United States Department of the Interior
FISH AND WILDLIFE SERVICE
Idaho Fish and Wildlife Office
1387 S. Vinnell Way, Suite 378
Boise, Idaho 83709
https://www.fws.gov/office/idaho-fish-and-wildlife

In Reply Refer to:
FWS/R1/ES/IFWO/2024-0118358

Lt. Col. ShaiLin KingSlack
U.S. Army Corps of Engineers
Walla Walla District
201 North Third Avenue
Walla Walla, Washington 99362-1876

Subject: Regional General Permit 27 for Lake Pend Oreille and Pend Oreille River – Bonner and Kootenai Counties, Idaho (USACE 2024a, entire) – Programmatic Biological Opinion

Dear Lt. Col. KingSlack:

This letter transmits the U.S. Fish and Wildlife Service's (Service) biological opinion (Opinion) on the effects of the subject proposed action to species and habitats listed under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.; [Act]). In an email dated September 27, 2024 and received by the Service on the same day, the U.S. Army Corps of Engineers (Corps) requested consultation under section 7 of the Act. Your letter included a biological assessment (Assessment) describing effects of the proposed subject action to bull trout (*Salvelinus confluentus*) and bull trout designated critical habitat (DCH).

Through the Assessment, the Corps determined that the subject proposed action may affect and is likely to adversely affect bull trout. Our Opinion concludes that the subject proposed action will not jeopardize the continued existence of bull trout. The Corps also determined that the subject proposed action may affect but is not likely to adversely affect bull trout DCH. The Service concurs with the Corps' determination and presents our rationale below.

The Corps also determined that the proposed action will have no effect on Canada lynx (*Lynx canadensis*), grizzly bear (*Ursus arctos horribilis*), North American wolverine (*Gulo gulo luscus*), whitebark pine (*Pinus albicaulis*), and Canada lynx proposed critical habitat. The regulations implementing section 7 of the Act do not require the Service to review or concur with no effect determinations. However, the Service does appreciate being informed of your determination for these species and designated critical habitats.

Informal Consultation

The Corps proposes to renew RGP-27 to authorize the installation, replacement, or modification of the following non-commercial structures: piers and floating docks, marine launching rails, mooring piles, portable boatlift stations, small diameter (less than or equal to two inches) water line intakes and associated submersible pumps, and mooring buoys. The action area for RGP-27 includes Lake Pend Oreille, the Pend Oreille River, and their tributaries that are inundated by the summer pool elevation of 2,062.5 National Geodetic Vertical Datum (NGVD) in Bonner and Kootenai Counties, Idaho.

A RGP is an alternative permitting procedure available to the Corps District Engineer in accordance with the Corps permitting regulations (33 Code of Federal Regulations [CFR] 325.2(e)(2)). A RGP may be used to authorize the construction of activities that are “similar in nature and cause only minimal individual and cumulative environmental impacts” (33 CFR 323.2(h)(1)).

All bull trout DCH within the action area is designated as foraging, migratory, and overwintering (FMO). No designated spawning and rearing (SR) habitat occurs within the action area. Permit activities will occur within or adjacent to bull trout DCH, but design features and conservation measures described in the proposed action and in *Appendix A: IDL Standards and IDEQ Conditions* would eliminate potential effects to physical and biological factors (PBFs) or reduce them to an *insignificant* level, as detailed below .

PBF 1: *Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flow) to contribute to water quality and quantity and provide thermal refugia.*

Structures authorized under RGP-27 are located along the shoreline and occupy a small footprint in terms of overwater shading and placement in benthic habitats. The action area is large and water contributions primarily come from multiple river and smaller streams. Given that water quality and quantity are primarily derived from larger surface waters, minor impacts to springs, seeps, and subsurface water flows from the construction of structures authorized under RGP-27 are not expected to measurably impact water quality or quantity, so effects to PBF 1 are *insignificant*.

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

Structures authorized under RGP-27 are anticipated to be semi-permanent structures located along the shoreline. Changes in water quality (sediment and chemical) are expected to occur, but are not anticipated to rise to a level that would alter habitat function or impair bull trout migration as conservation measures detailed in the Opinion under *Appendix A: IDL Standards and IDEQ Conditions* relating to turbidity and chemical contamination will reduce the severity of these stressors to *insignificant* levels. Limitations on the size of structures and how far they can extend waterward toward the line of navigation limit the extent to which they can encroach on bull trout DCH. Structures authorized would not create impassable barriers to migration and would occupy a small footprint relative to the size of the action area. Away from the mouths of

SR streams, bull trout could easily avoid authorized structures by foraging, migrating, and overwintering in similar suitable habitat away from authorized structures. The proposed action identifies exclusion areas that prevent constructions within a 100-yard radius of the mouth of excluded stream and require light penetrative decking between 100 yards and a quarter mile on each side of the mouth of excluded streams. These exclusion areas would limit changes to habitat around excluded streams where bull trout are expected in greater densities during migrations, reducing impacts to PBF 2 to *insignificant*.

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

Within the action area, kokanee salmon (*Oncorhynchus nerka*) are a primary food source for bull trout and many other predatory fish (Vidergar 2000, pp. 73–78). The proposed action excludes Scenic Bay, which provides important kokanee spawning habitat and requires light penetrative decking for docks constructed near known kokanee spawning areas to reduce potential impacts to kokanee (USACE 2024a, p. 28). The proposed action is expected to increase turbidity, expose environments to chemical contamination, and result in the loss of benthic and riparian habitat locally around individual permit sites, which could impact PBF 3. Conservation measures regarding turbidity, erosion control, in-water work, vegetation protection, and management of hazardous materials that are inherently tied to the proposed action are listed in the Opinion in *Appendix A: IDL Standards and IDEQ Conditions* and will reduce these effects to *insignificant* levels. Alterations of littoral habitats from overwater shading is also expected to occur; however, the small footprint of authorized structures is unlikely to measurably impact the food base, so effects to PBF 3 from overwater shading are *insignificant*.

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

The action area is large and complex and includes Lake Pend Oreille and two rivers. Minor effects to shoreline vegetation and benthic habitats are expected to occur, but the small size of authorized structures is unlikely to result in significant changes to habitat function or complexity and conservation measures on vegetation protection will reduce these effects to *insignificant* levels.

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

Surface water temperatures within the action area are often above 15 °C during summer months; however, cooler waters are available in deeper water within the action area. Shading from overwater structures may marginally reduce water temperature in a localized area, but the small area of overwater shading will have an *insignificant* effect on water temperature in the greater action area.

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

Habitat in the action area is designated as FMO and PBF 6 is not applicable.

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

Structures authorized under RGP-27 are located along the shoreline and occupy a small footprint in terms of overwater shading and placement in benthic habitats. Small waterline intakes are anticipated to reduce water quantity, but this quantity is insignificant given the water volume of the action area and given that the hydrograph (Figure 3 in the Opinion) is primarily controlled by Albeni Falls Dam which alters the hydrology and morphology within the action area through seasonal fluctuations in lake levels that range between 2,051-2,062 feet above mean sea level (msl; USACE 2024a, p. 43). The proposed action's effects to PBF 7 would likely be indiscernible relative to the baseline conditions created by the artificial hydrological regime and are therefore *insignificant*.

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

Effects pathways associated with the proposed action include increases in turbidity, reduced water volume, and exposure to chemical contamination. Water withdrawal from small waterline intakes is unlikely to measurable impact water levels in the action area, as Albeni Falls Dam operations maintain the action area on a seasonally consistent artificial hydrograph. Conservation measures listed in the Opinion in *Appendix A: IDL Standards and IDEQ Conditions* will reduce the effects of turbidity and chemical contamination to levels that would have an *insignificant* effect.

PBF 9: *Sufficiently low levels of occurrence of nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.*

Numerous nonnative predatory fish species already exist within the action area. Construction of overwater structures would provide shading that could attract nonnative predatory fish. A study within Lake Pend Oreille found relative predatory fish abundance to only be greater at developed sites compared to undeveloped sites during the day in summer, primarily due to high numbers of smallmouth bass (Bellgraph et al. 2012, p. 4.5). Data specific to the action area suggest bull trout are not a preferred or frequent prey resource for smallmouth bass. Juvenile bull trout, the age-class most vulnerable to predation are expected be temporally separated from these smallmouth bass as they are associated with benthic habitats and commonly conceal themselves under large substrates during the day. In addition, juvenile bull trout are likely to be more abundant near the mouths of excluded streams, where exclusion areas and light-penetrative decking would reduce the amount of overwater shading. Therefore, the effects of increased shading to PBF 9 are expected to be insignificant. In addition, the total amount of surface area impacted by overwater shading relative to the littoral surface area is expected to only be 0.07 percent (see Section 4.3.7 Predation in the Opinion). Given the small percent of habitat altered by the project, it is unlikely to measurably change the population of nonnative predatory fish in the action area, so effects to PBF 9 are *insignificant*.

<u>Concurrence</u>

Based on the Service's review of the Assessment, we concur with the Corps' determination that the action outlined in the Assessment and this letter, may affect, but is not likely to adversely affect bull trout designated critical habitat. This concurrence is based on conservation measures that reduce impacts of the proposed action to bull trout critical habitat to insignificant levels.

This concludes informal consultation for bull trout DCH. Further consultation pursuant to section 7(a)(2) of the Act is not required. Reinitiation of consultation on this action may be necessary if: (1) new information reveals effects of the action that may affect the listed species or critical habitat in a manner or to an extent not considered in the assessment, (2) the action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the analysis, or (3) a new species is listed or critical habitat is designated that may be affected by the proposed action.

Clean Water Act

This enclosed Opinion also address section 7 consultation requirements for the issuance of any proposed action-related permits required under section 404 of the Clean Water Act. Use of this Opinion to document that the Corps has fulfilled its responsibilities under section 7 of the Act is contingent upon the following conditions:

1. The action considered by the Corps in their 404 permitting process must be consistent with the proposed action as described in the Assessment such that no detectable difference in the effects of the action on listed species will occur.

2. Any terms applied to the 404 permit must also be consistent with conservation measures and terms and conditions as described in the Assessment and addressed in this Opinion.

Thank you for your continued interest in the conservation of threatened and endangered species. If you have any questions regarding this consultation, please contact Erin Schultz of this office at (208)-510-6163 or erin_schultz@fws.gov.

Sincerely,

KATHLEEN HENDRICKS
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Date: 2025.02.06 12:34:42 -07'00'

for Lisa Ellis
State Supervisor

Enclosure

cc:
USACE, Coeur d'Alene Office (CENWW-RD-CDA@usace.army.mil)
J. Achziger – USACE (jason.k.achziger@usace.army.mil)
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Literature Cited

Bellgraph, B., R. Harnish, L. Ortega, M. Paluch, D. Sontag, A. Scholz, and A. Black. 2012. Evaluation of Fish Assemblages and Piscivore Diets in Developed and Undeveloped Littoral Areas of Lake Pend Oreille. Batelle, Richland, Washington. 118 pp.

USACE. 2024. Programmatic Biological Assessment Regional General Permit 27 for Lake Pend Oreille and Pend Oreille River, Bonner and Kootenai Counties, Idaho. NWW-2007-00475. U.S. Army Corps of Engineers Walla Walla District Regulatory Division, 156 pp

Vidergar, D.T. 2000. Population estimates, food habits and estimates of consumption of selected predatory fishes in Lake Pend Oreille, Idaho. Master's. University of Idaho, 109 pp.

BIOLOGICAL OPINION
FOR THE
Regional General Permit 27 – Lake Pend Oreille and Pend Oreille River - 2024

2024-0118358

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

KATHLEEN HENDRICKS
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for Lisa Ellis
State Supervisor

Date ________________________________

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1. BACKGROUND

1.1 Introduction

This document represents the U.S. Fish and Wildlife Service's (Service) biological opinion (Opinion) on the effects to bull trout (*Salvelinus confluentus*) from the Regional General Permit 27 (RGP-27) – Lake Pend Oreille and Pend Oreille River. In a letter dated September 27, 2024, and received on the same day, the U.S. Army Corps of Engineers (Corps) requested formal consultation with the Service under section 7 of the Endangered Species Act of 1973, as amended (16 USC 1531 et seq.; [Act]).

This Opinion is primarily based on the Corps' *Programmatic Biological Assessment Regional General Permit 27 for Lake Pend Oreille and Pend Oreille River, Bonner and Kootenai Counties, Idaho* (USACE 2024a, entire) dated April 26, 2024 with revision dates of August 2, 2024, and September 27, 2024, and other sources of information cited herein. The biological assessment (Assessment) is incorporated by reference in this Opinion.

1.2 Consultation History

In 1981, the Seattle District of the Corps issued a regional permit authorizing mooring buoys, floats, piers, water withdrawal systems, marine launching rails, mooring piles, and portable boat-lift stations in Lake Pend Oreille. In 1986, regulatory responsibility in Idaho was transferred to the Walla Walla District of the Corps, and the regional permit was reissued as RGP-27.

Reissuance of RGP-27 has occurred every five years since then, following a public interest review and opportunity for public comment. During discussions involving the renewal of RGP-27 in 2002, the Service and the Corps agreed to incorporate exclusion areas into RGP-27 activities to protect known bald eagle nesting sites and the outlet of streams where bull trout were known to spawn. The Service subsequently completed informal consultation for the renewal of RGP-27 on June 28, 2002, which extended ESA coverage for activities conducted under the Program for five years through August 2007 (USFWS 2002a, entire). Between August 2007 and October 2009, the Service and Corps worked together to modify RGP-27 to reduce potential effects to bull trout. In October 2009, the Service issued an Opinion providing ESA coverage through 2014 (USFWS 2009a, entire). In December 2014, formal consultation between the Corps and Service was initiated for RGP-27. The Service issued an Opinion in February 2015 providing ESA coverage through 2020 (USFWS 2015a, entire). In 2019, the Corps initiated consultation for the reissuance of RGP-27 (2020-2025), and, on March 17, 2020, USFWS issued an Opinion providing ESA coverage through 2025 (USFWS 2020a, entire).

The Consultation History listed below is specific to the development of this Opinion which covers 2025 through 2030.

- February 2023 – The Corps discusses increased permitting demands and the approach of the ITS limit with the Service.
- April 29, 2024 – The Corps sends the Service the Assessment and requests reinitiation of the 2020-2025 RGP-27 and consultation on the next iteration of RGP-27 (2025-2030). After reviewing the reinitiation process and timeline, the Corps and Service agree to develop a consultation for activities under the RGP-27 to 2030.
- May 31, 2024 – The Corps and the Service meet to discuss the Assessment and consultation.
- June 14, 2024 – The Service provides comments on the revised Assessment to the Corps.
- July 11, 2024 – The Corps and the Service meet to discuss the revised Assessment.
- August 2, 2024 – The Corps sends the Service a revised 2024-2030 RGP-27 Assessment.
- August 13, 2024 – The Service provides comments on the revised Assessment to the Corps.
- August 2024 – The Corps sends the Service the revised 2024-2030 RGP-27 Assessment on the 2nd. The Service provides comments on the revised Assessment on the 13th.
- September 24, 2024 – The Corps and the Service meet to discuss the revised Assessment.
- September 27, 2024 - The Corps sends the Service a revised Assessment.
- October 7, 2024 – The Service accepts the Assessment as sufficient to initiate formal consultation.
- January 14, 2024 – The Service provides a draft sections 2.2, 2.6, 4.6, 5, and Appendix C of the Opinion to the Corps for review.
- January 24, 2024 – The Service and the Corps meet to discuss RGP-27. The Corps provides an email clarifying points that were discussed.

