Powell Satellite facility is provided from Walton Creek, a small tributary to the Lochsa River in north central Idaho. Diverted water flows through portions of the Powell adult salmon trap for a distance of 152 meters (500 feet) before re-entering the creek. From May through September, up to 6.24 cfs are authorized for use in the adult trap, but that use is reduced as the summer progresses and the average diversion is about 5 cfs. Facility staff reported that 4 cfs were diverted in late August 2017 (HDR 2017). The trap is formed by a concrete weir structure and sheet piling is used to divert flow into the trap's vertical screens.

Limited information is available to compare surface water diversions to average monthly flows on Walton Creek. A USGS gauge (USGS 13336635; USGS 2017b) was operated during July, August, and September of 1986, 1987, and 1988 near the Powell Ranger Station, upstream of the Powell Satellite facility. The gauge reported average flows of 16 cfs in July, 7.7 cfs in August, and 5.0 cfs in September. It should be noted that review of historic flows (1910-2016) for the Lochsa River indicated that the September flows in 1987 and 1988 were the lowest on record (HDR 2017). Therefore, the available gauge data represents a worst-case scenario that would not

likely be encountered during most years. Considering this worst-case low-flow scenario and diversion of up to 6.24 cfs from the May through September operational period, a large portion of flow may be diverted from the creek. However, because the maximum diversion is 5 cfs, this diversion scenario is atypical.

Still, considering the worst-case low flow scenario, average monthly surface water diversions for trapping and holding operations (i.e., 5 cfs) could divert more than 40 percent of Walton Creek flow. Therefore, during extremely low flow years, diversions at the Powell site are likely to adversely affect bull trout. During more average flow years, the facility is likely to divert less than 40 percent of Walton Creek flows; therefore, this is a conservative determination based on the available gauge data and the potential to affect individual bull trout.

During extremely low-flow periods (i.e., the lowest on record for the Lochsa River gauge), migratory fluvial adults and subadults could be adversely affected by a reduction in wetted width and depth through the 152-meter (500 feet) diversion reach. Most adult bull trout are collected at the weir in July and August, and during this period migratory adults are delayed in their movements to upstream spawning grounds. If juveniles were present, they would similarly be adversely affected through a reduction of rearing habitat along the stream margins during low-flow periods. Although mapped as SR habitat, bull trout do not spawn in the vicinity of the Powell Satellite weir or downstream.

As of publication of the 2011 HGMP for the Clearwater River Spring and Summer Chinook Program (IDFG 2011a), the intake screens were in compliance with NMFS screening criteria. However, draft reports provided to the LSRCP indicate that screens at the diversion no longer meet all of NMFS' 2011 screening criteria (HDR 2017). Relative concerns and potential remedies regarding screen compliance will be coordinated with NMFS and co-managers in the near future under separate consultation. If indeed the facility is out of compliance with NMFS (2011) juvenile screening criteria, there is a likelihood that juvenile bull trout could be affected (e.g., entrainment or impingement). The Powell Satellite is located along SR habitat, and rearing juveniles could be present during operation of the intake structure. Therefore, operation of an out of compliance intake is likely to adversely affect juvenile bull trout.

2.5.1.5 Effluent

Effluent discharge from the Clearwater River hatchery programs under the proposed action may affect individual bull trout in the action area. Although most facilities meet or exceed state and federal water quality standards for effluent and fish health protocols, these water quality standards have not been evaluated with respect to potential effects on bull trout. Negative effects from effluent may result from increased nutrient loading, the addition of chemicals to the waterways, and the transmission of parasites and pathogens. The effects of effluent may depend on water temperature, the life stage of fish present, the monthly volume of fish production, monthly pounds of feed used, efficacy of pollution abatement, and the rate of dilution.

The affected waterbody reach from hatchery effluent discharge includes the point of discharge downstream until mixing occurs in the adjacent stream or river (NMFS 2016). With the exception of Dworshak National Fish Hatchery, all facilities that meet annual fish production thresholds operate within the criteria of the hatchery facilities' NPDES permit administered by EPA; however, discharged effluent may locally affect water quality directly below the hatchery outfall. Bartholomew (2013, as cited in NMFS 2016) showed the effluent discharge effects to be

short-lived and extending downstream for less than 200 meters before becoming undetectable. For the purposes of this Opinion, therefore, it is estimated that effluent pollutants (e.g., nutrients and phosphorous) may be detectable in water bodies within 200 meters of hatchery outfalls.

During low-flow summer periods, Kendra (1991) reported that benthic invertebrates (i.e., juvenile salmonid prey items) sensitive to organic waste were often replaced by pollution-tolerant species in the vicinity of hatchery outfalls. The Federal Water Quality Administration (1970) states that waste concentrations of hatchery effluents are "small" and that the impact of hatchery discharges depends on the quantity and quality of the receiving water, as well as wastewater treatment methods employed at each facility. In Turkey, effluent from trout farms had significantly deviated ($P>0.05$) from baseline conditions for dissolved oxygen (DO), biological oxygen demand, nitrogen, and total phosphorus concentrations of the subject stream as measured 100 meters downstream of the effluent outfall. However, changes in pH, total suspended solids (TSS) and ammoniacal-nitrogen (NH3-N) concentrations were insignificant (Pulatsu et al. 2004). Despite the changes in water quality parameters, none of the changes resulted in exceedances of local water quality standards. Similar results were reported from studies of a river in Iran. At distances 50 to 100 meters downstream from the outfalls of three trout farms, biochemical oxygen demand and total suspended solids increased significantly and dissolved oxygen concentration and pH decreased. However, concentrations of measured variables at each downstream monitoring site were generally within acceptable water quality limits (Mahboobi Soofiani et al. 2012).

Despite the potential for localized water quality degradation from hatchery effluent, measurable effects on bull trout are unlikely. In its Biological Opinion for continued operation and maintenance of the Northeast Oregon and Southwest Washington hatchery programs, funded under the LSRCP and Northwest Power Act (USFWS 2016), the USFWS determined that "effluent from facilities regulated by the NPDES permits will not be noticeable or measurable over background conditions or result in effects to bull trout." Based on the similarities of actions and permit terms and conditions described in NEOR/SEWA action, effluent impacts from these facilities similarly are expected to result in insignificant effects to bull trout.

2.5.1.5.1 Nez Perce Tribal Hatchery

The Nez Perce Tribal Hatchery operates year round to support the Nez Perce Tribal Hatchery Spring Chinook Salmon Program. The facility is not required to obtain coverage under an upland finfish rearing NPDES permit because total production is less than the 20,000-pound annual production threshold. However, the NPT developed a NPDES Permit Waste Management Plan for all facilities, including the Nez Perce Tribal Hatchery. Final plans were submitted to Idaho Department of Environmental Quality (IDEQ) and the NPT Water Quality Division (NPT 2013). Because the hatchery diverts much less than 1 percent of average monthly flows, return flows (i.e., effluent) comprise a fraction of flows in the mainstem Clearwater River FMO habitat. Therefore, although temporary water quality degradation might occur immediately downstream of the outfall, effluent would dissipate quickly in the river and mobile adults and subadults are not likely to be adversely affected by effluent discharge. Water-quality related effects on bull trout from effluent discharge into the mainstem Clearwater River from the Nez Perce Tribal Hatchery are insignificant. During the lower flow summer periods when in-stream temperatures surpass ideal thresholds, bull trout are unlikely to occupy lower mainstem habitats and would not be affected by hatchery effluent.

2.5.1.5.2 Clearwater Fish Hatchery

Clearwater Fish Hatchery operates under NPDES permit IDG-131000. Similar to Dworshak National Fish Hatchery, the return flow from Clearwater Fish Hatchery enters the North Fork Clearwater River near the confluence with the mainstem Clearwater River. Near the Clearwater Fish Hatchery, the mainstem Clearwater and North Fork Clearwater Rivers provide FMO habitat for adult and subadult bull trout; no spawning or rearing takes place in these reaches. Although effluent discharge from the facility may increase nutrient loadings in the immediate vicinity of the outfall, effects on FMO habitat are likely insignificant considering average monthly flows of the North Fork and mainstem Clearwater rivers near the hatchery. During year-round operations, maximum surface water diversions from the Dworshak Reservoir for the Clearwater Fish Hatchery remove much less than 1 percent of the average monthly storage volume (Table10). This is particularly the case during the lower flow summer periods when bull trout occurrence is highly unlikely because of high in-stream temperatures. Effluent discharge from the Clearwater Fish Hatchery is not likely to adversely affect bull trout.

2.5.1.5.3 Dworshak National Fish Hatchery

Return flow from Dworshak National Fish Hatchery enters both the mainstem and North Fork Clearwater River near their confluence. These waterbodies provide FMO habitat for bull trout; no spawning or rearing occurs in these reaches. Discharge from Dworshak National Fish Hatchery is permitted by the EPA under a NPDES permit, but does not fully meet the requirements of the permit (USFWS and NPT 2010). Untreated rearing water from the nursery building and raceways, and effluent from the three-pond cleaning treatment systems, is discharged directly into the Clearwater River after treatment to remove solids. Raceway cleaning water from the three steelhead outdoor rearing systems meets NPDES permit requirements after treatment. Raceway cleaning water from the spring Chinook rearing system meets NPDES permit requirements most months, but does not meet the 90 percent solids removal requirement 1-2 months annually. A new NPDES permit is being developed by EPA and should be implemented in 2017. Under that permit, it is expected the raceways will meet full compliance with the new permit.

Although effluent discharge from the facility presumably results in localized increases in nutrient loadings in the immediate vicinity of the outfall, the hatchery diverts less than 1 to 8 percent of average monthly flows from the North Fork Clearwater River. Considering this, rapid dilution at the outfall likely limits effects to insignificant levels on bull trout that may occupy FMO habitat.

2.5.1.5.4 Kooskia National Fish Hatchery

Kooskia National Fish Hatchery diverts water from Clear Creek. A 42-inch-diameter gravity transmission pipeline runs from the intake diversion structure to the screen chamber/grit basin facility, and a 36-inch-diameter pipeline system conveys effluent water to the hatchery head tank on the southeast corner of the hatchery site (McMillen Jacobs Associates 2017). Effluent is discharged both to Clear Creek and to the Middle Fork Clearwater River under NPDES permit No. IDG131004. Water discharge from the hatchery is permitted by the State of Idaho and NPDES, and fully meets the requirements of the permit (USFWS and NPT 2010); however, the screen chamber also acts as a settling basin that accumulates solids that must be discharged back into Clear Creek. This operation does not comply with current NPDES regulations.

Modifications of the screen building are required to comply with NPDES and NMFS guidelines (NPT 2016). Such modifications are not part of the proposed action.

Although not designated as critical habitat for bull trout, adults have been historically collected at the weir on Clear Creek in low numbers, though no bull trout have been collected in recent years. The Middle Fork Clearwater is designated as critical habitat for bull trout, providing FMO habitat for adults and subadults. Considering this, portions of the discharge that are returned to the Middle Fork Clearwater River have the potential, however low, to adversely affect bull trout. Because this reach of the Middle Fork provides FMO habitat, individual subadults and adults that may migrate through the river near the outfall should be able to avoid the discharge plume downstream of the outfall. Therefore, effluent discharge from the Kooskia National Fish Hatchery is not likely to adversely affect bull trout. Neither the Middle Fork Clearwater River nor Clear Creek are located in proximity to SR habitat; therefore, effluent discharge would have no effect on eggs, alevins, or juvenile bull trout.

2.5.1.5.5 Seasonal Acclimation and Trapping Sites

Yoosa/Camp Creek Satellite

The Yoosa/Camp Creek Satellite operates from September to mid-October to acclimate/release summer Chinook salmon for the Nez Perce Tribal Hatchery Program. Upland finfish rearing NPDES permits are not required at the facility because total production is less than the 20,000-pound annual threshold. However, the NPT developed a NPDES Permit Waste Management Plan for all Nez Perce Tribal Hatchery facilities. Final plans were submitted to IDEQ and the NPT Water Quality Division (NPT 2013). Because of the low quantity of fish acclimated at the Yoosa/Camp creek facility, effluent production is limited.

Bull trout are highly unlikely to occur in Yoosa Creek, and the facility diverts less than 40 percent of average monthly flows in September and October. Therefore, the potential for effluent-related effects on individuals is discountable.

Newsome Creek Satellite

The Newsome Creek Satellite operates from September to mid-October to acclimate/release summer Chinook salmon for the Nez Perce Tribal Hatchery Program. Adult Chinook salmon are also collected at the Newsome Creek weir from May through September. Adults are held for less than 24 hours before transfer to the Nez Perce Tribal Hatchery for spawning.

Upland finfish rearing NPDES permits are not required at the facility because total production is less than the 20,000-pound annual threshold. However, the NPT developed a NPDES Permit Waste Management Plan for all Nez Perce Tribal Hatchery facilities. Final plans were submitted to IDEQ and the NPT Water Quality Division (NPT 2013).

