DWORSHAK RESERVOIR
NPDES PERMIT ISSUANCE

FOR THE
RESERVOIR NUTRIENT SUPPLEMENTATION PILOT PROJECT
US ARMY CORPS OF ENGINEERS
WALLA WALLA DISTRICT

Biological Assessment

for

Threatened and Endangered Species,
Critical Habitat, and Essential Fish Habitat

Under the Jurisdiction of:

National Marine Fisheries Service
and
U.S. Fish and Wildlife Service

Environmental Protection Agency
Region 10
Office of Water and Watersheds
NPDES Permits Unit

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If additional information regarding this document is required, please contact EPA at 206-553-6251.

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1. Introduction

The Environmental Protection Agency (EPA) proposes to issue a permit under the National Pollutant Discharge Elimination System (NPDES) which will address the implementation of a five-year nutrient supplementation pilot project beginning in 2011 or 2012 and lasting through 2016 or 2017. The nutrient addition project would be conducted by the US Army Corps of Engineers (Corps), Walla Walla District, in coordination with the Idaho Department of Fish and Game (IDFG), and the Nez Perce Tribe (NPT) in which liquid nitrogen fertilizer would be applied to Dworshak Reservoir, Clearwater County (Figure 1), Idaho in an effort to increase productivity of beneficial microorganisms and improve the ecosystem of the reservoir.

The Federal action for this consultation is the issuance of the NPDES permit by the EPA, and, as such, the EPA is the lead agency. The Corps is another Federal agency involved in the consultation, as the issuance of the NPDES permit will allow the Corps to implement the nutrient supplementation project. This biological assessment addresses both the issuance of the NPDES permit by EPA and the execution of the nutrient supplementation project at Dworshak Reservoir by the US Army Corps of Engineers, Walla Walla District.

2. Background / History

A nutrient supplementation project was originally initiated in 2007 by the Corps and IDFG, and continued through the spring of 2010. The project involved the application of fertilizer to Dworshak Reservoir. The project halted in May 2010 because it was determined by the Environmental Protection Agency (EPA) that a National Pollutant Discharge Elimination System (NPDES) permit was required. A biological assessment (BA) which addressed the nutrient application was completed by the Corps in August 2006 and informal consultation under section 7 of the Endangered Species Act concluded when the Corps received letters of concurrence from both the US Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS). The FWS sent a letter received September 12, 2006, (File #352.3250.06 2006-I-1014) concurring with the Corps determination that the project "is not likely to adversely affect (NLAA) bull trout (*Salvelinus confluentus*), the bald eagle (*Haliaeetus leucocephalus*), and the gray wolf (*Canis lupus*)." The Corps received a concurrence letter from NMFS dated December 5, 2006 (File #2006/05137) stating NMFS "concurred with the Corps that the Dworshak Reservoir Nutrient Supplementation Project will not adversely affect EFH". NMFS further concluded that "the subject action would have no more than a negligible potential to adversely affect ESA-listed Snake River (SR) fall Chinook salmon and Snake River Basin (SRB) steelhead." NMFS concurred with the Corps finding "that the subject action is not likely to adversely affect listed Snake River fall Chinook salmon and Snake River Basin steelhead."

2.1. Supplemental Information

The August 2006 BA is attached for reference.

3. Project Description

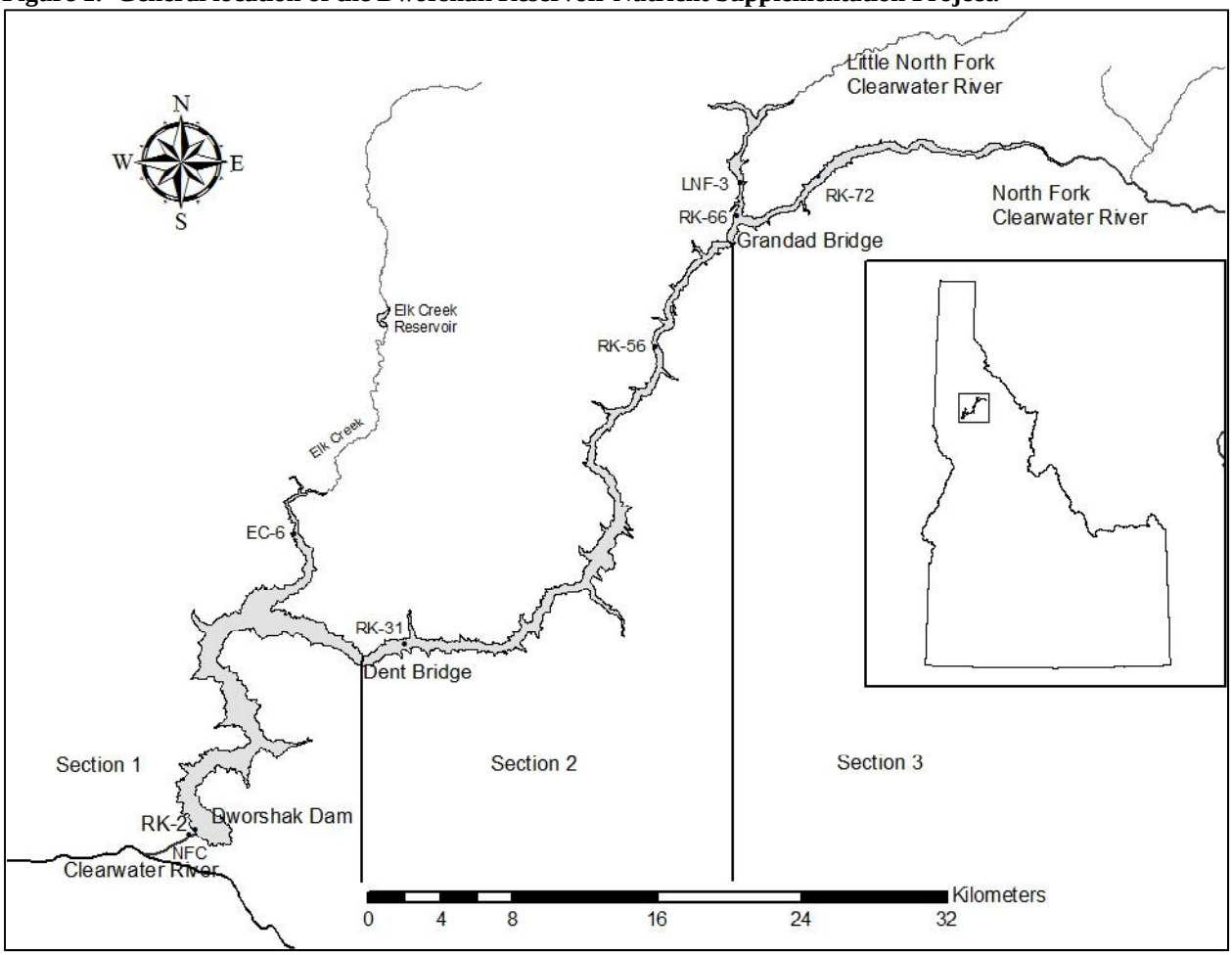
3.1. Authority

The EPA has authority to issue NPDES permits under Section 402 of the Federal Water Pollution Control Act (FWPCA) Amendments of 1972 (33 USC 1251 et seq.). Implementing regulations for the NPDES program are generally found in 40 CFR Part 122. Certain aspects of the NPDES program were changed by the 1977 Clean Water Act and the 1987 Water Quality Act, but the basic structure of the NPDES program remains unchanged from the framework established in the 1972 FWPCA Amendments. A more detailed discussion of the NPDES statutory framework can be found in Section 1.3 of the *U.S. Environmental Protection Agency NPDES Permit Writers' Manual* (EPA 2010). The FWPCA, as amended, is generally referred to as the Clean Water Act (CWA).

The Corps has authority to maintain and manage agency lands for recreation, flood control, and habitat for fish and wildlife under Section 1 of the Rivers and Harbors Act of 1945, Public Law 14 Flood Control and Watershed Development: Section 4 of the Flood Control Act of 1944; and Public Law 85-624, Fish and Wildlife Coordination Act, August 1959; and, as per ER 1130-2-540. The Dworshak Project authority also comes from Section 2 of the Forest Cover Act and PL 89-72 provides for the consideration of fish and wildlife enhancement opportunities at Corps water resources development projects.

3.2. Project Area and Action Area

Figure 1. General location of the Dworshak Reservoir Nutrient Supplementation Project.



3.2.1. Footprint

Dworshak Dam is located at River Mile 1.9 on the North Fork Clearwater River in Clearwater County, Idaho. The nearest communities are Ahsahka, just downstream from the dam, and Orofino, four miles to the east. The project area extends from the dam to the upper reaches of the reservoir. The action area extends into the tributaries upstream of the reservoir and down the North Fork Clearwater River below the dam. The reservoir extends over 50 miles upstream from the dam.

3.2.2. HUC, Township, Range, Section

The hydrologic unit codes (HUC) for this action are 17060306 and 17060308. The township, range, and sections of the dam are T37N, R1E, S26 and 35.

3.2.3. Quantification of Area Potentially Affected

Dworshak Dam is located in Clearwater County, Idaho at river mile 1.9 of the North Fork Clearwater River. At normal full pool the reservoir has a water depth at the dam of over 600 feet, has a volume of almost 3.5 million acre-feet, and extends over 50 miles. Fertilizer is not applied to all areas of the reservoir. Water from the dam flows into the North Fork Clearwater River and then into the Clearwater River.

3.3. Project Purpose and Objectives

The proposed action is the issuance of an NPDES permit by the EPA and the nutrient supplementation through the Corps. The purpose of the nutrient supplementation project is to improve the kokanee fishery and maintain nutrient balance in Dworshak Reservoir. Because of the declining fertility of the reservoir, the health of the kokanee population has declined. The zooplankton populations within the reservoir, which kokanee feed on, typically are depleted by mid-summer. Many kokanee now spawn as one-year-olds, instead of as is typical, two-year olds, presumably because of the limited food supply. Kokanee die after spawning, so any early spawners would not contribute to the fishery.

The objectives of this pilot project are:

- provide a balanced nutrient loading for Dworshak Reservoir throughout the spring and summer;
- improve the carbon flow within the reservoir, which may result in an increase in the phytoplankton community, promoting a strong zooplankton community that may become an abundant forage base for kokanee, rainbow trout, and smallmouth bass fry;
- improve water quality by decreasing blue-green algae abundance, promote desirable phytoplankton and zooplankton, and improve late season water clarity, and
- improve the overall health and size structure of the kokanee population in the reservoir.

3.4. Project Activities

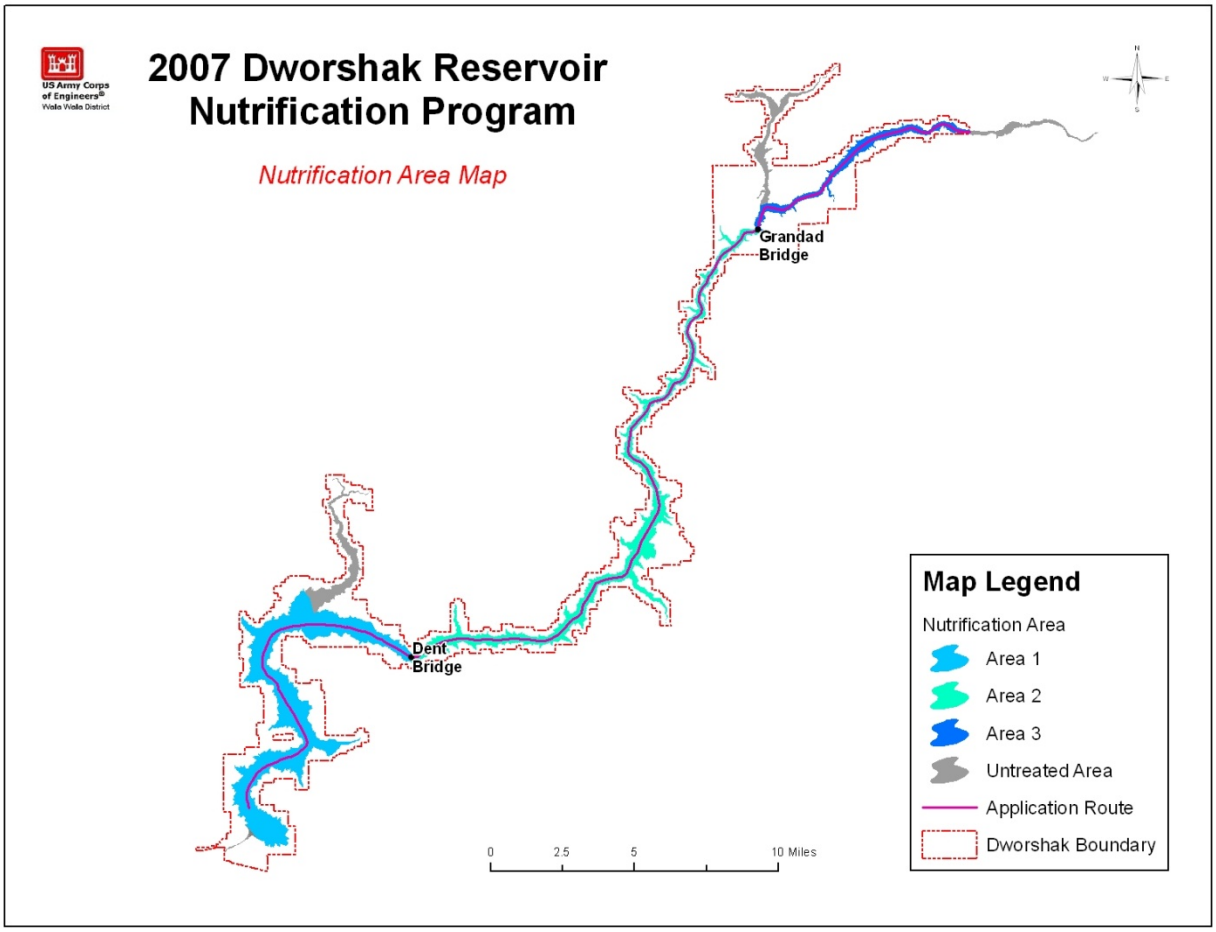
Fertilizer will be applied once per week by the Corps. The NPDES permit would allow nutrient application from April 1st through September 30th each year (2011 or 2012 through 2016 or 2017). However, specific application start and end dates will change from year to year and depend primarily on water temperature. Generally, application would start around the last week of April and end the last week of September. All applications will begin near the mouth of Indian Creek. A barge used for application of the fertilizer will run at 6 mph in order to discharge up to 3,100 gallons of nitrate in areas 1, 2, and 3 (Figure 3). The reservoir contains approximately 93 billion gallons of water at high pool (1600 msl) which equates to about 1 teaspoon of nitrogen fertilizer per 39,000 gallons of water. Barge speed can be adjusted, and the nozzles will automatically adjust the discharge rate according to barge speed. Dent Bridge (RM 16.8) is the end of the first zone. A new rate is input for zone 2 and discharge runs upstream to Grandad Bridge (RM 40.5). This process continues through zone 3, which ends between Benton Creek to

Minicamp 47, depending on the level of the reservoir. The barge returns to Grandad and is anchored at the floating toilet. The following week, the crew returns to barge at Grandad via boat and repeats the application process in reverse and unloads the empty truck and parks the barge at the end of trip.

Liquid nitrogen fertilizer (ammonium nitrate, 11 pounds per gallon concentration) is applied. Application rate varies with lake level and season. For example, one application in 2010 was 544 gallons applied over 9.5 miles (5.73 gal per minute) of the reservoir between Indian Creek and Dent Bridge.

Figure 2. Photo of the barge and fertilizer truck used to apply nitrogen fertilizer to Dworshak Reservoir.

Figure 3. Location of the Dworshak Reservoir Nutrient Supplementation Project application zones.



3.5. Project Timeline

The project timeline will begin from the date of issuance of the NPDES permit for a 5-year period. If the permit is issued in time for nutrient supplementation to occur in 2011, then the permit will end in September 2016; if the permit is issued later than necessary for any supplementation in 2011, the permit will end in the spring of 2017.

3.6. Proposed Conservation Measures

EPA and the Corps propose the following conservation measures as part of the proposed action.

3.6.1. Impact Minimization Measures

Due to the nature of this proposed project measures to reduce impacts center around accidental spills of the fertilizer or leaks from equipment, including the barge. Therefore, the best management practices will be somewhat unique. The following Best management practices (BMP) will be implemented by the Corps:

1) Refueling the barge will take place at Big Eddy Marina, or an off-reservoir fuel facility where spill kits and absorbent mats will be available and will be capable of absorbing 125% of any potential fuel or petroleum spill.

2) Application equipment (the truck, generators, etc.) will be inspected for leaks and cleaned prior to loading on the barge. Any detected leaks will be repaired before the vehicle or equipment is loaded on the barge.

3) A spill prevention and control plan will be developed and discussed to equipment operating personnel prior to fertilizer application. The Plan will provide detailed descriptions on how to prevent a spill or ensure effective and timely containment of any chemical spill. The Spill Plan will include spill control, containment, and clean-up procedures.

4) In the event of detecting over application or a spill of nutrient fertilizer, all application activities will cease immediately. The spill will be dispersed as quickly as possible using any reasonable means available, such as running over the spill area in the reservoir with the barge in order to mix the fertilizer with the barge wake and propellers.

5) The volume of liquid fertilizer transported on the application barge would not exceed the total quantity of the weekly application by more than 10 percent.

6) The application of the fertilizer would be computer controlled and linked to a GPS.

7) The permit requires the Corps to apply fertilizer in a manner such that the fertilizer is rapidly mixed with the receiving water. The fertilizer would be distributed through a spreader bar to distribute it over a wider area and would be mixed by the barge's prop wash.

8) Restricted use areas (400 yards) related to bald eagle nesting would be avoided. The barge would remain in motion while passing by nest sites.

9) The permit requires monitoring to be conducted periodically at multiple locations to analyze the effects of the added nutrients. See the draft permit at part I.C, “Surface Water Monitoring.” If monitoring showed significant negative effects, the program would be modified or halted. The permit requires that the Corps cease nutrient additions until obtaining approval from EPA and the Idaho Department of Environmental Quality (IDEQ) to resume if the annual median chlorophyll *a* concentration in the reservoir exceeds 3.0 µg/L or if the annual median Secchi disk depth is less than 3.0 m.