2. PROPOSED ACTION

This section describes the proposed Federal action, including any measures that may avoid or minimize adverse effects to listed species or critical habitat, and the extent of the geographic area affected by the action. The term "action" is defined in the implementing regulations for section 7 as "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas" (50 CFR 402.02).

2.1 Action Area

The term "action area" is defined in the regulations as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR 402.02). An action includes activities or programs "directly or indirectly causing modifications to the land, water, or air" (50 CFR 402.02). In this case, the area where land, water, or air is likely to be affected includes the navigable waters of the United States in Lake Pend Oreille (LPO), the Pend Oreille (PO) River, and their tributaries that are inundated by the summer pool elevation of 2,062.5 National Geodetic Vertical Datum (NGVD) in Bonner and Kootenai Counties, Idaho (Figure 1). The action area does not include exclusion areas, which encompass:

- the mouths, and 100 yards on either side of the mouth, of Gold Creek, West Gold Creek, Granite Creek, Trestle Creek, Lightning Creek, Strong Creek, and Priest River; or
- areas that provide important wildlife habitat:
    - Clark Fork Delta, from the confluence of Lightning Creek and the Clark Fork River, west to the Public Land Survey System (PLSS) range line between Range 1E and Range 2E,
    - Denton Slough, located in PLSS Sections 7, 18 & 19, T 56 N, R 2E,
    - Pack River including the Pack River Flats, north of Trestle Creek on the east, and north of Sunnyside Sportsman Access (Hawkins Point) on the west,
    - Morton Slough, including the left bank (east shoreline) of the PO River from the half section line of PLSS Section 16, T 56 N, R 3W, south to the south section line of PLSS Section 21, T 56N, R 3W,
    - Cocolalla Slough/Creek, upstream from the Spokane International Railroad Bridge across the slough, and
    - Scenic Bay of Lake Pend Oreille which provides important kokanee spawning habitat.

The action area is delineated according to the areas affected by the proposed action, which for terrestrial and aquatic environments would be the extent of effects related to noise (USACE 2024a, p. 21).

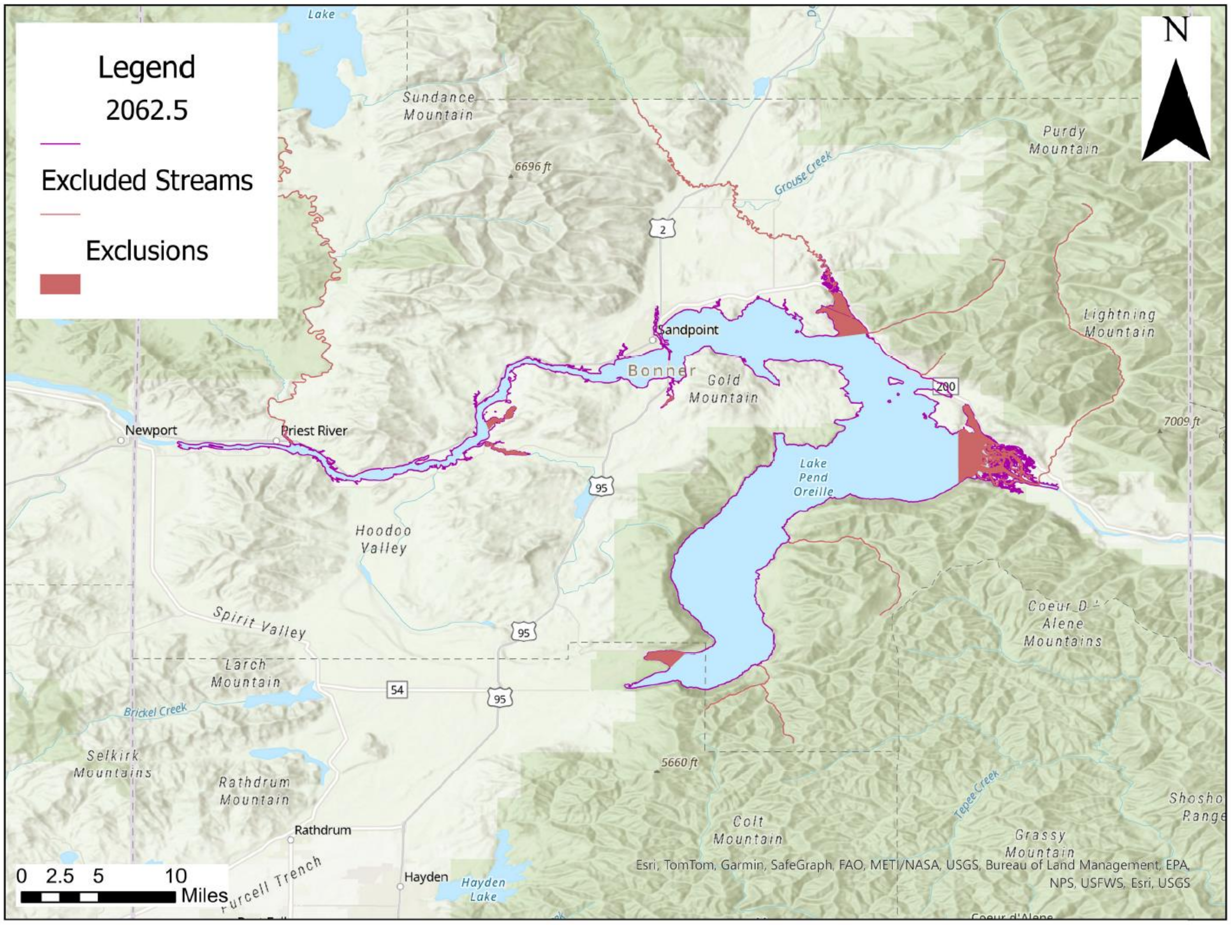

Figure 1. RGP 27 Geographic area of coverage (USACE 2024a, p. 25)

2.2. Description of the Proposed Action

The proposed action is to renew RGP-27. The RGP is an alternative permitting procedure that allows the Corps to fulfill its authorities under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act for activities that are similar in nature and cause minimal individual or cumulative environmental impacts (USACE 2024a, pp. 13–15). The RGP-27 allows the Corps to authorize installation, maintenance, replacement, or modification of noncommercial structures consisting of piers and floating docks, marine launching rails, mooring piles, portable boatlift stations, small waterline intakes with associated submersible pumps, and mooring buoys within the action area. The Corps is the action agency authorizing the action for their permittees (Applicants). Applicants may hire contractors (Contractor) for the construction of structures covered by RGP-27. Under special condition 3.p of the Corps' permit, the Applicant is responsible for all work done by any Contractor. The Applicant must ensure that any Contractor who performs the work is informed of and follows all the terms and conditions of the authorization. This includes condition 3.d, which states the authorization under the Corps permit is contingent upon compliance with all the mandatory terms and conditions related to the incidental take outlined in the Opinion (USACE 2024a, pp. 142–144).

Between 1986-2019, the Corps authorized 1,938 permits (USACE 2024a, p. 18), and between 2020 and April 2024, the Corps issued another 250 for a total of approximately 2,188 permits (this figure does not include individual permits that required consultation separate from the 2020 RGP 27 Programmatic Biological Opinion; USFWS 2009a, entire). The renewal of RGP-27 will authorize up to 500 permits for both new construction and maintenance or repair of authorized facilities during the five-year term of this RGP-27 iteration.

For the 2020-2025 iteration of RGP-27, the Corps provided estimates on the frequency of each type of structure (USACE 2024a, p. 19). The Service used these estimates to extrapolate the anticipated number of structures for the 500 permits covered by this programmatic in Table 1 below. These figures represent the best available data to estimate what types of permits the Corps may issue under this programmatic. Coverage provided by this Opinion is not limited to these estimates, as the proposed action is for 500 permits and a single permit can include installing all the structures listed in 2.2.1-2.2.6 or any combination thereof.

	Number from previous 250 Corps Permits under RGP-27	Percent out of 250 permits	Extrapolated Figure to Estimate Number out of 500 Permits
Dock	195	78%	**390**
Pier	12	5%	**24**
Marine Launching Rail	10	4%	**20**
Pile	74	30%	**148**
Boat Lift	112	45%	**224**
Waterline/Water line	11	4%	**22**
Buoy	5	2%	**10**
Replace	11	4%	**22**

Table 1: Estimates for Structure Construction

2.2.1 Piers and Floating Docks

Single-use and joint use piers and floating docks are authorized under the following terms:

- One pier or floating dock is authorized for each riparian property owner.
- The structure shall be for noncommercial activities only.
- Piers or floating docks shall extend into the waterway no further than the line of navigation. In no case shall the pier or dock extend more than 100 feet waterward of the ordinary high-water mark (OHWM), regardless of depth.
- Total deck area of a single-use pier or floating dock, including the access ramp,

shall not exceed 700 square feet waterward of the OHWM (elevation 2,062.5 NGVD). Total deck area of a joint-use pier or floating dock, including portions of the access ramp extending waterward of the OHWM, shall not exceed 1,100 square feet. Total deck area limitations do NOT include the area associated with portable boat lift stations, though only 2 stations are allowed per dock: See Section 2.2.4 below for more details. Treated wood may be used for the construction of piers or floating docks provided it is treated in a manner consistent with the pesticide's EPA-approved labeling and it is not treated with creosote, pentachlorophenol (Penta), or chromated copper arsenate (CCA).

- Only open-pile pier construction is authorized. Steel piles may not be larger than 10 inches in diameter. Wood pile diameter is not limited and may use treated wood, provided it is treated in a manner consistent with the pesticide's EPA-approved labeling and is not treated with creosote, CCA, or Penta. Piling shall be driven or set in excavated footings. No more than 10 cubic yards of lakebed may be excavated for footings. Footings shall be backfilled with native material, concrete, sand, gravel, grout, or epoxy. All excavation and filling of footings shall be done in the dry during low water conditions. All excess excavated material shall be disposed of in an upland location in a manner that precludes it from reentering waters of the United States. Piles may be bolted to bedrock if conditions preclude other attachment methods.
- No other structures, such as living quarters, toilets, fueling facilities, or hard-covered boat moorages shall be constructed or installed on any float or pier.
- Floating docks shall be designed to contain encapsulated flotation material under all conditions. Open cell polystyrene (beaded Styrofoam) and the reuse of industrial drums is not authorized under any circumstance.
- Piers and floating docks shall generally be constructed perpendicular to the shore, and the width of disturbance to the shoreline shall not exceed 8 feet at the access point to the pier or dock.
- In-water pile strike driving requires the use of a bubble curtain AND a 6-inch minimum thick wood, rubber or synthetic cushion block between the driving apparatus and the pile. Vibratory driving is not subject to this condition.
- Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the U.S.

2.2.2 Marine Launching Rails

One marine launching rail per riparian property ownership is authorized under the following terms:

- The marine launching rail shall be for noncommercial use.
- Marine launching rail systems shall be anchored to the surface of the bed of the

waterway or on low profile concrete plank ties, poured concrete footings, untreated or pressure-treated wood ties, or similar structures resting on the bed. If the area is bedrock, they may be fastened by drilled anchor bolts. If a boat launching ramp exists on the property, the marine launching rail system can be installed on the existing ramp surface. All pressure-treated wood ties must be treated in a manner consistent with the pesticide's EPA-approved labeling. As a matter of good industry practice, pressure-treated wood ties are also to be treated in accordance with standards established by the American Wood Protection Association.

- Marine launching rail systems shall not extend more than 200 feet waterward of the ordinary high-water mark (elevation 2,062.5 NGVD).
- Construction of marine launching rails shall be done in the dry during low water conditions.

2.2.3 Mooring Piles

A maximum of four mooring piles per riparian property ownership is authorized under the following terms:

- Mooring piles shall be for a noncommercial use.
- Piles shall be single, separate, and not constructed to form a multi-piled dolphin.
- Mooring piles shall not be installed more than 55 feet waterward of the ordinary high-water mark, or to the length of the permitted dock as determined on a case-by-case basis.
- In-water pile strike driving will use a bubble curtain AND a 6-inch minimum thick wood, rubber or synthetic cushion block between the driving apparatus and the pile while driving the piles. Vibratory driving is not subject to this condition.
- Steel piles may not be larger than 10 inches in diameter. limited. Wood pile diameter is not limited and may use treated wood provided it is treated in a manner consistent with the pesticide's EPA-approved labeling and is not treated with creosote, CCA, or Penta.

2.2.4 Portable Boat Lift Stations

A maximum of two portable boat lift stations per private riparian property ownership are authorized under the following terms:

- Portable boat-lift stations will be for noncommercial use.
- Portable boat-lift stations will be located adjacent to existing authorized docks or piers. They shall not extend waterward of the authorized floating dock or pier.
- Canopies shall be made of canvas or synthetic cloth and can be part of the boat-lift station or a framework attached to the floating dock or pier.

2.2.5 Small Diameter Waterline Intakes

A maximum of one small diameter waterline intake per private riparian property ownership is authorized under the following terms:

- Waterline intakes will be for noncommercial use.
- The diameter of the intake line shall not exceed 2 inches, though the intake manifold may be larger.
- To prevent unwanted entrainment and impingement of state or federally protected fish, waterline intakes shall be appropriately screened using the National Marine Fisheries Service's (NMFS) "Fish Screening Criteria for Anadromous Salmonids." For any technical questions regarding this criterion, applicants will contact the U.S. Fish and Wildlife Service's Idaho Fish and Wildlife Office Coeur d'Alene at (218) 918-2155 or their local Idaho Department of Fish and Game office (USACE 2024b, pp. 4–5).
- The waterline can be attached to an existing dock or pier, placed on the lake bottom, and held down by concrete blocks or similar means, or trenched into the lake bottom in the dry during lake drawdown period.
- A submersible pump can be part of the structure either attached to a dock or pier or lying on the lake bottom.
- Waterlines will not extend more than 120 feet waterward of the elevation 2,062.5 NGVD.

2.2.6 Mooring Buoys

A maximum of one, single boat mooring buoy per private riparian property ownership is authorized under the following terms:

- Mooring buoys will be for noncommercial use.
- Mooring buoys shall not be installed more than 55 feet waterward of the OHWM or to length of the permitted dock.