At Newsome Creek, juvenile bull trout are collected at the screw trap downstream of the acclimation site and adults and subadults rear in the lower portion of the creek. Bull trout, therefore, have the potential to occur during trapping and acclimation periods. However, trapped adult Chinook salmon produce low quantities of wastes and are held for less than 24 hours on site. Similarly, considering the relatively low quantity of fish acclimated at the site in September and October, effluent production and subsequent discharge into Newsome Creek is likely to be minor. The facility diverts up to 21 percent of flow from Newsome Creek during operations, and therefore, returns up to 21 percent of diverted flows to FMO habitat. Although minor, localized

increases in nutrients from effluent may occur downstream of the acclimation site outfall; effluent discharged over the 2-month acclimation period would be quickly diluted in the creek upon return. Therefore, although temporary water quality degradation might occur at the outfall, water-quality related effects on bull trout are anticipated to be insignificant.

Crooked River Trap

The Crooked River trap operates from May through September to collect and hold broodstock for 1 day or less as part of the Clearwater Spring and Summer Chinook Salmon Program. Upland finfish rearing NPDES permits are not required at the facility because total production is less than the 20,000-pound annual threshold. Considering the relatively low quantity of broodstock held at the site, effluent production and subsequent discharge into the Crooked River is minor during the May to September collection period. Although the facility diverts a large portion of average monthly flows, adult broodstock are not fed at the holding facility; therefore, waste production and subsequent discharge is low.

The Crooked River provides FMO habitat for bull trout, although bull trout occurrence is likely limited in the low-flow summer months when in-stream temperatures become prohibitive. Based on these conditions, the potential for measurable water quality degradation is discountable; therefore, effluent discharge from the Crooked River holding facility is not likely to adversely affect bull trout.

Red River Satellite

Red River Satellite operates from May through September to collect and hold broodstock and acclimate/release juveniles for the Clearwater Spring and Summer Chinook Salmon Program. Upland finfish rearing NPDES permits are not required at the facility because total production is less than the 20,000-pound annual threshold.

Bull trout are rarely collected in May at the Red River Satellite facility; peak collections occur in June and July. During low-flow years, it is assumed that the facility diverts a large portion of each stream's average monthly flow. This may reduce the streams' ability to dilute effluent for an unknown distance downstream. However, during the May to September adult collection period, broodstock are held for less than 24 hours on site. During the spring acclimation period, juveniles are acclimated for 4 hours to 10 days depending on weather conditions. Considering the relatively low quantity of fish held or reared at the site and the very limited time on-station, effluent production and subsequent discharge into the Red River is low.

The Red River is designated as SR habitat for bull trout (USFWS 2010c), however, no spawning has been reported at or downstream of the weir. Given the proximity to upstream spawning habitats, juvenile bull trout may occur near the satellite facility. Juvenile occurrence is likely limited in the low-flow summer months when in-stream temperatures become prohibitive. Based on this information, effluent from the Red River Satellite is not likely to adversely affect bull trout.

Powell Satellite

The Powell (Walton Creek) Satellite operates from May through September to collect, hold, and spawn broodstock and acclimate/release juveniles for the Clearwater Spring and Summer Chinook Salmon Program. Upland finfish rearing NPDES permits are not required at the facility because total production is less than the 20,000-pound annual threshold.

At the Powell site, adult bull trout are rarely captured in May or June, most collections occur in July and August. Based on this collection data, the spring juvenile acclimation period, which has the most potential to produce effluent, does not overlap with peak adult migration periods or bull trout spawning periods. During the May to September adult collection period, broodstock are held for less than 24 hours on site. During the spring acclimation period, juveniles are acclimated for 4 hours to 10 days depending on weather conditions. Considering the relatively low quantity of fish held or reared at the site and the limited time on-station, waste production and subsequent discharge into Walton Creek is low and effects on downstream water quality are insignificant.

Walton Creek is designated as SR habitat for bull trout (USFWS 2010c); however, no spawning has been reported at or downstream of the weir. Given the proximity to upstream spawning habitats, juvenile bull trout may occur in Walton Creek. Juvenile occurrence is likely limited in the low-flow summer months when in-stream temperatures become prohibitive. Based on the information presented above, effluent from the Powell Satellite is not likely to adversely affect bull trout.

2.5.1.6 Fish Health/Disease

Steward and Bjornn (1990) found little evidence that horizontal transmission of disease from hatchery-produced smolts to natural fish is widespread in the hatchery production area or in the free-flowing migration corridor. Little additional research, however, has occurred regarding this topic, and the full impact of disease on wild fish from hatchery fish may be underestimated (USFWS and NPT 2010). Hauck and Munson (IDFG, unpublished as cited in IDFG 2015) suggest that hatcheries with open water supplies (e.g., river water) may derive pathogens from their water source, via natural populations.

Spring Chinook salmon reared at Kooskia National Fish Hatchery have had bacterial kidney disease (BKD) problems in past years, though the past two decades have seen a decrease in the pathogen to very low levels in recent years. The potential still exists for horizontal transmission of BKD and other diseases from spring Chinook salmon released from Kooskia National Fish Hatchery to wild fish, including bull trout. Strict adherence to IHOT guidelines, and not releasing fish undergoing a disease epizootic are measures implemented to minimize possible disease transfer from hatchery fish to bull trout.

For all programs under the proposed action, hatchery operators monitor the health status of hatchery-produced Chinook salmon, coho salmon, and steelhead from the time they are ponded at rearing facilities, until their release. Policies established by the Pacific Northwest Fish Health Committee (PNFHC) were designed to prevent the spread of pathogens resulting from infected hatchery fish. All fish are examined annually by state (IDFG) and Service fish health specialists, and are certified for release as required under the PNFHPC guidelines (2007) and Service policy to mitigate for potential affects to bull trout and other fish in the receiving waters. Adherence to these fish health policies limits the disease risks associated with hatchery programs (IHOT 1995, USFWS 2004d, NWIFC and WDFW 2006). Specifically, the policies govern the transfer of fish, eggs, carcasses, and water to prevent the spread of exotic and endemic reportable pathogens. For all pathogens, both reportable and nonreportable, spread and amplification are minimized through regular monitoring (typically monthly), removal of mortalities, and disinfection of all eggs. Vaccines, if necessary, can provide additional protection from certain pathogens (NMFS

2016). If a pathogen is determined to be the cause of fish mortality, treatments (e.g., antibiotics) are used to limit further pathogen transmission and amplification.

Under the proposed action, the hatchery programs would continue to follow hatchery (IHOT) guidelines and regional fish health standards to minimize potential risks to bull trout and other listed species. Fish health staff would continue to monitor hatchery fish for signs of disease throughout their rearing cycle. Diagnostic visits are completed rapidly on demand to ensure timely treatments and limited mortality and morbidity. Mortalities are checked daily and live grab samples are taken every other month. Fish are tested, at a statistically valid number, prior to transfer to acclimation sites and before release. Sampling, testing, and treatment/control procedures are outlined in multiple documents (PNFHPC 2007, IHOT 1995, NWIFC and WDFW 2006, USFWS 2004d). All state and federal hatchery personnel follow protocols in the Biosecurity Plan and Hazardous and Critical Control Point Plan to minimize the likelihood of disease transmission or invasive species introductions (IDFG 2015). Protocols are also in place to guide the disinfection of equipment and gear to minimize risks associated with the transfer of potential disease agents.

In summary, although bull trout have the potential to occur in the rivers near existing hatchery facilities, satellites, and release sites, the factors identified above reduce the likelihood of disease and pathogen transmission between hatchery fish and bull trout. The proportion of facility surface water withdrawal and subsequent discharge at most sites comprises only a portion of the total stream flow (see Section 2.5.1.4), which reduces, via dilution, the potential for transmission of pathogens from effluent. Smolt release strategies promote distribution of hatchery fish throughout the system and rapid outmigration, which reduces the concentration of hatchery-released fish, and therefore, the potential for a diseased hatchery fish to encounter bull trout. Lastly, fish health protocols currently in place to address pathogens are expected to minimize the potential for disease and pathogen effects on bull trout.

In its Biological Opinion for continued operation and maintenance of the Northeast Oregon and Southwest Washington (NEOR/SWWA) hatchery programs funded under the LSRCP and Northwest Power Act (USFWS 2016), the USFWS determined that "impacts from the introduction of infectious disease by NPDES-regulated facilities are unlikely. These facilities implement BMPs (best management practices) to reduce the potential for exposure of bull trout to infectious diseases." The hatchery facilities in the Clearwater River under the proposed action implement similar BMPs. Based on the similarities of actions and permit terms and conditions described in the NEOR/SEWA action, effluent impacts from these facilities are expected to result in insignificant effects to bull trout.

2.5.1.7 Operation and Maintenance

Facility operations and maintenance include adult holding, spawning, incubation, rearing, and routine and semi-routine maintenance activities that occur above the OHWM at the facilities. Sediment generated by these activities would be contained within the facility through the adherence to the impact minimization measures as described in Section 2.1.5. Implementation of these measures would minimize the potential to affect bull trout in the Mid-Columbia RU to an insignificant level, and thus upland facility operation and maintenance are not likely to adversely affect bull trout.

As described in Section 2.1.3, in-water facility operation and maintenance activities include routine maintenance actions that occur below the OHWM, which typically occur on an annual

basis, or at a known, and relatively predictable frequency (e.g., screen cleaning for the Clearwater and Dworshak hatchery intakes in Dworshak Reservoir or the North Fork Clearwater River). Semi-routine activities are those that are not as predictable, but are expected to occur on an infrequent basis (over a period of 5 to 10 years), as needed to maintain hatchery operations. All routine and semi-routine activities are expected to occur during the normal operating period for each facility (see Section 2.1.3). Routine and non-routine actions that require in-water work would occur during the in-water work periods discussed in Sections 2.1.3 and 2.1.5, or, if necessary to maintain operations, during alternative periods for specific sites, upon approval of such variances from IDFG and the Service. Non-routine or emergency actions, or major new in-river hatchery structures, such as hatchery intake or outfall structures or weirs, are not considered in this Opinion. These activities would require a separate section 7 consultation with the Service.

Both routine and semi-routine maintenance actions that necessitate work in the active channel could affect bull trout if they were present near work sites. Examples of routine in-water maintenance activities include in-stream work such as clearing gravel or debris (e.g., wood) blockages from water intakes, outfalls, or traps after high flow events, and minor weir or ladder maintenance (see Section 2.1.3). All facilities are expected to have some level of routine or semi-routine in-water maintenance (see Section 2.1.3).

In-water maintenance activities are likely to cause short-term adverse habitat effects on water quality from increased suspended sediment and turbidity. The extent of downstream water quality degradation from turbidity is largely dependent upon substrate composition as well as flows and velocities at the time of work. In most cases, turbidity plumes will extend no more than 1,000 feet from the in-water work area. As an example, during in-stream dredging with a clamshell bucket to remove material from the river in front of the Sawtooth Hatchery intake on the Salmon River, increased turbidity was not detectable 450 feet (137 meters) downstream of the work site (USFWS 2015j). For the river systems described herein, similar gravel/cobble substrates with low embeddedness are predominant. Therefore, similar downstream turbidity plumes are anticipated. For this analysis, a conservative downstream turbidity exposure metric of 1,000 feet (305 meters) was considered in the impact assessment on bull trout (and their habitat).

During in-stream work, potential effects on bull trout may include behavioral changes resulting from elevated turbidity (Whitman et al. 1982, Sigler et al. 1984, Berg and Northcote 1985, Gregory and Levings 1998), displacement from habitats, and general disturbance from the presence of construction personnel or equipment. In potential rearing habitats (i.e., Red River, Walton Creek, Crooked River), increased suspended sediment could reduce juvenile growth and foraging efficiency. In-water work could also modify substrates, elevate underwater noise and vibration levels, and displace or kill forage species in the in-water work area. In the case of an accidental spill, bull trout could be impacted from chemical contamination. Effects on redds from increased sedimentation and resulting embeddedness are not anticipated because all facilities are located downstream of spawning habitat. Though mapped as SR habitat, bull trout do not spawn at or downstream of the Red River and Powell satellites (HDR 2017).

All in-water maintenance actions would follow standard impact minimization measures (see Section 2.1.5) to minimize effects on aquatic resources, including bull trout. All fish removal and salvage would occur in accordance with the Service's Recommended Fish Exclusion, Capture, Handling, and Electroshocking Protocols and Standards (USFWS 2012).

The following section presents the anticipated effects on bull trout from the implementation of in-water routine and semi-routine maintenance activities under the proposed action for each facility. Facility-specific maintenance is discussed rather than program-specific effects because several programs operate at more than one facility. In those cases, maintenance needs cannot be attributed to any specific program. The future (ongoing) implementation of these activities is reasonably foreseeable and considered part of the proposed action.

2.5.1.7.1 Nez Perce Tribal Hatchery

Routine Maintenance

As described in Section 2.1.3.1.1, periodic removal of accumulated sand, gravel, rocks, and woody debris is necessary to clear the fish ladder and trap to prevent bank erosion at the Nez Perce Tribal Hatchery. These routine activities typically occur during the July 1 to August 14 in-water work window. Heavy equipment would typically be operated from the streambank, and would, therefore, not enter the stream channel; however, if the volume of material requires removal using equipment, a small excavator may be required to enter the river to remove material. This would occur over a matter of hours. During in-stream debris removal, mobilized sediment could degrade water quality. Sediment and organic materials would be suspended in the water column resulting in a turbidity plume that could displace bull trout and reduce foraging efficiency.