10) The permit requires the Corps to take reasonable steps to prevent tampering or vandalism resulting in an uncontrolled discharge of fertilizer to surface waters.

11) The Corps of Engineers will adhere to Idaho Department of Environmental Quality consent order BMPs.

3.6.2. Mitigation

This project would be governed by the NPDES permit. No mitigation would be required, but the permit is conditioned such that the activity will meet Idaho water quality standards so that the beneficial uses of Dworshak Reservoir and the Clearwater River are protected. The Corps will provide the Idaho Department of Environmental Quality a list of the best management practices that will be used to minimize negative effects, a monitoring plan, and a plan for modifying the activity to better protect the beneficial uses of the reservoir if necessary.

3.6.3. Interrelated or Interdependent Actions

The Federal action is the issuance of the NPDES permit by the EPA and the implementation of the Dworshak Nutrient Project by the Corps. The IDFG and Nez Perce Tribe are cooperating partners in the project. The IDEQ is a participant in the program. No other interdependent or interrelated actions are associated with the proposed program.

4. Status of Species and Critical Habitat

4.1. Species Lists from NMFS and USFWS

The EPA reviewed the current list of threatened, endangered, and candidate species that pertain to the easement area under the jurisdiction of NMFS (http://www.nwr.noaa.gov/ESA-Salmon-Listings/upload/snapshot-7-09.pdf), as well as the USFWS lists for Clearwater County, Idaho (http://www.fws.gov/idaho/species/IdahoSpeciesList.pdf) on May 12, 2011.

Table 1 shows listed species for the project area.

4.2. Identification of Listed Species and Critical Habitat

Table 1. Federal Register notices for final rules that list threatened and endangered species, designate critical habitats, or apply protective regulations to listed species considered in this consultation. Listing status: 'T' means listed as threatened under the ESA; 'E' means listed as endangered; "P" means proposed for listing or designation.

Species	Listing Status	Critical Habitat	Protective Regulations
Chinook salmon (*Oncorhynchus tshawytscha*)			
Snake River fall-run	T 6/28/05; 70 FR 37160	12/28/93; 58 FR 68543	6/28/05; 70 FR 37160
steelhead (*O. mykiss*)			
Snake River Basin	T 1/05/06; 71 FR 834	9/02/05; 70 FR 52630	6/28/05; 70 FR 37160
bull trout (*Salvelinus confluentus*)			
Columbia River Distinct Population Segment (DPS)	T 6/10/98; 63 FR 31647 31674	9/02/05; 70 FR 56211 56311: 10/18/10; 75 FR 63898	
Canada lynx (*Lynx canadensis*)			
Contiguous U.S. DPS	T 3/24/00; 63 FR 16051 16086	2/25/09; 74 FR 8615 8702	
Gray wolf (*Canis lupus*)			
Experimental population (non-essential)	11/22/1994: 59 FR 60266 60281 (Delisted 5/5/11: 76 FR 25590)	n/a	

4.3. Identification of Designated Critical Habitat

Critical habitat has been designated for each fish species. Critical habitat has been designated for SR fall Chinook, and SRB steelhead below Dworshak Dam in the 1.9 miles of the North Fork Clearwater River below Dworshak Dam, and in the Clearwater River. Critical habitat is designated for bull trout in the Clearwater River, Dworshak Reservoir, and many of the reservoir's tributaries. The proposed project area encompasses Dworshak Reservoir in the North Fork Clearwater River. The action area also includes a small portion of the Clearwater River downstream of the confluence with the North Fork. There is no critical habitat for lynx in the Dworshak Project area.

4.4. Status of Species

4.4.1. SR Fall Chinook

4.4.1.1. Listing History

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

4.4.1.2. Life History/Biological Requirements

Detailed life history data (age at spawning, sex ratios, etc.) are plentiful for hatchery populations, but limited and inconsistent for wild populations. More data are also available for some sub-basins and streams than others, and different types of data are available for different streams at different times. Age at spawning and associated fecundity differ between the adults returning to the Middle Fork and main Salmon Rivers and all other areas where information is available. In these two areas, 3-ocean adults (especially females) with higher fecundity predominate, whereas 2-ocean adults with lower fecundity predominate in other areas. This is in spite of the fact that spring- and summer-run Chinook salmon inhabit parts of both areas. This suggests that geography or other environmental factors are more influential in determining age at return than run-timing (Mathews and Waples 1991).

The generalized life history of Pacific salmon involves incubation, hatching, and emergence in freshwater, migration to the ocean, and subsequent initiation of maturation and return to freshwater for completion of maturation and spawning. Juvenile rearing in freshwater can be minimal or extended. Additionally, some male Chinook salmon mature in freshwater, thereby foregoing emigration to the ocean. The timing and duration of each of these stages is related to genetic and environmental determinants and their interactions to varying degrees. Salmon exhibit a high degree of variability in life-history traits; however, there is considerable debate as to what degree this variability is the result of local adaptation or the general plasticity of the salmonid genome.

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

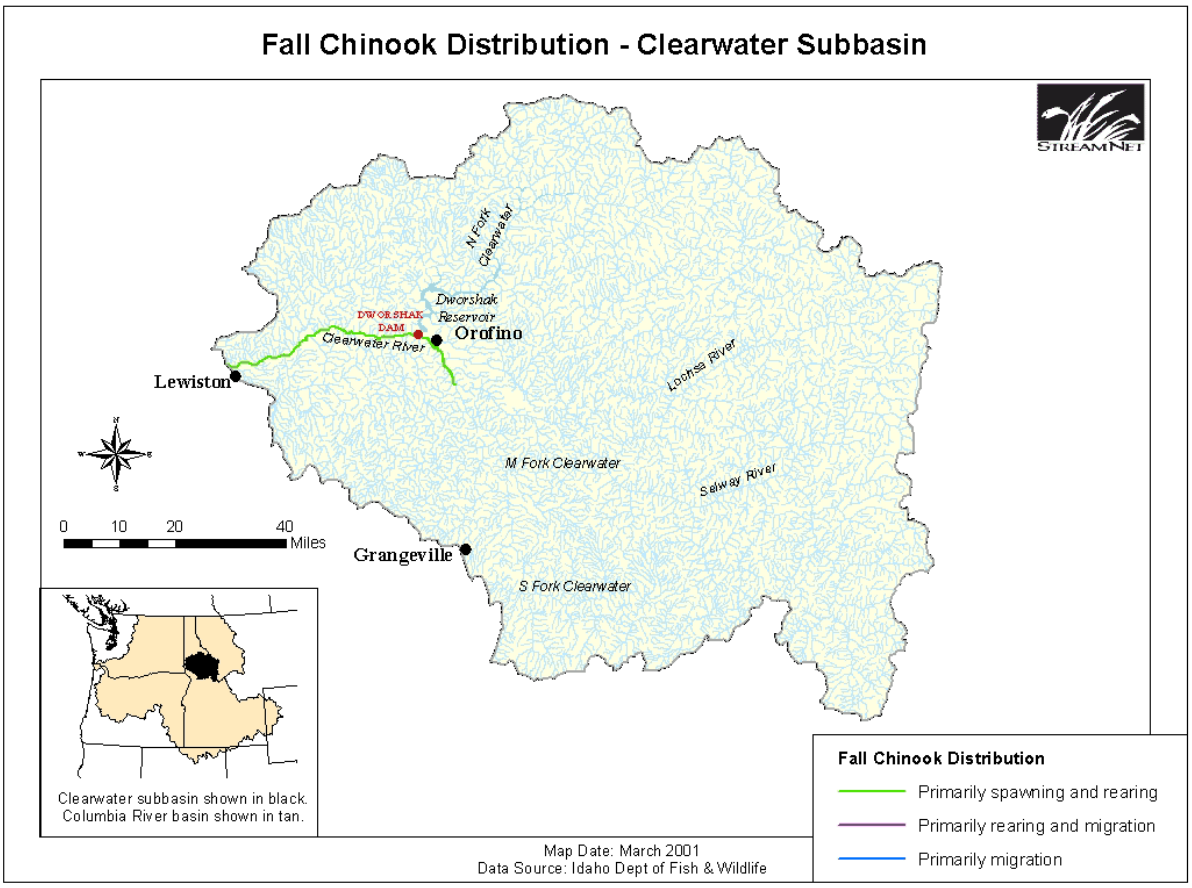
4.4.1.3. Distribution

SR fall Chinook salmon spawning and rearing occurs only in larger, main-stem rivers such as the Salmon, SR, and Clearwater River. Historically, the primary fall-run Chinook salmon spawning areas were located on the upper main-stem SR (Connor *et al*. 2005). A series of SR main-stem dams block access to the upper SR, which has significantly reduced spawning and rearing habitat for SR fall-run Chinook salmon. The vast majority of spawning today occurs upstream from the Lower Granite Dam, with the largest concentration of spawning sites in the Clearwater River, downstream from Lolo Creek. Currently, natural spawning is limited to the SR from the upper end of Lower Granite Reservoir to Hells Canyon Dam, the lower reaches of the Imnaha, Grande Ronde, Clearwater, Salmon, and Tucannon Rivers, and small areas in the tailraces of the lower SR hydroelectric dams (Good *et al.* 2005). Adult SR fall Chinook salmon enter the Columbia River in July and August and reach the mouth of the SR from the middle of August through October. Spawning occurs in the main stem and in the lower reaches of large tributaries in October and November. Based on what is known of upper Columbia River fall Chinook salmon, juveniles in the SR presumably emerge from the gravel in March and April, and downstream migration usually begins within several weeks of emergence. Trapping studies conducted in 1954 and 1955 showed that juveniles moving through the lower SR in March and April were less than 50 mm in length, whereas those migrating in May and June were 60 to 80 mm. Peak fry migration in the Brownlee-Oxbow Dam reach of the SR occurred from April through the middle of May (Waples et al. 1991).

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

SR fall Chinook do not occur above Dworshak Dam. Figure 4 shows the extent of their distribution in the Clearwater River below Dworshak Dam. The area is used as primary spawning and rearing by fall Chinook.

Figure 4. SR fall Chinook Distribution as of 2001 (StreamNet 2010)



4.4.1.4. Factors for Decline

4.4.1.4.1. Historical Pressures on the Species

Snake River fall Chinook salmon are believed to have once lived and spawned in the main-stem Snake River from its confluence with the Columbia River upstream to Shoshone Falls (RM 615). The spawning grounds between Huntington, Oregon (RM 328) and Auger Falls in Idaho (RM 607) were historically the most important for this species; and only limited spawning activity occurred downstream of RM 273 (Waples et al. 1991), about one mile below Oxbow Dam. However, development of irrigation and hydropower projects on the main-stem Snake River have inundated or blocked access to most of this area in the past century.

Construction of Swan Falls Dam (RM 458) in 1901 eliminated access to many miles (about 25 percent) of potential habitat, leaving only 458 miles of useable habitat. Construction of the Hells Canyon Dam complex (from 1958-1967) cut off anadromous fish access to 211 miles (or 46 percent) of the remaining historical fall Chinook salmon habitat upstream of RM 247. Construction of Dworshak Dam in 1972 cut off all but 1.9 miles of the North Fork Clearwater

River from anadromous specie. The lower Snake River Dams allow access to upriver areas, but have further changed the character of the remaining habitat.

4.4.1.4.2. Current Pressures on the Species

Snake River fall Chinook salmon now have access to approximately 100 miles of main-stem Snake River habitat, which is roughly 22 percent of the 458 miles of historic habitat available prior to completion of the Hells Canyon Complex and the four lower Snake River dams. The limited amount of habitat limits the salmon population. These fish are also affected by passage through dams, high water temperatures, predation and poor estuary conditions.

The Snake River system has contained hatchery-reared fall Chinook salmon since 1981. The hatchery contribution to Snake River Basin escapement has been estimated at greater than 47% (Myers *et al.* 1998). Some returning hatchery fall Chinook spawn naturally in the Clearwater River. Artificial propagation is relatively recent, so cumulative genetic changes associated with it may be limited. Wild fish are incorporated into the brood stock each year, which should reduce divergence from the wild population. Release of sub-yearling fish may also help minimize the differences in mortality patterns between hatchery and wild populations that can lead to genetic change.

4.4.1.4.3. Limiting Factors for Recovery

Approximately 80 percent of historical spawning habitat was lost with the construction of a series of dams on the main-stem Snake River. The loss of spawning habitat restricted the ESU to a single naturally spawning population and increased its vulnerability to environmental variability and catastrophic events. The diversity associated with populations that once resided above the Snake River dams has been lost and the impact of hatchery fish and fish from other areas straying to the spawning grounds has the potential to further compromise the genetic diversity of the ESU. Although recent improvements in the marking of hatchery fish and their removal at Lower Granite Dam have reduced the impact of many of these strays, introgression below Lower Granite Dam remains a concern. The Biological Review Team found moderately high risk for all viable salmon population categories and therefore felt that this ESU was at some level of risk despite the recent positive signs.

4.4.1.5. Local Empirical Information

Dworshak Dam, built on the NFCR in the 1970's, permanently prevented upstream fish passage. As a result no anadromous fish species currently occur on Dworshak Reservoir or within any of its tributaries.

4.4.1.5.1. Current Local Population Information

Wild juvenile fall Chinook salmon typically pass through the Lower Snake River from mid-June through September, with double peaks in mid-July and some lingering portion of the annual migration lasting until December. Many of the juvenile fall Chinook salmon out-migrating from the Clearwater and Snake Rivers spend time in shoreline areas (less than 9.8 feet [3 meters] in

depth) in the Lower Granite reservoir and less time in downriver reservoirs, where they prefer sand-substrate areas. When water temperatures reach about 70°F (21.1°C), these fish may have achieved adequate growth and fitness due to the warming conditions of these shallow-water habitat areas. They leave the shoreline areas to either continue rearing or begin their migration in the cooler pelagic zone of the reservoirs.

Though most juvenile Chinook salmon migrate to the ocean as sub-yearlings, passive integrated transponder (PIT) tag detections from 1993 to 1995 brood year juvenile fall Chinook salmon from the Clearwater River were recorded in the spring of 1994 to 1996 at some lower Snake River dams. It is unknown whether these fish overwintered in one or more of the lower Snake River reservoirs. More PIT-tagged fall Chinook salmon out-migrants were detected in the spring of 1994 and 1995 than in the previous year, while the trend was reversed with the 1995 brood year. It is apparent from these detections that some Clearwater River fall Chinook salmon migrate to the ocean as yearlings, rather than as sub-yearlings.

Cold-water releases from Dworshak Dam, aimed at augmenting flows for adult migration, may cause stunted growth rates in juveniles in the late summer and early fall, causing these fish to overwinter. Overwintering and early rearing of fall Chinook salmon in Lake Wallula backwater areas has been documented and it would be logical to assume that the potential for overwintering and rearing exists in the lower Snake River as well.

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

4.4.1.5.2. Ongoing Monitoring

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

4.4.2. SRB Steelhead

4.4.2.1. Listing History

SRB steelhead was listed as a threatened on August 18, 1997 (62 FR 43937) and protective regulations were issued under section 4(d) of the ESA on July 10, 2000 (65 FR 42422). Their threatened status was reaffirmed on June 28, 2005 (70 FR 37160). The DPS includes all naturally spawned steelhead populations below natural and manmade impassable barriers in streams in the SRB of southeast Washington, northeast Oregon, and Idaho, as well as six artificial propagation programs: the Tucannon River, Dworshak NFH, Lolo Creek, North Fork

Clearwater River, East Fork Salmon River, and the Little Sheep Creek/Imnaha River Hatchery steelhead hatchery programs.

4.4.2.2. Life History/Biological Requirements

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

SRB steelhead migrate a substantial distance from the ocean (up to 940 miles) and use high elevation tributaries (up to 6,562 feet above sea level) for spawning and juvenile rearing. SR steelhead occupy habitat that is considerably warmer and drier (on an annual basis) than other steelhead distinct population segments (DPSs). Managers classify up-river summer steelhead runs into two groups based primarily on ocean age and adult size upon return to the Columbia River. A-run steelhead are predominately age-1-ocean fish while B-run steelhead are larger, predominated by age-2-ocean fish. SRB steelhead are generally classified as summer run, based on their adult run timing pattern. SRB steelhead enter fresh water from June to October and, after holding over the winter, spawn during the following spring from March to May. SRB steelhead usually smolt as 2 or 3-year-olds. Outmigration occurs during the spring and early summer periods, coinciding with snowmelt in the upper drainages. Median and 90% passage dates at Lower Granite Dam for PIT tagged groups from the Imnaha River were: wild steelhead trout - May 2 and May 9; and hatchery steelhead trout (NPT and FPC) - May 31 and June 16. Hatchery steelhead trout displayed small peaks in arrival timing at Lower Granite and Little Goose Dams in mid-May to mid-June; however, the general trend at each dam was a long protracted emigration (Blenden et al. 1996).

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

Steelhead adult migration preferred temperatures are between approximately 4°C and 9°C. Steelhead preferred temperatures fall between 10 °C and 13°C, while the upper lethal limit for steelhead is 23.9 °C.