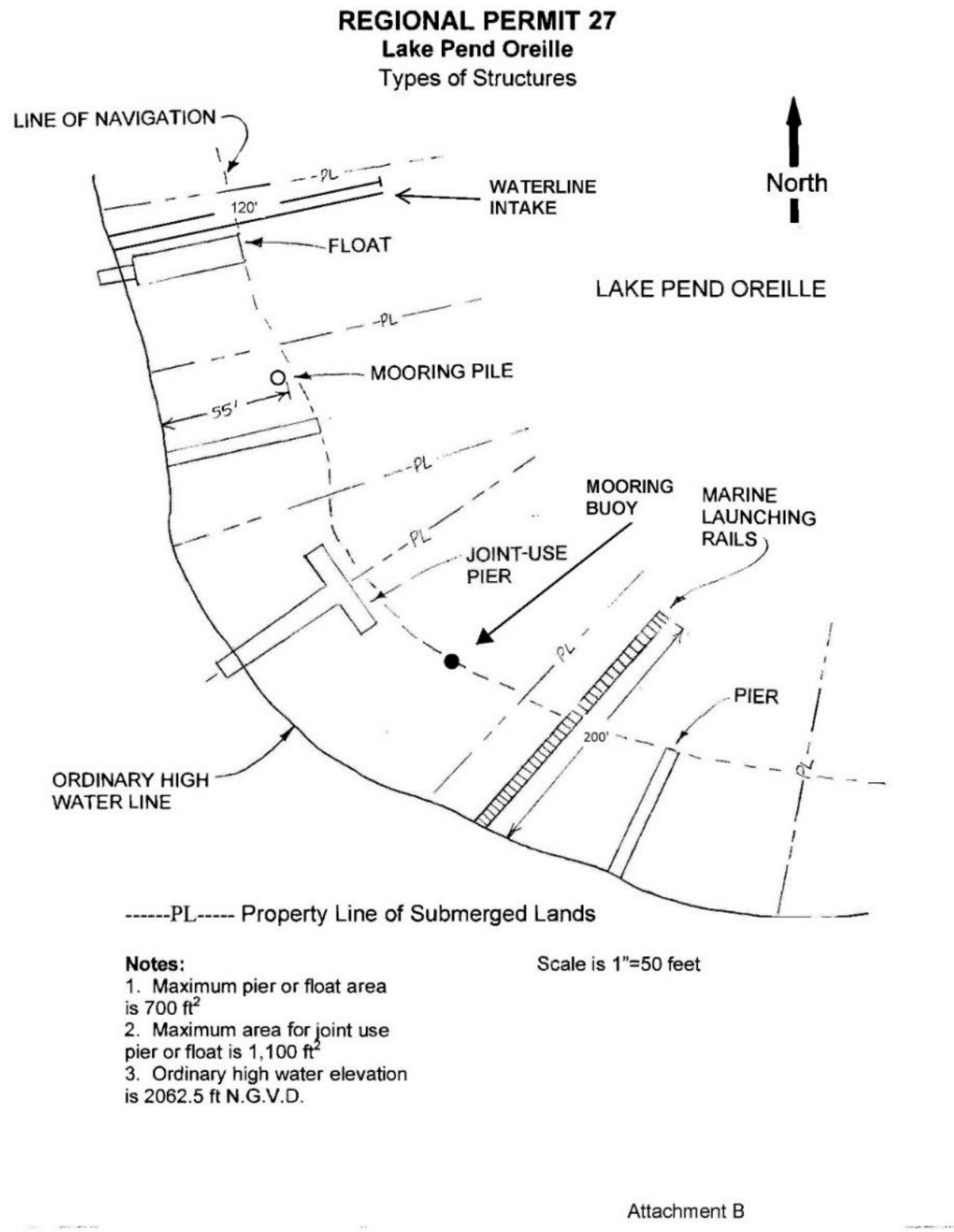

Figure 2. Types of structures authorized by RGP-27 (USACE 2024a, p. 25).

2.3 Term of the Action

This Opinion covers actions under RGP-27 as described in the proposed action for five years from February 6, 2025 to February 6, 2030 or until reinitiation of consultation is required (see Reinitiation Notice of this Opinion), whichever occurs first.

2.4 Proposed Conservation Measures

The Corps has identified specific measures to reduce the degree of impact from the proposed action to bull trout. The Service considers these measures essential to limit impacts to bull trout. If any of these measures are not implemented, there may be effects of the action that were not considered in this Opinion and reinitiation of consultation may be required.

Conservation measures are included as RGP-27 Conditions (USACE 2024a, pp. 142–144)

1. Permittees (Applicants) must comply with the Idaho Department of Environmental Quality (IDEQ) Water Quality Certification (WQC) issued to the Corps for RGP-27 (condition 2.b.).
2. Existing native shoreline or riverbank vegetation will be protected to the extent possible to minimize soil disturbance, erosion, delivery of sediment to the waterway and minimize the effect of construction activity on aquatic biota, including bull trout (condition 3.h.).
3. Shoreline or riverbank disturbed during construction shall be stabilized by appropriate soil erosion control practices to minimize sediment delivery into the water, which may result in an adverse impact to aquatic biota, including bull trout (condition 3.i.).
4. Disturbed soils shall be re-vegetated with non-invasive plant species within the current or next appropriate planting season (condition 3.j.).
5. All construction debris shall be disposed of in an upland location in a manner that precludes it from reentering Waters of the U.S., including wetlands. Disposal must be in compliance with all state and local regulations with regard to open burning of construction debris (condition 3.k.).
6. Hammer or vibratory pile-driving equipment is allowed when driving steel piling into the lakebed during in-water work. A bubble curtain in the water AND a wood, rubber, or synthetic block, between the driving apparatus and the pile, shall be used at all times when using hammer-driving equipment. Bubble curtains shall be maintained according to manufacturer’s specifications (condition 3.l.).
7. Installation of light penetrative decking (e.g., grating or clear translucent material) is required for docks constructed between 100 yards and ¼ mile on each side of the mouth of excluded streams (see Figure 1). Light penetrative decking is required for docks constructed near known kokanee spawning areas in order to reduce potential impacts to kokanee, potential prey base for bull trout. Grating or clear translucent material is required to cover the entire surface area of the piers and ramps. Grating material must have at least 60% open area, and clear translucent material must have greater than 90% light transmittance (as rated by the manufacturer; condition 3.m.).

8. Any equipment operating over water is required to replace hydraulic fluid with vegetable or mineral oil, which is less toxic to fish and other aquatic organisms (condition 3.n.).
9. No in- or overwater concrete pouring is authorized under this RGP (condition 3.o.).
10. The Applicant is responsible for all work done by any contractor. The Applicant shall ensure any contractor who performs the work is informed of and follows all the terms and conditions of this authorization, including any Special Conditions. The Applicant shall also ensure these terms and conditions are incorporated into engineering plans and contract specifications (condition 3.p).

2.5 Incorporated Idaho Department of Lands Standards and Idaho Department of Environmental Quality Conditions

Idaho Department of Lands (IDL) standards and IDEQ WQC conditions are incorporated into the proposed action as an Applicant must obtain an IDL encroachment permit and RGP-27 condition 2.b. states that Applicants must comply with the conditions listed in the IDEQ WQC (USACE 2024a, p. 142 and Appendix B). The Service acknowledges that the Corps considers these State standards and conditions associated with the proposed action outside of their regulatory authority. The Applicant is required to adhere to state laws as they pertain the IDL standards and the IDEQ WQC conditions and must ensure that any hired Contractor adheres to these standards and conditions as well.

As the Corps has incorporated these standards and conditions into their analysis, the Service has done so as well. These regulations affect the analysis and the subsequent determination for bull trout within the action area. Therefore, any project that does not adhere to the regulatory standards and conditions listed in *Appendix A: IDL Standards and IDEQ Conditions* would not be covered by this Opinion. Furthermore, the Service cannot anticipate changes in IDL standards and IDEQ conditions and analyzed the proposed action with the standards and conditions in place at the time of writing this Opinion. It is reasonably certain that regulations may change over time; as such, any changes to the IDL standards and IDEQ Conditions in *Appendix A: IDL Standards and IDEQ Conditions* that could change the effects analysis would preclude coverage under this Opinion for the RGP-27 permit.

2.6 Excluded Activities

Actions that include certain activities, occur in certain geographic areas, or meet one or more of the conditions below, will not be covered under this Opinion. For actions that do not qualify due to one or more of these exclusions, consultation requests should be emailed to the Idaho Fish and Wildlife Office at fw1idahoconsultationrequests@fws.gov.

1. Activities as described in section 2.2 that are intended for anyone other than an individual or adjacent individual landowners.
2. Activities as described in section 2.2 that are intended for commercial use.

3. Docks and piers constructed to skirt (constructed parallel to) the shoreline.
4. Construction of refueling facilities.
5. Construction of docks or piers with structures, such as living quarters, toilets, fueling facilities, or hard-covered boat moorages.
6. Docks or piers with a width greater than 10 feet.
7. Jetties, groins, coves, breakwaters, break walls, retaining walls, culverts, bridges, or any structures not specifically named in section 2.2.
8. Any activity that involves using fill to raise in any part of LPO or the PO River from below the OHWM to above the OHWM.
9. Riprapping/bank stabilization.
10. Activities within exclusion areas listed in section 2.
11. Maintenance of any existing structure not listed in section 2.
12. Site dewatering.
13. Fish handling or salvage.
14. Water jetting for pile placement or removal.
15. Impact pile driving that exceeds 12 strikes per pile or 16 piles per day.
16. Any exposure of uncured concrete in water.
17. Activities that do not comply with IDEQ WQC conditions, as represented by Applicants' agreement with the Corp's RGP-27, which under condition 2.b. states that Applicants must comply with the conditions listed in the IDEQ WQC (USACE 2024a, p. 142 and Appendix B)
18. Any digging or trenching in lakebed or riverbed that is done in-water.
19. Installation of marine launching rails that is done in-water.

3. Analytical Framework

3.1 Jeopardy Determination

In accordance with our regulations (50 CFR 402.02, 402.14(g)), the jeopardy analysis in this Opinion relies on the following four components:

1. The *Status of the Species* evaluates the species' current rangewide condition relative to its reproduction, numbers, and distribution; the factors responsible for that condition; its survival and recovery needs; and explains if the species' current rangewide population retains sufficient abundance, distribution, and diversity to persist and retains the potential for recovery (USFWS and NMFS 1998, pp. 4-33—4-37).

2. The *Environmental Baseline* section evaluates the past and current condition of the species in the action area relative to its reproduction, numbers, and distribution absent the effects of the proposed action; including the anticipated condition contemporaneous to the term of the proposed action; the factors responsible for that condition; and the relationship of the action area to the survival and recovery of the species.

3. The *Effects of the Action* section evaluates all consequences to the species that are reasonably certain to be caused by the proposed action, including the consequences of other activities that are caused by the proposed action (i.e., the consequences would not occur but for the proposed action and are reasonably certain to occur) and how those consequences are likely to influence the survival and recovery of the species.

4. The *Cumulative Effects* section evaluates the consequences of future State or private activities, not including Federal activities, reasonably certain to occur in the action area of the Federal action subject to consultation, on the species and its habitat, and how those effects are likely to influence the survival and recovery of the species.

In accordance with policy and regulation, the jeopardy determination is made by formulating the Service's Opinion as to whether the proposed Federal action, including its consequences, taken together with the status of the species, environmental baseline, and cumulative effects, reasonably would be expected to reduce appreciably the likelihood of both the survival and recovery of the species in the wild by reducing the reproduction, numbers, or distribution of that species.

Interim recovery units were defined in the final listing rule for bull trout for use in completing jeopardy analyses (64 FR 58910, November 1, 1999). Subsequently, six recovery units (RUs) for the bull trout were defined in the final Recovery Plan for the Coterminous United States Population of Bull Trout (USFWS 2015b, entire). Pursuant to Service policy (USFWS 2006, *in litt.*), when a proposed Federal action impairs or precludes the capacity of a RU from providing both the survival and recovery function assigned to it, that action may represent jeopardy to the species. When using this type of analysis, the biological opinion describes how the proposed action affects not only the capability of the RU, but the relationship of the RU to both the survival and recovery of the listed species as a whole.

4. BULL TROUT

4.1 Status of Bull Trout

This section summarizes information found in Appendix B, regarding the listing status, the bull trout's life history and habitat preferences, geographic distribution, population trends, threats, and conservation needs.

The coterminous United States population of the bull trout was listed as threatened on November 1, 1999 (64 FR 58910). Bull trout occur in the: Klamath River Basin of south-central Oregon; Jarbidge River in Nevada; Willamette River Basin in Oregon; Pacific Coast drainages of Washington, including Puget Sound; major rivers in Idaho, Oregon, Washington, and Montana, within the Columbia River Basin; and Saint Mary-Belly River east of the Continental Divide in northwestern Montana (64 FR 58910).

Bull trout are a fish species native to the Pacific Northwest, Alaska, and Canada. Bull trout spawn and rear in mountain streams that have clean, cold water and complex habitat. This species exhibits four different life history strategies that include: a resident form that does not migrate; and three migratory forms that consist of: fluvial bull trout that reside entirely in rivers, an adfluvial (or lacustrine) form that spawns in rivers and matures in lakes or reservoirs, and an uncommon amphidromous/anadromous form that migrates between the ocean and freshwater. Bull trout population structure depends on migratory behavior, which can be compromised by habitat alterations that impede or block movements between spawning areas and the areas used by adult fish.

Bull trout usually mature between four to seven years of age. An individual may spawn annually or every other year. Bull trout typically spawn between August and November but sometimes as late as December. During spawning, females deposit eggs in redds (egg nests) they create by digging into gravel with their tails. Females lay an average of 5,000 eggs that remain in the gravel for up to 210 days when bull trout fry emerge. Upon emergence, juvenile bull trout may rear one to four years in their natal (or birth) stream before migrating either to river, lake/river, or nearshore marine areas to mature. After emerging, bull trout feed primarily on aquatic and terrestrial insects. As bull trout grow, their diet expands to include fish. Bull trout are opportunistic feeders that continually adapt their diet to capitalize on types of prey that are frequently encountered or readily captured with minimal expenditure of energy.

Bull trout populations remain depressed across much of their range and there has been very little change in the general distribution of bull trout in the coterminous United States since their listing. The overall trend for the listed bull trout population as a whole is uncertain due to scarcity of data from many subpopulations (USFWS 2015c, p. 2)**.** Out of six recovery units designated in the final Bull Trout Recovery Plan (USFWS 2015b, entire) only the Klamath River Unit appears to be significantly imperiled, by shrinking geographic extent and declining populations.

Threats to bull trout vary throughout its range, depending largely on the amount of human development and types of land uses in the locations where bull trout occur. Habitat alterations that reduce carrying capacity or fragment populations are two of the most widespread threats. Prominent causes of habitat degradation and fragmentation include the following: water withdrawals, passage barriers created by dams and road crossings, alteration of stream and floodplain characteristics by roads and other valley bottom developments, and effects of present and historical activities such as timber harvest, mining, and livestock grazing. In some areas, introduced nonnative species such as brook trout have displaced local populations of bull trout. The Final Recovery Plan (USFWS 2015b, p. iv) identified climate change as an additional threat to bull trout that has emerged since the listing. Bull trout are vulnerable to potential increases in water temperatures and changes in stream flow regimes that may occur from increased amounts of greenhouse gasses in the atmosphere.