At the Nez Perce Tribal Hatchery, bull trout are rarely captured in the trap (NPT 2013), and no bull trout have been collected at the hatchery in over 10 years. However, because the Clearwater River, adjacent to and downstream of the Nez Perce Tribal Hatchery, provides FMO habitat for adults and subadults, in-stream debris removal along the right bank of the river has a low likelihood to adversely affect mobile adult and subadult individuals. Conducting the work during the July to August 14 in-stream work window is likely to minimize potential effects on bull trout because high summer in-stream temperatures in the mainstem Clearwater River may preclude use, particularly along the shallow stream margins. Still, with the release of water from the hypolimnion of Dworshak Reservoir to mitigate downstream temperatures, the potential occurrence of bull trout during the summer work window cannot be completely discounted.

The Clearwater River adjacent to the Nez Perce Tribal Hatchery is over 500 feet wide. Therefore, the entire channel would not be affected by increased turbidity across its width; rather, turbidity would likely be limited to the area from the bank to mid-channel downstream of the intake. Along the bank downstream of the fish ladder, turbidity concentrations are expected to exceed 50 nephelometric units (NTU) over background levels, which is generally the threshold used for minor sublethal effects (USFWS 2015j). Turbidity plumes with concentrations high enough to adversely affect bull trout are conservatively estimated to extend downstream up to 1,000 feet, but will affect only a portion of the channel (i.e., the plume will not extend across the entire channel width). Because portions of the channel would not be affected by turbidity caused by intake sediment removal operations, effects on bull trout are expected to be limited to minor displacement.

Because the Clearwater River adjacent to the Nez Perce Tribal Hatchery functions as FMO habitat and is located within a migration corridor for adults and subadults, effects on less mobile juveniles would be highly unlikely, and therefore discountable. The Clearwater River near the hatchery does not provide SR habitat (USFWS 2010c). Therefore, operation of in-stream

equipment (i.e., excavators) would not compact spawning gravels, nor impact redds, eggs, alevins, or young-of-the-year during a summer in-stream work window.

Semi-routine Maintenance

Minor repairs to the intake and fish ladder are occasionally required to ensure proper functioning. Although minor repairs are often conducted using hand tools, with discountable effects on bull trout, repairs may require the use of heavy machinery operated from the riverbank. Depending on the nature of repairs, heavy machinery may operate for a few hours in the active channel. Direct effects on individual adult or subadult bull trout from the operation of heavy equipment along the bank could include displacement of fish; however, considering the minor amount of habitat that could be affected and the width of the available migratory corridor, adverse effects are highly unlikely. All semi-routine maintenance activities would be coordinated with the Service to ensure that impact minimization measures are employed to minimize adverse effects on bull trout and FMO habitat. All in-water work would be conducted during the July 1 to August 14 in-water work window (NPT 2013), or via a variance as determined in coordination with the Service and IDFG.

Because the Clearwater River adjacent to the Nez Perce Tribal Hatchery functions solely as a migratory corridor for adult and subadult bull trout, no effects on sensitive life histories (i.e., eggs, alevins, young-of-the-year) would occur. Further, considering the distance to upstream spawning tributaries, the potential for effects on juveniles is discountable.

2.5.1.7.2 Clearwater Fish Hatchery

Routine Maintenance

As described in Section 2.1.3.2.1, routine in-stream maintenance activities include debris removal from intake and outfall structures. The Clearwater Fish Hatchery outfall structure is located along FMO habitat on the mainstem Clearwater River. If outfall debris removal is required, it will be conducted during a July 1 – August 14 in-water work window for the mainstem Clearwater River. By conducting such work in the summer low-flow months, potential effects from sedimentation on bull trout would be discountable because high in-stream temperatures preclude use in summer. Outfall debris removal at other times of the year may affect adults or subadults in FMO habitat in the mainstem Clearwater River. The minor sediment plume generated from outfall debris removal would result in insignificant effects on mobile life stages.

Semi-routine Maintenance

Minor repairs to the Clearwater Fish Hatchery outfall or replacement of a small quantity of streambank armoring fill along previously armored banks may be necessary to ensure continued operation and facility integrity. If present, repair activities could displace adult and subadult bull trout in the immediate work area, which is likely to adversely affect individuals. Although in-water work would occur during the summer in-stream work window when instream temperatures in the mainstem Clearwater River are typically high, cold water flow releases from the Dworshak Reservoir may provide thermal refuge in the North Fork Clearwater near the confluence with the mainstem. Therefore, although the probability is low, adult and subadult bull trout may be present during semi-routine maintenance activities in the mainstem. Mobile life stages such as these should be able to avoid lethal impacts from such activities. The Clearwater River provides FMO habitat in this reach and the potential for juvenile occurrence, and effects on them, is so

remote as to be discountable.

Over the course of operations, debris and algae may plug the Clearwater Fish Hatchery intake screens in Dworshak Reservoir. Materials must be removed from the surface screen of the primary intake annually and from the deepwater screen about every 5 years to ensure an uninterrupted supply of water for hatchery operation. Removal of accumulated woody debris and algae, and inspections of screens and piping may only be accomplished using a dive contractor certified and approved through Corps security clearance protocol. A manual pressure washer is used to wash the intake screens. Cleaning is typically accomplished in April or May, over a period of 1-2 days.

NMFS has established interim disturbance and injury thresholds for fish. Sound pressure levels (SPLs) in excess of 150 decibels (dB) root mean squared (rms) may illicit no response, brief acoustic annoyance, or cause displacement. Sound pressure levels in excess of 183 dB rms and 187 dB rms may result in physical injury to fish less than 2 grams and greater than 2 grams in weight, respectively (Fisheries Hydroacoustic Working Group 2008). Young-of-the-year juvenile bull trout would not be present in the vicinity of the pressure washing, and therefore, underwater noise related activities would have no direct or indirect effects on fish less than 2 grams in size.

Fish are not expected to be harmed or injured from the use of high-pressure sprayers underwater. Hand-held, high-pressure washers used to remove debris would be similar to those generally used for household and industrial purposes. Although high-pressure washers are commonly used underwater for a variety of purposes, information on underwater sound pressure levels produced by high-pressure washers is not readily available. In-air sound levels from high-pressure washers are generally considered to be approximately 100 A-weighted decibels (dB[a]), and can be as high as 111.4 dB(a) at 1 meter, as recorded on an ultra-high-pressure washer (Hutt 2004). To estimate the underwater SPL for the same device it is generally recommended to add 26 dB to account for the change in pressure (20 microPascal [µPa] to 1 µPa) and to add an additional 36 dB for the higher impedance of water (NOAA 2015). Therefore, the maximum underwater SPL for a high-pressure washer is not expected to exceed 173.4 dB rms at 1 meter.

During intake cleaning using a pressure washer in Dworshak Reservoir, underwater sound levels may exceed the interim underwater noise disturbance threshold set by the Fisheries Hydroacoustic Working Group (2008). Disturbance at this level would likely result in displacement of fish and temporary avoidance of noise levels greater than the disturbance threshold. However, pressure washing would be well under the injury thresholds for noise (187dB rms for fish larger than 2 grams). This, combined with the fact that adult bull trout are unlikely to be present during intake cleaning operations conducted in April or May as they migrate away from the dam (where the intake screen is) and lower reservoir to the upper reservoir and riverine habitat during that time (Hanson et al. 2014, p. 37). Therefore, the likelihood of adverse effects on bull trout is discountable; underwater noise from these activities is not likely to adversely affect mobile adults and subadults in the reservoir.

2.5.1.7.3 Dworshak National Fish Hatchery

Routine Maintenance

Routine maintenance activities for Dworshak National Fish Hatchery would be similar to those described for Clearwater Fish Hatchery. Effects on bull trout are anticipated to be insignificant.

Rearing juveniles are highly unlikely to be present in the reservoir or downstream in the North Fork Clearwater River. Therefore, effects on juveniles would be discountable. Routine maintenance would have no effect on redds, eggs, alevins, or young-of-the-year life stages.

With regard to Dworshak National Fish hatchery's intake in the North Fork Clearwater River, routine maintenance consists of operation of travelling screens to remove algae and other sediments to ensure delivery of pumped river water. These mechanical screens are located behind non-compliant fish barrier screens that preclude fish entry into the pump infrastructure. Travelling screens are operated daily, as frequently as needed to remove algae and sediment buildup. Operation of traveling screens behind fish barrier screens is not likely to adversely affect bull trout. Although screens are non-compliant for juvenile screening criteria, juveniles do not rear near the hatchery. Non-compliant fish barrier screens function to exclude larger fish, including adult and subadult bull trout.

Semi-routine Maintenance

Semi-routine maintenance activities at Dworshak National Fish Hatchery would be similar to those described for the Clearwater Fish Hatchery. If present, repair activities could displace adult and subadult bull trout in the immediate work area, which is likely to adversely affect individuals. Although in-water work would occur during the summer in-stream work window when instream temperatures in the mainstem Clearwater River are typically high, cold water flow releases from the Dworshak Reservoir may provide thermal refuge in the North Fork Clearwater near the confluence with the mainstem. Therefore, although the probability is low, adult and subadult bull trout may be present during semi-routine maintenance activities in the mainstem. Rearing juveniles are highly unlikely to be present in the reservoir or downstream in the North Fork Clearwater River. Therefore, effects on juveniles would be discountable. Semi-routine maintenance would have no effect on redds, eggs, alevins, or young-of-the-year life stages.

A portion of the hatchery supply is diverted from an intake in Dworshak Reservoir and requires similar cleaning and debris removal conducted by Clearwater Fish Hatchery staff as part of their operation of the reservoir water supply system (Dworshak National Fish Hatchery staff do not operate the system directly). The likelihood that foraging or overwintering adults and subadults would be adversely affected by such activities is discountable because adult bull trout are highly unlikely to be present during intake cleaning operations conducted during a July 1 – August 14 in-water work window (they migrate out of the reservoir starting mid-June and return mid-October). Therefore, semi-routine screen cleaning during the summer in-water work window in the Dworshak Reservoir is not likely to adversely affect bull trout.

2.5.1.7.4 Kooskia National Fish Hatchery

Routine Maintenance

Annual sediment and debris removal from Clear Creek in the area in front of the intake at Kooskia National Fish Hatchery occurs during periods of low in-stream flow (USFWS and NPT 2010), during the July 1 to August 14 in-water work window. This may be accomplished using hand tools, a clamshell-type excavation bucket mounted to a crane, or a tracked or rubber-tired excavator. Although heavy equipment (e.g., excavator) does not typically operate from the streambank, if the volume of material requires it, removal may be accomplished using a small excavator operated in the active channel for a few hours in 1 day. During in-stream debris

removal, mobilized sediment could degrade water quality. Sediment and organic materials would be suspended in the water column resulting in a turbidity plume that could displace bull trout and reduce foraging efficiency.

Although not designated as critical habitat and bull trout have not been captured at the hatchery in the past 10 years, bull trout adults and subadults have historically been documented in Clear Creek adjacent to and downstream of Kooskia National Fish Hatchery. Therefore, in-stream debris removal has the potential, however low, to affect individual adults and subadults. Conducting the work during a summer low-flow work window is likely to minimize potential effects on bull trout. Maximum summer water temperatures in the Clear Creek watershed during summer averaged 13-20°C (55-68°F) between 2007 and 2012 (USFS 2014b). Temperatures in Clear Creek near the hatchery often exceed 18°C (64°F) in summer (Nez Perce Tribe, unpublished data, as cited in HDR 2017). Such high summer in-stream temperatures in Clear Creek may preclude use, particularly along the shallow stream margins. Based on the information presented above, and the low likelihood that bull trout may be present in Clear Creek, effects on mobile adult and subadult life stages from minor sedimentation or displacement during debris removal are insignificant.

An inflatable weir is operated nearly year round to trap adult steelhead, spring Chinook salmon, and coho salmon. During operations, the weir is occasionally lowered to pass accumulated sediments and debris, or to dislodge accumulated ice. However, effects on mobile adult and subadult life stages are likely insignificant from weir lowering and debris flushing.

Semi-routine Maintenance

Semi-routine maintenance activities at Kooskia National Fish Hatchery would be similar to those described for Clearwater Fish Hatchery. Because both facilities operate within (or near in the case of Clear Creek) FMO habitat for bull trout, and well downstream from SR habitat, effects on bull trout adults and subadults would also be minor, temporary, and insignificant. Rearing juveniles are highly unlikely to be present in Clear Creek. Therefore, effects on juveniles would be discountable. Semi-routine maintenance would have no effect on redds, eggs, alevins, or young-of-the-year life stages.