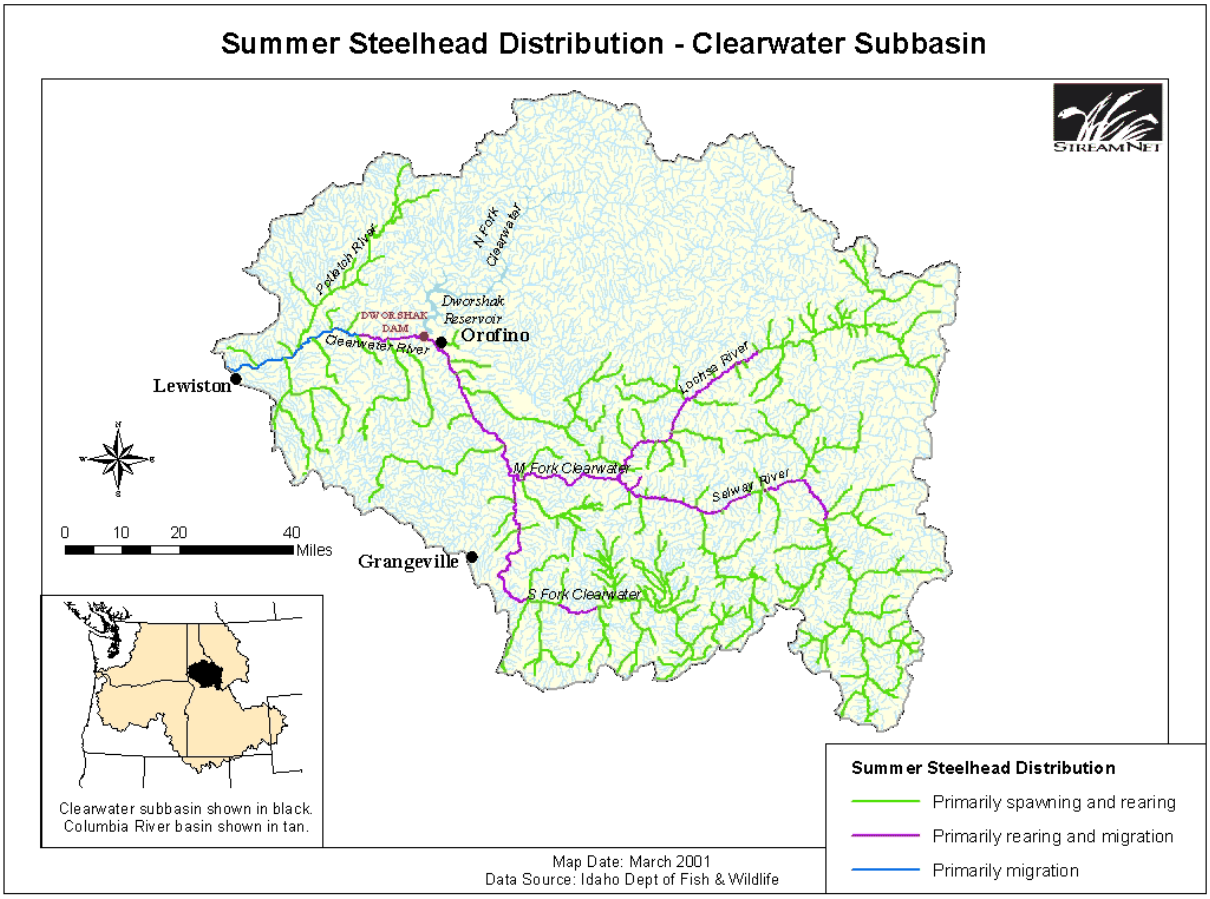
With one exception (the Tucannon River production area), the tributary habitat used by SR steelhead DPS is above Lower Granite Dam. Annual return estimates are limited to counts of the

aggregate return over Lower Granite Dam. Returns to Lower Granite Dam fluctuated widely in the 1980s and remained at relatively low levels through the 1990s. The 2001 run size at Lower Granite Dam was substantially higher relative to the 1990s. The 2002 through 2005 return years have declined annually but continue to remain higher than the 1990s return years. Counts of wild steelhead, which began in 1994, show a marked increase in 2001 and a decreasing trend through 2006, but have increased again through 2010.

4.4.2.3. Distribution

The SR steelhead DPS is distributed throughout the SR drainage system, including tributaries in southwest Washington, eastern Oregon and north/central Idaho (Good *et al.* 2005). SRB steelhead do not occur above Dworshak Dam. The Interior Columbia Basin Technical Recovery Team (ICTRT) identified 26 populations in the following six major population groups (MPGs) for this species: Clearwater River, Grande Ronde River, Hells Canyon, Imnaha River, Lower SR, and Salmon River. The North Fork population in the Clearwater River is extirpated. SRB steelhead do not occur above Dworshak Dam. Figure 5 shows the extent of their distribution in the Clearwater River below Dworshak Dam. The Clearwater River is used as primary spawning and rearing by steelhead.

Figure 5. SRB Steelhead Distribution as of 2001 (StreamNet 2010)



4.4.2.4. Factors for Decline

4.4.2.4.1. Historical Pressures on the Species

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

4.4.2.4.2. Current Pressures on the Species

Hydrosystem projects create substantial habitat blockages in this ESU; the major ones are the Hells Canyon Dam complex (main-stem Snake River) and Dworshak Dam (North Fork Clearwater River). Minor blockages are common throughout the region. Habitat in the Snake River Basin is warmer and drier and often more eroded than elsewhere in the Columbia River Basin or in coastal areas.

4.4.2.4.3. Limiting Factors for Recovery

The reduced amount of suitable habitat may be the main factor limiting steelhead recovery.

4.4.2.5. Local Empirical Information

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

4.4.2.5.1. Current Local Population Information

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

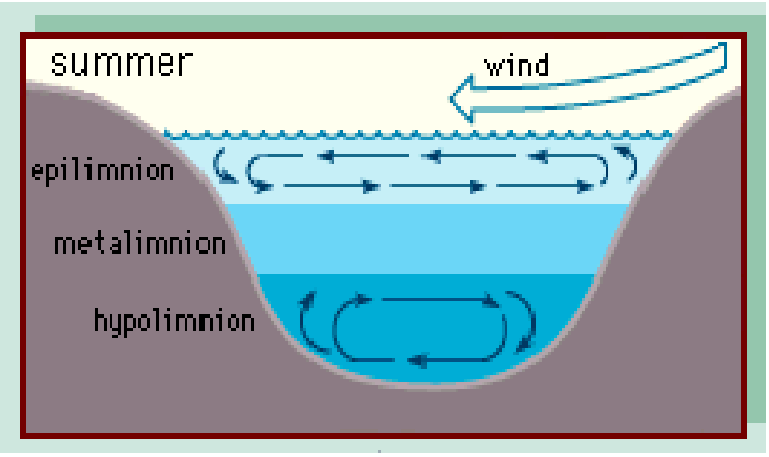
Wild juvenile SR steelhead generally migrate downstream through the lower Snake River, mainly between late March and the end of August. Some rearing or overwintering may occur in the reservoirs.

4.4.2.5.2. Supplemental Hatchery-Origin Steelhead Information

Nutrient supplementation (fertilizing) started in 2007. The data collected from 2007 – May 2010 indicates that the project has not had any negative impact to the chemical or biological conditions within the reservoir. It appears that the biggest factor impacting the chemistry and biology of the systems is the amount of winter precipitation and the run-off pattern in the spring. The amount of nutrients coming into the system from the upper watershed appears to be the key factor affecting the phytoplankton community within the reservoir. In years of high run-off there is more phosphorus added to the system. When this occurs there is an increase of *Microcystis sp.* in the system. Under low to moderate run-off years there is a bloom of the diatom *Fragillaria crotonensis.* Nitrogen is continually the limiting nutrient in the Dworshak system.

However, beginning in 2007 the Dworshak National Fish Hatchery began experiencing higher than normal mortality of juvenile Snake River steelhead in burrows ponds due to Infectious Hematopoietic Necrosis Virus (IHN), a naturally occurring viral infectious disease of steelhead that is present in the Clearwater River and North Fork Clearwater River. Mortality was 4.9% of the hatchery population in 2007. It increased to 22% in 2008 and 44.2% in 2009. In 2007 through 2009, water for the hatchery was pumped from the North Fork Clearwater River, where they had pumped in water to the hatchery for many years. In 2010 the hatchery was able to acquire early season water from the reservoir instead of from the North Fork Clearwater River. Mortality went back down to acceptable levels during 2010. Water from the reservoir is pumped from the hypolimnion layer. During the time when nitrogen is being applied there is essentially no interaction between the epilimnion and the hypolimnion. Based on available data, it is reasonable to assume that it is extremely unlikely that the IHN that caused the hatchery mortality came from the reservoir, or was a result of the nutrient supplementation.

Figure 6. Position of the hypolimnion in relation to the other two water layers in the reservoir.



The Clearwater Hatchery on the right bank of North Fork Clearwater River (directly across from Dworshak Hatchery) draws its water through a pipeline directly from Dworshak Reservoir. Steelhead reared in the Clearwater Hatchery do not experience IHN outbreaks, and have had no effect from the nutrient supplementation.

4.4.2.5.3. Ongoing Monitoring

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

4.4.3. Bull Trout

4.4.3.1. Listing History

The USFWS issued a final rule listing the Columbia River population of bull trout as a threatened species on June 10, 1998 (63 FR 31647). Bull trout are currently listed throughout their range in the coterminous United States as a threatened species. In the Columbia River Basin, bull trout historically were found in about 60 % of the basin. They now occur in less than half of their historic range. Populations remain in portions of Oregon, Washington, Idaho, Montana, and Nevada. The Clearwater River Recovery Unit (Clearwater River RU) 21 (Figure 7) forms part of the range of the Columbia River Distinct Population Segment. The Clearwater River RU includes the entire Clearwater River upstream from the confluence with the SR. Bull trout are distributed throughout most of the large rivers and associated tributary systems within the Clearwater River RU, and they exhibit adfluvial, fluvial and resident life history patterns. The Clearwater River RU consists of 7 core areas, with a total of 45 local populations and 27 potential local populations distributed among the core areas (USFWS 2002).

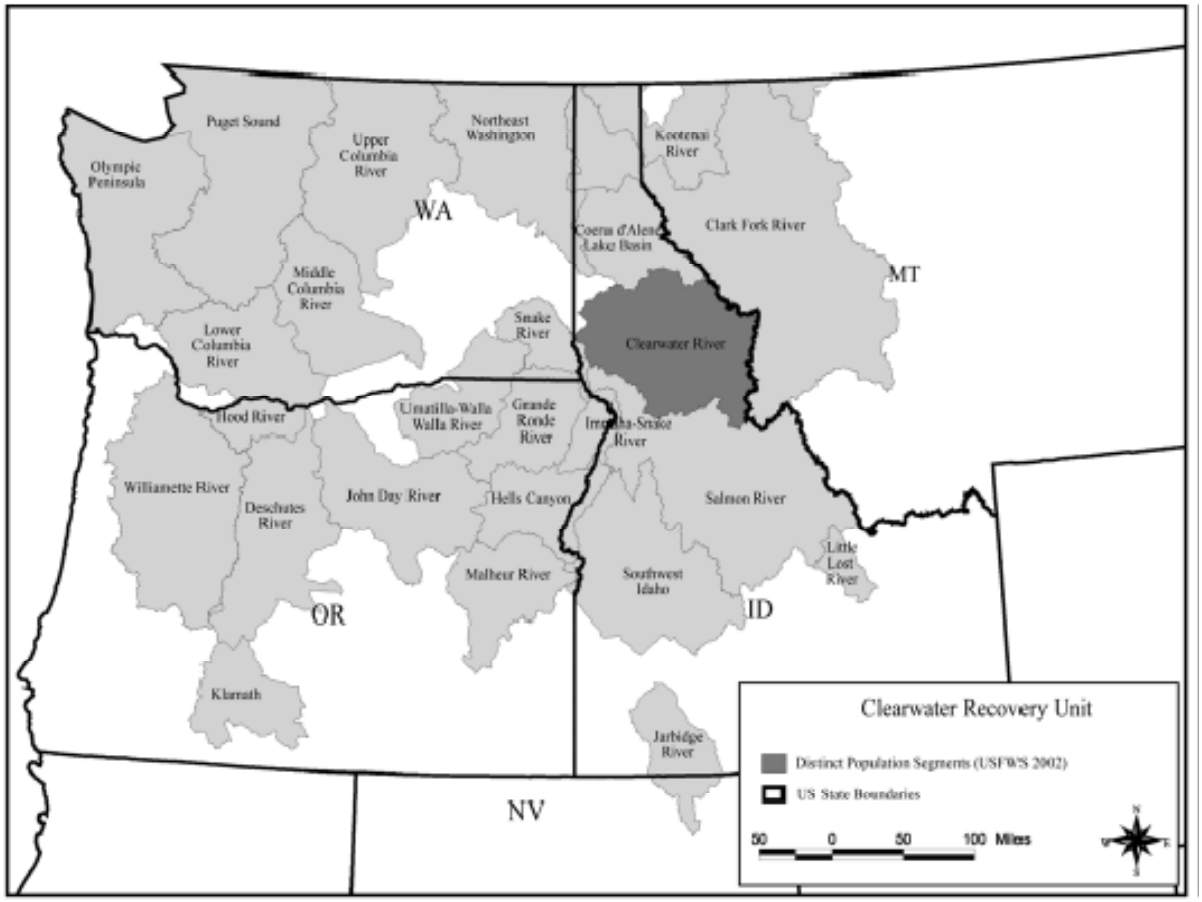
4.4.3.2. Life History/Biological Requirements

Individual bull trout may exhibit resident or migratory life history strategies. Resident bull trout carry out their entire life cycle in the stream in which they spawn and rear. Migratory bull trout spawn in tributary streams, but eventually travel to larger streams (or lakes) where they mature. Habitat components that appear to influence bull trout distribution and abundance include water temperature, cover, channel form and stability, valley form, spawning and rearing substrates and migratory corridors (with resting habitat). All life history stages of bull trout are associated with complex forms of cover, including large woody debris, undercut banks, boulders and deep pools.

Bull trout normally reach maturity in four to seven years and may live as long as twelve years. They generally spawn from August to November during periods of decreasing water temperatures. Migratory bull trout may travel over one hundred miles to their spawning grounds. Egg incubation is normally 100 to 145 days and fry remain in the substrate for several months.

Bull trout are opportunistic feeders. Their diet requirements vary depending on their size and life history strategy. Resident and juvenile bull trout prey on insects, zooplankton and small fish. Adult migratory bull trout mainly eat other fish.

Figure 7. Location of the bull trout Columbia River Distinct Population Segment with the Clearwater River Recovery Unit highlighted darker. (USFWS 2002).



Bull trout forage, spawn and overwinter in the action area. There is no bull trout spawning in Dworshak Reservoir (i.e. the project area). Spawning occurs only in the upper tributaries of the Little North Fork and North Fork Clearwater Rivers.

4.4.3.3. Distribution

Bull trout are distributed throughout most of the large rivers and associated tributary systems within the Clearwater River RU. Bull trout exhibit adfluvial, fluvial, and resident life history patterns within the Clearwater River RU. Fluvial and resident bull trout populations have been commonly documented throughout the current range of bull trout in the Clearwater River RU. There are two naturally adfluvial bull trout populations within the Clearwater River RU; one is associated with Fish Lake in the upper NF Clearwater River drainage, and the other is associated with Fish Lake in the Lochsa River drainage (USFWS 2002).

Wydoski and Whitney (2003) indicate that all four life history types of bull trout (anadromous, adfluvial, fluvial, and resident) require water temperatures below 15°C (59° F). They also note that bull trout are occasionally collected in the tail races of Priest Rapids and Wanapum Dams on the main-stem Columbia River. In Idaho, bull trout were found at elevations from 2000 to 3800 feet in elevation with gradients ranging from 1.9 to 8.3 % (Wydoski and Whitney 2003).

StreamNet (2010) shows the distribution of bull trout in the North Fork Clearwater River core area – Clearwater Recovery Unit, Lower-Middle Fork Clearwater River core area – Clearwater Recovery Unit, and the Lower North Fork sub-basin (Figure 8, 9, and 10, respectively). Based on Figures 7 through 9, it appears that bull trout distribution in the reservoir limited to migration only and other life stages occur in streams higher in the reservoir above the action area (StreamNet 2010).

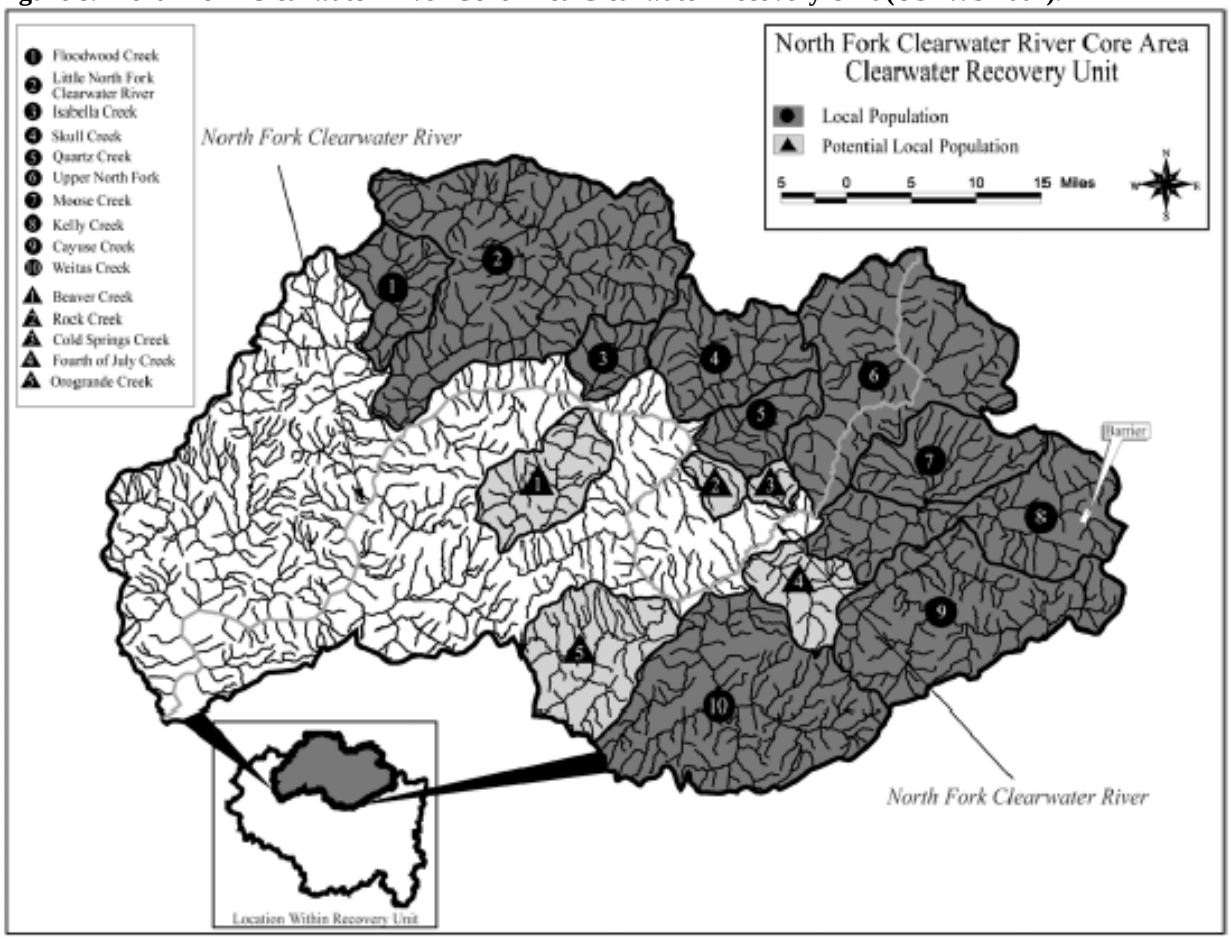
4.4.3.4. North Fork Clearwater River core area.