4.2 Environmental Baseline of the Action Area

The term "environmental baseline" is defined in the regulations implementing the Act as "the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. The impacts to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline" (50 CFR 402.02).

4.2.1 Status of Bull Trout in the Action Area

4.2.1.1 Columbia Headwater Recovery Unit

The Columbia Headwater Recovery Unit (CHRU) consists of 35 core areas spanning Idaho, Washington, and Montana and has 163 local populations. Of these core areas, 15 are complex, meaning they represent large, interconnected habitats, and 20 are simple, representing smaller isolated areas with a single population (USFWS 2015d, p. D-2-D-4). Complex core areas contain most individual bull trout, DCH, and local populations in the recovery unit. Unlike other recovery units in Washington, Idaho, and Oregon, the CHRU lacks any overlap with anadromous fish. As a result, bull trout within the CHRU do not benefit from the recovery actions for anadromous salmon (USFWS 2015d, p. D-42).

Except for much of the headwaters of the Clark Fork River drainage (upstream of Rock Creek) and portions of the Coeur d'Alene River system, both of which are severely degraded due to contamination from heavy metals associated with historical mining operations, bull trout continue to be present in most major watersheds where they likely occurred historically in the CHRU. Despite the intact broad distribution of bull trout core areas, several local populations of bull trout have been extirpated in recent times. Examples include portions of the upper Clark Fork and lower Pend Oreille drainages.

Decline of bull trout in this recovery unit are attributed to climate change, mostly historical mining and contamination by heavy metals, expanding populations of nonnative fish predators and competitors, modified instream flows, migratory barriers (e.g., dams), habitat fragmentation, forest practices (e.g., logging, roads), agriculture practices (e.g., irrigation, livestock grazing), and residential development (USFWS 2015d, p. D-10-D-25).

4.2.1.2 Lake Pend Oreille Core Area

The Lake Pend Oreille Core Area (LPOCA) is the largest and most diverse complex core area in the CHRU, covering 4.46 million acres, with 8,276 miles of mapped streams, 35 local populations and five major systemic barriers (USFWS 2015d, p. D-31). Due to the complexity of the core area, it is described in three parts (LPO-A, -B, and -C) that are largely disconnected from each other by dams (USFWS 2015d, p. D-2). LPO-A is upstream of Cabinet Gorge Dam, almost entirely in Montana, and includes the mainstem Clark Fork River upstream to the confluence of the Flathead River as well as the portions of the lower Flathead River on the Flathead Indian Reservation. LPO-B is the LPO basin proper and its tributaries, extending between Albeni Falls Dam on the PO River and Cabinet Gorge Dam on the Lower Clark Fork River. LPO-C extends downstream of Albeni Falls Dam to Boundary Dam and includes portions of Idaho, eastern Washington, and the Kalispel Reservation dams (USFWS 2015d, p. D-2).

The LPO-C core area below Albeni Falls Dam was occupied with a low abundance of bull trout at listing, and has since become extirpated (USFWS 2024, p. 11). The construction and operation of Cabinet Gorge Dam on the Clark Fork River and Albeni Falls Dam on the PO River impact bull trout water quality (sediment, temperature, and nutrients) and access to spawning and rearing (SR) habitat within the LPOCA. Lake Pend Oreille A and B are increasingly being reconnected by dam removal, such as the Milltown Dam, and improved fish passage at Cabinet Gorge, Noxon Rapids, and Thompson Falls dams (USFWS 2010, p. 827).

Construction of the Cabinet Gorge Fish Passage Facility (CGFPF) was completed in 2022, though modifications continued throughout 2023 (Avista 2023, p. 59). PIT antennas in the lower Clark Fork River downstream of Cabinet Gorge Dam detected 24,324 unique detections of 70 individual bull trout between March and early November of 2023 (Avista 2023, p. 60). During trapping operations, Avista detected bull trout most frequently at the CGFPF in late June-early July and during September (Avista 2023, p. 60). Of the 60 individual bull trout captured downstream of Cabinet Gorge Dam, Avista transported 50 upstream to Montana streams based on genetic assignment or previous capture history (Avista 2023, p. 61). Avista captured a total of 217 juvenile bull trout (120-300mm) in Montana and transported them to LPO-B in Idaho during 2023 (Avista 2023, p. 62). As fish passage improves between LPO-A and LPO-B, habitat in LPO-B may begin to have a greater influence on bull trout populations within portions of LPO-A.

4.2.1.3 Lake Pend Oreille Core Area Part B

The action area for RGP-27 fully occurs within part B of the Lake Pend Oreille core area (LPO-B). LPO-B is the Pend Oreille lake basin proper and its tributaries, extending between Albeni Falls Dam on the Pend Oreille (PO) River and Cabinet Gorge Dam upstream of LPO on the Lower Clark Fork River (USFWS 2015d, p. D-2). While geographically it covers roughly 15 percent of the LPOCA, it has 19 local populations, constituting more than half of all local populations in the LPOCA.

Within LPO-B, the action area for RGP-27 is LPO, PO River, and their tributaries that are inundated by the summer pool elevation of 2,062.5 NGVD, except for the exclusion areas in Figure 1. The action area has a shoreline length of 226 miles and a surface area of 94,600 acres with LPO having an average depth of 545 feet (U.S. Army Corps of Engineers 2018, p. 3; USACE 2024a, p. 42).

Lake Elevations and Flows

The Lower Clark Fork River is the primary tributary by volume to LPO though numerous smaller creeks and rivers also drain into LPO, many of which provide valuable SR habitat. Lightning Creek drainage and Johnson Creek have important SR habitat and empty into the Lower Clark Fork River or near its delta with LPO. Strong Creek, Trestle Creek, Granite Creek, North Gold Creek, and Gold Creek are all SR streams that empty directly into LPO. Much of Pack River is foraging, migratory, and overwintering (FMO) habitat, however, it becomes SR habitat in its upper reaches and connects to numerous other SR streams before ultimately draining into the northern part of LPO.

Surface water from LPO only flows out of the PO River, though groundwater contributions from LPO to the Spokane Valley-Rathdrum Prairie Aquifer have been estimated between 3.8 and 7 percent of the total aquifer recharge (U.S. Environmental Protection Agency 2007, p. 20). The Priest River empties into the PO River a few miles upstream of Albeni Falls Dam and is FMO habitat; however, it is an important migratory corridor for bull trout in LPO to access SR habitat in the North Fork East River, the Middle Fork East River, and Uleda Creek. Bull trout spawning in these SR habitats show a unique allucustrine migration pattern (fish migrate from downstream riverine habitat and tributary spawning areas upstream into a lake to forage and overwinter; Dupont et al. 2007, entire).

LPO water elevation is largely controlled by Albeni Falls dam, which alters the hydrology and morphology within the action area through seasonal fluctuations in lake levels that range between 2,051-2,062 feet above mean sea level (msl; USACE 2024a, p. 43). During spring, dam operations fill LPO following flood risk management (FRM) criteria, and water elevation is typically kept at 2,062 feet throughout summer until around Labor Day to promote recreation. Between October 1 and mid-November, water levels are reduced to around 2,051 feet to improve conditions for kokanee spawning and to support ESA-listed salmon in the Columbia River (USACE 2024a, p. 43). Fall and winter levels can be influenced by system FRM storage, the minimum control elevation related to kokanee salmon, and flexible winter power operations (USACE 2024a, p. 43). The LPO elevation hydrograph (Figure 3) shows that the 99, 75, and 25 percent lines remain close to the median line throughout the year; however large precipitation events can elevate lake levels, as depicted by the 1 percent line. Overall, the median line shows what typical lake levels are year-to-year, with higher water in summer and lower water in winter months.

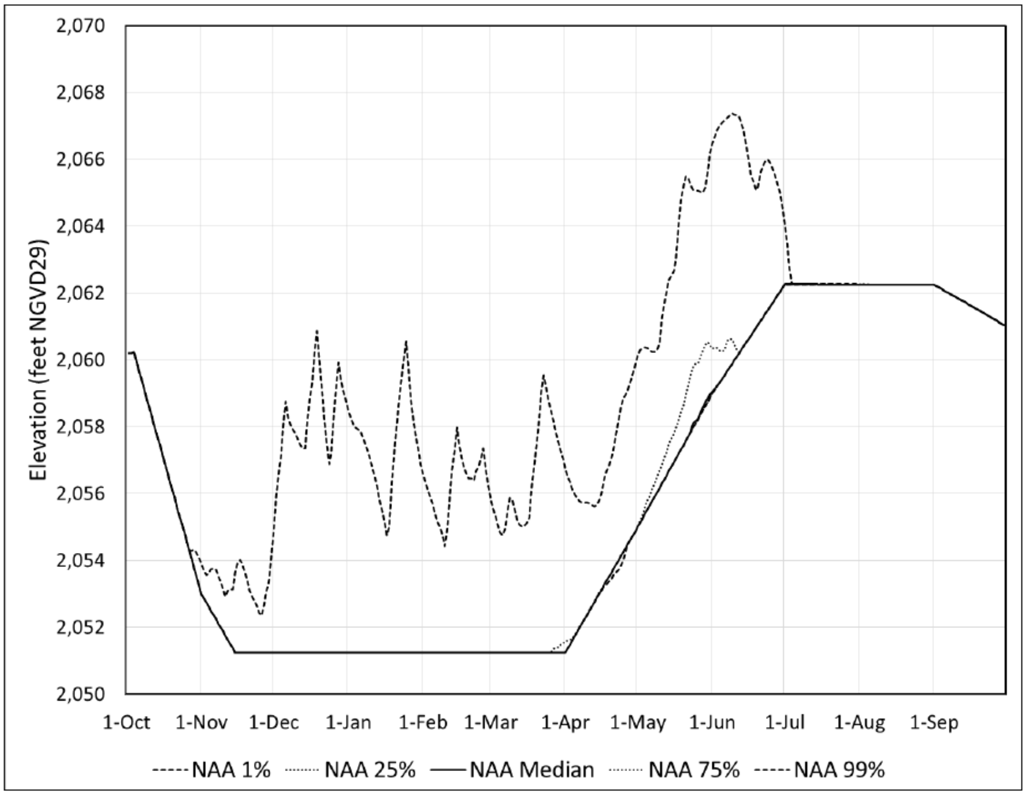

Figure 3 Lake Pend Oreille hydrograph (USACE 2024a, p. 44).

Water Quality

Forestry, grazing, dry-land agriculture, mining, climate change, dam operations, and sub/exurban development have contributed to suboptimal water quality measurements to varying degrees. Flow regime modification from the dams contributes to the dissolved gas supersaturation and to elevated sedimentation levels due to erosion of shoreline. Metals like mercury, cadmium, copper, and zinc are traced back to mining operations in the watershed. Nitrogen and phosphorous inputs generally come from nonpoint sources and have caused algal blooms and aquatic weed growth (USACE 2024a, p. 46).

The IDEQ has identified numerous water quality impairments in LPO-B in its Final 2022 305(b) Integrated Report map. The assessed beneficial uses of LPO include primary contact recreation, cold water aquatic life, and salmonid spawning; however, the report classified all of these uses as “not supporting” due to flow regime modification, mercury, and total phosphorus (Idaho Department of Environmental Quality 2022, accessed October 2, 2024). Between Cabinet Gorge dam and the delta with LPO, IDEQ found the Lower Clark Fork River “not supporting” of cold water aquatic life and salmonid spawning due to temperature, copper, cadmium, zinc, and dissolved gas supersaturation (Idaho Department of Environmental Quality 2022, accessed October 2, 2024). Similarly, IDEQ found the PO River “not supporting” of cold water aquatic life due to dissolved gas supersaturation and temperature (Idaho Department of Environmental Quality 2022, accessed October 2, 2024). The Lower Clark Fork River, LPO, and the PO River are all 303(d) listed under the Clean Water Act (CWA), and the state of Idaho is required to develop a water quality improvement plan called a TMDL (total maximum daily load) to meet water quality standards. According to the Final 2022 §305(b) Integrated Report map, numerous smaller tributaries to LPO are also "not supporting" of cold water aquatic life or salmonid spawning due to temperature impairment, sedimentation, and total phosphorus, and combined biota/habitat assessments (Idaho Department of Environmental Quality 2022, accessed October 2, 2024).

Data from water monitoring locations across the action area are shown in Table 2 and represent the range in values between May and September of 2023 (Idaho Conservation League 2024, accessed October 2, 2024). Dissolved oxygen levels were variable month to month, while pH was typically lower in May and July. Nitrogen and phosphorous were often high in May, and phosphorous was also high in the Lower Clark Fork River and PO River in September. Typically, waters had greater transparency between July and September during high water levels. High water temperatures in summer reflect that surface waters could rise as high as 24°C in some parts of the action area. Water quality data below are indicative of a dynamic and complex system where criteria vary depending on spatiotemporal conditions.

Water Monitoring Location	**Dissolved Oxygen (mg/L)**	**pH**	**Water Temp. (°C)**	**Total Nitrogen (mg/L)**	**Total Phos-phorous (µg/L)**	**Trans-parency (meters)**
Laclede (PO River) 48.16388, -116.74083	7.87-9.02	7.61-8.24	14-24	0.12-0.71	5-10.3	2.5-6
PO River Station 48.24222, -116.59555	7.43-9.37	6.98-8.23	8-20.5	0.14-0.72	8-13	3-6
Oden Bay Station 48.31283, -116.45791	6.13-8.03	7.44-8.84	15-23.5	0.05-0.71	2-22.7	0.25-1.75
Bayview 47.9769, -116.5493	7.63-10.01	7.64-8.14	11-18	0.13-0.71	5-8.4	2.75-7.5
Clark Fork Delta Station 48.15597, -116.2525	7.23-8.64	7.33-8.2	13-23	0.16-0.76	9-27	1-5.5
Average Ranges	7.26-9.01	7.4-8.33	12.2-21.8	0.12-0.72	5.8-16.3	1.9-5.35

Table 2: May to September 2023 water quality values from across the action area

Fish Assemblages

The bull trout population in LPO-B is relatively robust due to the high-quality FMO habitat and a diverse and robust forage fish community. Other native fish present in LPO-B include westslope cutthroat trout (*Oncorhynchus clarkii lewisi)*, mountain whitefish (*Prosopium williamsoni)*, pygmy whitefish (*Prosopium coulteri),* northern pikeminnow (*Ptychocheilus oregonensis),* and peamouth (*Mylocheilus caurinus*; Birdsall and Ransom 2023, p. 1). Non-native fish species present include: rainbow trout (*Oncorhynchus mykiss*), lake trout (*Salvelinus namaycush*), kokanee (*Oncorhynchus nerka), s*mallmouth bass (*Micropterus dolomieu*), largemouth bass (*Micropterus salmoides*), yellow perch (*Perca flavescens*), black crappie (*Pomoxis nigromaculatus*), white crappie (*Pomoxis annularis*), brook trout (*Salvelinus fontinalis)*, lake whitefish (*Coregonus clupeaformis*), walleye (*Sander vitreus*), bluegill (*Lepomis macrochirus*), pumpkinseed (*Lepomis gibbosus*), northern pike (*Esox lucius*), tiger muskie (*Esox lucius x E.* masquinogy), catfish (*Ictalurus punctatus*), and brown trout (*Salmo trutta*; Birdsall and Ransom 2023, p. 1; Idaho Department of Fish and Game, accessed October 2, 2024).