2.5.1.7.5 Seasonal Acclimation and Trapping Sites

Lapwai Creek Weir

Routine Maintenance

The Lapwai Creek seasonal weir is located at RKM 1.2 (RM 0.7) and operates from October through December to collect Clearwater River Coho salmon. Routine maintenance includes the removal of sediment from the weir traps via flushing over 1 day using high-pressure water hoses. Lapwai Creek is not designated as critical habitat and no bull trout have been collected at the Lapwai weir (HDR 2017). Therefore, occurrence is highly unlikely and routine maintenance is not likely to adversely affect bull trout.

Semi-Routine Maintenance

Semi-routine maintenance may include minor repairs completed by working in the stream using hand tools. Extensive repairs (i.e., weir panel repair or replacement) that exceed the lifting capability of personnel may be accomplished using a crane or similar device operated from the streambank. If weir repairs require the use of equipment operated in the active channel, such use

would occur over a matter of a few hours. Although such in-stream work would displace and potentially disturb bull trout, Lapwai Creek is not designated as critical habitat and no bull trout have been collected at the Lapwai weir (HDR 2017). Therefore, occurrence is highly unlikely and semi-routine maintenance is not likely to adversely affect bull trout.

Lolo Creek Weirs (Upper and Lower)

Routine Maintenance

Once or twice during each May to September trapping season, hatchery personnel use high-pressure water hoses to flush accumulated sediments from the fish traps back to the river channel. The process is completed in less than 1 day. Bull trout are rarely observed in Lolo Creek. No adults have been collected at the lower trap since 2003, and the most recent juvenile collections at the screw trap occurred in 2011. Because there is potential, however low, that bull trout could occur in Lolo Creek, sediment flushing activities may affect them. However, the potential that adults and subadults would be disturbed or displaced during routine maintenance operations is so remote as to be discountable.

Semi-Routine Maintenance

Semi-routine maintenance activities may include repair or replacement of weir panels, weir anchors and trap box panels. Such repairs are typically accomplished using hand tools; however, an excavator may be required to replace weir panels. If weir repairs require the use of equipment operated in the active channel, such use would occur over a matter of a few hours. Similar to the analysis for routine maintenance activities, because bull trout occurrence is relatively rare in Lolo Creek, potential effects on individuals are discountable.

Yoosa/Camp Creek Satellite

Routine Maintenance

Gravel or debris is removed seasonally from the immediate vicinity and downstream of the intake for the Yoosa Camp acclimation facility. If the volume of material is limited, this may be accomplished by workers operating in the stream using hand tools. If deposition requires the use of heavy machinery, this may be accomplished using a tracked excavator, a crane, or by an excavator working from the bank with a clamshell bucket. If required, gravel removal would be conducted using an excavator operated in the active channel over a matter of a few hours.

As discussed above for Lolo Creek, bull trout occurrence in the Lolo Creek watershed, including Yoosa Creek, is rare. During gravel removal efforts, the likelihood that bull trout juveniles would be encountered is discountable and maintenance activities at Yoosa Creek are not likely to adversely affect bull trout. Although there is a possibility of encountering bull trout during maintenance of the juvenile acclimation facilities, none have been encountered to date (NPT 2013).

Semi-Routine Maintenance

Semi-routine maintenance activities, and effects on bull trout, would be similar to those described above for the Lolo Creek weirs.

Newsome Creek Trap and Satellite

Routine Maintenance

Both the Newsome Creek Trap and Satellite facility are located along reaches of the creek mapped as FMO habitat for bull trout. Routine maintenance at both facilities could include minor repairs, anchor relocation, or weir/trap sediment and debris removal. Seasonal gravel removal is required in the immediate vicinity and downstream of the intake at the Newsome Creek Satellite facility. Sediment is removed once or twice each season using high-pressure water hoses over the course of a single day. Gravel removal may be required at any time during the May through September operational period. As described in Section 2.1.3.1.4, if the operation of in-stream equipment is required to remove gravel, such activities would occur during the established in-water work window in coordination with the state resource agencies and the Service, as described above. To minimize impacts on bull trout, all work would be completed within a work window of July 1 to August 14. If a variance to this window were required, no activities would occur until agency approvals were obtained.

Although the number of adult collections at the Newsome Creek trap is low, juvenile bull trout have been collected at the screw trap near the mouth of the creek every year from 2010 through 2016. Therefore, sediment/gravel removal operations may affect bull trout. A small turbidity plume would extend downstream of such routine maintenance activities.

Because routine maintenance of the weir and trap is typically accomplished by personnel in the river channel, and does not require the use of heavy equipment, routine maintenance actions are not likely to adversely affect bull trout and effects would be insignificant. Larger, mobile juveniles and adults and subadults can avoid potential turbidity plumes and in-stream workers at the weir. Further, any turbidity resulting from minor maintenance of the weir during operation would not span the full channel; therefore, a portion of the channel would remain turbidity-free. Newsome Creek does not provide SR habitat at either the trap or satellite location. Therefore, routine maintenance activities would have no effect on redds, eggs, alevin, or young-of-the-year bull trout. If weir repairs require the use of equipment operated in the active channel, such use would occur over a matter of a few hours to minimize potential disturbance to bull trout, if present.

The Newsome Creek weir is operated for adult collections from May through September, and the satellite facility is currently operated from late August/early September through mid-October for acclimation and release of presmolt spring Chinook salmon. If gravel removal activities are conducted in the July 1 to August 14 in-water work window (see Section 2.1.5), high in-stream temperatures should preclude use of the project reaches by rearing juveniles and adults. However, despite high in-stream temperatures from mid-June through August (USFS 2002), bull trout are occasionally collected during weir operations from May through September. Therefore, routine in-stream gravel removal activities have the potential, however low, to adversely affect bull trout at the Newsome Creek sites. Adverse effects would likely be limited to temporary displacement during gravel removal activities.

Semi-Routine Maintenance

Semi-routine maintenance activities would be similar in scope, duration, and approach as those described above for the Lolo Creek weir. Despite the high instream temperatures during the summer in-stream work window when semi-routine maintenance activities would be conducted,

bull trout have occasionally been collected during weir operations from May through September. Therefore, the potential exists, however low, that individuals may be present in the vicinity of weir/panel maintenance or repair activities. Therefore, such activities are likely to adversely affect bull trout via displacement, disturbance, or downstream sedimentation. The likelihood for adverse effects exists if heavy equipment is operated in-stream to replace weir panels or other infrastructure associated with the seasonal picket weir. If weir repairs require the use of equipment operated in the active channel, such use would occur over a matter of a few hours.

Crooked River, Red River Satellite, Powell Satellite

Routine Maintenance

Removal of accumulated sediment or woody debris at the seasonal Red River and Powell satellites and the Crooked River trap is a common maintenance activity. Debris removal may occur one or two times each adult collection period, from May to mid-September. In addition, at the Red River and Powell acclimation sites, the intakes, diversion weirs, and traps are cleaned as often as required to maintain flow through the facility during juvenile acclimation in March and April.

Debris removal from intakes, ladders, weirs, and traps may at times require heavy equipment, ranging from a clamshell-type excavation bucket mounted to a crane, to a tracked or rubber-tired excavator, or workers operating mud and sand suction dredges. With the exception of a clamshell bucket, excavation equipment does not typically enter the stream channel; work is accomplished using machinery positioned on the bank. This eliminates the risk of fuel or oil contamination. Suction dredges are mounted on floating devices and screened to prevent fish entrainment. Excavated material is loaded into a truck and hauled off site. With proper screening of suction dredges, juvenile bull trout are not expected to be harmed or injured, but they may be startled from the work area and displaced from ideal rearing habitats, particularly in SR habitat in the Red River and Walton Creek (Powell site). If debris removal requires the use of equipment operated in the active channel, such use would occur over a matter of a few hours

A suction dredge produces noise from an engine used to power the pump or air compressor. As discussed under Section 2.5.1.7.2 for the Clearwater Fish Hatchery, high underwater sound pressure levels are documented to alter fish behavior, cause hearing loss, and can injure or kill individual fish by causing serious internal injury (Hastings and Popper 2005, Popper et al. 2003, Wycoski et al. 2007). Generally, an 18-horsepower gasoline-powered engine is used to run a suction dredge. Such engines can produce in-air noise levels in excess of 85 dB at close range (USFS 2006). Using the same approach presented in Section 2.5.1.7.2, the underwater noise equivalent for suction dredging would be approximately 147 dB rms. Combined with mechanical noise associated with the material being displaced, it is possible that suction dredging could exceed the underwater noise disturbance threshold for fish. Disturbance at this level could result in minor displacement of fish and temporary avoidance of noise levels greater than the disturbance threshold. However, suction dredging would be well under the injury thresholds for noise (187dB rms for fish larger than 2 grams). Regardless, the potential for adverse effects to bull trout from disturbance and displacement exists, however low. Therefore, underwater noise related to these activities may adversely affect bull trout.

The Red River and Powell trap sites are located in SR habitat and the Crooked River trap is located along FMO habitat. Therefore, routine debris removal may directly affect bull trout, including juveniles, by disturbance and displacement as a result of personnel working near the

river channel during both spring acclimation at the Red River and Powell satellites, and May through September adult collections at all traps. During debris/sediment removal, less mobile juveniles could be adversely affected during sediment removal using a clamshell bucket.

If in-stream equipment were required to remove a large volume of sediment following a high-flow event, effects on bull trout would be minimized by conducting debris removal within a work window of July 1 to August 14 (IDFG 2011a). If variances to this window are required to maintain facility operation, IDFG will coordinate with the Service to ensure appropriate measures are in place to protect bull trout.

Bull trout have not been observed to spawn at or immediately downstream of the Powell trap or Red River facility. Summer debris removal would avoid effects on bull trout redds, eggs, or alevins. The July 1 to August 14 work window overlaps with bull trout spawning migration in the Red and Crooked Rivers in the South Fork Clearwater core area, and in Walton Creek in the Lochsa River core area. Therefore, routine maintenance requiring in-water work may adversely affect migrating adults via displacement and disturbance. Adverse effects are likely if the use of heavy equipment is required in the active channel. Rearing juveniles at the Red River and Powell sites could also be adversely affected.

During debris removal, mobilized sediment in the river could degrade downstream water quality. Sediment and organic materials would be suspended in the water column each time an excavator bucket removes material from the streambed. This could result in a turbidity plume that displaces bull trout, including juveniles, and reduces foraging efficiency. Displacement could, in turn, alter migration timing or behavior. A small, temporary sediment plume is anticipated to extend less than 1,000 feet downstream from sites conducting debris removal with a clamshell bucket. In most cases, excavation would only occur along one side of the river, immediately downstream of the intake, trap, or ladder. Therefore, under most circumstances, turbid water would flow only along one side of the channel. As discussed in the introduction to this section, for similar debris removal activities conducted using a clamshell bucket at the Sawtooth Hatchery on the Salmon River, project-related turbidity was not detectable 450 feet downstream of the activity. Similar conditions are expected at the Red River and Powell satellite facilities, and at the Crooked River trap site.

Semi-Routine Maintenance

Although infrequent, it is sometimes necessary to replace stoplogs or place fill material along the streambed below the OHWM (e.g., scour holes under the seasonal picket barrier), or replace displaced streambank armoring along the river channel to control bank erosion. All materials used in such efforts would be clean (washed) rock to limit the introduction of sediment to the river channel. If materials cannot be placed by hand, machinery used for fill placement would be operated from above the OHWM to avoid the possibility of fuel or oil entering the water. Depending on the timing of these activities, direct, adverse effects to individual bull trout may occur. Adverse effects could include disturbance and displacement of fish as a result of personnel or heavy equipment working near the river channel, and potential mortality if fill placement crushes juveniles or younger life stages.

Considering that streambank armoring replacement would likely be done in response to extreme high river flows and localized flooding, the turbidity generated from the action would likely be less than what is already present in the river. If such fill placement is required outside the typical July 1 to August 14 in-water work window, hatchery operators would coordinate with the

Service prior to fill placement to obtain approval for a work window variance, and ensure measures are in place to minimize effects on sensitive life history stages of bull trout.

Other semi-routine activities would be similar to those described for the Lolo Creek seasonal weirs and could include anchor and weir panel replacements. At all sites, if repairs were accomplished using hand tools, effects on all life stages of bull trout would be insignificant. If heavy machinery was required, both juveniles and adults could be adversely affected via displacement, possible injury from machinery, and downstream sedimentation that could approach lethal levels in the immediate work area. These effects would be temporary, but would be likely to adversely affect bull trout on an individual level.

Coastal Recovery Unit

The lower mainstem Columbia River, from its mouth upstream to John Day Dam, is part of the Coastal RU. The lower mainstem provides bull trout FMO habitat (USFWS 2015i). None of the Clearwater River hatchery programs included under the proposed action are located in the Coastal RU. As such, no adult collection, water diversions, hatchery-produced effluent discharges, RM&E, or facility-related maintenance activities occur in the Coastal RU; there would be no effect to bull trout from these activities.

Steelhead, Chinook salmon, and coho salmon juveniles and adults from all of the Clearwater River programs considered in this Opinion use the lower mainstem Columbia River as a migration corridor to and from the ocean. Therefore, migratory individuals could affect bull trout that may occur in the mainstem Lower Columbia River, which is part of this RU. Because all hatchery programs would continue to follow IHOT and PNFHC guidelines and regional fish health standards to minimize potential risk to bull trout, the risk of horizontal disease transfer from hatchery fish to bull trout is highly unlikely.