The NFCR core area (Figure 8) is located in Clearwater, Idaho, and Shoshone Counties. It includes the NFCR River and all its tributaries upstream of Dworshak Dam. The core area is approximately 632,360 hectares (1,562,561 acres). Elevations range from 441 meters (1,445 feet) near the reservoir to 2,440 meters (8,000 feet) at the headwaters (CBBTTAT 1998a). Major tributaries within the core area include; Elk Creek, Little NFCR, Beaver Creek, Quartz Creek, Skull Creek, Orogrande Creek, Weitas Creek, and Kelly Creek (USFS 2000).

The NFCR flows 46 kilometers (29 miles) from its headwaters to Dworshak Reservoir with an average annual discharge of 100 cubic meters per second (3,520 cubic feet per second) from Dworshak Dam (CBBTTAT 1998a). Long-term discharge and temperature data have been recorded by the U.S. Geological Survey at Canyon Creek, just upstream of Dworshak Reservoir.

The NFCR has been identified by the State of Idaho as a Special Resource Water. This State designation recognizes the NFCR as having at least one, if not all, of the following characteristics: (1) the water is of outstanding high quality, exceeding cold water biota standards; (2) the water is of unique ecological significance; (3) the water possesses outstanding recreational or aesthetic qualities; and (4) intensive protection of the quality of the water is in the paramount interest of the people of Idaho (USFWS 2002).

Figure 8. North Fork Clearwater River Core Area Clearwater Recovery Unit (USFWS 2002).



4.4.3.5. Lower-Middle Fork Clearwater River core area

This core area (Figure 9) includes the Middle Fork Clearwater River (MFCR) and main-stem CR and encompasses approximately 660,024 hectares (1,630,919 acres). The MFCR is formed at the confluence of the Selway and Lochsa Rivers near Lowell, Idaho. It flows in a westerly direction for 37 kilometers (23 miles) until it joins the South Fork of the CR near Kooskia, Idaho. At this point the river is locally known as the main-stem or lower CR (CSS 2001) and continues its westerly and northwesterly flow to the town of Ahsahka, where it is joined by the NFCR. The CR then joins the SR at Lewiston, Idaho, 120 kilometers (75 miles) from its source (U.S. Bureau of Land Management (BLM) 2000). Major tributaries within this core area include: Lapwai Creek, Potlatch River, Cottonwood Creek, Bedrock Creek, Big Canyon Creek, Orofino Creek, Jim Ford Creek, Lolo Creek, Lawyer Creek, Clear Creek, Maggie Creek, Big Horse Creek, and Smith Creek.

Figure 9. Lower-Middle Fork Clearwater River Core Area - Clearwater Recovery Unit (USFWS 2002).

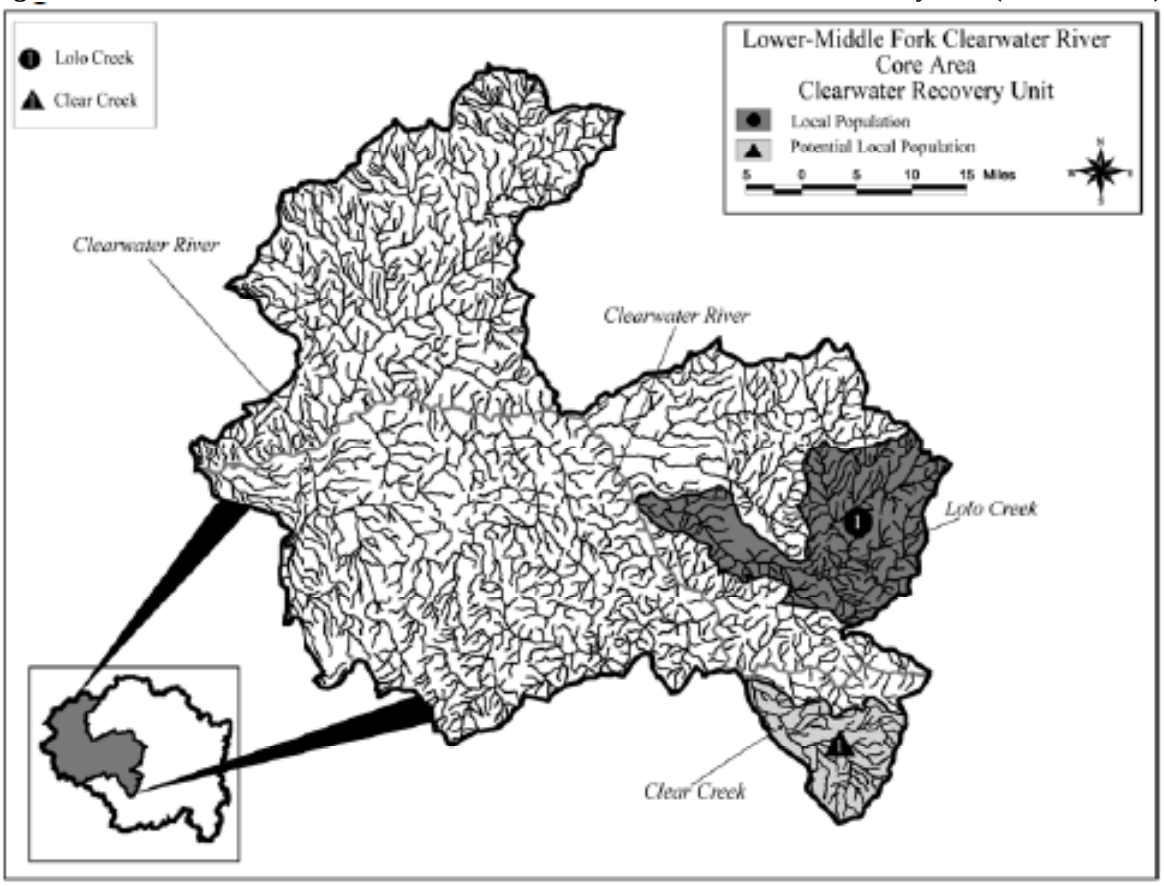


Figure 10 shows bull trout distribution in the Lower North Fork Clearwater River (HUC 17060308).

Figure 10. Bull Trout Distribution in Lower North Fork Clearwater (HUC 17060308) (StreamNet 2010)

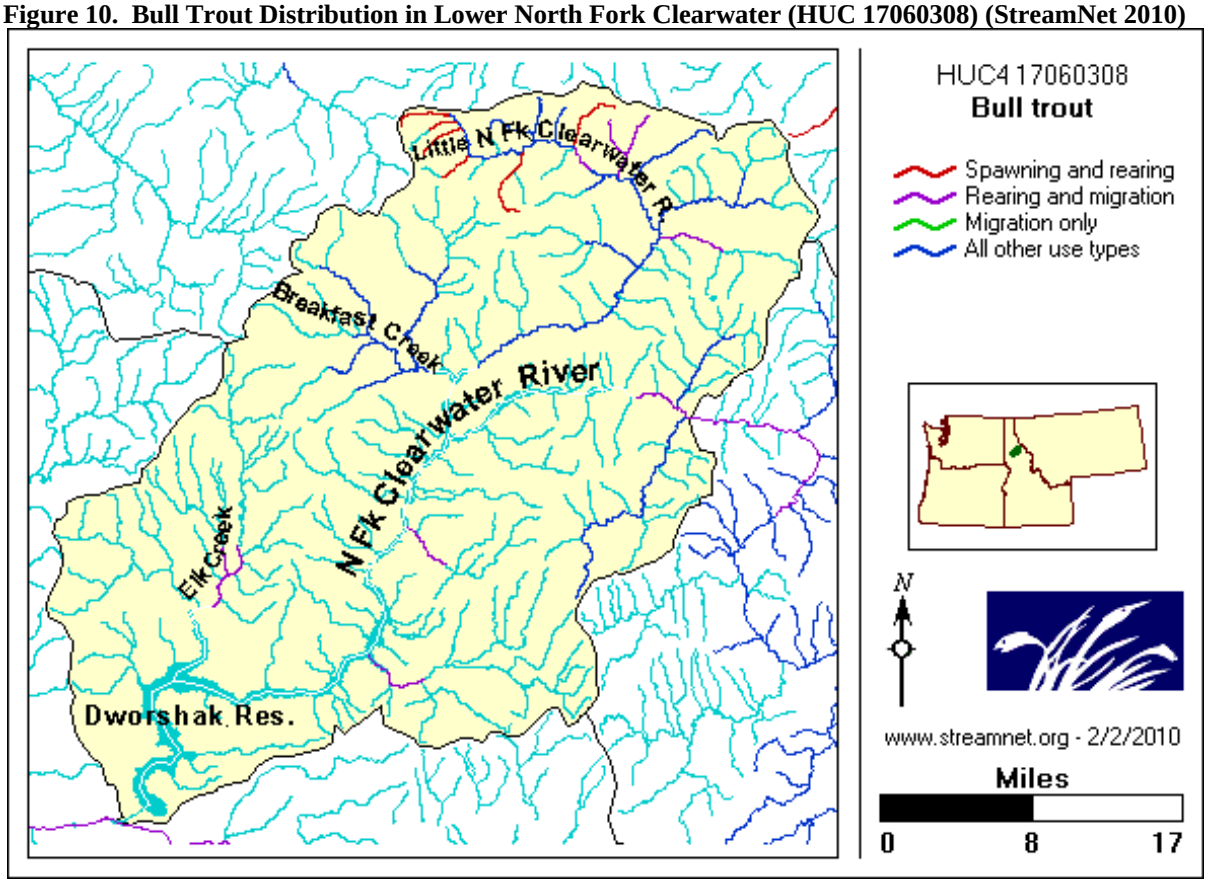


Figure 11 shows the distribution of bull trout throughout the Clearwater River and tributaries in the proposed project area. StreamNet (2010) also identifies occupied streams and shows usage of those streams as a percentage (Table 2). The information indicated that bull trout use 4% (125.1 miles) of the total stream miles (3146.65 miles) in the HUC (Table 3). Distribution below the reservoir appears to be limited to rearing and migration in the action area (StreamNet 2010).

Figure 11. Bull Trout Distribution in Clearwater and Tributaries (HUC 17060306) (StreamNet 2010).

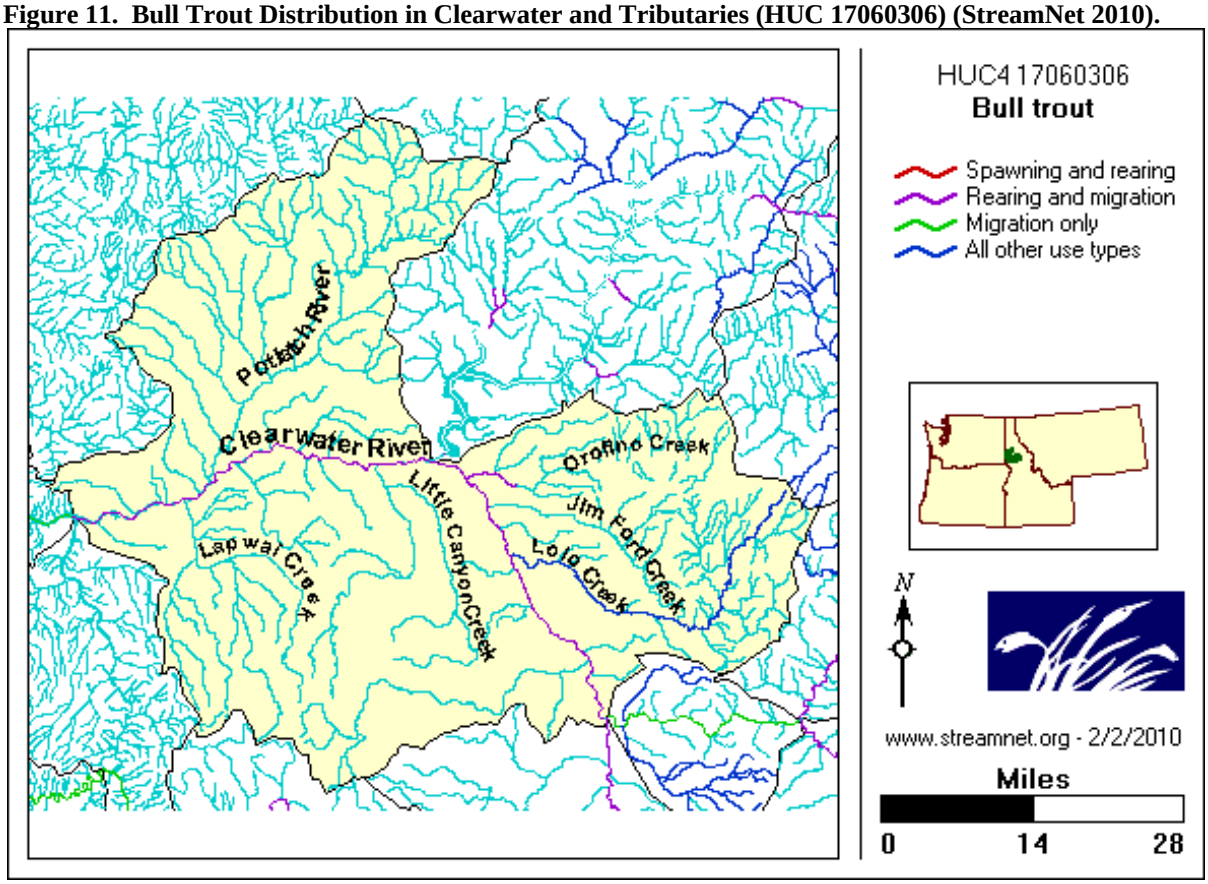


Table 2. Bull Trout Distribution in Clearwater and Tribs Subbasin (StreamNet 2010)

Stream	Total Miles of Stream	Miles of Stream Used	% of Miles Used
Clearwater River, trib to Snake River	74.30	73.96	99.5%
Lolo Creek, trib to Clearwater River	45.33	45.33	100.0%
Orofino Creek, trib to Clearwater River	40.10	5.85	14.6%

Table 3. Clearwater and Tribs Bull Trout Life History Usage (StreamNet 2010).

Species	Run	Use Type	Miles of Stream Used (mi)	% of Stream Miles Used
Bull trout	N/A	Rearing and migration	79.81	3%
		Unknown	45.33	1%
Total: Total Stream Miles in the defined area: 3146.65			125.1	4%

4.4.3.6. Factors for Decline

4.4.3.6.1. Historical Pressures on the Species

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

4.4.3.6.2. Current Pressures on the Species

Bull trout habitat is sensitive to stream channel changes. Altered flow regimes, sedimentation rates, bank erosion and reduced channel complexity all reduce the quality of bull trout habitat.

4.4.3.6.3. Limiting Factors for Recovery

Barriers between isolated populations are a limiting factor for most of the bull trout subpopulations in the Columbia Basin.

4.4.3.7. Local Empirical Information

Dworshak Dam is a barrier to upstream fish passage. The reservoir has an isolated sub-population of migratory bull trout. Migratory bull trout formerly linked resident bull trout to the overall gene pool for this species. Migration barriers have isolated these populations, potentially causing a loss of genetic diversity. In some cases, reservoirs such as Libby, Hungry Horse, and Dworshak provide habitat that is used by adfluvial populations of bull trout (USFWS 2000).

Available historical data does not suggest bull trout spawning/early rearing habitat was inundated when Dworshak or the Lower SR dams were completed; all evidence suggests that the impounded areas were historically used as adult/subadult foraging and over-wintering areas. This use continues today for these age groups (USFWS 1998).

4.4.3.7.1. Current Local Population Information

Spatial and temporal distribution, migration patterns, spawning sites, and basic life history information of bull trout in Dworshak Reservoir are currently being investigated by IDFG. IDFG's investigation began in the spring of 2000 and, as of 2002, 163 adult bull trout had been captured, radio-tagged, and monitored. Preliminary findings indicated extensive use of the reservoir by bull trout for over-wintering. Bull trout enter the reservoir after spawning in the larger tributaries. They may remain in the tributaries for extended periods of time after spawning or migrate to the reservoir immediately depending on the abundance of prey in the specific tributary. For example, bull trout spawning in the Little NF Clearwater River have been documented to begin their downstream migration immediately following spawning and reach the reservoir in early September. Whereas spawning adults in the main-stem reach the reservoir in late October presumably due to a large spawning population of kokanee in the main-stem. Bull

trout will spend the entire winter in the reservoir and begin their upstream migration in late May to early June. The highest concentrations of wintering bull trout have been documented as occurring between Cranberry Creek and Elkberry Creek (D. Schiff , personal communication, 2003).

Although bull trout are found within Dworshak Reservoir and are currently being studied, no bull trout spawning streams exist within the project boundary (StreamNet, 2010).

4.4.3.7.2. Ongoing Monitoring

Fish passage at all lower Snake River dams is monitored. Any bull trout observations are recorded, though only a few, if any, are generally seen in any year.

4.4.4. Canada Lynx

4.4.4.1. Listing History

The Canada lynx was listed as a threatened species in 2000. In 2003, in response to a court-order to reconsider the listing, USFWS clarified their final listing decision. Recent observations of lynx are primarily from the Cascade Range and the Blue Mountains. Canada lynx likely have never been as abundant in the lower 48 States as they were in northern Canada and Alaska because there is less lynx and snowshoe hare habitat at the southern part of the range.

4.4.4.2. Life History/Biological Requirements

Canada lynx are medium-sized cats, generally measuring 75-90 centimeters long (30-35 inches) and weighing 8-10.5 kilograms (18-23 pounds). Canada lynx are smaller than the European lynx with a shorter tail and longer hind legs. They have large feet adapted to walking on snow, long legs, tufts on the ears, and black-tipped tails. They are highly adapted for hunting snowshoe hare, the primary prey, in the snows of the boreal forest.