Kokanee are a primary food source for bull trout and many other predatory fish in LPO (Vidergar 2000, pp. 73–78). Other nonnative species such as northern pike, lake trout, and walleye may prey on bull trout or compete with them. A study in Milltown Reservoir found that juvenile bull trout (mean length 200mm) were the single most abundant species found in northern pike stomachs during high water and juvenile outmigration in May (Schmetterling 2001, pp. 9–12). Multiple studies have shown that native bull trout populations are negatively impacted by lake trout (Donald and Alger 1993, entire; Fredenberg 2002, entire), and a regional analysis showed that bull trout were more abundant and had higher population growth rates in lakes where lake trout were actively suppressed, including LPO (Kovach et al. 2017, pp. 642–644). The introduction of opossum shrimp (*Mysis diluviana*) as a prey resource eventually led to an exponential population growth of lake trout within LPO from 1999-2005, which threatened to collapse the kokanee population and cause the decline or eventual collapse of bull trout (Dux et al. 2019, p. 3). Between 2006 and 2019, the IDFG removed 228,898 lake trout from LPO through a suppression program using incentivized angling, gill netting, and trapping in order to protect kokanee and bull trout in LPO (Rust et al. 2022, p. 39). This program along with the Cabinet Gorge Fish Hatchery kokanee stocking efforts have allowed kokanee numbers to recover to an estimated 18.1 million individuals (Rust et al. 2022, p. 28), which provide bull trout in LPO with high quality foraging opportunities. Walleye were illegally introduced upstream of LPO in the early 1990s and the IDFG is concerned that predation by walleye may negatively impact LPO fish assemblages (Rust et al. 2022, p. 59). Telemetry studies suggest walleye primarily use the northern section of LPO and the Lower Clark Fork and PO Rivers, and they are thought to primarily feed on kokanee in deeper parts of LPO and yellow perch and assorted warmwater fish in shallower areas (Rust et al. 2022, p. 59). A 2017 study suggested that walleye exploitation was around 16%, which IDFG considers too low to effectively limit walleye population expansion, and targeted monitoring efforts suggest that densities are doubling about every three years (Rust et al. 2022, pp. 59–60).

Bull Trout Population, Migration, and Spawning

Despite the competition with, and predation by, other piscivorous fish, an abundance of forage fish and active predator suppression efforts have created favorable conditions for bull trout in LPO-B where they can be found in the action area year-round. Bull trout likely use the action area while migrating to spawning habitat, and as foraging and overwintering habitat in LPO, the PO River, and the Lower Clark Fork River. Some bull trout are alternate year spawners and may reside in the foraging, migratory, and overwintering habitat for the entire year.

Bull trout are associated with cooler waters 15°C or below, but during the summer, water temperatures in PO River and many LPO tributaries rise above 15°C. Similarly, from June to October, surface water temperatures are often greater than 18°C in LPO, though deeper parts of the lake below the thermocline of 45 feet provide cooler water below 15°C. From November through June, surface temperatures typically range from 4°C to 15°C (USACE 2024a, p. 47). Despite the elevated summer surface temperatures, bull trout may still be using these warmer waters, as numerous papers provide evidence that bull trout will remain in waters above 15°C. A bull trout migration study by Howell et al. (2010, pp. 102–103) found that "the maximum 7DADM temperatures [7-day average daily maximum temperature] of tagged fish in migratory habitat downstream of reaches used for spawning and early rearing were up to 5°C higher than the 16°C upper limit considered tolerable for bull trout" and that "the maximum 7DADM ambient water temperatures in those reaches over the course of the study were 18-25°C." A study in the Weiser River drainage found age-0, juvenile, and bull trout in creeks that reached over 20°C on at least three afternoons, though adult bull trout typically remained in deeper pools closer to 17°C when possible (Adams 1994, pp. 59, 67–68). These studies indicate that bull trout can occupy warmer waters as necessary for migration or foraging, particularly when there is a lack of cooler water available; however, the Adams study also demonstrates the preference for cold water given adults were found in the deepest pools.

While surface waters often exceed 15°C within the action area during the hottest summer months, there is no limitation of cold water available within LPO, as bull trout can access cooler water at greater depths in the water column. Despite this, bull trout are known to occasionally use the warmer waters of nearshore areas of lakes (Bassista et al. 2003, pp. 18–19; Meeuwig et al. 2008, pp. 4–9; Hansen et al. 2017, p. 24; Birdsall and Ransom 2023, pp. 4–6). The 2022 Nearshore Index Netting Survey on LPO caught five bull trout with a mean size of 464.6mm during springs surveys out of 60 nets set and two bull trout with a mean size of 483.5mm during fall surveys out of 32 nets set (Birdsall and Ransom 2023, pp. 4–6).

Similarly, a predation research study by the IDFG in LPO tagged six bull trout and tracked their use of the habitat across all seasons and also found nearshore use. Bull trout behavior showed minor variability between day and night in the summer where night detections were available; however, sampling effort between day and night had variability across seasons with tracking efforts in spring being 78 percent day to 22 percent night, summer being 67 percent day to 33 percent night, and 100 percent of fall/winter tracking occurring in the day (Bassista et al. 2003, p. 18). Across all seasons, mean bull trout depths varied between 12 and 26 meters, mean water temperatures varied between 5.2 and 12.8°C, and mean distance from shore varied from 53 to 1,696 meters, with the highest percentage of detections occurring in benthic habitats. Within the observed ranges, bull trout were found in depths as shallow as 5 meters, in temperatures as high as 21.1°C, and within 15 meters of the shoreline (Bassista et al. 2003, p. 19). A full summary of the bull trout tracking data from the Bassista et al. study is in Table 3 below.

	Day Depth mean (range)	Day Temperature mean (range)	Day Distance to Shore mean (range)	Night Depth mean (range)	Night Temperature mean(range)	Night Distance to Shore (range)
Late Spring – Nearshore Benthic	23 m (15-27 m)	7.4°C (5.0-9.9°C)	140 m (50-200 m)	No detections	No detections	No detections
Summer – benthic (66% detections)	19 m (10-46 m)	10.6°C (5.5-15.8°C)	84 m (20-370 m)	19 m (14-29 m)	9.8°C (7.2-12.5°C)	69 m (15-185 m)
Summer – nearshore (25% detections)	12 m (5-18 m)	12.8°C (6.0-21.1°C)	53 m (15-100 m)	17 m (4-27 m)	11.3°C (8.5-21.1°C)	55 m (15-100 m)
Summer – pelagic (9% detections)	17 m (8-22 m)	9.9°C (5.6-8.2°C)	(300-4,000 m)	15 m (13-17 m)	10.0°C (9.9-10.0°C)	(300-4,000 m)
Fall/Winter – nearshore/ benthic (60% detections)	26 m (8-62 m)	5.5°C (4.1-8.0°C)	(25-370 m)	No sampling	No sampling	No sampling
Fall/Winter – Pelagic (40% detections)	20 m (8-34 m)	5.2°C (4.4-10°C)	1,696 m (300-3,704 m)	No sampling	No sampling	No sampling

Table 3: Summary of Bull Trout Tracking Data from Bassista et al. 2004, p.19

Bull trout population estimates within the action area are variable. Meyer et al. (2014, entire) estimated a population of 12,513 adult bull trout in LPO based on records from 1983-2010, and data suggested a stable population with a 0.00 intrinsic rate of change over all years. Demographic modeling by the Idaho Department of Fish and Game (IDFG) for bull trout in LPO has estimated that from 1983-2018, adult, subadult, and juvenile bull trout averaged 4,255; 14,205; and 48,348 individuals, respectively (Mucciarone et al. 2022, p. 20). Mucciarone et al. (2022, p. 20) found that estimated annual bull trout population varied but was stable over the timespan with a geometric mean growth rate of 1.01 (Figure 4). Between 2010 and 2018, the mean apparent survival for bull trout in LPO was 0.39 for adults, 0.59 for subadults, and 0.18 for juveniles, with the annual probability of a subadult transitioning to the adult stage being an estimated 0.36 (Mucciarone et al. 2022, pp. 18–19).

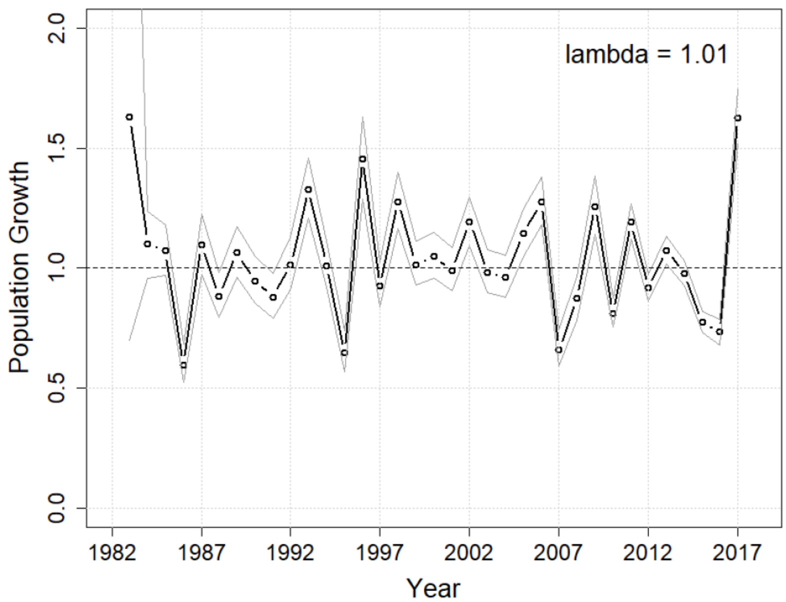

Figure 4: Estimated annual population growth rate for the Lake Pend Oreille bull trout population, 1983–2018. The geometric mean population growth rate (λ) over the course of the study was 1.01 (Mucciarone et al. 2022, p. 24).

Bull trout in the LPO are adfluvial and spawning individuals frequently begin spawning migrations as early as April and typically spawn in cooler headwaters between August and November (USFWS 2015b, p. 6). Most bull trout spawn in consecutive years in LPO, but estimates vary among spawning streams within the system (McCubbins 2013, pp. 4–5). In a study in Trestle Creek, an estimated 83 percent of bull trout spawned in consecutive years while 17 percent spawned every other year (Downs et al. 2006, p. 193). This study also found that bull trout migrated primarily from dusk until dawn, potentially to decrease their vulnerability to predation (Downs et al. 2006, p. 195). Large-scale outmigration of bull trout fry after their emergence often occurred during high spring flows, followed by a period of low outmigration in late July and August, and a second pulse of outmigration in fall, often associated with rain or rain on snow at low elevations (Downs et al. 2006, p. 198). Downs et al. (2006, pp. 195–198) found successful bull trout emigrants ranged from ages 1 to 5 and determined that age-0 bull trout did not appear to survive well in LPO because no age-0 emigrants returned to Trestle Creek. Another study showed juvenile bull trout emigration from Granite and Trestle creeks typically occurred in late-fall and winter (Bouwens and Jakubowski 2017, pp. 30–32). Within this study, adult bull trout appeared to enter Granite Creek from April through November, with the majority of fish entering during May through July; however, adult bull trout entering Trestle Creek had a bimodal distribution with a peak in June and September (Bouwens and Jakubowski 2017, pp.

32–24). These studies indicate that there is some variability in the migration and spawning pattern of bull trout in LPO-B, though the reasons for these differences is unknown.

In addition to migrating upstream to spawn, some bull trout in LPO exhibit a unique life history strategy described as allacustrine. These bull trout migrate downstream out of LPO into the PO River in May and June, before ascending the Priest River to the East River to spawn in the Middle Fork East River or Uleda Creek (Scholz et al. 2005, p. 3; Dupont et al. 2007, pp. 1269–1272). Post-spawn, bull trout migrate back through the PO River typically in September and October to overwinter in LPO, though some bull trout may overwinter in the PO River as well (Scholz et al. 2005, p.3). Juveniles requiring this upstream migration to the lake often migrate in the late winter and early spring at larger sizes than observed in other adfluvial populations (USFWS 2020b, p. 94).

Little information is available on juvenile bull trout behavior within LPO, and most information on their numbers and apparent survival come from trapping efforts in SR streams within LPO-B. It's unclear to what degree documented occurrences of adults would correspond with juvenile presence. A study by Bonneau and Scarnecchia (1996, pp. 629–630) observed bull trout in a pool in Trestle Creek during the night and results indicated that when given a choice of temperatures from 8°C to 15°C, juveniles were located in the coldest water 8-9°C, and that nighttime juvenile distribution in pools did not seem to be restricted by any particular depth, substrate, water velocity, overhead cover, or interactions with other fish. The authors clarify that this result is only applicable to night conditions, as during the day, it was often necessary to manually overturn individual pieces of substrate to find juvenile bull trout (Bonneau and Scarnecchia 1996, pp. 629–630).

A laboratory study in which juvenile bull trout were exposed to high water temperature over a 60 day period resulted in reduced growth in temperatures over 20°C leading to substantial mortality (Selong et al. 2001, pp. 1029–1034). Within this study, no age-0 or age-1 bull trout survived temperatures greater than 22°C for 60 days, and age-1 bull trout began dying after only five days of exposure to 20°C, though age-0 bull trout had slightly greater temperature tolerance (Selong et al. 2001, p. 1030). The temperature range for peak growth was 10.9-15.4°C, and growth rates decreased sharply above and below this range, falling to 60 percent below the peak growth rate at 8°C and 18°C (Selong et al. 2001, p. 1030).

Temperature is undoubtedly a key environmental variable in considering the distribution of juvenile bull trout, but concealment behavior of juvenile bull trout may also be linked to light and substrate. A laboratory study that used wild-caught bull trout found that the majority of juveniles concealed in substrate during daylight, particularly when substrate sizes were larger; whereas during the darkness, bull trout were frequently found resting on top of substrate (Thurow et al. 2020, pp. 7–9). This study also investigated temperature effects between 7 and 15°C and found that as water temperature increased, bull trout were less likely to conceal or rest and showed more swimming activity (Thurow et al. 2020, pp. 7–9). A study on habitat utilization and diel behavior of juvenile bull trout in Profile Creek, Idaho, at the onset of winter found a total of 17 juvenile bull trout, all of which were concealed under substrate or "home-stones" during the day (Thurow 1997, p. 3). After being uncovered, juvenile bull trout typically remained immobile for 1 to 3 seconds before darting away and sheltering under another stone (Thurow 1997, p. 3). In the same location at night, Thurow (1997, p. 4) observed 40 juvenile bull trout, with two actively feeding on benthos and the remainder resting on or near the substrate.