2.5.1.8 Effects of Interrelated or Interdependent Actions

The Service has not identified any actions that are interrelated and interdependent with the on-going Clearwater steelhead, spring/summer Chinook salmon, and coho salmon hatchery programs.

2.5.2 Bull Trout Critical Habitat

Mid-Columbia Recovery Unit

The Clearwater River Subbasin hatchery programs included under the proposed action occur in three CHUs within the Mid-Columbia RU portion of the Action Area: the mainstem Upper Columbia River CHU (provides a migratory corridor for program fish), the Clearwater River CHU (all facilities and release sites), and the Mainstem Snake River CHU (migration corridor for program fish).

Within the Clearwater River CHU, hatchery programs under the proposed action are operated in the following CHSUs:

- Middle-Lower Fork Clearwater River (Nez Perce Tribal Hatchery, Clearwater Fish Hatchery, Dworshak National Fish Hatchery, Kooskia National Fish Hatchery [proximity of Clear Creek])

- South Fork Clearwater River (Newsome Creek Satellite, Crooked River trap, Red River Satellite, and release sites on Red House Hole, Meadow Creek, Newsome Creek, and Red River)
- North Fork Clearwater River (surface water intakes for Clearwater Fish Hatchery and Dworshak National Fish Hatchery)
- Selway River (hatchery juvenile release sites on Meadow Creek, Lower Selway, and Upper Selway rivers)
- Lochsa River (Powell Satellite on Walton Creek)

Effects of the proposed action on critical habitat in the Clearwater River CHU portion of the Action Area are discussed by activity below.

Neither Lolo Creek nor Lapwai Creek are designated as critical habitat for bull trout. Therefore, facilities on Lolo Creek (upper and lower weirs, juvenile screw trap, Yoosa/Camp Creek site) and Lapwai Creek (weir) are not located in critical habitat for bull trout. Potential effects of these facilities would not extend downstream to designated critical habitat in the mainstem Clearwater River. Therefore, operation of the Lolo Creek and Lapwai Creek facilities under the proposed action would have no effect on bull trout critical habitat.

Kooskia National Fish Hatchery is located near RKM 1.0 (RM 0.6) on Clear Creek, a tributary to the Middle Fork Clearwater River at RKM 124 (RM 77), near Kooskia, Idaho. Clear Creek is not designated as critical habitat for bull trout (USFWS 2010a, b). However, due to the proximity of Clear Creek to shared FMO habitat, potential effects on near-proximity, downstream critical habitat are discussed herein.

2.5.2.1 Direct and Indirect Effects of the Ongoing Action

For more detailed information on the effects of each of the Operational Elements of the Hatchery Program see the bull trout effects section (section 2.5.1), above.

2.5.2.1.1 Broodstock Collection

Adult collection of broodstock at traps in the mainstem Clearwater River (Nez Perce Tribal Hatchery), North Fork Clearwater River (Dworshak National Fish Hatchery), Newsome Creek, Crooked River, Red River, Walton Creek (Powell trap), and Clear Creek (Kooskia National Fish Hatchery trap) may affect migratory habitat for bull trout (PBF 2). Although the Dworshak National Fish Hatchery and Nez Perce Tribal Hatchery traps are volitional and do not span the channel, attraction flow could result in a passage delay though the mainstem migratory corridor (PBF 2). Effects are likely discountable because individuals are highly unlikely to enter the traps, and traps therefore have a low likelihood of affecting PBF 2. All of the remaining collection facilities are channel-spanning, and therefore preclude all upstream migration during operational periods. Thus, adult collection at Newsome Creek, Crooked River, Red River, Walton Creek (Powell trap), and Clear Creek (Kooskia National Fish Hatchery trap) is likely to adversely affect PBF 2.

All facilities withdraw surface water from streams to water adult holding areas. Therefore, operations at all sites may affect PBF 7 and PBF 8. Seasonal weir installation and removal at the Newsome Creek, Crooked River, Red River, and Powell sites may result in sedimentation that

could affect PBF 8. Based on the water quantity assessment method presented in Section 2.5.1 for hatchery-related water withdrawals, only the Crooked River trap, Red River Satellite, and Powell Satellite on Walton Creek are likely to adversely affect the quantity of habitat in the diversion reach. The Crooked River trap, Red River Satellite, and Powell Satellite may divert a large portion (i.e., more than 40 percent) of each stream's flow, particularly during low-flow periods of operation (July, August, September). The remaining sites divert less than 40 percent of average flows and are not likely to adversely affect these PBFs.

With the exception of the Red River and Powell (Walton Creek) satellite facilities, all collection sites are downstream of SR habitat; therefore, no effects on PBF 6 (spawning habitat) would occur from the operation of adult collection facilities. As previously discussed, despite the SR habitat designation for the Red River and Walton Creek (USFWS 2010c), no bull trout spawning occurs near or below the facilities (HDR 2017). Therefore, weir-related effects on PBF 6 are anticipated to be discountable at both sites.

Installation and removal of seasonal traps at Newsome Creek, Crooked River, Red River, and the Powell satellite facility (Walton Creek) could result in minor, insignificant effects on complex habitats (PBF 4; e.g., sedimentation in pools). Similarly, seasonal raising and lowering of the Obermeyer weir on Clear Creek for the Kooskia Hatchery collections may result in minor downstream habitat modifications (PBF 4; e.g., sedimentation in pools). Because Clear Creek is not designated as critical habitat for bull trout, effects to downstream FMO habitat are likely insignificant. Operation of permanent traps at the Dworshak National Fish Hatchery and Nez Perce Tribal Hatchery would have no effect on PBF 4. The operation of trapping facilities would have no effect on PBFs 1, 3, 5, or 9.

Angling for steelhead broodstock from January through April in the South Fork Clearwater River might result in a temporary, minor effect on PBF 2 from the presence of anglers, which may alter local migratory routes. Angling might also result in a similarly minor, localized effect on PBF 8 (water quality) by local habitat modification and potential sedimentation from the presence of anglers or watercraft. Angling could also reduce potential nonnative species (PBF 9) in localized microhabitats. Effects on these PBFs would be insignificant, and angling would have no effect on other PBFs (1, 3, 4, 5, 6, and 7)[7].

2.5.2.1.2 Acclimation and Release

With the exception of Lolo Creek and Lapwai Creek, hatchery programs under the proposed action release hatchery juveniles into numerous waterbodies that are designated as critical habitat for bull trout. Relative to bull trout habitat, the release of hatchery spring/summer Chinook salmon, coho salmon, and steelhead may affect PBF 3 from an increase in prey availability. An increase in prey abundance at and immediately downstream of release sites is considered a beneficial effect. Additional beneficial effects may include increased primary productivity (PBF 8; water quality) from marine-derived nutrients introduced from adult Chinook salmon, coho salmon, and steelhead upon their return to the Clearwater River CHU for spawning.

[7] This action does not have a federal funding or permitting nexus.

2.5.2.1.3 Research, Monitoring, and Evaluation

As an in-river flow-through facility, operation of the Newsome Creek and Meadow Creek screw traps in FMO habitat from February through November would not modify in-stream temperatures, divert surface water (PBF 5, 7), or affect hyporheic interchanges or spawning habitat (PBF 1, 6). Operation would adversely affect migratory corridors (PBF 2) because the trap is a barrier to passage if an individual enters. This, in turn, could affect forage species (PBF 3) temporarily, resulting in discountable effects on bull trout prey.

Occasional maintenance of the traps to replace worn parts or anchoring systems could result in minor degradations to downstream water quality in the form of sedimentation. This, in turn, could affect PBF 4 (complex habitats) and PBF 8 (water quality). Impacts would be insignificant and not likely detectable about 450 feet downstream of the activity (see USFWS 2015j). If maintenance activities require in-stream work and presence of personnel, the migratory corridor (PBF 2) might be altered; this effect would be insignificant. No effects on PBF 9 are anticipated.

2.5.2.1.4 Water Withdrawals/Diversions

Water diversions at hatchery, satellite, or trapping facilities in the Clearwater River CHU have the potential to affect PBF 1 (seeps and springs), PBF 2 (migration habitat), PBF 3 (abundant forage), PBF 4 (complex habitats), PBF 5 (in-stream temperature), PBF 7 (flows), and PBF 8 (water quality and quantity). An ongoing LSRCP facility review is underway to determine if their existing facility intakes are out of compliance with current NMFS (2011) screening criteria. Other facilities will be reviewed separately. If facilities are out of compliance, operational effects on juvenile migration (PBF 2) may occur from potential impingement on intake screens.

All Sites Except Crooked River Trap, Red River and Powell Satellite Sites

With the exception of the Crooked River trap, the Red River Satellite, and the Powell Satellite, most facilities under the proposed action divert a relatively small portion (i.e., less than 40 percent of average flow; see Section 2.5.1.4) of surface water from subject streams that are designated as critical habitat. In addition, most facilities return the water to the river a short distance from the diversion point (See Section 2.5.1.4).

Because the surface water uses are nonconsumptive, occur primarily in FMO habitat, and are proportionally small, these withdrawals do not significantly affect hyporheic connections to seeps and springs (PBF 1), migration corridors (PBF 2), habitat for forage species (PBF 3), or water quality/quantity (PBF 8). Although surface water diversions would alter natural flows (PBF 7), and may affect specific complex habitat features (e.g., reduced pool depths; PBF 4), such effects are likely insignificant in FMO habitats with relatively short diversion reaches. Therefore, water diversions for most sites are not likely to adversely affect these critical habitat PBFs. Diversions would not affect PBF 9. See Appendix A of the Assessment for site-specific determinations.

Over the period of on-going hatchery operations, climate change may exacerbate the effect of hatchery surface withdrawals on instream temperatures (PBF 5). In lower-elevation habitats within the CHU, program facilities typically divert much less than 10 percent of average monthly streamflows. This, combined with relatively short diversion reaches, ameliorates future climate changes on PBF 5 in diversion reaches.

As presented in Section 2.5.1.4.4, the Kooskia National Fish Hatchery intake on Clear Creek may divert more than 40 percent of average flow during peak diversions as well as low flow months in the late summer and early fall. Dewatering of a 100 m reach downstream of the intake has been observed during late summer or early fall. Despite this condition, Clear Creek is not designated as critical habitat for bull trout. Measurable changes to the hydrology or water quality of the Middle Fork Clearwater River from surface water diversion are likely insignificant, particularly because the use is non-consumptive and returned to both water bodies downstream of the hatchery. Potential effects on individual PBFs in the Middle Fork Clearwater River downstream of the Clear Creek confluence would be similar to those described above.

Crooked River Trap, Red River and Powell Satellite Sites

In higher-order tributaries in the CHU, where a significant portion of streamflow is diverted for operations (i.e., Crooked River, Red River, Walton Creek), colder water may mitigate the effect of diversions on in-stream temperatures in the context of climate change.

At the Crooked River trap, surface water diversions during low-flow periods exceed 40 percent of flow and could reduce available migratory habitat (PBF 2). At the Red River and Powell satellite sites located along SR habitat, water diversions may exceed 40 percent of streamflow and constrict the migratory corridor. This is particularly the case during low-flow periods (July, August, and September), when adults are migrating to spawning grounds past each facility. Therefore, surface water diversion at the Crooked River trap and the Red River and Powell satellites may adversely affect PBF 2. In the diversion reaches during the low-flow summer periods, facility water diversion may adversely affect the hydrograph (PBF 7), in-stream temperatures (PBF 5), and water quality (PBF 8). Diversions may reduce stream depths, resulting in increased in-stream temperatures and solar gain, which may reduce dissolved oxygen in the diversion reach. Along the reach of the Red River and Walton Creek, adjacent to the satellite facilities, effects on mapped SR habitat (PBF 6) would be discountable because suitable spawning habitat does not exist in the vicinity of either facility and spawning has not been observed at either site. Bull trout spawn upstream of both satellite sites (HDR 2017).

2.5.2.1.5 Hatchery Effluent

As described in Section 2.5.1.5, with the exception of the Dworshak National Fish Hatchery, most facilities meet or exceed state and federal NPDES water quality standards for effluent and fish health protocols. Effluent discharges have the potential to increase nutrient loading, and therefore, decrease water quality downstream of project sites. At the Dworshak National Fish Hatchery, direct discharge of unsettled effluent may impair PBF 8 (water quality and quantity) and reduce optimal use of FMO habitat downstream of the outfall in the Clearwater River. However, given the volume of flow in the North Fork Clearwater River, effects on critical habitat PBFs are likely to be insignificant.