Lynx in the contiguous United States are at the southern margins of a widely-distributed range across Canada and Alaska. The center of the North American range is in north-central Canada. Lynx occur in mesic coniferous forests that have cold, snowy winters and provide a prey base of snowshoe hare (Ruggiero et al. 2000). These forests are generally described as boreal forests. In North America, the distribution of lynx is nearly coincident with that of snowshoe hares. Lynx survivorship, productivity, and population dynamics are closely related to snowshoe hare density in all parts of its range. A minimum density of snowshoe hares (greater than 0.5 hare per hectare (1.2 hares per acre)) distributed across a large landscape is necessary to support survival of lynx kittens and recruitment into and maintenance of a lynx population.

In the United States, lynx inhabit conifer and conifer-hardwood habitats that support their primary prey, snowshoe hares. Both timber harvest and natural disturbance processes, including fire, insect infestations, catastrophic wind events, and disease outbreaks, can provide foraging habitat for lynx when resulting understory stem densities and structure provide the forage and cover needs of snowshoe hare). These characteristics include a dense, multi-layered understory

that maximizes cover and browse at both ground level and at varying snow depths throughout the winter (crown cover within the lower 4.5 meters (15 feet) in order to provide cover and food for snowshoe hares to 2 meters (6 feet) high at maximum snow depths). Despite the variety of habitats and settings, good snowshoe hare habitat has a common denominator – dense, horizontal vegetative cover 1-3 meters (3-10 feet) above the ground or snow level.

The southernmost extent of the boreal forest that supports lynx occurs in the contiguous United States in the Northeast, western Great Lakes, northern and southern Rockies, and northern Cascades. Here the boreal forest transitions into other vegetation communities and becomes more patchily distributed. As a result, the southern boreal forests generally support lower snowshoe hare densities, hare populations do not appear to be as highly cyclic as snowshoe hares further north, and lynx densities are lower compared to the northern boreal forest.

Individual lynx maintain large home ranges (reported as generally ranging from 31 to 216 kilometers^2 (km^2), or 12-83 mi^2. Thus, a lynx population can only persist in a large boreal forested landscape that contains appropriate forest types, snow depths, and high snowshoe hare densities. In the Northeast, lynx were most likely to occur in areas that support deep snow (greater than 268 centimeters [106 inches] annual snowfall) associated with regenerating boreal forests in landscapes 100 km^2 (40 mi^2) or greater in area. EPA and the Corps assume areas with smaller patches of boreal forest are unlikely to provide a sufficient amount of habitat suitable to support a lynx population.

Lynx are highly mobile and have a propensity to disperse long distances, particularly when prey becomes scarce. Lynx also make long distance exploratory movements outside their home ranges. Areas or habitats used by lynx during dispersal or exploratory movements are poorly understood at this time. Dispersing lynx may colonize suitable but unoccupied habitats, augment existing resident populations, or disperse to unsuitable or marginal habitats where they cannot survive. Numerous lynx mortality records exist from anomalous habitats or habitats where no records support evidence (either current or historical) of a reproducing population. Many of these records correspond to post-population peaks in Canada, with some lag time for immigration. EPA and the Corps find no evidence of lynx populations becoming established in such areas.

4.4.4.3. Distribution

The Canada lynx occurs throughout Canada and Alaska, in the extreme northeastern and north-central U.S., and in the northern and central Rocky Mountains (ICDC 2010). In western states, most lynx occurrences (83%) were associated with Rocky Mountain Conifer Forest, and most (77%) were within the 1,500-2,000 m (4,920-6,560 ft) elevation zone (McKelvey et al. 2000*b*). Primary vegetation that contributes to lynx habitat is lodgepole pine, subalpine fir, and Engelmann spruce (Aubry et al. 2000). Within Idaho populations occur north of the Salmon River in the west and north of the Caribou Range in the east (McKelvey et al. 2000). The total population size in Idaho is unknown, but it is thought to be less than 100 individuals (ICDC 2010). In extreme northern Idaho, northeastern Washington, and northwestern Montana, cedar-hemlock habitat types may also be considered primary vegetation. In central Idaho, Douglas-fir on moist sites at higher elevations may also be considered primary vegetation. Secondary

vegetation that may also contribute to lynx habitat when interspersed within subalpine forests, includes cool, moist Douglas-fir, grand fir, western larch, and aspen forests. Dry forest types (e.g., ponderosa pine, climax lodgepole pine) do not provide lynx habitat (Corps 2006).

4.4.4.4. Local Empirical Information

The IDFG, using 12 remote camera stations and live traps, conducted surveys for furbearers and carnivores throughout Dworshak Reservoir in 2000 and 2001. Eleven species of furbearers and carnivores were documented. No lynx were observed within the study area. However, lynx have been documented in 2 locations north of Breakfast Creek, one on the Floodwood Road in 1997 and once at Stocking Meadows Ridge in 1998 (Corps 2006).

4.4.4.4.1. Current Local Population Information

There are no known local populations of Canada lynx in the action area.

4.4.4.4.2. Ongoing Monitoring

There are no known ongoing monitoring efforts for Canada lynx at Dworshak Reservoir.

4.4.5. Gray Wolf

4.4.5.1. Listing History

The gray wolf was listed as endangered in the lower 48 states and Mexico in 1974. The USFWS's 1987 recovery plan for wolves in the Northern Rocky Mountains included reintroducing them in central Idaho in 1995 and 1996. A non-essential experimental population was established in 1994. In 2008 the Northern Rocky Mountain (NRM) population of the gray wolf was delisted. An injunction order went into effect in 2008 halting the delisting decision. In April, 2009, the NRM population was classified as a distinct population segment (DPS), and the ESA listing status was revised (USFWS 2010b).

The U.S. Federal District Court in Missoula, Montana issued an order on August 5, 2010, in Defenders of Wildlife et al. v. Salazar, CV 09-77-M-DWM and Greater Yellowstone Coalition v. Salazar, CV 09-82-M-DWM, which vacated the delisting of the NRM DPS of the gray wolf. In compliance with this order, wolves are again considered endangered throughout the NRM DPS except where they are classified as experimental populations (southern Montana, Idaho south of Interstate 90, and all of Wyoming) (USFWS 2010a).

On April 15, 2011, President Obama signed the Department of Defense and Full-Year Appropriations Act, 2011. A section of that Appropriations Act directs the Secretary of the Interior to reissue within 60 days of enactment the final rule published on April 2, 2009, that identified the Northern Rocky Mountain population of gray wolf (*Canis lupus*) as a distinct population segment (DPS) and to revise the List of Endangered and Threatened Wildlife by removing most of the gray wolves in the DPS.

Gray wolves in Montana and Idaho, as well as portions of eastern Oregon, eastern Washington, and north-central Utah, are removed from the List of Endangered and Threatened Wildlife. Gray wolves in Wyoming remain on the List of Endangered and Threatened Wildlife and continue to be subject to the provisions of our experimental population regulations codified at 50 CFR 17.84(i) and (n).

4.4.5.2. Life History/Biological Requirements

Wolves play an important role as predators in the ecosystems they inhabit. They feed primarily on large mammals, such as deer and elk, removing sick and injured animals from the populations. Wolves are highly social, living in packs and hunting and raising young cooperatively (USFWS 2007).

Wolves exist in packs of typically 2-12 individuals. Wolves generally reside within a specific territory defined by their home range. Young wolves reach sexual maturity by the age of one and may leave the pack at age two, adopting a solitary lifestyle before pairing with a mate and establishing a new territory (Wildlife Trust 2000).

Wolves are highly adaptable animals and have historically occupied a variety of biomes within North America. As a result, they are not considered to be limited to specific habitats (Wildlife Trust 2000). The central Idaho packs exist primarily in temperate coniferous forest characterized by the absence of human habitation and access. In the Rocky Mountains, wolves feed on elk, mule deer, beaver, and other small mammals. Wolves even eat some insects, nuts, and berries. They may not eat for a week or more but are capable of eating 20 pounds of meat in a single meal (USFWS 2000b).

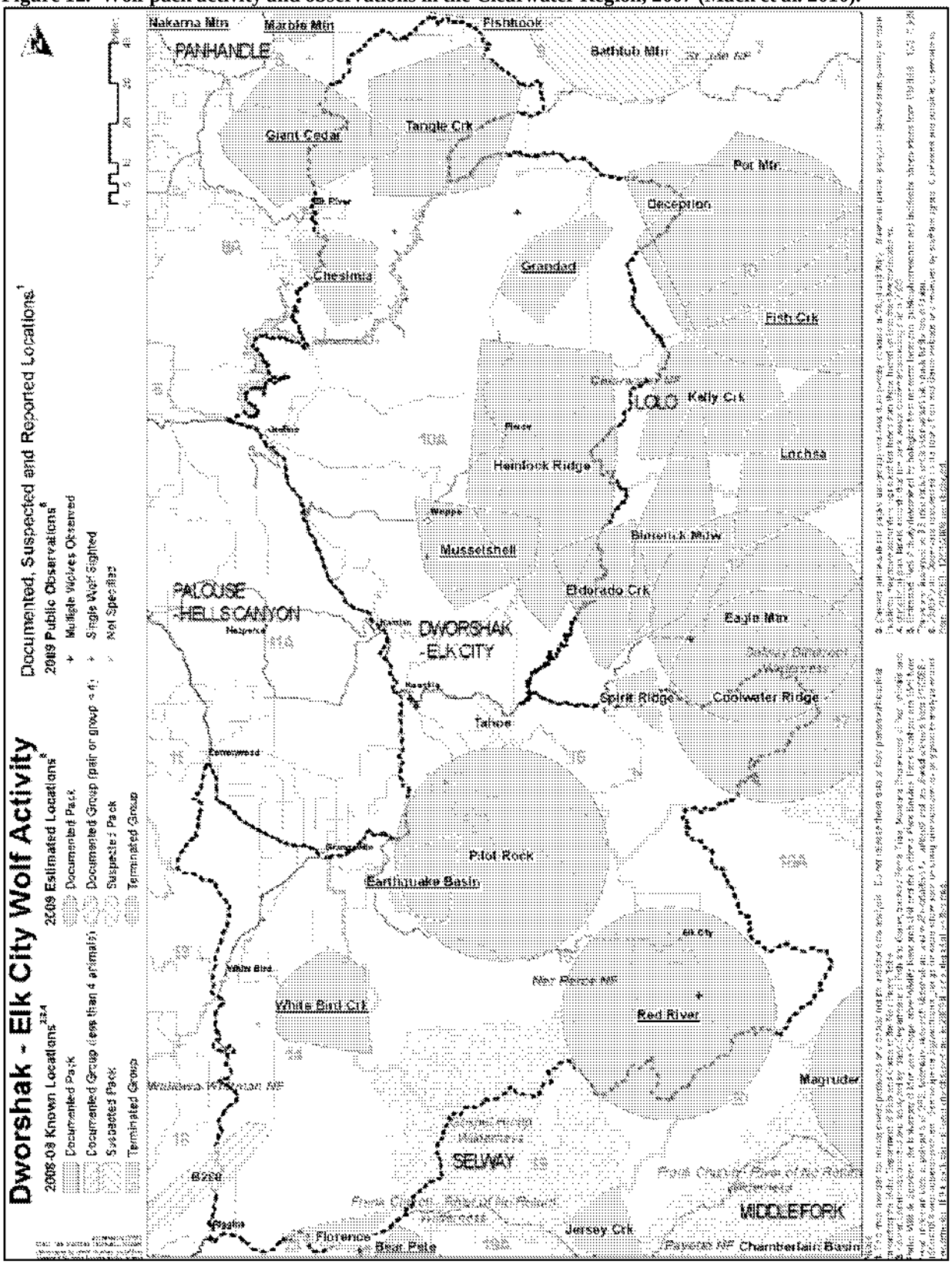
Wolf packs typically include a breeding pair, their offspring, and other non-breeding adults with an average pack size of 8.1 animals. They are capable of mating by age two or three, and sometimes form lifelong bonds. Wolves can live 13 years and reproduce past 10 years of age. Five pups, on average, are born in early spring, and are cared for by the entire pack. Dens are often used year after year. Pups are reared in dens for the first six weeks, and depend on their mother's milk for the first month, then are weaned and fed regurgitated meat brought by pack members. By seven to eight months, pups begin traveling with the adults. After a year or two, wolves may leave and try to find a mate and form a pack. Lone, dispersing wolves have been known to travel up to 600 miles in search of a new home.

Wolf packs live within territories that they defend from other wolves. Territories range from 50 square miles to more than 1,000 square miles. Wolves travel as far as 30 miles in a day to hunt. They trot at about 5 miles per hour, but they can run as fast as 40 miles per hour for short distances (IDFG 2010).

4.4.5.3. Distribution

Wolves are known to exist in the vicinity of Dworshak reservoir (Figure 12).

Figure 12. Wolf pack activity and observations in the Clearwater Region, 2007 (Mack et al. 2010).



4.4.5.4. Local Empirical Information

4.4.5.4.1. Current Local Population Information

The Dworshak-Elk City Zone was home to 12 documented packs in 2009, 1 suspected pack, and 1 other documented group during 2009. The Musselshell pack was newly documented. After a 2 year period in which no evidence of the pack could be verified, the O'Hara Point pack was removed as a documented pack, though unverified wolf activity was reported from this pack's territory in 2009.

Documented mortalities (n = 25) included control (agency removal and legal take; n = 4), harvest (n = 18), other human (illegal take, vehicle collision, etc.; n = 1) causes, and unknown (n = 2) causes. The harvest limit was fulfilled and the season was closed on 16 November. A mortality signal was detected for male B318, radiocollared as a member of the Red River pack in 2007, near White Bird Summit, Idaho. This animal's signal was last detected in December 2007; condition of the remains indicated this wolf had been dead for over 1 year, so no cause of death was ascertained and this wolf does not appear in 2009 data unknown (Mack et al. 2010).

Female B330 dispersed from the Hemlock Ridge pack and had apparently settled into an area that was formerly part of the Eldorado Creek pack's territory. Female B342, formerly of the Pilot Rock pack, was no longer considered a member of that pack, having moved north in 2008 into the area occupied by the suspected Tahoe pack and remained there throughout 2009 unknown (Mack et al. 2010).

Confirmed (n = 4) and probable (n = 1) wolf-caused cattle losses were attributed to the Chesimia, Earthquake Basin, and White Bird Creek packs accounting for a minimum 5 depredation events. Two wolves were lethally controlled in both the Chesimia and White Bird Creek packs. No domestic sheep or dog losses were recorded. Three wolves were captured by USFWS personnel that resulted in the placement of 3 radiocollars (Mack et al. 2010).

4.4.5.4.2. Ongoing Monitoring

Gray wolves continue to be monitored throughout Idaho by numerous Federal, State, and Local agencies and Tribes.

4.5. Candidate Species

The North American Wolverine (*Gulo gulo luscus*) became a federal candidate species December 14, 2010. The wolverine is the largest terrestrial member of the weasel family. With its broad head, small eyes, and short, rounded ears, the wolverine resembles a bear with a long, bushy tail. Wolverines have a light face mask and dark, glossy fur that ranges in color from black to cinnamon-brown with light stripes running down both sides of its thick body. Adult males weigh 26 to 40 pounds and adult females weigh 17 to 26 pounds. Short legs and wide feet allow wolverines to travel across deep snow. Curved, semi-retractile claws are used for digging and climbing. Poor eyesight is compensated for by a keen sense of smell which enables the

wolverine to find food even when buried deep in the snow. Their diet includes small mammals, birds, insects, and some berries, as well as the carrion of large ungulates.

Wolverine habitat consists entirely of alpine, arctic, and sub-arctic regions. Snow cover during the spring is essential for females who use deep snow banks for denning throughout the pregnancy and weaning periods. Habitat areas for wolverines are usually isolated and described as "patchy," often separated by large areas of unsuitable habitat. Almost all wolverine habitat in the contiguous U.S. is federally owned and managed. Suitable wolverine habitat in Oregon is considered to be the high-elevation forests of the Cascade Range, and of the Blue Mountains, Wallowa Mountains, and Ochoco Mountains. There is potential for wolverines from the Rocky Mountain population to enter Oregon from Idaho, Wyoming, or Montana.

Wolverines have not been documented at Dworshak and are not on species lists maintained by the Dworshak Wildlife Biologist. Although it is possible, it is likely that wolverines may not occur at elevations consistent with Dworshak Reservoir, as the upper most elevations in the timber forest at Dworshak are at the lower end of the recorded inhabited elevation of wolverines. Combined with the amount of anthropogenic influence at the reservoir, and the solitary nature of wolverines, it seems highly unlikely that wolverines would occur near the reservoir (R. Davis, personal communication, May 17, 2011).

There are no other candidate species or species of concern in the project area.

4.6. Status of Critical Habitat

In 1993, NMFS determined that the critical habitat designations for SR fall-run Chinook salmon would focus on the physical and biological features of the habitat that are essential to the conservation of the species. In 2005, in designating critical habitat for SRB Steelhead NMFS focused on certain habitat features called "primary constituent elements" (PCEs) that are essential to support one or more of the life stages of salmon and steelhead. The 2005 designations also analyzed areas that will provide the greatest biological benefits for listed salmon and balance the economic and other costs for areas considered for designation.

Unlike the 1993 designations, which relied on the U.S. Geological Survey's (USGS) maps of sub-basins and included "all accessible river reaches within the current range of the listed species," the 2005 designations used a much finer, more specific scale in designating critical habitat for salmon and steelhead. The 2005 designations identify stream and near-shore habitat areas where listed salmon and steelhead have actually been observed, or where biologist with local area expertise presume them to occur. These habitat areas are found within more than 800 watersheds in the Northwest and California.

The species addressed in this document occupy the same geographic areas and have similar life history characteristics and, therefore, require many of the same habitat functions provided by critical habitat. The 1993 critical habitat designation lists these critical functions as essential physical and biological features and the 2005 critical habitat designation lists these as PCEs; however, they function the same for all listed species. Both the essential physical and biological

features and the PCEs are identified in the documents designating critical habitat and listed below in Tables 4 and 5.

4.6.1. SR Fall Chinook

4.6.1.1. Geographical Extent of Designated Critical Habitat

The following is taken from 50 CFR 226.205- Critical habitat for SR sockeye salmon, SR fall Chinook salmon, and SR spring/summer Chinook salmon:

The following areas consisting of the water, waterway bottom, and adjacent riparian zone of specified lakes and river reaches in hydrologic units presently or historically accessible to listed SR salmon (except reaches above impassable natural falls, and *Dworshak* (emphasis added) and Hells Canyon Dams). Adjacent riparian zones are defined as those areas within a horizontal distance of 300 feet (91.4 m) from the normal line of high water of a stream channel (600 feet or 182.8 m, when both sides of the stream channel are included) or from the shoreline of a standing body of water.