Lacking specific data on juvenile bull trout habitat use in LPO, inferences from these studies indicate that juvenile bull trout are likely to be found in cooler water temperatures, to conceal in larger substrates during the day, and are commonly associated with benthic habitats either resting on or under substrate. Association with benthic habitats and large substrates may offer juvenile bull trout a survival advantage by reducing their vulnerability to predators as hiding under substrate offers concealment and the bull trout's cryptic coloration may provide them with enhanced camouflaging while resting on substrates.

While an IDFG study showed that the modeled bull trout population has remained steady in LPO between 1983-2018 (Mucciarone et al. 2022, p. 20), bull trout redds within the basin have been trending downwards. The past decade has had some of the lowest redd counts in LPO-B since bull trout were listed in 1999. **Error! Reference source not found.**Figure 5 shows that the redd counts from 2023 were significantly below the previous 10-year average, with a total of 281 redds, the lowest number since surveys first began in 1983 (Jakubowski et al. 2024, pp. 9, 20).

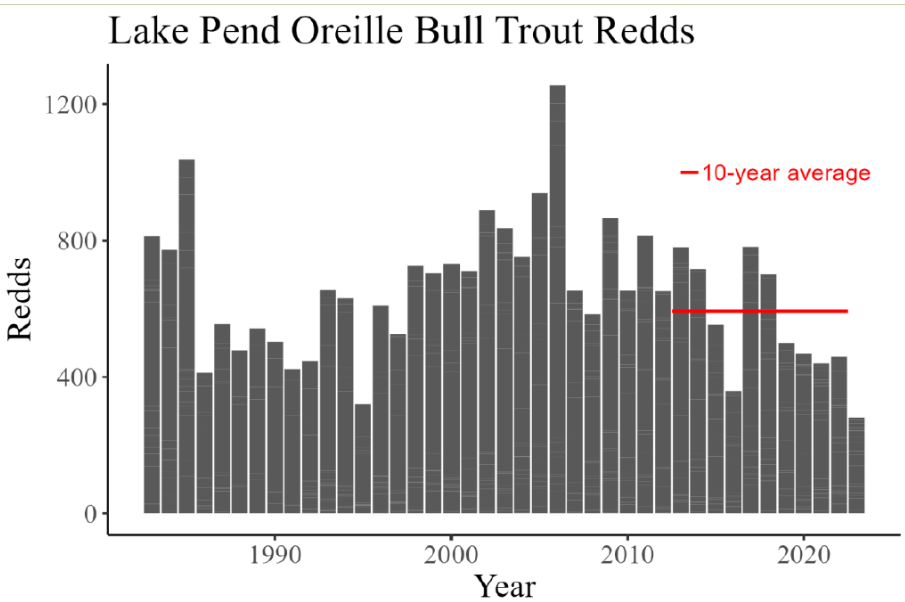

Figure 5: Total number of Bull Trout redds counted in all surveyed streams in the Pend Oreille drainage 1983–2023. The horizontal red line represents the prior 10-year average (2013–2022; Jakubowski et al. 2024, p. 9)

The steepest declines in total redds are attributed to Trestle Creek, Gold Creek, and the Pack River drainage where redds declined by 49%, 93%, and 74% respectively from 2022 counts (Jakubowski et al. 2024, p. 5). While redd count data can be impacted by changing survey conditions, spawn timing, stream morphology, and surveyor variability, all 2023 redd surveys were conducted during good survey conditions (Jakubowski et al. 2024, p. 5). Jakubowski et al. (2024, p. 20) discuss that low redd counts in 2023 may have been due to drought conditions, which could lead to a decreased availability of spawning habitat, reduced stream connectivity, and decreased quantity and size of adult holding pools. In addition, large rainfall events common to tributaries of LPO may result in flooding and widespread bedload movement throughout the watershed creating dynamic and changing conditions and potentially causing negative effects on incubating bull trout eggs (Rieman and McIntyre 1996, pp. 137–138).

Riparian Vegetation and Shoreline Habitat

Altered seasonal water levels in the action areas have led to deteriorated shoreline habitat by reducing native riparian vegetation, eroding beaches and shorelines, decreasing productivity in littoral habitats, reducing biodiversity, and altering forage resources and availability (USACE 2024a, pp. 48–49). Residential and commercial development along the shorelines further degrade shoreline habitat as bank armoring and docks have limited large woody debris (LWD) recruitment, modified natural hydrologic processes, and removed vegetation that provided shade and foraging opportunities.

Approximately 27 percent of LPO is littoral zone habitat that supports more than 50 species of plants (Madsen and Wersal 2008, p. 4). Native riparian vegetation in the action area is negatively impacted by invasive plants including Eurasian watermilfoil (*Myriophyllum spicatum* L.) and flowering rush (*Butomus umbrellatus* L.). Eurasian watermilfoil reached a peak infestation in LPO of 2,000 ha in 2007, but populations were reduced to approximately 200 ha after seven years of intensive herbicide application (Madsen et al. 2015, pp. 230–231). Since 2008, flowering rush began to invade LPO, with estimates that it could infest up to 2,400 ha of the littoral zone (Getsinger and Madsen 2021, p. 85). Flowering rush responds well to fluctuating lake levels and can quickly colonize exposed sediments during water draw down. Thick plant stands may reduce habitat quality for bull trout by providing cover to piscivorous fish that prey on juvenile bull trout, altering foraging sites, and increasing water temperature by reducing littoral zone water exchange and increasing sedimentation rates in the littoral zone (Getsinger and Madsen 2021, pp. 85–86). The Corps, Idaho State Department of Agriculture, and the Navy have all contributed to efforts to control invasive plants in LPO through mechanical or chemical means.

Land Use, Development, and Recreation

Bonner County has experienced significant human population growth with a 137 percent increase from 1970 to 2000, a 11 percent increase from 2000 to 2010, and a 13 percent increase from 2010 to 2020 (Bonner County Planning Department 2023, p. 2). The 2021 population estimates for Bonner and Kootenai County were 49,491 and 179,789 respectively, and the projected population growth for northern Idaho is expected to be around 13% between 2021 and 2031 (Bonner County Planning Department 2023, pp. 3, 11). Development may further pressure aquatic systems from point and nonpoint source water pollution, channel modification for flood control or other purposes, loss of riparian vegetation and instream structure, increased water diversion, and altered flow regimes due to changes in watershed vegetation cover and impervious surfaces (USACE 2024a, p. 50). While much of the shoreline in the action area is undeveloped, areas near population centers along the north and west portions of LPO and the PO River have had long stretches of shoreline altered from docks, bulkheads, marinas, residences, roads, and shoreline stabilization/riprapping which has resulted in reduced riparian vegetation, reduced LWD recruitment, and altered wave and scour patterns.

As the human population grows and development expands, there is a corresponding increase in shoreline use, boat traffic, and recreational boating activities. Recreators commonly use motorboats and sailboats on LPO, and most boating is limited to the summer high pool use as most docks and boat ramps are fixed at high pool elevations and are often dry during lake draw down. The Corps states that aerial imagery of the action area shows that the baseline number of docks is approximately 2,500, with about 200 docks in the exclusion areas of the proposed action, and most docks being in the dry, or at least partially in the dry, during low pool elevation (USACE 2024a, p. 54).

4.3 Effects of the Proposed Action

Implementing regulations define "effects of the action" as "all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action but that are not part of the action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action" (50 CFR 402.02).

During the five-year term of the RGP-27 permit renewal, the Corps expects the issuance of up to 500 permits for the construction, replacement, repair, or modification of piers and floating docks, marine launching rails, mooring piles, portable boat lift stations, small diameter waterline intakes, and mooring buoys.

The Corps deconstructs their proposed actions into "construction and operation impact mechanisms" that provide more detail on the implementation of the proposed action (USACE 2024a, pp. 55–61). The Service expects the implementation of the action to involve:

- **Construction activities in and near water** – use of hand tools, power tools, and operation of heavy machinery (typically excavators stationed on land or barge-mounted). *Note: Pile driving is considered a separate activity from general construction activity.*
- **Pile driving** – to install piles for piers, docks, boat lifts, and mooring piles.
- **Installation of structures**– installation of structures authorized by RGP-27 such as docks, piers, and marine launching rails will occur in shoreline habitat and some installation will modify shorelines, remove vegetation, shade parts of the littoral zone, and have components on the lakebed in benthic habitat. Shoreline modification does not include bank armoring, construction of bulkheads, or riprapping as these are not included in the proposed action and are not analyzed within this Opinion.
- **Digging in lakebed substrates and placement of fill** - digging of footings for marine launching rails or docks/piers and burying of small waterline intakes. The proposed action specifies that this will only occur in the dry during low water. Dewatering, construction or use of coffer dams, and fish salvage operations are not a part of the proposed action and are not analyzed within this Opinion.
- **Water withdrawal** – from small waterline intakes.
- **Increased boat moorages/boating** – a level of boat use commensurate with the life of permitted structures is attributable to the proposed action.

Implementation of the proposed action may affect bull trout due to increased turbidity and suspended sediment, noise and disturbance, percussive damage, loss of benthic habitat, loss of riparian vegetation and shoreline habitat, reduced water volume, increased predation, entrainment or impingement, reduced littoral productivity, increased boating and poaching, and chemical contamination. Table 4 provides a summary chart of the cause of these effects and the determinations the Service made in the following analysis.

Note: Within the Assessment, the Corps identified "light modification" as an effect of the action. The Service does not include "light modification" in the analysis as the Corps states, "there would be no lights installed as part of the proposed action. Therefore, the proposed action will not produce this potential stressor…"(USACE 2024, p. 117). While the proposed action mentions installation of "safety lights and signals prescribed by the U.S. Coast Guard," these lights are only required for structures extending beyond the line of navigation, and structures installed under RGP 27 are not allowed to extend beyond the line of navigation (USACE 2024, pp. 24, 117). The Service also analyzes the potential for impingement, along with entrainment, and addresses the Corps-identified effect of "avoidance" within the section "Noise and Disturbance" below.

Type of Effect	*Cause of Effect*	*Effect Determination*
Increased Turbidity and Suspended Sediment	-Construction activities in and near water -Pile driving -Installation of structures -Digging in lakebed substrates and placement of fill -Increased boating	*Insignificant – Not Likely to Adversely Affect*
Noise and Disturbance	-Construction activities in and near water -Digging in lakebed substrates and placement of fill -Increase boating -Pile driving (see Percussive Damage)	*Insignificant – Not Likely to Adversely Affect*
Percussive Damage	-Pile driving	*Likely to Adversely Affect*
Loss of Benthic Habitat	-Pile driving -Installation of structures	*Insignificant – Not Likely to Adversely Affect*
Loss of Riparian Vegetation and Shoreline Habitat	-Construction activities in and near water	*Insignificant – Not Likely to Adversely Affect*

	-Installation of structures -Increased boating	
Reduced Water Volume	-Water withdrawal	*Insignificant – Not Likely to Adversely Affect*
Entrainment and Impingement	-Water withdrawal/operation of small waterline intake	*Entrainment is insignificant – Not Likely to Adversely Affect* *Impingement - Likely to Adversely Affect*
Increased Predation	-Installation of structures	*Insignificant -Not Likely to Adversely Affect*
Reduced Littoral Productivity	-Installation of structure (shading)	*Insignificant – Not Likely to Adversely Affect*
Chemical Contamination	-Construction activities in and near water (particularly use of heavy machinery) -Installation of structures -Increased boating	*Insignificant – Not Likely to Adversely Affect*

Table 4: Summary of likely effects to bull trout resulting from re-issuance of RGP-27

In order to assess the impact of structure installation on bull trout, the Service estimated the total surface area that could be impacted and the total estimated benthic surface area that could be impacted in Table 5 below.

Structure	**Dimensions**	**Total estimated above water surface area/shading per permit**	**Total estimated maximum benthic/ lakebed or riverbed disturbance per permit**
Piers and floating docks	1,100 square feet[1] Average 18 piles per dock with an average of 0.5454 square feet per pile = 9.82 sq feet[2]	1,100 square feet shaded surface area	9.82 sq feet
Marine launching rails	200’[3] x 11.5’[4]	-	2,300 square feet benthic impact

Mooring piles	Average 10" diameter per pile = 0.5454 square feet, up to 4 piles[5]	-	2.18 square feet
Portable boatlift stations	12.7' [152"] x 13.2' [158"] [6] x 2 total lifts[7]	335.3 square feet	-
Small diameter (≤ 2") water line intakes and submersible pumps	2/12' x 120'[8]	-	20 square feet
Mooring buoys (dimension of anchor)	5' length x 5' width for ~5400lb concrete anchor[9]	-	25 square feet
Total Estimated Maximum Area per Permit	-	1,435.3 square feet of shading	2,357 square feet of benthic impact
Total Estimated Maximum disturbance for 500 permits		717,650 square feet ~16.47 acres	1,178,500 square feet ~27.05 acres
Total Percent of Surface Area Impacted within Surface Area of Action Area (94,600 acres)[10]		(16.47/94,600)*100 =0.02%	(27.05/94,600)*100 =0.03%

Table 5:Total Maximum Estimated Area of Disturbance to Habitat

[1] Taken from IDL encroachment standards 015.01.b – see Appendix A
[2] Taken from the Assessment (USACE 2024a, p. 76)
[3] Taken from the Assessment (USACE 2024a, p. 24)
[4] Overall width for a marine rail system capable of supporting a 12,000 lbs vessel per commercial sources. (Naylor Systems Inc. , accessed October 3, 2024)
[5] Diameter size of pile and number of piles from the Assessment (USACE 2024a, pp. 24, 76)
[6] Dimensions for aluminum vertical boat lift capable of supporting a 10,000 lbs boat per commercial sources (The Dock Doctors 2024, p. 71)
[7] Taken from the Assessment (USACE 2024a, p. 25)
[8] Taken from the Assessment (USACE 2024a, p. 26)
[9] Anchor size (Town of Marshfield 2010, p. 8)
[10] (U.S. Army Corps of Engineers 2018, p. 3; USACE 2024a, p. 42, b, pp. 1–2)

Note on Table 5: To calculate the potential impacts from the action, the Service made conservative assumptions when sizes were not explicitly a part of the permit or IDL standards. Information gathered from commercial sources regarding marine rail width and boat lift size were selected based on the largest available standard sizes from commercial catalogues. The Corps does not specify what types of anchoring system may be used by applicants. Compared to anchors that screw into the lakebed, weighted anchors are anticipated to occupy the most surface area, and the 5'x 5' measurement was selected as a conservative size for concrete anchors. Since the proposed action is for 500 permits, and permits are not limited to just one type of construction, each construction was multiplied by 500 to fully encompass the potential scope of the proposed action. For the 2025-2030 iteration of RGP-27, the Corps provided estimates on the frequency of each type of structure based on previous permit issuance (USACE 2024a, p. 19), and *Table 1: Estimates for Structure Construction* provides extrapolated estimates based on 500 permits. Given that no single structure was authorized in every permit the Corps issued in the past, estimating the size of disturbance based on 500 permits for each type of structure accounts for the total area of potential habitat that could be directly impacted by the proposed action, even though the actual disturbance would likely be smaller.