Water withdrawals at most facilities generally comprise a small proportion of the total surface water volume during surface water diversion periods (see Section 2.5.1.4 for operational periods and anticipated bull trout occurrence at each site). Seasonal facilities that divert larger portions of streamflow (i.e., the Crooked River trap and the Red River Satellite) hold few adults or acclimate juveniles from a few hours to a few days on site. Thus, effluent production from holding and acclimation operations is low. Any contaminants in the effluent would be diluted when mixed with the remaining water in the creek or river, leading to insignificant changes in water quality or quantity (PBF 8) relative to bull trout use of FMO habitat. Because bull trout do

not spawn in SR habitat near the Red River or Powell satellite sites, pollutant-related effluent effects on sensitive eggs, alevin, or young-of-the-year are highly unlikely and therefore, discountable.

Bartholomew (2013, as cited in NMFS 2016) showed effluent discharge effects to be short-lived and extending downstream for less than 200 meters before becoming undetectable. Water travel time through the facilities is of short duration (typically a day or less) and would not significantly affect river temperature (PBF 5) below the outfalls.

As reported by Kendra (1991), because benthic macroinvertebrates sensitive to organic wastes may be replaced by more tolerant species downstream of hatchery outfalls, released effluent may affect PBF 3. The effect is likely insignificant because such benthic prey items are typically forage for juvenile bull trout that are highly unlikely to occur in FMO habitat near the subject facilities. Effluent release would have no effect on PBFs 1, 2, 4, 6, 7, and 9.

Although not designated as critical habitat for bull trout, portions of the discharge that are returned to the Middle Fork Clearwater River have the potential, however low, to affect PBFs in the mainstem from settling basin discharge that violates current NPDES permit limits. Given the quantity of effluent discharge compared to surface water volumes in the mainstem Middle Forks Clearwater River, potential effects on PBFs 3, 5, 7, and 8 would be insignificant. Effluent releases from Kooskia National Fish Hatchery would have no effect on PBFs 1, 2, 4, 6, and 9.

2.5.2.1.6 Fish Health/Disease

Hatchery, satellite and trapping facilities under the proposed action have the potential to affect PBF 8 (water quality and quantity) through transmission of disease into critical habitat from hatchery effluent. Hatchery-released smolts and parr may also horizontally transfer diseases in the natural environment. As described in Section 2.5.1.6, elevated levels of disease and pathogen are typically concentrated near the hatchery effluent outfall and then are diluted by water as they discharge downstream (NMFS 2016). The higher concentration of disease and pathogens associated with hatcheries is typically localized and short-lived (Bartholomew 2013, as cited in NMFS 2016).

Little evidence suggests that diseases are routinely transmitted from hatchery to natural fish (NMFS 2016). This indicates that pathogen-related effects on PBF 8 are insignificant. Fish health monitoring and disease management procedures diminish the potential for pathogens to impact water quality. Established disease management policies and protocols including the IHOT policies; PNFHPC fish health model program; and state, federal, and tribal policies are expected to reduce potential water quality effects on critical habitat. Existing protocols employed to minimize possible effects on bull trout from potential disease exposure from hatchery practices should similarly reduce any potential impacts to PBFs 3 (prey fish species) and 9 (nonnative fish species) to insignificant levels; there would be no effect on the remaining PBFs (1, 2, 4, 5, 6, and 7).

2.5.2.1.6 Facility Maintenance

Routine operation and maintenance above the OHWM at facilities operated under the proposed action have limited potential to impact bull trout PBFs. Such activities would be implemented according to impact minimization measures (Section 2.1.5) to reduce potential effects on bull trout critical habitat. Existing protocols employed to minimize potential effects to bull trout during maintenance operations within the facilities should reduce any potential impacts to bull

trout PBFs (1, 2, 3, 4, 5, 6, 7, 8, and 9) to insignificant levels.

Aside from routine maintenance activities, most in-water maintenance actions would not occur frequently and impacts would be minimized by isolating in-water work sites from active flow, limiting the in-water work footprint, conducting work during the established in-stream work windows (typically July 1 to August 14, see Section 2.1.5), and adhering to the impact minimization measures presented in Section 2.1.5. Because maintenance activities would occur in areas that were previously disturbed during initial facility construction, long-term cumulative effects on PBFs from ongoing and future in-water maintenance would be insignificant.

The construction of new facilities is not included under the proposed action; however, operations may require in-water maintenance of existing in-stream structures (e.g., debris removal from weirs or weir panel replacements). Further, seasonal installation and removal of infrastructure is required for weirs and trapping facilities at Newsome Creek, the Crooked River trap, the Red River Satellite, and the Powell Satellite. In-water maintenance actions occur below the OHWM and have the potential to affect PBF 2 (migration habitat), PBF 4 (complex river channels, pool habitat for seasonal structures [e.g. weir placement and removal]), and PBF 8 (water quality).

The level of effect on these PBFs (i.e., insignificant or adverse) is largely dependent upon the portion of the river channel affected by the activity and whether an in-stream migratory corridor is available around the work area. The extent and duration of in-water work is also relevant. In instances where turbidity would affect only a portion of the stream channel, effects on PBF 2 would be insignificant. In-water maintenance that involves sediment removal would produce turbidity plumes that could interfere with migration for a distance of about 450 feet (USFWS 2014) downstream of the activity. The turbidity plume is likely to affect only one side of the channel immediately downstream of the debris removal location, resulting in an unaffected corridor along the opposite bank.

Adverse effects on PBF 4 could occur, particularly at those sites within or in proximity to SR habitat (Red River Satellite, Powell Satellite on Walton Creek). At these sites, if in-stream debris removal is required, the riverbed would be altered, producing a temporary sediment plume that would flow downstream and settle into the river. This impact is considered significant only in areas that are in close proximity to rearing habitats (i.e., Red River Satellite, Powell Satellite on Walton Creek). At other sites, the effect of debris removal activities on complex habitats would be insignificant.

During in-water work at all sites, short-term effects on water quality (PBF 8) from downstream sediment mobilization and potential chemical contamination from operation of equipment are may affect critical habitat for bull trout. However, impact minimization measures (Section 2.1.5) should reduce effects to an insignificant level.

In-water maintenance actions could result in minor sedimentation that could impact prey species (PBF 3). Effects on PBF 3 would be insignificant. In-water maintenance actions would have no effect on the remaining PBFs (1, 5, 6, 9) identified for bull trout. See Appendix A of the Assessment for facility-specific effect determinations for each facility.

Coastal Recovery Unit

The Lower Columbia River mainstem in the RU is FMO habitat that does not currently support many bull trout, and those that are present are adults and subadults that are not susceptible to predation. Therefore, the potential that hatchery juveniles or adults migrating through the

mainstem Columbia River in the Coastal RU might compete with bull trout for resources is highly unlikely. Juvenile hatchery smolts would not encounter SR habitat for bull trout in the mainstem Lower Columbia, therefore, predation on juvenile bull trout or eggs would not occur. Therefore, the potential for negative ecological interactions between bull trout and hatchery-reared steelhead, Chinook salmon, or coho salmon produced at the Clearwater River programs is so remote as to be discountable.

Similarly discountable are potential negative effects on PBFs for bull trout critical habitat. The bull trout migratory corridor (PBF 2) would not be affected by the presence of hatchery-produced juvenile steelhead, Chinook salmon, or coho salmon from the Clearwater River programs. Hatchery-released juveniles may provide additional prey items (PBF 3) for adult and subadult bull trout that may be present during their outmigration in the Lower Columbia River. No other PBFs would be affected by the migration of adults and juveniles to and from the ocean through the Lower Columbia River.

2.5.2.2 Effects of Interrelated or Interdependent Actions

The Service has not identified any actions that are interrelated or interdependent with the on-going Clearwater River Hatchery Programs.

2.5.3 Summary of Effects

Tables 13 and 14 summarize the Programs' effects to bull trout and critical habitat. Adverse effects are limited to the Clearwater River Basin and primarily occur from broodstock collection, juvenile releases, RM&E, facility water withdrawal/diversion, and in-water facility maintenance. These activities can result in bull trout disturbance, injury, and mortality. The Programs are likely to adversely affect PBFs 2 (migration habitat), 3 (prey base), 4 (complex habitat), 5 (water temperature), 7 (natural hydrograph), 8 (water quality and quantity), and 9 (non-native species) (Table 14). The potential for bull trout or designated critical habitat to be adversely affected outside the Clearwater River Basin (i.e., the Lower Columbia River FMO habitat in the Coastal RU) as a result of the Programs' activities is insignificant or discountable.

Table 13. Summary of Effects to Bull Trout from the Programs' activities.

Facility	Broodstock Collection	Juvenile Releases	RME	Water Diversion	Effluent	Disease	Maintenance	
							Up-land	Inwater
Lapwai Creek Weir	NE	--	--	--	--	--	NE	NLAA
Nez Perce Tribal Hatchery	LAA	NLAA	--	NLAA	NLAA	NLAA	NLAA	LAA
Lolo Creek Weir and Trap and Juvenile release sites at Yoosa/Camp Creek and Eldorado	LAA	--	--	NLAA Yoosa/ Camp Creek NE Lolo Creek weir	NLAA Yoosa/ Camp Creek NE Lolo Creek weir	NLAA Yoosa/ Camp Creek NE Lolo Creek weir	NLAA	NLAA
Lolo Creek	--	--	LAA	--	--	--	--	NLAA

Facility	Broodstock Collection	Juvenile Releases	RME	Water Diversion	Effluent	Disease	Maintenance	
							Up-land	Inwater
juvenile screw trap								
Clearwater Fish Hatchery	--	NLAA	--	NLAA	NLAA	NLAA	NLAA	LAA (in-channel) NLAA (reservoir screen cleaning)
Dworshak NFH	LAA	NLAA	--	NLAA	NLAA	NLAA	NLAA	LAA (in-channel) NLAA (reservoir screen cleaning)
Kooskia NFH	LAA	NLAA	--	NLAA	NLAA	NLAA	NLAA	LAA
Newsome Creek Weir (RKM 0.1) and Newsome Creek Acclimation Site (RKM 8.1)	LAA	NLAA	--	NLAA	NLAA	NLAA	NLAA	LAA
Angling for South Fork Clearwater (Localized) steelhead broodstock in South Fork Clearwater River[a]	LAA	--	--	--	--	--	--	--
Newsome Creek juvenile screw trap	--	--	LAA	--	--	--	--	NLAA
SF Clearwater juvenile screw trap	--	--	LAA	--	--	--	--	NLAA
Meadow Creek juvenile screw trap	--	--	LAA	--	--	--	--	NLAA
Crooked River Trap	LAA	--	--	LAA	NLAA	--	--	LAA NLAA for seasonal

Facility	Broodstock Collection	Juvenile Releases	RME	Water Diversion	Effluent	Disease	Maintenance	
							Up-land	Inwater
								installation and removal
Red River Trap and Satellite	LAA	LAA	--	LAA	NLAA	NLAA	NLAA	LAA NLAA for seasonal installation and removal
RM&E Surveys associated with Nez Perce Tribal Hatchery program at Lolo Creek Newsome Creek, and Meadow Creek and Selway River sites	--	--	LAA	--	--	--	--	--
Powell Satellite (Walton Creek)	LAA	LAA	--	LAA	NLAA	NLAA	NLAA	LAA
Juvenile releases into Meadow Creek and Lower and Upper Selway River	--	LAA	--	--	NLAA	--	--	--

LAA=Likely to Adversely Affect; NLAA=May Affect, Not Likely to Adversely Affect; NE=No Effect; double dashes = N/A

[a]This action does not have a federal nexus and is presented here for illustrative purposes only.

Table 14. Summary of effects to bull trout critical habitat from the Programs' activities.