50 CFR 226.205(c) *SR Fall Chinook salmon (Oncorhynchus tshawytscha).* The Columbia River from a straight line connecting the west end of the Clatsop jetty (south jetty, Oregon side) and the west end of the Peacock jetty (north jetty, Washington side) and including all Columbia River estuarine areas and river reaches proceeding upstream to the confluence of the Columbia and SR; the SR, all river reaches from the confluence of the Columbia River, upstream to Hells Canyon Dam; the Palouse River from its confluence with the SR upstream to Palouse Falls; the Clearwater River from its confluence with the SR upstream to its confluence with Lolo Creek; *the NF Clearwater River from its confluence with the Clearwater River upstream to Dworshak Dam* (emphasis added). Critical habitat also includes river reaches presently or historically accessible (except reaches above impassable natural falls, and Dworshak and Hells Canyon Dams) to SR fall Chinook salmon in the following hydrologic units; Clearwater, Hells Canyon, Imnaha, Lower Grande Ronde, Lower NF Clearwater River, Lower Salmon, Lower Snake, Lower Snake-Asotin, Lower Snake-Tucannon, and Palouse. Critical habitat borders on or passes through the following counties in Oregon: Baker, Clatsop, Columbia, Gillium, Hood River, Morrow, Multnomah, Sherman, Umatilla, Wallowa, Wasco; the following counties in Washington: Adams, Asotin, Benton, Clark, Columbia, Cowlitz, Franklin, Garfield, Klickitat, Lincoln, Pacific, Skamania, Spokane, Wahkiakum, Walla, Whitman; and the following counties in Idaho: Adams, Benewah, Clearwater, Idaho, Latah, Lewis, Nez Perce, Shoshone, Valley. [58 FR 68551, Dec. 28, 1993, as amended at 63 FR 1393, Jan. 9, 1998. Re-designated and amended at 64 FR 14067, Mar. 23, 1999; 64 FR 57403, Oct. 25, 1999; 69 FR 18803, Apr. 9, 2004]

4.6.1.2. Essential Elements of Designated Critical Habitat

Table 4. Primary constituent elements (PCEs) of critical habitats designated for SR spring/summer run Chinook salmon, SR fall-run Chinook salmon, and SR sockeye salmon, and corresponding species life history events.

Primary Constituent Elements		Species Life History Event
Site	**Site Attribute**	
Spawning and juvenile rearing areas	Access (sockeye) Cover/shelter Food (juvenile rearing) Riparian vegetation Space (Chinook) Spawning gravel Water quality Water temperature (sockeye) Water quantity	Adult spawning Embryo incubation Alevin development Fry emergence Fry/parr growth and development Fry/parr smoltification Smolt growth and development
Juvenile migration corridors	Cover/shelter Food Riparian vegetation Safe passage Space Substrate Water quality Water quantity Water temperature Water velocity	Fry/parr seaward migration Smolt growth and development Smolt seaward migration
Areas for growth and development to adulthood	Ocean areas – not identified	Adult growth and development Adult sexual maturation Fry/parr smoltification Smolt/adult transition
Adult migration corridors	Cover/shelter Riparian vegetation Safe passage Space Substrate Water quality Water quantity Water temperature Water velocity	Adult sexual maturation Adult “reverse smoltification” Adult upstream migration Kelt (steelhead) seaward migration

4.6.2. SRB Steelhead

4.6.2.1. Geographical Extent of Designated Critical Habitat

NMFS designated critical habitat for SR spring/summer Chinook to include the Columbia River from a straight line connecting the west end of the Clatsop jetty (south jetty, Oregon side) and the west end of the Peacock jetty (north jetty, Washington side) and including all Columbia River estuarine areas and river reaches proceeding upstream to the confluence of the Columbia and Snake Rivers; all Snake River reaches from the confluence of the Columbia River upstream to Hells Canyon Dam.

Critical habitat also includes river reaches presently or historically accessible (except reaches above impassable natural falls (including Napias Creek Falls) and Dworshak and Hells Canyon

Dams) to Snake River spring/summer chinook salmon in the following hydrologic units: Hells Canyon, Imnaha, Lemhi, Little Salmon, Lower Grande Ronde, Lower Middle Fork Salmon, Lower Salmon, Lower Snake-Asotin, Lower Snake-Tucannon, Middle Salmon-Chamberlain, Middle Salmon-Panther, Pahsimeroi, South Fork Salmon, Upper Middle Fork Salmon, Upper Grande Ronde, Upper Salmon, Wallowa. Critical habitat borders on or passes through the following counties in Oregon: Baker, Clatsop, Columbia, Gillium, Hood River, Morrow, Multnomah, Sherman, Umatilla, Union, Wallowa, Wasco; the following counties in Washington: Asotin, Benton, Clark, Columbia, Cowlitz, Franklin, Garfield, Klickitat, Pacific, Skamania, Wahkiakum, Walla Walla, Whitman; and the following counties in Idaho: Adams, Blaine, Custer, Idaho, Lemhi, Lewis, Nez Perce, Valley.

The Lower North Fork Clearwater sub-basin is located in the Clearwater River Basin. The ESU is limited to the lowermost watershed in the sub-basin which contains portions of Clearwater and Latah counties, Idaho. The upper areas of the sub-basin also contain portions of Shoshone County, Idaho. The sub-basin contains one watershed that is occupied by the anadromous life history type of this ESU. The occupied watershed encompasses approximately 81 mi^2 and 93 miles of streams. Fish distribution and habitat use data from IDFG and USFS identify approximately 2 miles of occupied riverine habitat in the lowermost watershed of the sub-basin (NOAA 2005). The occupied habitat is part of the Lower Clearwater River population (ICBTRT 2003). The Critical Habitat Analytical Review Teams (critical habitat ART) initially concluded that all of the occupied areas contained one or more PCEs for this ESU. However, after considering again the extremely limited quality and quantity of habitat features in this HUC5 the critical habitat ART concluded that PCEs are lacking here and did not consider it eligible for designation as critical habitat.

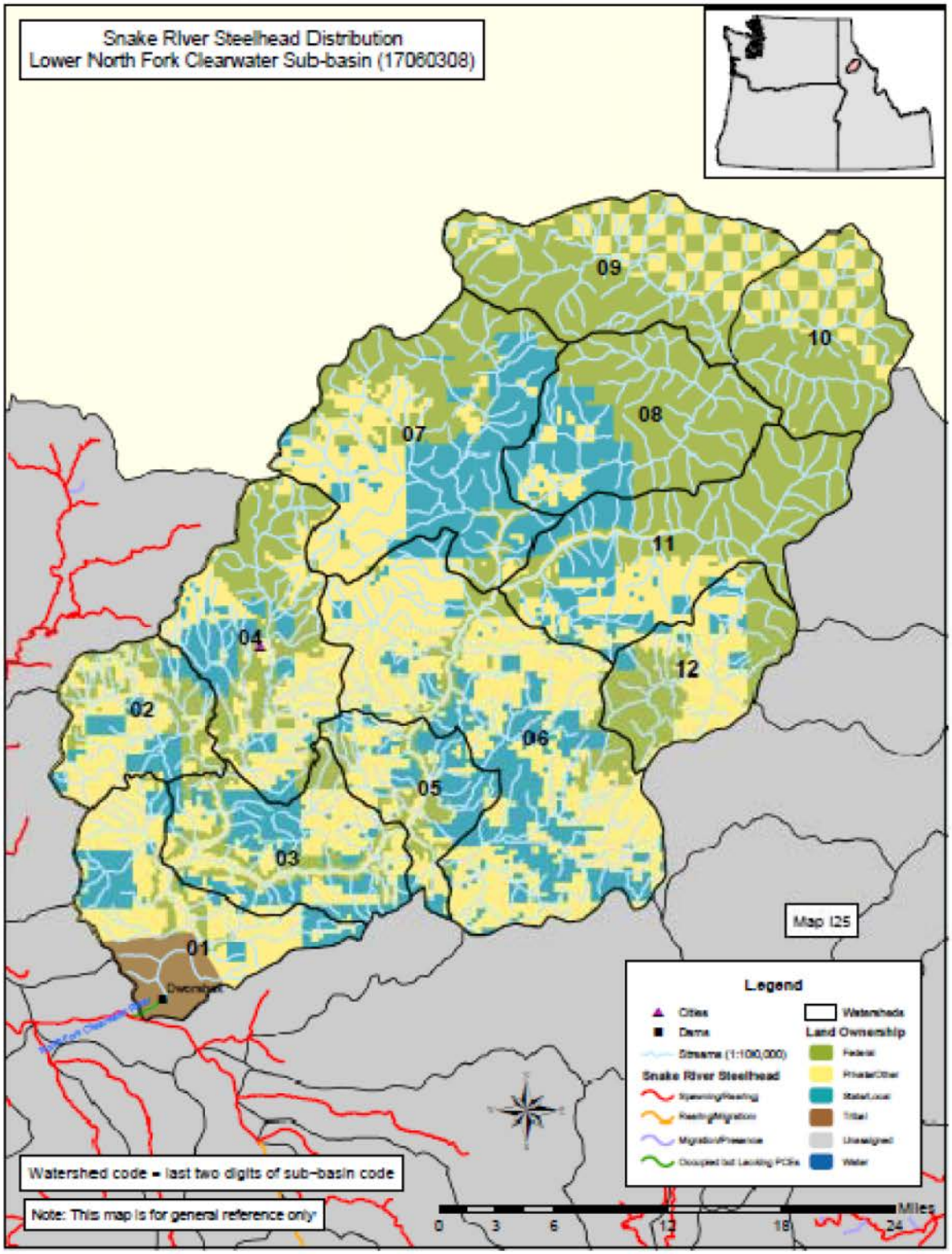
In addition, the critical habitat ART also considered whether historically occupied areas of this sub-basin (and the upstream sub-basin – Upper North Fork Clearwater) above Dworshak Dam are essential for ESU conservation. Although many areas are now inundated, the critical habitat ART concluded that most of the blocked watersheds are still in good condition. The critical habitat ART also noted that the ICBTRT identified these areas as part of a historically independent population and underscored that the resident *O. mykiss* above Dworshak Dam are genetically unique relative to other *O. mykiss* in the Clearwater River Basin. In addition, NMFS recently completed a status review update of this ESU that noted "recent genetic data suggest that native resident *O. mykiss* above Dworshak Dam on the NF Clearwater River should be considered part of this ESU, but hatchery rainbow trout that have been introduced to that and other areas would not." Given these considerations, the critical habitat ART concluded that these blocked watersheds may be essential for ESU conservation however they were uncertain which specific areas within them may warrant consideration as critical habitat (NOAA 2005).

Lower North Fork Clearwater River (17060308). The critical habitat ART report[1] indicates that the Lower North Fork Clearwater watershed contains the following SRB steelhead PCEs: 0 miles of spawning/rearing, 0 miles of rearing/migration, and 0 miles of migration/presence. The section of the NF Clearwater River below Dworshak Dam to the

[1] CH ART report available at: http://www.nwr.noaa.gov/Salmon-Habitat/Critical-Habitat/Redesignations/upload/NWR2005critical habitatARTRPT.PDF

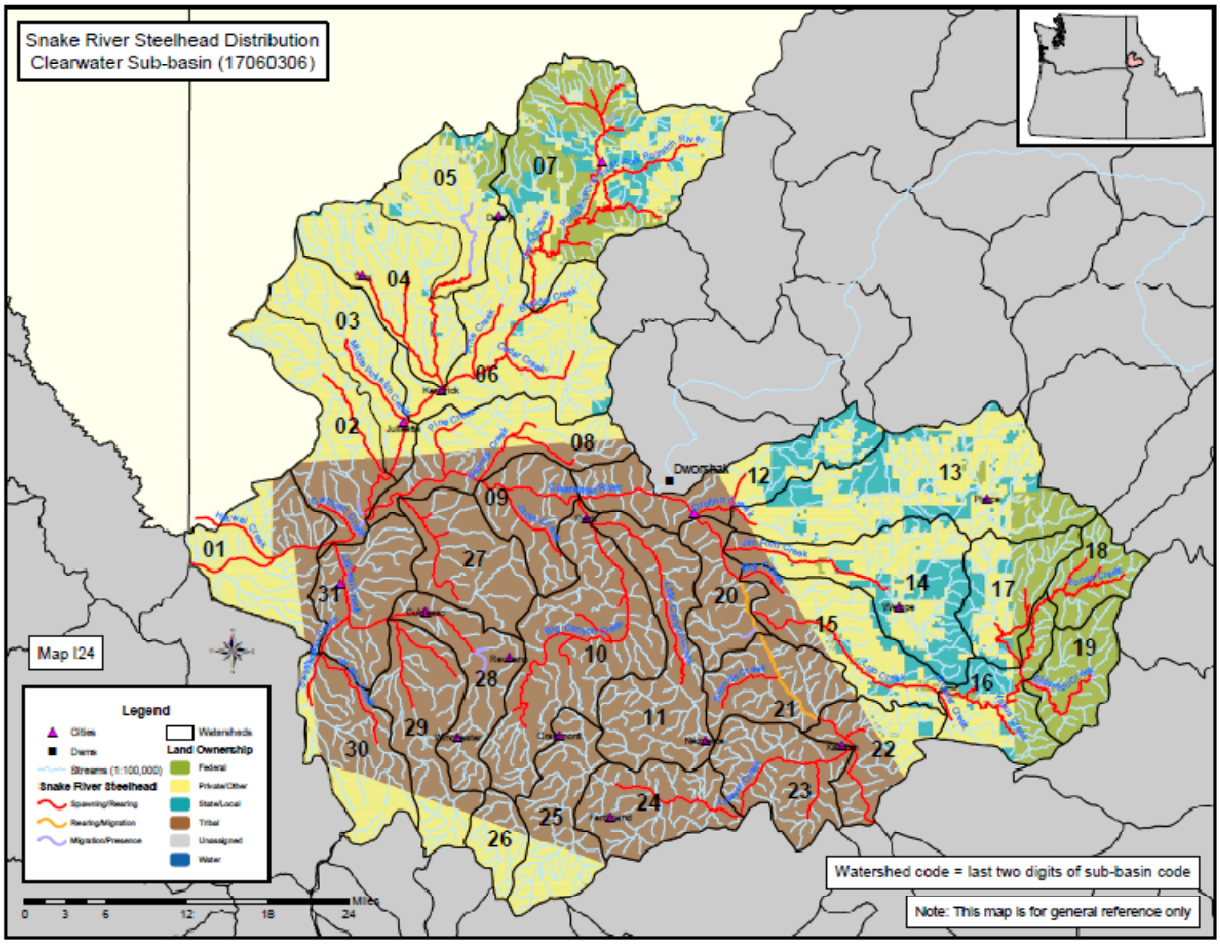
confluence with the Clearwater River is occupied by SRB steelhead, but has no PCEs (Figure 13).

Figure 13. Lower North Fork Clearwater Sub-basin (NOAA 2005).



Clearwater River Lower Orofino Creek (HUC 1706030612). The critical habitatART report indicates that the Clearwater River Lower Orofino Creek sub-basin watershed (Figure 14) contains the following SRB steelhead PCEs: 15.5 miles of spawning/rearing, 0 miles of rearing/migration, and 0 miles of migration/presence. The critical habitat ART report rates Clearwater River Lower Orofino Creek sub-basin as having a low conservation value.

Figure 14. Location of and SRB steelhead PCEs in Clearwater River/Lower Orofino Creek Sub-basin (NOAA 2005).



4.6.2.2. Essential Elements of Designated Critical Habitat

Table 5. Primary constituent elements (PCEs) of critical habitats designated for Pacific salmon and steelhead species (except SR spring/summer run Chinook salmon, SR fall-run Chinook salmon, and SR sockeye salmon), and corresponding species life history events.

Primary Constituent Elements		Species Life History Event
Site Type	**Site Attribute**	
Freshwater spawning	Substrate Water quality Water quantity	Adult spawning Embryo incubation Alevin development
Freshwater rearing	Floodplain connectivity Forage Natural cover Water quality Water quantity	Fry emergence Fry/parr growth and development
Freshwater migration	Free of artificial obstructions Natural cover Water quality Water quantity	Adult sexual maturation Adult upstream migration, holding Kelt (steelhead) seaward migration Fry/parr seaward migration

4.6.3. Bull Trout

4.6.3.1. Geographical Extent of Designated Critical Habitat

Bull trout critical habitat was designated in 2005.The USFWS revised the designation in 2010. A final rule was published on October 18, 2010, and took effect on November 17, 2010.

Unit 21: Clearwater River Unit. The Clearwater River Critical Habitat Unit (CHU) (Figure 15) is located east of Lewiston, Idaho, and extends from the SR confluence at Lewiston on the west to headwaters in the Bitterroot Mountains along the Idaho–Montana border on the east in Nez Perce, Latah, Lewis, Clearwater, Idaho, and Shoshone Counties. This unit includes five Critical Habitat subunits (CHSUs): Lower/ Middle Fork Clearwater River; NF Clearwater River (and Fish Lake); South Fork Clearwater River; Lochsa River (and Fish Lake); and the Selway River. In the Clearwater River CHU, 2,702.1 km (1,679.0 mi) of streams and 6,721.9 ha (16,610.2 ac) of lake and reservoir surface area are proposed as critical habitat.

Figure 15. Unit 21, Bull Trout Critical Habitat within and adjacent to Dworshak Reservoir.