4.3.1 Turbidity and Suspended Sediment

Construction activities near and in-water, pile driving, digging in lakebed substrates and placement of fill, shoreline modification, and increased boating traffic are expected to mobilize sediment and increase turbidity in the water column. Suspended sediment can impact all life stages of bull trout and has been linked to altered forage availability, a wide range of behavioral impacts, and acute health impacts at higher concentrations. According to IDEQ's WQC for the Corps' RGP-27 permit, the primary pollutant of concern is sediment (Idaho Department of Environmental Quality 2019, p. 2). Conditions that are a part of the IDEQ WQC would reduce the impacts of sediment mobilization and turbidity on bull trout.

Suspended sediment can impact bull trout by impacting prey resources, altering habitat, and influencing feeding behavior. Turbidity increases of 5 Nephelometric Turbidity Units (NTU) in a naturally clear lake may reduce the productive eutrophic volume by about 80 percent (Lloyd 1987, p. 19), which can further impact the food web and reduce invertebrate abundance. In addition, fine sediment can fill interstitial spaces and eliminate habitat for various microorganisms, aquatic macroinvertebrates, and juvenile fish (Waters 1995, pp. 111-116). Thus, overall food availability for fish may be reduced as sediment levels increase due to proposed project activities (Cordone and Kelley 1961, pp. 189-190; Henley et al. 2000, pp. 129-133; Lloyd et al.1987, p. 18). Social and feeding behaviors may be altered as areas with high concentrations of suspended sediments may be avoided, subsequently reducing feeding efficiency, growth rates, and survival of bull trout (Berg and Northcote 1985, p. 1410; Hicks et al. 1991, p. 483-485; Suttle et al. 2004, p. 973). However, turbidity's effect on bull trout may vary based on the life stage, as a study by Gregory and Northcote (1993, p. 239) showed juvenile salmonids accelerated their foraging rate during moderate levels of turbidity. While the effects of turbidity on bull trout foraging behavior may be variable, elevated levels of turbidity would likely have a negative effect on prey and forage fish availability.

For salmonids, turbidity has been linked to behavioral and physiological responses such as gill flaring, coughing, avoidance, and increase in blood sugar levels, which indicate some level of stress (Bisson and Bilby 1982, p. 372; Sigler et al. 1984, p, 149). The magnitude of these stress responses is generally higher when turbidity is increased and particle size decreased (Bisson and

Bilby 1982, p. 372; Gregory and Northcote 1993, p. 239). Lethal effects to salmonids are more common at higher concentrations and from prolonged exposures; however, both adult and juvenile salmonids exhibited an avoidance response to low levels of suspended sediment (SS) at around 20 mg SS/L within one hour of exposure (Newcombe and Jensen 1996, pp. 693–698). This avoidance response may reduce the likelihood of bull trout exposure to higher concentration levels that could result in sublethal to lethal effects.

The level of anticipated sediment mobilization from each activity of the proposed action is highly variable, depending on site-specific substrate and whether the work occurs in-water or in the dry. The lake substrate consists mainly of silt, sand, gravel, cobble, bedrock debris, some boulders, and some bedrock outcrops (Barton and Dux 2013, entire). Generally, finer, less-embedded substrates are more likely to become mobilized and yield more suspended sediment. The speed that turbidity levels attenuate is dependent upon the quantity of materials in suspension, the particle size of suspended sediments, the amount and velocity of ambient water, and the physical/chemical properties of the sediments. In-water work would generate immediate turbidity within localized waters, while ground disturbance from work in the dry may generate dust and loose soils that could be transported into water by wind, precipitation, wave action, or high-water conditions.

While not a direct measure of suspended sediment, light penetration using a Secchi disk measured transparencies ranging from 1.9-5.35 meters in depth between May and September of 2023 across five different sampling locations in LPO-B (Table 2). Typically, Secchi depths were greater between July and September, indicating greater water transparency, than during May and June. Actual measurements across these sites varied between 0.25-6 meters in depth for light penetration. Overall, Secchi depths varied considerably both temporally and geographically, showing that in an action area of this size, a singular baseline is difficult to establish, and that each activity may have a unique baseline for turbidity depending on the location and the time of year that construction occurs.

IDEQ water quality standards state, “turbidity, below any applicable mixing zone set by the Department, shall not exceed background turbidity by more than fifty (50) NTU instantaneously or more than twenty-five (25) NTU for more than ten (10) consecutive days” (IDAPA 58.01.02.250.02.e; Idaho Department of Environmental Quality, entire). This standard protects bull trout from some thresholds for adverse effects when sediment concentrations exceed 89 NTU over background at any time or at 60 NTU over background for more than one hour (Muck 2010, p. 36). However, adverse effects could occur when turbidity exceeds 24 NTU over background for more than three hours cumulatively or when turbidity exceeds 12 NTU over background for seven hours cumulatively (Muck 2010, p. 36). Considering the size of the action area relative to an individual permitted site, the Service expects that if background turbidity were to exceed 24 NTU over more than three hours or exceed 12 NTU over seven hours, bull trout would likely move away from this potential stressor. The subsections below address potential sources of increased turbidity or suspended sediment from the proposed action.

Construction Activities Near and In-Water

Construction of piers and docks, marine launching rails, mooring piles, portable boat lift stations, small diameter waterline intakes, and mooring buoys will all take place near or in-water. The Corps limits the construction of marine launching rails, the placement of concrete footings, the setting of anchors for boat mooring, and any trenching into the lake bottom for the placement of small intake waterlines to in the dry. The remainder of the activities may occur in-water or in the dry. Construction activities may involve use of heavy machinery; use of hand tools; and ground disturbance near water, on dry lakebed, or below the water surface.

Construction for most permitted structures under RGP-27 may take hours to a few days, so the overall exposure would be temporary and localized to permitted sites. Considering site variability and the various types of machinery that could be utilized under the proposed action, turbidity levels that surpass the threshold for adverse effects to bull trout may occur during in-water work. However, proper implementation of IDEQ WQC conditions that will reduce sediment mobilization from construction near and in-water is expected to significantly reduce turbidity. These conditions include: placement of permanent and/or temporary erosion control measures (e.g. silt curtains, geotextile fabrics, silt fences, etc.) around the perimeter of the work area, monitoring for sediment plumes in water and inspection of turbidity and erosion control measures if a plume is observed, equipment working from an upland site to minimize disturbance to waters when practicable, and limiting work in open water to a minimum and only when necessary. A full list of IDEQ's WQC conditions for turbidity, erosion and sediment control, and in-water work are listed #9-43 in the RGP-27 permit's WQC (USACE 2024a Appendix B). While the effectiveness of erosion control measures may vary based on the specific measure used and the water velocity at the site, best management practices include their use due to their overall effectiveness. Silt curtains have been shown to keep turbidity levels in the water column 80 to 90 percent lower than levels within the enclosure (JBF Scientific Corporation (1978), as referenced in USACE 2005, p. 6). The Service expects that most turbidity associated with construction activities near and in-water would settle out of the water column within a few hours inside of the erosion control device. Any remaining turbidity that enters the water column during removal of erosion control devices is not expected to exceed 24 NTU over background for more than three hours cumulatively or 12 NTU over background for seven hours cumulatively and is expected to dissipate quickly given the overall volume of water in the action area. Implementation of IDEQ WQC conditions would reduce turbidity to levels below the threshold for adverse effects to bull trout, resulting in an *insignificant* effect.

Pile Driving and Pile Removal

Pile driving may be done in the dry or in-water and is typically done by excavators stationed on land or from barge mounted excavators. Pile driving may be done using a vibratory hammer or an impact hammer, or piles may be installed without pile driving using concrete footings. Ground disturbance from pile driving and pile removal in the dry may generate dust and loose soils that could be transported into water by wind, precipitation, wave action, or high-water conditions. In-water installation and removal of piles will disturb bottom sediments and may cause a temporary increase in turbidity in the immediate vicinity of permitted activities. As the substrate can vary significantly throughout the action area, total suspended sediment concentrations would vary accordingly. Pile driving is subject to the same IDEQ WQC conditions as "*Construction Activities Near and In-Water*", including installation of permanent and/or temporary sediment control measures and monitoring for sediment plumes. The Service anticipates implementation of IDEQ WQC conditions would reduce turbidity levels from in-water pile driving and pile removal to levels below the threshold for adverse effects to bull trout. Pile-driving is limited to a maximum of 16 piles per day for each permitted activity, and pile-driving and pile removal is expected to take hours to a few days per project. As a result, the overall exposure would be temporary and localized to permitted sites.

While bull trout would not be present in the project area in the dry, in-water work may expose bull trout to increased turbidity. Turbidity associated with pile driving and pile removal near and in-water is expected to dissipate quickly given the overall volume of water in the project area. Some estimates for total suspended sediment (TSS) concentrations from pile driving and removal are between 5.0 to 10.0 mg/L above background levels within approximately 300 feet (FHWA 2012 as cited in National Oceanic Atmospheric Administration , accessed October 3, 2024), which is fairly low, as salmonid avoidance responses to suspended sediment were typically measured at around 20 mg SS/L within one hour of exposure (Newcombe and Jensen 1996, pp. 693–698). Pile driving and pile removal near and in-water are likely to temporarily increase localized sediment mobilization; however, the IDEQ WQC conditions that limit in-water work to only when necessary and require erosion control measures to be used would reduce effects to bull trout to *insignificant* levels.

Digging in Lakebed Substrates and Placement of Fill

Digging in lakebed substrates may only occur in the dry and is limited to digging trenches to bury small diameter water intake lines and digging footings for docks, piers, and marine launching rails. No more than 10 cubic yards may be excavated for footings for each finalized action. The flat bases for new or replacement piles must be excavated using a hand shovel, which will minimize disturbance to the lakebed from large machinery (USACE 2024a, p. 58). There are no limits in the RGP-27 permit on the volume of lakebed that can be excavated for the trenching for small water intake lines or on the types of machinery that can be used. Given that the diameter of the line is up to two inches and the length can extend up to 120 feet, the Service estimates that the minimum volume of lakebed needed to be excavated to bury each small diameter water intake line will be approximately 0.123 cubic yard (2”x 2” x 1,440” = 5760 cubic inches = 0.123 cubic yards).

Digging and placement of fill may generate dust and loose soils that could be transported into water by wind, precipitation, wave action, or high-water conditions. The amount of sediment generated by the required backfill would depend on the type of fill used and options covered under the RGP-27 permit, including native material, concrete, sand, gravel, grout, or epoxy. In general, finer, looser substrates would have more sediment mobilization than less erosive and more embedded substrates.

The primary conservation measures proposed for digging and filling is the installation of permanent and/or temporary erosion control measures (e.g. geotextile fabrics, silt fences, etc.) around the perimeter of the work area. These measures will be implemented at the earliest practicable time in accordance with good construction practices and maintained throughout project operation (USACE 2024a Appendix B). Additionally, all construction debris must be properly disposed of so it cannot enter water of the state or cause water quality degradation (USACE 2024a Appendix B). Given the conservation measures in place, and since all digging and fill placement will occur in the dry, the Service does not expect a measurable increase in turbidity from these activities; therefore, the effects to bull trout are expected to be *insignificant*.

Installation of Structures

Loss of riparian vegetation along the shoreline from the installation of structures authorized by RGP-27 may lead to increased erosion and sediment mobilization. Shoreline baseline conditions are already degraded due to the loss of riparian vegetation, which has been influenced by seasonal changes in water elevation from Albeni Falls dam operations. During low water, large surfaces of bare lakebed are exposed, and wind, precipitation, and wave action can cause erosion and sediment mobilization into surrounding waters. Considering the degraded baseline conditions at low water, the Service does not anticipate that additional loss of riparian vegetation along the high-water shoreline would create a measurable difference in turbidity over baseline conditions; therefore, effects to bull trout would be *insignificant*.

Dock width is limited to 10 feet and commercially available marine launching rails typically range from 8 to 11.5 feet in width (Naylor Systems Inc. , accessed October 3, 2024). If all 500 permits constructed both a dock and marine launching rails, then the estimated maximum permanent shoreline loss would be around 21.5 feet (10+11.5 feet) per permit, or around 10,750 feet total (2.04 miles), though additional shoreline may be temporarily disturbed during construction activities. Conservation measures dictate that existing native shoreline or riverbank vegetation shall be protected to the extent possible and that disturbed soils shall be revegetated with non-invasive plant species within the current or next appropriate planting season (USACE 2024a, p. 79), limiting the impact of non-permanent shoreline modification. The shoreline of the action areas is approximately 226 miles, so the 2.04 miles of permanent shoreline loss would amount to less than 0.9 percent of action area. Given the conservation measures in place to protect shoreline vegetation and the minimal amount of permanent shoreline modification associated with the proposed action, the Service does not expect a measurable increase in the amount of suspended sediment within the waters of the action area; therefore, the effects to bull trout would be *insignificant.*

Increased Boating Traffic

Although boat use is already common within the action area, a level of boat use commensurate with the life of permitted structures is attributable to the proposed action. Boating near the shoreline can create wakes that can erode shorelines, scour the bottom of shoreface, and increase suspended sediment concentrations (Bilkovic et al. 2019, p. 2). Boat wakes can be influenced by vessel length, water depth, boat speed, shoreline structure, and the amount of shoreline vegetation (Bilkovic et al. 2019, p. 2). A study in Chesapeake Bay found that boating may have contributed to shoreline erosion and poor water clarity in some parts of the study area and that turbidity was elevated in many waterways during periods of expected high boating activity, such as weekends and holidays (Bilkovic et al. 2019, p. 7). Considering current boating levels in the action area, turbidity associated with increased boating traffic would be difficult to distinguish from the baseline.

Within the action area, most boating is limited to during high waters as most boat ramps and docks do not extend to the low water level (USACE 2024a, p. 92). Consequently, impacts are likely to be higher during the summer when water levels are elevated. Bonner County boating regulations dictate that boats should not operate more than five miles per hour in no wake zones within 200 feet from shorelines or structures and limits speed to 50 miles per hour on Lake Pend

Oreille and the PO River and 35 miles per hour on the Clark Fork River (Bonner County Idaho , accessed October 3, 2024). Kootenai County has similar regulations, limiting day speed to 50 miles per hour and night speeds to 25 miles per hour on lakes with a no wake zone within 200 feet of shoreline (Kootenai County Idaho, accessed October 3, 2024). These existing regulations reduce the potential turbidity generated by boat wakes by providing a no wake zone buffer of 200 feet from the shoreline. Higher speeds of 50 miles per hour may still generate some wave activity that could temporarily increase turbidity along the shoreline, but bull trout would likely relocate to lower turbidity waters farther from shore until suspended sediments dissipate; therefore, effects to bull trout would be *insignificant.*

4.3.2 Noise and Disturbance

Noise and disturbance may impact bull trout while implementing the proposed action. Heavy equipment operating adjacent to water will create noise and visual disturbance that may impact fish in the action area, leading to short-term displacement and disruption of local foraging. Visual disturbance may elicit a startle response in bull trout and cause them to move away, but it is unlikely to result in harm or injury.