Facility	Broodstock Collection	Juvenile Releases	RME	Water Diversion	Effluent	Disease	Maintenance	
							Up-land	Inwater
Nez Perce Tribal Hatchery	NLAA PBFs 2, 7, and 8 NE all others	NLAA PBFs 2, 3 and 8 NE all others	--	NLAA PBFs 1, 2, 3, 4, 5, 7, and 8 NE all others	NLAA PBFs 3, 5, and 8 NE all others	NLAA PBFs 3, 8, and 9 NE all others	NLAA PBF 8 NE all others	LAA PBF 2 NLAA PBFs 3, 4, 7, and 8 NE all others
Clearwater Fish	--	NLAA PBFs 2, 3	--	NLAA PBFs 1, 2,	NLAA PBFs 3,	NLAA PBFs 3,	NLAA PBF 8	LAA PBF 2

Facility	Broodstock Collection	Juvenile Releases	RME	Water Diversion	Effluent	Disease	Maintenance	
							Up-land	Inwater
Hatchery		and 8 NE all others		3, 4, 5, 7, and 8 NE all others	5, and 8 NE all others	8, 9 NE all others	 NE all others	NLAA PBFs 3, 4, 7,and 8 NE all others
Dworshak NFH	NLAA PBFs 2, 7, 8 NE all others	NLAA PBFs 2, 3 and 8 NE all others	--	NLAA PBFs 1, 2, 3, 4, 5, 7, and 8 NE all others	NLAA PBFs 3, 5, and 8 NE all others	NLAA PBFs 3, 8, 9 NE all others	NLAA PBF 8 NE all others	LAA PBF 2 NLAA PBFs 3, 4, 7, and 8 NE all others
Kooskia NFH	NLAA PBFs 2, 4, 7, 8 NE all others	NLAA PBFs 2, 3 and 8 NE all others	--	NLAA PBFs 1, 2, 3, 4, 5, 7, and 8 NE all others	NLAA PBFs 3, 5, and 8 NE all others	NLAA PBFs 3, 8, 9 NE all others	NLAA PBF 8 NE all others	LAA PBF 2, NLAA PBFs 3, 4, 7, 8 NE all others
Newsome Creek Weir (RKM 0.1) and Newsome Creek Acclimation Site (RKM 8.1)	LAA PBF 2 NE all others	NLAA PBFs 2, 3, 8 NE all others	--	NLAA PBFs 2, 5, 7, and 8 NE all others	NLAA PBFs 3, 5, and 8 NE all others	NLAA PBFs 3, 8, 9 NE all others	NLAA PBF 8 NE all others	NLAA PBFs 2, 4, and 8 NE all others (Weir installation and removal and in-river maintenance)
Angling for South Fork Clearwater (Localized) steelhead broodstock in South Fork Clearwater River[a]	NLAA PBFs 2, 8, and 9 NE all others	--	--	--	--	--	--	--
Newsome Creek juvenile screw trap	--	--	LAA PBF 2 NLAA PBF 3 NE all others	--	--	--	--	NLAA PBFs 2 and 3 NE all others
SF Clearwater juvenile screw trap	--	--	LAA PBF 2 NLAA PBF 3 NE all	--	--	--	--	NLAA PBFs 2 and 3 NE all others

Facility	Broodstock Collection	Juvenile Releases	RME	Water Diversion	Effluent	Disease	Maintenance	
							Up-land	Inwater
			others					
Meadow Creek juvenile screw trap	--	--	LAA PBF 2 NLAA PBF 3 NE all others	--	--	--	--	NLAA PBFs 2 and 3 NE all others
Crooked River Trap	LAA PBF 2 NE all others	--	--	LAA PBFs 2, 3, 4, 5, 7, 8, and 9 NE all others	NLAA PBFs 3, 5, and 8 NE all others -	--	--	NLAA PBFs 2, 4, and 8 NE all others (Weir installation and removal and in-river maintenance)
Red River Trap and Satellite	LAA PBF 2 NLAA PBF 6 NE all others	--	--	LAA PBFs 2, 3, 4, 5, 7, 8, and 9 NLAA PBF 6 NE PBF 1	NLAA PBFs 3, 5, 6, and 8 NE all others	NLAA PBFs 3, 8, and 9 NE all others	--	NLAA PBFs 2, 4, and 8 NE all others (Weir installation and removal and in-river maintenance)
RM&E Surveys associated with Nez Perce Tribal Hatchery program at Lolo Creek, Newsome Creek& Meadow Creek and Selway River sites	--	--	LAA PBF 2 NLAA PBF 3 NE all others	--	--	--	--	--
Powell Satellite (Walton Creek)	LAA PBF 2 NE all others	--	--	LAA PBFs 2, 4, 5, 7, and 8 NLAA PBFs 3 and 9 NE all others	NLAA PBFs 3, 5, 6, and 8 NE all others	--	--	NLAA PBFs 2 (installation and removal), 4, 6, and 8 NE all others
Juvenile	--	NLAA	--	--	--	--	--	--

Facility	Broodstock Collection	Juvenile Releases	RME	Water Diversion	Effluent	Disease	Maintenance	
							Up-land	Inwater
releases into Newsome Creek, Meadow Creek, Red River, and Lower and Upper Selway River		PBFs 2, 3, and 8 NE all others						

LAA=Likely to Adversely Affect; NLAA=May Affect, Not Likely to Adversely Affect; NE=No Effect; double dashes = N/A

[a]This action does not have a federal nexus and is presented here for illustrative purposes only.

2.6 Cumulative Effects

The implementing regulations for section 7 define cumulative effects to include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this Opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

2.6.1 Bull Trout

Within the action area, there are numerous state, tribal, local, and private actions that potentially affect bull trout. Many of the categories of on-going activities with potential effects to bull trout and bull trout critical habitat were identified in the Status of the Species and Environmental Baseline sections of this Opinion. These activities include timber harvest, road building, grazing, water diversion, residential development, and agriculture. The Service assumes that future private and state actions will continue within the action area, and will increase as human population density rises. As the human population in the action area continues to grow, demand for agricultural, commercial, and residential development is also likely to grow. The effects of new development caused by that demand are likely to reduce the conservation value of bull trout habitat within the action area.

City, state, and county governments have ongoing weed spraying programs, some with less-stringent measures to prevent water contamination. Unknown amounts of herbicides are sprayed annually (and sometimes several times a year) along road right-of-ways by state and county transportation departments. Private landholders also spray unknown chemicals in unknown amounts. Any private herbicide use could potentially combine with contaminants from other federal and non-federal activities, and could contribute to formation of chemical mixtures or concentrations that could kill or harm bull trout. In addition, fish stressed by elevated sediment and temperatures are more susceptible to toxic effects of herbicides. While the mechanisms for cumulative effects are clear, the actual effects cannot be quantified due to a lack of information about chemical types, quantity, and application methods used.

Ongoing actions that result in beneficial effects to fisheries resources include those actions aimed at protecting, enhancing, or restoring aquatic and riparian habitat in the basin. Activities carried out by state, tribal, and local governments under the various salmonid recovery planning efforts will continue in the future throughout the listed species' range, including the action area. For example, the Salmon Recovery Funding Board will continue to provide grants to local organizations in watersheds in the action area to restore and protect salmon habitat, and state salmon recovery plans will continue to provide a recovery framework for various fish populations in the action area. Such future tribal, state, and local government actions adhering to the plans will likely to be implemented through legislation, administrative rules, policy initiatives, or permitting. Government and private actions may include changes in land and water uses (including ownership and intensity) and habitat improvements, any of which could impact listed species or their habitat. Watershed assessments and other educational programs may further reduce the adverse effects associated with land uses in the action area by continuing to raise public awareness about the potentially detrimental effects of various land uses (e.g., timber harvest, roads, and grazing) on salmonid habitat.

Although these factors are ongoing to some extent and likely to continue in the future, past occurrence is not a guarantee of a continuing level of activity. That will depend on whether there are economic, administrative, and legal impediments or safeguards in place. Therefore, although the Service finds it likely that the cumulative effects of these activities will have adverse effects commensurate with or greater than those of similar past activities; it is not possible to quantify these effects.

2.6.2 Bull Trout Critical Habitat

Within the action area, there are numerous state, tribal, local, and private actions that potentially affect bull trout critical habitat. Many of the categories of on-going activities with potential effects to bull trout critical habitat were identified in the Status and Environmental Baseline sections of this Opinion (sections 2.3.2 and 2.4.2). These activities include timber harvest, road building, grazing, water diversion, residential development, and agriculture. The Service assumes that future private and state actions will continue within the action area, and will increase as human population density rises. As the human population in the action area continues to grow, demand for agricultural, commercial, and residential development is also likely to grow. The effects of new development caused by that demand are likely to reduce the conservation value of bull trout critical habitat within the action area.

City, state, and county governments have ongoing weed spraying programs, some with less-stringent measures to prevent water contamination. Unknown amounts of herbicides are sprayed annually (and sometimes several times a year) along road right-of-ways by state and county transportation departments. Private landholders also spray unknown chemicals in unknown amounts. Any private herbicide use could potentially combine with contaminants from other Federal and non-Federal activities, and could contribute to formation of chemical mixtures or concentrations that could impact water quality (PBF 8). While the mechanisms for cumulative effects are clear, the actual effects cannot be quantified due to a lack of information about chemical types, quantity, and application methods used.

2.7 Conclusion

2.7.1 Bull Trout

The Service has reviewed the current status of the bull trout, the environmental baseline in the action area, effects of the Programs, and cumulative effects, and it is our conclusion that the ongoing action is not likely to jeopardize the continued existence of the bull trout. The Programs' activities adversely affecting bull trout include broodstock collection, smolt releases, RM&E activities, water withdrawal, and in-water facility maintenance. Some activities may be in downstream proximity to bull trout SR habitat[8] but do not occur in that habitat. Because adverse effects are limited to individual feeding, migrating, or overwintering bull trout, the Service does not expect adverse effects at the larger population, core area, recovery unit, or rangewide levels.

2.7.2 Bull Trout Critical Habitat

The Service has reviewed the current status of bull trout critical habitat, the environmental baseline in the action area, effects of the Programs, and cumulative effects, and it is our conclusion that the ongoing action is not likely to destroy or adversely modify designated critical habitat for bull trout. The Programs are likely to adversely affect PBFs 2 (migration habitat), 3 (prey base), 4 (complex habitat), 5 (water temperature), 7 (natural hydrograph), 8 (water quality and quantity), and 9 (non-native species) (Table 14). However, the Programs' activities will only impact bull trout FMO habitat, not SR habitat. Because adverse effects are limited to discrete reaches of FMO (or non-spawning) habitat, we are not expecting adverse effects to bull trout critical habitat at the larger CHSU, CHU, or rangewide designation levels.

2.8 Incidental Take Statement

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened fish and wildlife species, respectively, without specific exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm in the definition of take in the Act means an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to listed species by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering.

[8] Red River in the vicinity of the Red River Satellite is designated as SR habitat, but spawning does not occur in the vicinity of the facility due to high water temperatures. Bull trout spawn higher in the watershed upstream of the facility.

Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the NMFS, BPA, FWS-Fisheries, LSRCP, and Corps, as the federal action agencies, for the exemption in section 7(o)(2) to apply. These requirements may become binding conditions of any authorizations or funding contracts issued to the program operators (i.e., IDFG, the NPT, and the Service). The action agencies have a continuing duty to regulate the activities covered by this incidental take statement. If the action agencies (1) fail to assume and implement the terms and conditions, or (2) fail to require the program operators to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the authorization or funding contract documents, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the NMFS, BPA, FWS-Fisheries, LSRCP, and Corps shall require that IDFG, NPT, and FWS-Fisheries report on the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

2.8.1 Form and Amount or Extent of Take Anticipated

The Service has determined that the Programs' broodstock collection, juvenile releases, RM&E, water withdrawals/diversions, and in-stream maintenance are likely to result in the incidental take of bull trout through capture and handling, competition and predation, reductions in available stream habitat, and increases in suspended sediment and turbidity. These effects pathways will result in incidental take of bull trout in the forms of harassment, harm, and mortality (see Section 2.5.2.1 for details).

Table 15 shows the Incidental Take Limits for the Programs[9]. The low limits for lethal take shown in Table 15 are not unreasonable to expect based on past reported capture rates, the nature of many of the activities, and the associated stress from capture and handling. We opted to provide some margin for unforeseen circumstances for activities where no or very low take has been reported in the past, without providing for excessive take. The fact that mortality is possible for all the activities shown in Table 15 is based on reported take for a number of the activities.

[9] Angling for South Fork Clearwater (Localized) steelhead broodstock may result in the incidental take of bull trout. However, anglers hold state fishing licenses and are fishing under IDFG established fishing regulations; therefore, any angling related take of bull trout would be permitted under the state's 4(d) authorization and is not included in this incidental take statement.

Table 15. **Annual incidental take limits for bull trout by Program activity.**

Activity	Facility/Method	Agency Operators	Funding Source	Dates of Activity	Incidental Take Limits	
					Non-lethal	Lethal
Broodstock Collection	Nez Perce Tribal Hatchery	NPT	BPA/LSRCP	May - Sep	2	1
	Lolo Creek Weir and Trap	NPT	BPA	May - Sep	2	1
	Dworshak NFH	FWS-Fisheries NPT	LSRCP - Spring Chinook COE – B-run Steelhead	Almost year-round for combined hatchery programs	10	2
	Kooskia NFH	NPT	FWS-Fisheries	May - Dec	5	1
	Newsome Creek Weir	NPT	BPA	May - Sep	6	1
	Crooked River Trap	IDFG	LSRCP	May – mid-Sep	60	2
	Red River Trap	IDFG	LSRCP	May - Sep	25	1
	Powell Trap and Satellite (Walton Creek)	IDFG	LSRCP	May – mid-Sep	40	2

Activity	Facility/Method	Agency Operators	Funding Source	Dates of Activity	Incidental Take Limits	
					Non-lethal	Lethal
Acclimation and Release	Red River Trap and Satellite	IDFG	LSRCP	Mar – early Apr	All bull trout in the reach of concern See surrogate #1 below	
	Powell Satellite (Walton Creek)	IDFG	LSRCP	Mar – early Apr	All bull trout in the reach of concern See surrogate #1 below	
	Juvenile releases into Meadow Creek and Lower and Upper Selway River	NPT IDFG FWS-Fisheries	BPA LSRCP	Mid-Jun	All bull trout in the reach of concern See surrogate #1 below	
RM&E	Lolo Creek juvenile screw trap	NPT	BPA	Feb - Nov	5	--
	Newsome Creek juvenile screw trap	NPT	BPA	Feb - Nov	50	2
	SF Clearwater juvenile screw trap	NPT	BPA	Feb - Nov	100	4
	Meadow Creek juvenile screw trap	NPT	BPA	Feb – Nov	5	1
	RM&E Surveys	NPT	BPA	Jun - Oct	10	1