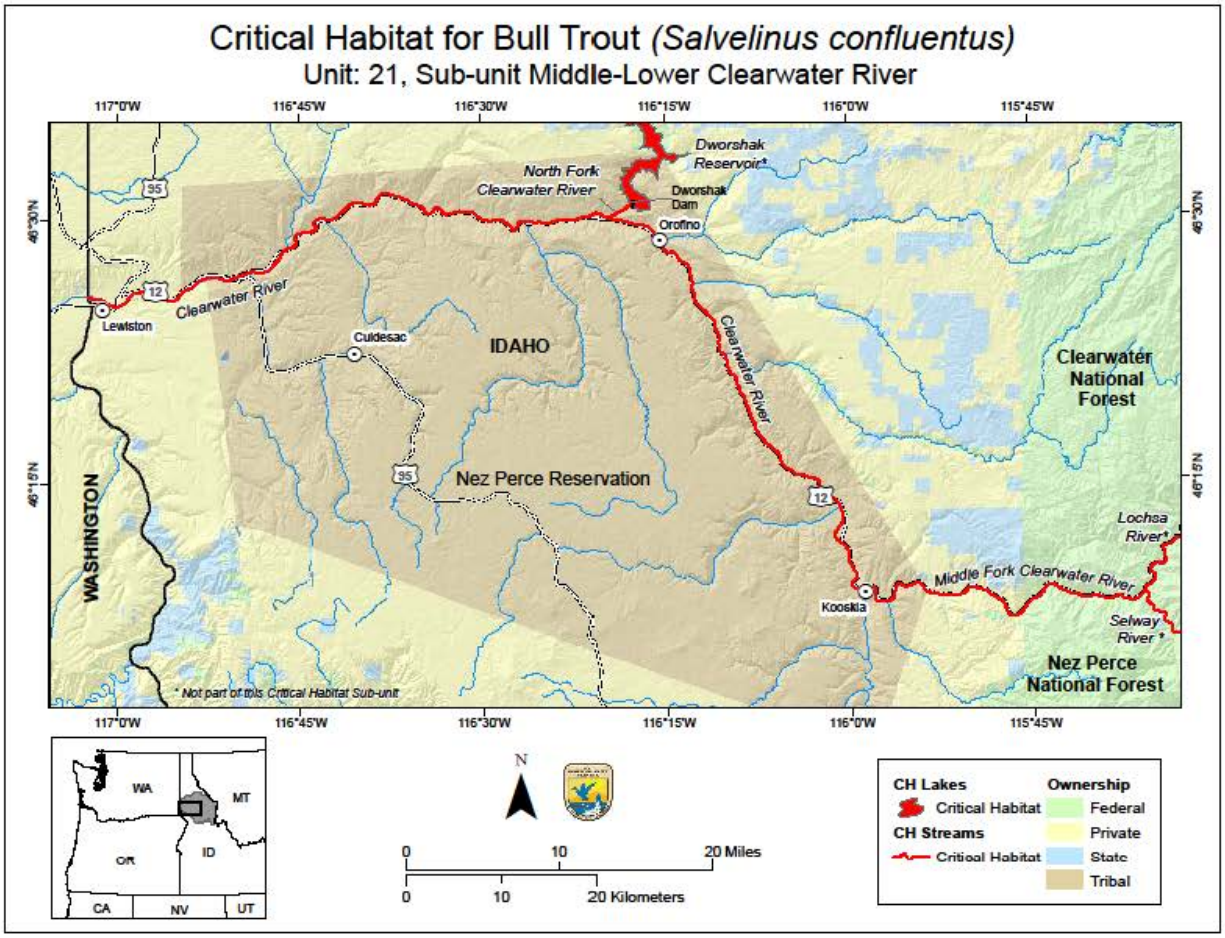
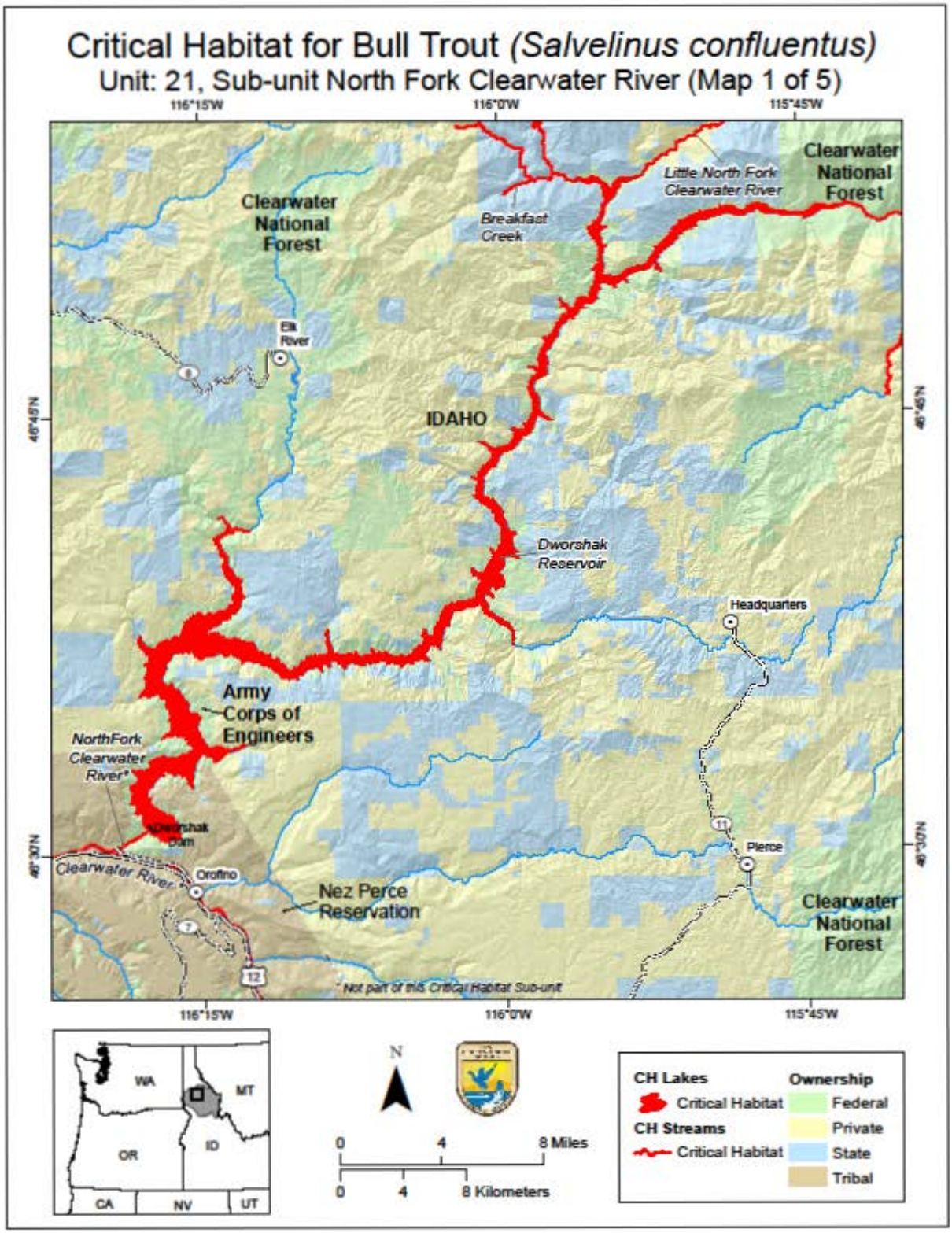


Figure 16. Unit 21 showing Dworshak Reservoir.



4.6.3.2. Essential Elements of Designated Critical Habitat

Primary Constituent Elements for Bull trout based on the needs identified in 50 CFR 17 (75 FR 63898) and the current knowledge of the life-history, biology, and ecology of the species and the characteristics of the habitat necessary to sustain the essential life history functions of the species, the USFWS has identified the following PCEs for bull trout critical habitat.

Table 6 Primary constituent elements (PCEs) of critical habitats designated for bull trout.

PCEs		
1	Water Quality	Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.
2	Migration Habitat	Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.
3	Food Availability	An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.
4	In-stream Habitat	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 Temperature	Water temperatures ranging from 2 to 15 °C (36 to 59 °F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.
6	Substrate Characteristics	In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount 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	Stream Flow	A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.
8	Water Quantity	Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.
9	Nonnative Species	Sufficiently low levels of occurrence of nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.

4.6.4. Canada lynx

4.6.4.1. Geographical Extent of Designated Critical Habitat

No critical habitat for Canada lynx has been designated within the proposed action area.

4.6.4.2. Essential Elements of Designated Critical Habitat

No critical habitat for Canada lynx has been designated within the proposed action area.

4.6.5. Gray Wolf

4.6.5.1. Geographical Extent of Designated Critical Habitat

No critical habitat rules have been published for the gray wolf.

4.6.5.2. Essential Elements of Designated Critical Habitat

No critical habitat rules have been published for the gray wolf.

5. Environmental Baseline

The geographical area for which the environmental baseline is being established is discussed in the Action Area section of this document.

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

The environmental baseline should paint a picture of the habitat for listed or proposed species in the action area and amount of degradation that has occurred to date. Describe the present condition of the habitat elements essential for the listed or proposed species. If the action area includes designated or proposed critical habitat for the listed species, describe the critical habitat and level of degradation.

5.1. Historic Conditions

A variety of human activities has degraded aquatic habitats or affected native fish populations in the SRB tributaries. The activities include stream channelization, elimination of wetlands, construction of flood control dams and levees, construction of roads (many with impassable culverts), timber harvest, splash dams, mining, water withdrawals, unscreened water diversions, agriculture, livestock grazing, urbanization, outdoor recreation, fire exclusion and suppression, artificial fish propagation, fish harvest, and introduction of non-native species. In the action area, numerous anthropogenic features or activities (e.g., dams, marinas, docks, roads, railroads, rip-rap, and landscaping) have become permanent fixtures on the landscape and have displaced and altered native riparian habitat. Consequently, normal riparian processes (e.g., shading, bank stabilization, and large woody debris (LWD) recruitment) are diminished or eliminated, and aquatic habitat has become simplified to the degree that it limits population diversity and spatial structure (NMFS 2008).

The logging boom took off in the 1930s with salvage logging for western white pine, and logging of western red cedar for power poles. Initially, log flumes, dams, and chutes were built down major drainages to the NF Clearwater River. From there, logs were floated to Lewiston in the now historic Clearwater River log drives. Subsequently, logging systems utilized railroads,

tractors/bulldozers, Idaho jammers, skylines with long cable reaches, and, most recently, helicopters. Logging activity and associated road construction was at its peak in the 1960s and 1970s, and has tapered off considerably; however, logging is still important to the economies of the surrounding communities (IDEQ 2002).

5.2. Current Conditions

The project area includes approximately 40 miles of Dworshak Reservoir from Granddad Campground downstream to the dam. As is typically the case with man-made reservoirs, the biological productivity of Dworshak Reservoir has gone through an aging process. The nutrient content of the reservoir is now a reflection of the watershed characteristics and inflowing nutrient concentrations. The North Fork Clearwater River, and subsequently the reservoir, also experience nutrient declines due to the loss of decomposing carcasses of steelhead and Chinook salmon that used to spawn in the river each year (i.e. marine derived nutrients). The primary goal of the proposed action is to provide a balanced nutrient loading for Dworshak Reservoir throughout the spring and summer.

The quality of critical habitat in the North Fork Clearwater and Clearwater Rivers is very good to excellent downstream from Dworshak Dam. Development along the rivers is limited to small parcels of level land and the conditions of in-stream habitat and water quality are both high.

5.3. Matrix of Pathways and Indicators (MPI)

NMFS uses the "Matrix of Pathways and Indicators" (MPI) (NMFS 1996) to summarize important environmental parameters and levels of condition for each. USFWS adopted a similar strategy in 1997 based on NMFS' matrix. The NMFS matrix is divided into six overall pathways (major rows in the matrix):

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

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

Because the North Fork Clearwater River is now impounded by Dworshak Dam all indicators in table 7 were considered to be not properly functioning as compared to a natural river system.

Table 7. Checklist for Documenting Environmental Baseline and Effects of the Proposed Dworshak Nutrient Supplementation Pilot Project on Relevant Anadromous Salmonid Habitat Indicators, i.e. Snake River Fall Chinook and Snake River Basin steelhead.

PATHWAYS	ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION		
Indicators	Properly Functioning	At Risk	Not Properly Functioning	Restore	Maintain	Degrade
Water Quality:						
Temperature			X		X	
Sediment			X		X	
Chem. Contam./Nut.			X		X	
Habitat Access:						
Physical Barriers			X		X	
Habitat Elements:						
Substrate			X		X	
Large Woody Debris			X		X	
Pool Frequency			X		X	
Pool Quality			X		X	
Off-Channel Habitat			X		X	
Refugia			X		X	
Channel Cond. & Dyn.:						
Width/Depth Ratio			X		X	
Streambank Cond.			X		X	
Floodplain Connectivity			X		X	
Flow/Hydrology:						
Peak/Base Flows			X		X	
Drainage Network Increase			X		X	
Watershed Conditions:						
Road Dens. & Loc.			X		X	
Disturbance History			X		X	
Riparian Reserves			X		X	
Watershed Name: North Fork Clearwater River			Location: HUC 17060308;			

6. Baseline Conditions Justification

The current status of Dworshak Reservoir (i.e. a manmade lake, no longer a free-flowing river) with relation to bull trout habitat is also the baseline condition. The reservoir has existed since the completion of the dam in 1972 and it is not likely that the North Fork Clearwater River will be returned to a free-flowing stream any time in the near future. Figure 17 is an example of what the shoreline of Dworshak Reservoir looks like from late September through late April each year.

Fluctuations in pool elevation as a result of cool-water augmentation for migrating anadromous salmonids (mandated by NMFS' BO for the FCRPS) leave 80 to 155 feet of exposed banks in the reservoir below the ordinary high water mark (OHWM). These banks (Figure 17) were historically submerged under reservoir water, and were stripped of trees and vegetation during construction of the reservoir. The now exposed banks release a great deal of suspended sediment

and routinely create turbidity in the reservoir because of rising and lowering reservoir elevations, as well as wind and water erosion events.

Figure 17. Example of Exposed Banks in Dworshak Reservoir in Elk Creek Meadows Area.

7. Effects of the Action

This section includes an analysis of general project-related effects of the proposed action, as well as specific effects on the species and PCEs of critical habitat. Effects from any interrelated and interdependent activities are also discussed.

Factors considered in the analysis include: proximity of the action, distribution, timing, nature of the effect, duration and disturbance frequency, disturbance intensity, and disturbance severity.

7.1. Project Effects

Potential project effects must be analyzed carefully for this project based on the proposed project area and the environmental baseline. The proposed project area includes only the area above Dworshak Dam. The action area includes the area above and below Dworshak Dam.

7.1.1. Chemical Contamination

Operation of the barge and pump equipment requires the use of fuel and lubricants, which, if spilled into the reservoir or adjacent riparian zone, can injure or kill aquatic organisms. Petroleum-based contaminants contain poly-cyclic aromatic hydrocarbons (PAHs), which can be acutely toxic to salmonids at high levels of exposure and can cause lethal and sub-lethal chronic effects to other aquatic organisms (Neff 1985). Refueling the barge will take place at Big Eddy Marina, or an off-reservoir fuel facility where spill kits and absorbent mats will be available and will be capable of absorbing 125% of any potential fuel or petroleum spill. Application equipment (the truck, generators, etc.) will be inspected for leaks and cleaned prior to loading on the barge. Any detected leaks will be repaired before the vehicle or equipment is loaded on the barge.

The conservation measures stated in section 3.6.1 will likely reduce the risk of chemical contamination to a level that is insignificant or discountable. Effects from chemical contamination on ESA-listed species are, therefore, not reasonably certain to occur.

7.2. Effects on Listed Species

7.2.1. SR Fall Chinook

Chinook salmon are only located downstream from Dworshak Dam. No direct effects to Chinook salmon would occur from the proposed project. Indirect effects to Chinook could occur if water quality conditions change (such as temperature) downstream of the dam. Since water can be withdrawn from the reservoir at various levels, significant changes in water quality, including temperature, are not expected. In addition, no interrelated or interdependent effects are anticipated.

The possible effects on domestic drinking water were addressed in a memo from Terra Graphics Environmental Engineering in August 2010 (TerraGraphics, 2010). The current allowable concentration for nitrite+nitrate as N in the state of Idaho for drinking water supplies is 10 ppm or mg/L. The maximum nitrite+nitrate as N concentration observed in Dworshak reservoir is 0.17 ppm and maximum recorded in the North Fork Clearwater is 0.069 ppm. The concentrations that have observed in Dworshak Reservoir are orders of magnitude lower than the drinking water criteria. Although the information above does not apply directly to Snake River fall Chinook or steelhead, it is offered here as an indication of the quality of water that would be passing from the reservoir into the NFC River.

The state of Idaho does not have a numeric criterion for nitrogen levels in regards to aquatic life protection. They have a narrative standard that states that waters cannot have nitrogen levels sufficient to result in nuisance aquatic vegetation growth. This is a vague criteria and one of the principle reasons chlorophyll a concentrations are being measured within the reservoir. The state has chosen a median chlorophyll a concentration of 3 ppb or µg/L and a median Secchi depth of 3 m as the level where they begin to become concerned that the algae population has the potential to be considered a nuisance. These thresholds have not been exceeded in the life of the project. In addition, EPA has established recommendations for total nitrogen concentrations in

lakes and reservoirs, to protect against the effects of excess nutrients. For the aggregate ecoregion in which Dworshak Reservoir is located, the recommendation is 100 µg/L total nitrogen (EPA 2000). EPA does not expect this project to increase the total nitrogen concentration in Dworshak reservoir above 100 µg/L. Based on the information supplied by Terra Graphics, the EPA believes the risk of adverse impacts to Snake River Fall Chinook from elevated nitrogen levels and associated changes in microorganisms is negligible and likely not measurable.

7.2.2. SRB Steelhead

The effects on Snake River Basin steelhead are the same as those described for Snake River fall Chinook.

7.2.3. Bull Trout

Bull trout forage, spawn and overwinter in the action area. There is no bull trout spawning within Dworshak Reservoir (i.e. the project area). Bull trout spawning is limited to the upper reaches of some tributaries of the North Fork Clearwater River (Dworshak Reservoir). It is possible that bull trout would benefit from the proposed project. An increase in nutrients should trigger an increase in productivity of microorganisms in the reservoir. This should lead to an increase in zooplankton which, in turn would provide additional food for aquatic insects. Kokanee could have more forage which could conceivably result in an increased kokanee population or growth rates, which could subsequently provide additional food for bull trout. The changes are subtle at this point and are confounded by yearly changes in the kokanee population within the reservoir. The population of kokanee within the reservoir also appears to be on the rise. The increase in kokanee population in the reservoir may be a result of the improved conditions within the reservoir or it may be due to the community recovering after the population crash that occurred in the winter of 2006/2007, prior to our first application year. (TerraGraphics, 2010).