Activity	Facility/Method	Agency Operators	Funding Source	Dates of Activity	Incidental Take Limits	
					Non-lethal	Lethal
	associated with Nez Perce Tribal Hatchery program at Lolo Creek Newsome Creek, and Meadow Creek and Selway River sites				Per survey tributary per year	Per survey tributary per year
Water Withdrawals/ Diversions	Crooked River Trap	IDFG	LSRCP	May - Sep	All bull trout in the reach of concern See surrogate #2 below	
	Red River Trap and Satellite	IDFG	LSRCP	May - Sep	All bull trout in the reach of concern See surrogate #2 below	
	Powell Satellite (Walton Creek)	IDFG	LSRCP	May – Sep	All bull trout in the reach of concern See surrogate #2 below	
Maintenance – in-water	Nez Perce Tribal Hatchery	NPT	BPA	Jul 1- Aug 14	All bull trout in the reach of concern See surrogate #3 below	
	Clearwater Fish Hatchery	IDFG	LSRCP	Jul 1 – Aug 14	All bull trout in the reach of concern See surrogate #3	

Activity	Facility/Method	Agency Operators	Funding Source	Dates of Activity	Incidental Take Limits	
					Non-lethal	Lethal
					below	
	Dworshak NFH	FWS-Fisheries/NPT	FWS-Fisheries/LSRCP/USCOE	Jul 1 – Aug 14	All bull trout in the reach of concern See surrogate #3 below	
	Kooskia NFH	NPT	FWS-Fisheries	Jul 1 – Aug 14	All bull trout in the reach of concern See surrogate #3 below	
	Newsome Creek Weir (RKM 0.1) and Newsome Creek Acclimation Site (RKM 8.1)	NPT	BPA	Jul 1 – Aug 14	All bull trout in the reach of concern See surrogate #3 below	
	Crooked River Trap	IDFG	LSRCP	Jul 1 – Aug 14	All bull trout in the reach of concern See surrogate #3 below	
	Red River Trap and Satellite	IDFG	LSRCP	Jul 1 – Aug 14	All bull trout in the reach of concern See surrogate #3 below	
	Powell Satellite (Walton Creek)	IDFG	LSRCP	Jul 1 – Aug 14	All bull trout in the reach of concern See surrogate #3 below	

The federal action agencies will exceed the authorized level of take if the above incidental take limits are exceeded or if take occurs outside the facility locations or the timeframes shown in Table 15.

Due to the difficulty of observing take of bull trout from the release of hatchery steelhead juveniles, water withdrawals/diversions, and in-stream facility maintenance the Service will use the observed probability of salmon and steelhead residualism (see Section 2.5.1.2), the occurrence of dewatering (see Section 2.5.1.4), and suspended sediment (see Section 2.5.1.7), respectively, as surrogates for take.

1. For the release of juvenile salmon and steelhead associated with the sites identified in Table 15, the surrogate for take is the percentage of salmon and steelhead from the releases that are observed to be parr, precociously maturing, or precociously mature, immediately prior to release. Incidental take will be exceeded if this number is greater than 5 percent for each release group averaged over 5 years (after NMFS 2017b).
2. For water withdrawals/diversions at the facilities shown in Table 15, authorized take will be exceeded if the associated streams are dewatered within the reaches between the intakes and the returns during critical periods (March through June and August through October) when bull trout are migrating to and from SR habitat.
3. For in-stream maintenance activities with the potential for generating suspended sediment/turbidity shown in Table 15, authorized take will be exceeded if the downstream extent of any visible work-associated sediment plume extends further than 600 feet and lasts more than 5 continuous hours.

If the authorized level of take is exceeded, contact and coordinate with the Service immediately to assess the feasibility of adjusting the particular activity to allow for its continued operation.

This Incidental Take Statement remains valid until NMFS's authorizations expire.

2.8.2 Effect of the Take

In the accompanying Opinion, the Service determined that this level of anticipated take is not likely to jeopardize the continued existence of the bull trout across its range.

Program broodstock collection and RM&E activities occur in FMO or designated SR areas where spawning habitat is not present (e.g., Red River trap and satellite) in the waterbodies shown in Table 15; as such, only adult, subadult, and outmigrating juvenile bull trout will be subject to incidental take. Because adverse effects are limited to individual feeding, migrating, and overwintering bull trout, we are not expecting adverse effects at the larger population, core area, recovery unit, or rangewide levels. Impact minimization measures incorporated into the hatchery program are expected to reduce the level of incidental take.

2.8.3 Reasonable and Prudent Measures

The Service concludes that the following reasonable and prudent measure is necessary and appropriate to minimize the take of bull trout caused by the proposed action.

- Minimize the potential for harassment, harm and mortality to bull trout from broodstock collection, acclimation and release, RM&E, water withdrawals, and in-stream hatchery maintenance.

2.8.4 Terms and Conditions

In order to be exempt from the prohibitions of section of 9 of the Act, the agencies must comply with the following terms and conditions, which implement the reasonable and prudent measure described above. These terms and conditions are non-discretionary.

1. Implement the Programs as described in the Assessment and this Opinion, including implementation of all applicable impact minimization measures, as described in Section 2.1.5.
2. For the release of juvenile salmon and steelhead at sites associated with the locations shown in Table 15, visually monitor each release group and ensure that, immediately prior to release, the percentage of parr, precociously maturing, or precociously mature salmon and steelhead does not exceed 5 percent using a five-year running average, beginning with the 2018 release. If it is apparent from the numbers observed in years prior to the fifth year, that the average will exceed 5 percent before five years, the operators will contact the Service in the year the likely exceedance occurs (after NMFS 2017b).
3. For water withdrawals/diversions, ensure that dewatering does not occur in the reaches between the intakes and returns at the facilities indicated in Table 15 during critical periods (March through June and August through October) when bull trout are migrating to and from upstream SR habitat.
4. For suspended sediment generating activities during in-stream maintenance at the facilities indicated in Table 15, visually monitor the sediment plume and adjust maintenance activities (e.g., halt/delay activities until the plume subsides, implement additional sediment containment measures, etc.) to ensure that the plume does not extend more than 600 feet downstream and lasts for more than 5 continuous hours.

2.8.5 Reporting and Monitoring Requirement

In order to monitor the impacts of incidental take, the Federal agency or any applicant must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [(50 CFR 402.14 (i)(3)]. NMFS, BPA, FWS-Fisheries, LSRCP, and Corps shall ensure through the respective funding agency's binding language for the operators to annually report on compliance with this Opinion's terms and conditions.

1. Annually by March 31, for the previous calendar year, NMFS, BPA, FWS-Fisheries, LSRCP, and Corps shall provide, as required through the annual contracting process, and

supplied by program operators, a report to the Service documenting the number of bull trout captured and handled during implementation of the activities shown in Table 15. The report shall include the date each bull trout was captured and released, as well as general information on life history stage and condition at capture (e.g., presence of injuries). The report shall also contain the results of (1) monitoring the percentage of parr, precociously maturing, or precociously mature juvenile salmon and steelhead observed immediately prior to releases at the sites shown in Table 15; (2) visual monitoring of stream levels at the Crooked River Trap, Red River Trap and Satellite, and Powel Satellite (Walton Creek), between the hatchery intakes and returns, during critical times when bull trout are migrating to and from SR habitat (March - June and August - October); and (3) visual monitoring of the extent and duration of turbidity plumes generated during instream maintenance work at facilities indicated in Table 15. Submit all reports to: U.S. Fish and Wildlife Service, Idaho Fish and Wildlife Office, 1387 S. Vinnell Way, Suite 368, Boise, Idaho 83709.

2. In the event that the number of bull trout incidentally killed by the Programs' activities exceeds the limits set forth in Table 15, immediately cease the activity resulting in death, and notify the Service's Idaho Fish and Wildlife Office (IFWO) (208-378-5253). Such notification must be followed up in writing to the IFWO within three working days, at which time the agency operator must provide a report of the circumstances that led to the mortality, including: date, time, and precise location; disposition of the dead or injured bull trout[10]; and a description of the changes in activity protocols that will be implemented to reduce the likelihood of such injury or mortality from reoccurring. The incident should also be discussed in the annual report that is subsequently submitted.

2.9 Conservation Recommendations

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery programs, or to develop new information on listed species.

1. Coordinate bull trout recovery with listed anadromous fish species recovery in the Clearwater River Geographic Region.

2. A Conservation Recommendation in the Mid-Columbia Recovery Unit Implementation Plan for Bull Trout (USFWS 2015d) suggests that releasing "excess hatchery stock in areas where bull trout and anadromous fish historically coexisted, and where anadromous populations are currently depressed, may aid bull trout recovery." Consistent with the recovery plan, the Service recommends that streams in the Clearwater River Basin (specifically the Lochsa, Selway, Crooked, Colt Killed, and Middle Fork Creeks/Rivers)

[10] Designated depository: The Idaho Museum of Natural History, Dr. C. R. Peterson, Curator of Fish, Campus Box 8007, Idaho State University, Pocatello, Idaho 83209.

should be targeted for future evaluations and studies to determine where these excess hatchery releases may benefit bull trout.

3. In order to increase our understanding of bull trout movements in the mainstem lower Snake and Columbia rivers and interactions between subbasin bull trout populations, work with partners to collect genetic samples (e.g., fin clips) from all un-marked bull trout that are handled in the mainstem (e.g., Lower Granite Dam adult trap) or lower reaches of tributary subbasins to establish origin. In addition, these same fish should be PIT-tagged if possible so their movements could be determined from the wide array of PIT detection sites at the mainstem dams and within tributary subbasins (Barrows et al. 2016, pp. 199-200).

2.10 Reinitiation Notice

This concludes formal consultation on the continued operation of the Clearwater Steelhead, Spring/Summer Chinook Salmon and Coho Salmon Hatchery Programs. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if:

1. The amount or extent of incidental take is exceeded.
2. New information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion.
3. The agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this Opinion.
4. A new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

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4. APPENDIX

4.1 Appendix A. Bull Trout Protocol at Dworshak National Fish Hatchery

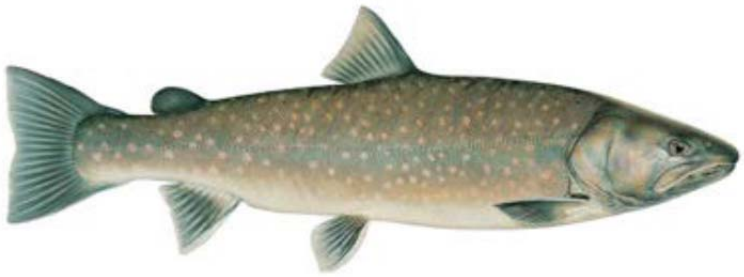
Bull Trout Protocol – DNFH

Updated September 28 2017

Bull Trout Protocol at Dworshak National Fish Hatchery

1. Please familiarize yourself with the September 28, 2017 memorandum from the DNFH Complex Manager entitled; "*Bull Trout Trapping at DNFH Guidance 9 28 17*" so you fully understand the importance of this protocol. Also, please ensure you are able to identify a bull trout by knowing its morphological characteristics. There is a picture of a bull trout in the vicinity of the sorting table and at the bottom of this protocol.
2. All fish species spawned at Dworshak Fish Hatchery will be anesthetized in the loading basket according to label as appropriate. Once sufficiently docile, the basket of fish is lifted up and spilled onto the sorting table.
3. As the anesthetized fish are raised in the basket begin looking immediately for any bull trout. Bull trout are to be removed and processed first.
4. Note and record the following onto the paper *Bull Trout Log* posted in the spawning area:
    a. Date and time;
    b. Fork length;
    c. Fish condition at handling (Excellent, Good, Poor);
    d. If condition is "Poor" describe why;
    e. Visible marks or tags, and any other pertinent information;
    f. Fish condition at release (added to the log after released).
5. Processing the bull trout should take less than a minute. After collecting and recording data, place the fish into the tub of fresh water located at the end of the CWT scanner. Take one of the red plastic fish transport tubes and fill it three-quarters with fresh water. Gently and quickly place the fish into the transport tube.
6. Immediately carry the bull trout in the transport tube to the fence gate located north of the System 1 Clarifiers. Carefully navigate the rip rap and gently release the fish into the North Fork Clearwater River, noting its condition at release. Add this information to the *Bull Trout Log*.
7. After spawning is concluded, enter the information from the *Bull Trout Log* into the FINS or other appropriate database, and into the appropriate file in the hatchery shared drive. Paper copies of the *Bull Trout Log* should be retained as well.

8. The Production Biologist in charge of the specie and brood year being trapped (or their designee) should send an email describing the bull trout incidental take with all data collected on the same day it occured. The email should be sent to both of the Assistant Hatchery Managers, the Hatchery Manager, the SRBA Coordinator, the Idaho FWCO Project Leader, and the Dworshak Fisheries Complex Manager. This redundant record keeping and communication will ensure all bull trout collections are properly documented and shared.



Bull Trout: Note the light spots on a dark background and clear fins with no markings.