Additional data from 2011 through 2016 will help determine the impact of the project on the kokanee fishery. If the lower trophic levels maintain the production that has been observed in 2008 and 2009 one would expect to see a positive impact on the kokanee population. (TerraGraphics, 2010)

There is minimal risk of negative effects caused by the proposed addition of nutrients to the reservoir.

7.2.4. Canada Lynx

Application of nitrogen fertilizer to Dworshak Reservoir and the subsequent effects of that application would have no direct effect on lynx. There is a very slight possibility that the fertilizer application may provide a beneficial effect for lynx if they make use of increased kokanee populations.

7.2.5. Gray Wolf

Application of nitrogen fertilizer to Dworshak Reservoir and the subsequent effects of that application would have no direct or indirect effect on gray wolves.

7.3. Effects on Critical Habitat

7.3.1. SR Fall Chinook

7.3.1.1. Spawning and Juvenile Rearing Areas

Cover/shelter: No measurable effect in accessible areas.

Food (juvenile rearing): No measurable effect in accessible areas.

Riparian vegetation: No measurable effect in accessible areas.

Space: No effect.

Spawning gravel: No effect.

Water quality: No measurable effect in accessible areas.

Water quantity: No effect.

7.3.1.2. Juvenile Migration Corridors

Cover/shelter: No measurable effect in accessible areas.

Food: No measurable effect in accessible areas.

Riparian vegetation: No measurable effect in accessible areas.

Safe passage: No effect.

Space: No effect.

Substrate: No measurable effect in accessible areas.

Water quality: No measurable effect in accessible areas.

Water quantity: No effect.

Water temperature: No measurable effect in accessible areas.

Water velocity: No effect.

7.3.1.3. Areas for growth and development to adulthood

Ocean areas – not identified: No effect.

7.3.1.4. Adult Migration Corridors

Cover/shelter: No effect.

Riparian vegetation: No measurable effect in accessible areas.

Safe passage: No effect.

Space: No effect.

Substrate: No effect

Water quality: No measurable effect in accessible areas.

Water quantity: No effect.

Water temperature: No measurable effect in accessible areas.

Water velocity: No effect.

7.3.2. SRB Steelhead

7.3.2.1. Freshwater spawning sites

Water quantity, w*ater quality*, and s*ubstrate (i.e. spawning gravel)*: Effects would be the same as those described for Snake River fall Chinook.

7.3.2.2. Freshwater rearing sites

Water quantity, w*ater quality, forage (i.e. food) and natural cover (i.e. riparian vegetation):* Effects would be the same as those described for Snake River fall Chinook.

Floodplain connectivity: No measurable effect.

7.3.2.3. Freshwater migration corridors

Free passage, natural cover (i.e. riparian vegetation), and water quality: Effects would be the same as those described for Snake River fall Chinook.

7.3.3. Bull Trout

Water quality: Indirect effects to bull trout could occur if water quality conditions (such as turbidity) change. Based on the description of the effects on listed species in section 7.2.3 there is low risk that water quality would experience significant changes. Additionally, fluctuations due to withdrawals from the reservoir for cool-water augmentation for anadromous salmonids, resulting in increased turbidity and suspended sediment, would exist without the implementation of the proposed action. It is unlikely that water quality effects in the form of turbidity and suspended sediment would be distinguishable from background levels. Bull trout are likely to be in the reservoir during late April through May applications of nitrogen. Based on radio-tag date, upstream migration out of the reservoir to tributaries primarily takes place between the end of May through the end of June (Hanson et al., 2007) Over half of the radio-tagged bull trout moved out of tributaries and back to the reservoir between the first week of October through the first week of November (Hanson et al., 2007), which is after nitrogen applications end around September 15 each year. The EPA believes indirect effects of water quality will be insignificant and probably not measurable.

There will be no change to springs, seeps, groundwater sources, and subsurface water connectivity that to contribute to water quality and quantity and provide thermal refugia. There would be no effect to water quality in tributaries upstream of Dworshak Reservoir.

Migration habitat: No effect. The proposed project will not create physical, biological, or water quality impediments to spawning, rearing, overwintering, and freshwater foraging habitats. There will be no permanent, partial, intermittent, or seasonal barriers created.

Food availability: The proposed project will possibly have a positive effect on the food base, primarily aquatic macro-invertebrates and forage fish.

In-stream habitat: No effect. Dworshak Reservoir provides a lake-like, aquatic environment for overwintering bull trout. Shoreline habitat complexity is limited due to the annual draw down of the reservoir from July through September. Complex river or stream habitat is available in the tributaries of the reservoir and will not be altered by this project.

Water temperature: The effects on water temperature are the same as those described in water quality above.

Substrate characteristics: No effect. Since this project is restricted to the reservoir there will be no change in amount, size, and composition of substrates in the tributaries. Success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival will continue to be unchanged and in excellent condition. There will be no amount of sediment generated by this project, in the reservoir or tributaries.

Stream flow: No effect. This project will have no effect on the natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges.

Water quantity: No effect. This project will not change or affect water quality and quantity in the reservoir or tributaries, nor have any effect on normal reproduction, growth, and survival of bull trout.

Nonnative species: The Dworshak nutrient supplementation pilot project may result in an increase of non-native fish, such as smallmouth bass, due to the anticipated increase in forage fish (i.e. kokanee). However, these non-native fish already occur in the reservoir, and any increase in predation from non-native species would likely be immeasurable and insignificant.

7.4. Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this BA. There are no anticipated cumulative effects that would have detrimental or beneficial effects on any of the listed fish species addressed in this amendment.

7.5. Effects Determination

7.5.1. Listed Species

<u>The EPA has determined that the proposed action may affect, but is not likely to adversely affect (NLAA) Snake River fall Chinook, Snake River Basin steelhead, and bull trout.</u>

The effects of the action will include seasonal increases in beneficial green algae, micro-organisms, and zooplankton and possibly increase the population of kokanee or the size of individual fish. The project will reduce the amount of blue-green algae which could improve the overall health of the reservoir ecosystem. Changes in water quality are not likely to be measurable and are not reasonably certain to occur downstream of Dworshak Dam. Bull trout may benefit from the project due to increased forage from the potential increase in macro-invertebrates and kokanee. The project will have no direct or indirect effects on Snake River fall Chinook or Snake River Basin steelhead.

Because of the proposed conservation measures, effects from chemical contamination on ESA-listed species are not reasonably certain to occur.

7.5.2. Critical Habitat

Any effects on the PCEs for SR fall Chinook or SRB steelhead that may occur will be insignificant or discountable because of the implementation of the BMPs and the extreme dilution of the fertilizer before the water it is applied to is discharged from the reservoir, and the stratification of the reservoir. Additionally, discharges from Dworshak Reservoir come from the hypolimnion.

Similarly, because the project is restricted to the reservoir and the fertilizer application effects on the environment are negligible in terms of the intensity, extent and duration, the PCEs of the bull

trout critical habitat in the action area are likely to remain functional, or retain their current ability to become functionally established, to serve the intended conservation role for the species.

Therefore, the EPA has determined that the proposed action will not likely destroy or adversely modify SR steelhead, fall Chinook, or bull trout critical habitat.

7.5.3. Bald and Golden Eagle Protection Act (BGEPA) of 1940, As Amended.

This act prohibits the taking or possession of and commerce in bald and golden eagles, with limited exceptions. This action does not conflict with the purposes of the Act. The bald eagle was delisted on July 9, 2007 (Federal Register, http://www.gpo.gov/fdsys/pkg/FR-2007-07-09/pdf/07-4302.pdf#page=1 .) Although bald eagles have been delisted they are still protected by the BGEPA. Bald eagles nest and forage around Dworshak Reservoir every year. Best management practices have been proposed to reduce the risk of harassing eagles during fertilizer application.

7.5.4. Summary.

Species	**Effect Determination**
Threatened	
1. Snake River Fall Chinook	May Affect, Not Likely to Adversely Affect
2. Snake River Basin Steelhead	May Affect, Not Likely to Adversely Affect
3. Columbia Basin Bull Trout	May Affect, Not Likely to Adversely Affect
4. Canada Lynx	No effect
5. Gray Wolf	Delisted

Species	**ESA Designation**	**Species Determination**	**Critical Habitat Determination**
1. SR Fall Chinook	Threatened	NLAA	NLAA
2. SR Basin Steelhead	Threatened	NLAA	NLAA
3. Columbia Basin Bull Trout	Threatened	NLAA	NLAA
4. Canada Lynx	Threatened	No effect	No effect
5. Gray Wolf	Not Listed	Delisted	

8. Conclusions

The proposed action is for the issuance of a NPDES permit by the EPA for the Corps' Nutrient Supplementation Project. The issuance of the permit will allow the Corps to implement their project in cooperation with IDFG. The intent of the project is to enhance the microscopic biota of the reservoir in order to improve the ecosystem of the whole reservoir. The expected results are the reduction of undesirable blue-green algae and an increase in desirable zooplankton and green algae. The increase of the latter should help increase the macro-invertebrate population of the reservoir. This will hopefully lead to an increase in the kokanee population and/or an increase in the size of individual kokanee. Bull trout, which prey on kokanee, would subsequently benefit from this project. Indirect effects may include increases in populations of other fish and macro-invertebrates or other aquatic vertebrates.

EPA and the Corps have proposed a number of best management practices for the proposed project that will alleviate the certainty for any potential adverse effects to likely adversely affect ESA-listed species or their designated and proposed critical habitats. In addition, tributaries of Dworshak Reservoir that provide critical habitat for bull trout would not be affected by this project. Downstream effects from nutrient supplementation on water quality and Snake River fall Chinook and steelhead should be negligible and most likely immeasurable.

9. Essential Fish Habitat

The proposed action and action area for this assessment are described in section 3 of this document.

The consultation requirement of section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) directs Federal agencies to consult with NMFS on all actions, or proposed actions that may adversely affect Essential Fish Habitat (EFH). Adverse effects include the direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside EFH, and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires NMFS to recommend measures that may be taken by the action agency to conserve EFH.

The action area includes areas designated as EFH under the MSA for various life-history stages of Chinook and Coho salmon. The Clearwater River (HUC # 17060306) is identified as current EFH for Chinook and currently accessible, historic habitat for coho. The Nez Perce Tribe has been stocking coho salmon in the Clearwater Basin since 1995. The ten year average over Lower Granite Dam is 2088 adults, with 1509 returning last year. The Lower North Fork Clearwater River (HUC # 17060308) is identified as historic EFH for Chinook. (PFMC 1999).

9.1. Effects of the Proposed Action on EFH

Based on information provided above, and the analysis of effects presented in the ESA portion of this document, the EPA concludes that there will be no adverse effects on Chinook and Coho salmon EFH

9.2. Cumulative Effects

There are no anticipated cumulative effects on EFH as a result of the proposed project.

9.3. Proposed Conservation Measures

Proposed conservation measures include the BMPs listed in the ESA portion of this document.

9.4. Conclusions for EFH

Based upon the nature of the proposed project, the fact that the NPDES permit will allow implementation of a project that is restricted to Dworshak Reservoir, and the negligible effects described in section 7 of this document, the EPA believes there will be no adverse effects to EFH.

10. References

Blenden, M. L., R. S. Osborne, and P. A. Kucera. 1996. Spring outmigration of wild and hatchery chinook salmon and steelhead trout smolts from the Imnaha River, Oregon, February 6 - June 20, 1995.Annual project report to the Bonneville Power Administration. Nez Perce Tribe Department of Fisheries Resources Management, Lapwai, Idaho. 74 pp. (pp. 14-15).

Connor, W.P., J.G. Sneva, K.F. Tiffan, R.K. Steinhorst, and D. Ross. 2005. Two alternative juvenile life history types for fall Chinook salmon in the Snake River Basin. American Fisheries Society. 134: 291-304.

EPA. 2000. Ambient Water Quality Criteria Recommendations: Information Supporting the Development of State and Tribal Nutrient Criteria: Lakes and Reservoirs in Nutrient Ecoregion II. United States Environmental Protection Agency. Office of Water. EPA 822-B-00-007. 107 pp.

EPA. 2010. NPDES Permit Writers' Manual. United States Environmental Protection Agency. Office of Wastewater Management, Water Permits Division, State and Regional Branch. EPA-833-K-10-001.

Good, T. P., R. S. Waples, P. Adams. (eds.) 2005. Updated status of Federally listed ESUs of West Coast salmon and steelhead. U.S. Dept. of Commerce, NOAA Tech. Memo., NMFS-NWFSC-66, 598 p.

Hanson et al. 2007. Jonathan Hanson, Schriever E., Erhardt J. "Bull Trout Life History Investigations in the North Fork Clearwater River Basin". Prepared for the US Army Corps of Engineers, Walla Walla District, by the Idaho Department of Fish and Game, PO Box 25, Boise, Idaho, 83707, under subcontract to Normandeau Associates, Inc., 1921 River Road, P.O. Box 10 Drumore, Pennsylvania 17518, Contract Number DACW68-02-D-0002, Delivery Order Number 0002.

ICBTRT (Interior Columbia Basin Technical Recovery Team). 2003. Independent populations of Chinook, steelhead, and sockeye for listed evolutionarily significant units within the Interior Columbia River Domain: working draft, July 2003. NOAA National Marine Fisheries Service, Northwest Fisheries Science Center. Seattle, Washington. Available at: http://researach.nwfsc.noaa.gov/trt/col_docs/IndependentPopChinSteelSock.pdf

IDEQ (Idaho Department of Environmental Quality). 2002. Lower North Fork Clearwater River Sub-basin Assessment and TMDL. Lewiston, Idaho. November.

Matthews, G.M., and R.S. Waples. 1991. Status review for Snake River spring and summer chinook salmon. NOAA Tech. Memo. NMFS F/NWC-200, 75 p. (Available from Natl. Mar. Fish. Serv., Northwest Fisheries Science Center, Coastal Zone and Estuarine Studies Division, 2725 Montlake Blvd. E., Seattle, WA 98112-2097.)

Myers, J. M., R. G. Kope, G. J. Bryant, D. J. Teel, L. J. Lierheimer, T. C. Wainwright, W. S. Grant, F. W. Waknitz, K. Neely, S. Lindley, R. S. Waples. 1998. Status review of Chinook salmon from Washington, Idaho, Oregon, and California. U.S. Dept. of Commerce, NOAA Tech. Memo., NMFS-NWFSC-35, 443 p.

Neff, J.M. 1985. Polycyclic aromatic hydrocarbons. Pages 416–454 in G.M. Rand and S.R. Petrocelli, editors. Fundamentals of aquatic toxicology. Hemisphere Publishing, Washington, D.C.

NMFS (National Marine Fisheries Service). 1996. Making Endangered Species Act determinations of effect for individual and grouped actions at the watershed scale. The National Marine Fisheries Service Environmental and Technical Services Division, Habitat Conservation Branch, Seattle, WA. Available at: http://www.nwr.noaa.gov/Publications/Reference-Documents/upload/matrix_1996.pdf

NMFS (National Marine Fisheries Service). 2009. Endangered Species Act Section 7 Consultation Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation Farley Vegetation Management Project Umatilla National Forest Desolation Creek Watershed (HUC 1707020204) Grant County, Oregon. National Marine Fisheries Service, Portland, Oregon. June.

NMFS (National Marine Fisheries Service). 2005. Endangered and Threatened Species: Final Listing Determinations for 16 Evolutionarily Significant Units of West Coast Salmon, and Final 4(D) Protective Regulations for Threatened Salmonid ESUs. Final Rule. Federal Register 70:123:37160-37204.

NMFS (National Marine Fisheries Service). 2005. Endangered and Threatened Species: Final Listing Determinations for 16 Evolutionarily Significant Units of West Coast Salmon, and Final 4(D) Protective Regulations for Threatened Salmonid ESUs. Final Rule. Federal Register 70:123:37160-37204.

NOAA Fisheries. 2008. Endangered Species Act Section 7(a) (2) Consultation Biological Opinion And Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation on Remand for Operation of the Federal Columbia River Power System, 11 Bureau of Reclamation Projects in the Columbia Basin and ESA Section 10(a) (I) (A) Permit for Juvenile Fish Transportation Program (Revised and reissued pursuant to court order, *NWF v. NMFS*, Civ. No. CV 01-640-RE. (D. Oregon)) May 5, 2008. Portland, Oregon.

PFMC (Pacific Fishery Management Council). 1999. Amendment 14 to the Pacific Coast Salmon Plan. Appendix A: Description and identification of essential fish habitat, adverse impacts, and recommended conservation measures for salmon. Pacific Fishery Management Council, Portland, Oregon. March. Available at: http://www.pcouncil.org/salmon/salfmp/a14.html

StreamNet 2006. Database. Available at: http://www.streamnet.org.

TerraGraphics, 2010. TerraGraphics Environmental Engineers, Inc., 10905 E. Montgomery Dr., Ste. 3 Spokane Valley, WA 99206-6606 Phone: (509) 928-1063; Fax: (509) 928-1067. Memo summarizing Dworshak Nutrient Supplementation data from 2007 through cessation of application in 2010.

USFWS (Fish and Wildlife Service) 2000. Biological Opinion for Army EPA of Engineers, Bonneville Power Administration and Bureau of Reclamation. USFWS (Regions 1-6). 98 pp.

USFWS (U.S. Fish and Wildlife Service). 1998. *Bull Trout Interim Conservation Guidance*. USFWS Lacey, Washington.

USFWS (U.S. Fish and Wildlife Service). 1998. *Final Action: Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Klamath River and Columbia River Distinct Population Segments of Bull Trout*. Federal Register: June 10, 1998 (Volume 63, Number 111). Boise, ID: U.S. Department of Interior, Snake River Basin Field Office.

USFWS (U.S. Fish and Wildlife Service). 2002. Bull Trout (*Salvelinus confluentus*) Draft Recovery Plan. U.S. Fish and Wildlife Service, Portland, Oregon. 137 pps.

Waples, R. S., O. W. Johnson. 1991. Status Review for Snake River Sockeye Salmon. U.S. Dept. of Commerce, NOAA Tech. Memo., NMFS-F/NWC-195.

Wydoski, R. and R. Whitney. 2003. Inland Fishes of Washington. Second Edition. American Fisheries Society, Bethesda, MD in association with University of Washington Press, Seattle. 322 pp.