The acoustic threshold for the onset of behavioral effects in fish is 150 dB root-mean-square, which is an average sound pressure level calculated by taking the square root of the average of the squared sound pressure over a given duration (National Marine Fisheries Service 2023, pp. 5–7). Sounds at or exceeding this threshold may adversely affect bull trout if they disrupt critical life stages such as migration and spawning. The thresholds for physical injury from impulsive sounds include two separate measurements, a peak pressure and a cumulative sound exposure limit (SEL). Peak pressure is the maximum instantaneous sound pressure created and cumulative SEL measures the maximum amount of sound energy a fish could be exposed to over a twelve-hour period. Cumulative SELs address constructive interference, which is when sound waves build upon one another due to the way their peaks and troughs align, resulting in a louder sound than individual waves. The peak pressure threshold for physical injury from a single strike is 206 dB and the cumulative SEL thresholds for all pile strikes 187 dB for fish weighing more than two grams or 182 dB for fish weighing less than two grams (National Marine Fisheries Service 2023, pp. 5–7).

Construction Activities In and Near Water

Noise and disturbance from digging, filling, use of power and hand tools, and construction with heavy equipment (e.g. excavators) from barge or land adjacent to water may disturb bull trout in the action area. Heavy equipment operation is expected to generate a noise limit at 50 feet (L_{max}) that is up to 95 dB (Federal Highway Administration 2006, p. 59), well under the 150 dB threshold needed to elicit behavioral effects. The Service anticipates the primary response bull trout will have to noise and disturbance would be to temporarily relocate to nearby suitable habitat; therefore, effects are expected to be *insignificant*.

Digging in Lakebed Substrates, and Placement of Fill

Digging in lakebed substrates may occur to create trenches and bury small diameter water intake lines and to create footings for docks, piers, and marine launching rails. Since all digging and placement of fill is limited to being done in the dry, noise and visual disturbance are expected to have an *insignificant* effect on bull trout.

Increased boating traffic

A level of boat use commensurate with the life of permitted structures is attributable to the proposed action and may generate noise, which can cause stress and change bull trout behavior resulting in the disruption of normal feeding or migration of the species. Increased background noise has been shown to increase stress in fish (Mueller 1980, pp. 249–250; Scholik and Yan 2002, pp. 207–208). Studies documenting fish responses to increased boating range from no response to increased cardiac output (Graham and Cooke 2008, pp. 1319–1321) to avoidance of the area (De Robertis and Handegard 2013, p. 34).

Per regulation, the action area has no wake zones within 200 feet of the shoreline and near docks and piers, which limits speed and boating noise in those areas (Bonner County Idaho , accessed October 3, 2024; Kootenai County Idaho , accessed October 3, 2024). Typical noise from powerboat engine operating between 2500 and 6000 RPMs (rotations per minute) is approximately 125-165 dB, with the noise levels increasing as engine RPMs increase (Barlett and Wilson 2002, pp. 5, 7–8). Reduced speed in no wake zones near the shoreline and around structures is expected to result in substantially lower sounds since the engine RPMs will be lower, so sound in this area is likely to be under the 150 dB threshold for behavioral disturbance to bull trout. Noise from increased boating outside of the no wake zone is likely to blend into the existing baseline soundscape of the action area, which already has significant recreational boating. Since effects would not be measurable or distinguishable from baseline conditions, effects to bull trout are expected to be *insignificant.*

Pile Driving

See 4.3.3 Percussive Damage

4.3.3 Percussive Damage

The proposed action includes vibratory and impact pile driving of steel piles up to 10 inches in diameter or wooden piles of unlimited diameter. Vibratory pile driving may require proofing of piles with the use of an impact pile driver. Concrete piles are not a part of the proposed action and are not covered by this Opinion.

Noise and disturbance from pile driving can rise to levels that may result in decreased predator avoidance and injury or death of bull trout. Driving steel piles with an impact hammer can produce intense, sharp spikes of sound reaching levels that can harm or kill fish (NMFS 2002, p. 34; J. Stadler, NMFS, pers. comm. 2002). Barotrauma associated with impulsive sounds can lead to ruptured capillaries, internal bleeding, and damage to vascular organs due to strain associated with swim bladder resonance and pneumatic compression (Hastings and Popper 2005, pp. 34–

40). High sound levels can also lead to fish injury through "rectified diffusion" in which gas bubble formation causes tissue damage (Hastings and Popper 2005, p. 35). Sublethal effects of exposure to long-term increased background sounds levels or intense but short-term sounds can lead to temporary threshold shift (TTS) in fish, which is a temporary type of hearing loss, but may increase fish susceptibility to predation or decrease their ability to sense prey (Popper 2008, p. 35).

The extent to which noise will affect fish is related to the distance between the sound source and affected fish and by the duration and intensity of pile driving. The type and intensity of the sounds produced during pile driving depends on a variety of factors, including, but not limited to pile material and size, the type of pile driving, the substrate into which the pile is being driven, and water depth.

Vibratory pile driving is not currently associated with injury or death to fish or other aquatic organisms. This may be attributable to slower pressure rise times (the time in milliseconds it takes the wave form to rise from 10 percent to 90 percent of its highest peak) associated with vibratory pile driving, and the fact that the energy produced is distributed over the duration of pile installation (Washington State Department of Transportation 2023, p. 7.38). The Service anticipates that vibratory pile driving may cause only minor behavioral effects to bull trout, and these behavioral effects are unlikely to result in measurable effects or a significant impairment of their normal behaviors. Therefore, effects to bull trout associated with vibratory installation of piles are considered *insignificant*.

All in-water impact pile driving must use a bubble curtain and a minimum six-inch thick wood, rubber, or synthetic cushion block between the driving apparatus and the pile when driving the piles. No more than 16 piles will be pile driven in a day with a maximum of 12 strikes per pile (USACE 2024a, pp. 24, 71, 76), which would equal a maximum of 192 strikes per day. Assuming a common driving rate of 40 strikes per minute (the standard used in the "Sound Exposure Level Calculator for Marbled Murrelet and Bull Trout"), the noise generated to drive each pile will occur over approximately 18 seconds, with a combined total of around 4.8 minutes each day for 16 piles.

The impacts that pile driving will have on bull trout will vary depending on whether it is conducted in-water or in the dry, the type of driving method used, and the material of the pile. Driving piles in the dry substantially reduces the amount of underwater sound energy that is transmitted as either a pressure wave into the water column or as vibration from the ground into adjacent waters (California Department of Transportation 2020, p. 2-17). The dry land buffer between driving activities and the water will attenuate noise and reduce visual disturbance. By the time the noise reaches water it will likely be below levels that may cause substantial behavioral changes and, therefore, effects from pile driving in the dry are expected to be *insignificant* to bull trout.

According to the "Sound Exposure Level Calculator for Marbled Murrelet and Bull Trout" (USFWS 2023, entire), wooden pilings are not anticipated to cause injury as the material creates a "duller" sound compared to steel pilings; however, the noise generated may still cause some disturbance to bull trout. The Service expects that this disturbance will not exceed the energetic cost associated with relocating to suitable nearby habitat. Therefore, the effects on bull trout from pile driving wooden piles, whether conducted in-water or in the dry, would likely be insignificant.

Impact hammers produce impulsive noises with short durations that consist of a broad range of frequencies and a rapid pressure rise time (Washington State Department of Transportation 2023, p. 7.38) which results in reduced energy in lower frequencies such that avoidance by salmonids may not be elicited (Carlson et al. 2001, pp. 23–26). Thus, impact hammers may be harmful for two reasons: they produce more intense pressure waves; and the sounds produced do not elicit an avoidance response in fish, leading to longer periods of exposure to harmful pressures. In order to calculate the potential radius for injury and behavioral disturbance, the Service used the "Sound Exposure Level Calculator for Marbled Murrelet and Bull Trout" to generate data in Table 6Table 6 below (*note that steel 10 inch is not a measurement available in the sound calculator due to its absence in available literature, so 12 inch steel pipes were used in the calculation per the calculator's instructions).

Piling Type and Diameter	**Steel 12"* pipe - Attenuated**	**Steel 12nch* pipe - Unattenuated**
Piles Per Day	16	16
Pile Strikes Per Pile	12	12
dB Attenuation	5	0
Peak Single Strike (dB re: 1 μPa)	202	207
RMS Single Strike (dB re: 1 μPa)	184	189
SEL Single Strike (dB re: 1 μPa2s)	168	173
Cumulative SEL (dB re: 1 μPa2s)	191	196
Radius (ft) of Injury Effects (Bull Trout ≤ 2 gram), 183 dB_{SEL}	109	235
Radius (ft) of Injury Effects (Bull Trout > 2 gram), 187 dB_{SEL}	59	127
Radius (ft) of Injury Effects (Bull Trout > 2 gram), 206 dB_{PEAK}	18	38
Radius (ft) of Bull Trout Behavior Effects, 150 dB_{RMS}	6,061	13,058

Table 6: Impact Pile Driving Sound Calculator Data. See Appendix D for screenshots of calculator.

Unattenuated, impact driving is expected to generate a single strike maximum of 207 dB, which in water would create an injury radius of 235 feet for bull trout weighing two grams or less and an injury radius of 127 feet for bull trout weighing over two grams. In addition, noise capable of creating a behavioral disturbance is anticipated to extend to a radius of 13,058 feet. Mandatory conservation measures that include the use of a bubble curtain and a minimum six inch thick wood, rubber, or synthetic cushion block between the driving apparatus and the pile for all in-water impact pile driving are expected to attenuate sound created by impact pile driving (USACE 2024a, p. 24). Cushion blocks are already factored into values generated by the USFWS "Sound Exposure Level Calculator for Marbled Murrelet and Bull Trout," but the use of a bubble curtain is not. Bubble curtains can vary in their ability to attenuate sounds, but technical guidance on the effects of pile driving states, "it is reasonable to assume that a bubble curtain for any size of pile will provide at least 5 dB of sound reduction" but that "sound reduction greater than 5 dB should not be assumed" (California Department of Transportation 2020, p. 4.13). Given a 5 dB attenuation, the radius of effects to bull trout would be reduced to 109 feet for injury to bull trout weighing two grams or less, 59 feet for injury to bull trout greater than two grams, and 6,061 feet for behavioral impacts. The use of bubble curtains is likely to reduce the radius of effects to a smaller area; however, in-water impact pile driving is still expected to create sounds that can lead to harm of bull trout in a radius extending outward to 109 feet. While bull trout are more commonly associated with cooler waters, bull trout can be found anywhere in the action area at any time of year and, therefore, in-water impact pile driving of steel piles is *likely to adversely impact* bull trout, potentially causing harm that ranges from injury to death.

4.3.4 Loss of Benthic Habitat

Structures built under RGP-27 that include components installed on the lakebed or riverbed will result in the loss of benthic habitat. Specific impacts to the lake bottom include: the diameter of installed piles, the areas covered by structures to anchor marine launching rails, trenching of water lines, and areas covered by concrete used for footings for piles, stabilizing waterlines, or allowing for mooring attachment. These structures occupy a small area and will not impact the quality of the habitat for migration or overwintering, though they may temporarily impact foraging.

Removal of benthic habitat can reduce benthic invertebrate species that juvenile salmonids and other fish may prey on. The maximum footprint of benthic habitat loss is small compared to the size of the action area and invertebrate populations in locally disturbed areas are expected to recolonize within a few weeks or months depending on the species. Within the action area, altered hydrological regimes from the changing lake level result in significant benthic habitat loss on a seasonal basis as lake elevation drops approximately 10 feet in fall and winter, causing a large amount of habitat that is benthic in the summer to be dry in the winter. Considering that many of the authorized structures will be in the dry seasonally, the impact of these structures on benthic habitat would be minimal when compared to baseline conditions and impacts to bull trout from benthic habitat loss would primarily occur during high water.

During this time, the Service anticipates that benthic habitat loss will primarily affect bull trout through reduced foraging opportunities from a reduction in benthic invertebrates. Benthic invertebrates are not considered a significant part of bull trout's diets in the action area, though other bull trout prey species may rely on them. Though bull trout are opportunistic and may forage on benthic invertebrate populations, kokanee are thought to be the primary prey resource for bull trout in the action area, accounting for about 65.6 percent of diet by weight (Vidergar 2000, p. 44). The Service anticipates that any foraging bull trout impacted would relocate to suitable nearby habitat that would provide ample foraging opportunity until the disturbed area recovers. While the total surface area of benthic habitat is unavailable, the surface area for the action area 94,600 acres, which would represent a smaller value than the actual area of benthic habitat in the action area, as it does not account for the added surface area below water due to water depth. The maximum estimated benthic habitat loss associated with 500 permit issuances is approximately 26.95 acres, which would be less than 0.03 percent of benthic habitat in the action area. Overall, benthic habitat loss will to be localized to the footprint of installed structures and changes in associated benthic invertebrate populations are expected to be temporary and not represent a measurable loss in forage availability for bull trout in the action area; therefore, the impact of benthic habitat loss would be *insignificant* to bull trout.

4.3.4 Loss of Riparian and Shoreline Habitat

Riparian and shoreline vegetation can provide shading that moderates nearshore water temperatures during summer high-water and can help stabilize banks, reducing sediment mobilization into surrounding waters. In-water vegetation provides habitat for small fish and trees can generate coarse woody debris inputs that increase in-water habitat complexity and provide organic matter that increases primary and secondary productivity in aquatic food chains (Carrasquero 2001, p. 28).

Structures authorized by RGP-27 may result in semi-permanent shoreline modification, temporary shoreline disturbance, and a reduction in riparian and shoreline vegetation. Removal of shoreline vegetation would increase solar exposure which could result in a localized increase in water temperature; however, structures such as docks and piers may provide localized shading, creating a cooling effect that could counteract some changes in temperature from vegetation loss. Loss of shoreline vegetation may cause an increase in sediment mobilization (see 4.3.1 Turbidity and Suspended Sediment), a reduction in large woody debris (LWD) recruitment, a reduced supply of terrestrial insects, and reduced habitat complexity. Changes in habitat complexity and invertebrate abundance may reduce cover and forage availability for juvenile bull trout or bull trout forage fish.

Within the action area, shoreline baseline conditions are already degraded from the annual drawdown due to Albeni Falls dam operations, pre-existing shoreline structures and shoreline stabilizations (e.g. riprap, bulkheads, docks, piers, etc.), and wake action from baseline boating (USACE 2024a, pp. 77–78). In addition, the Assessment indicated that more than 90 percent of existing waterfront private properties on LPO are primarily lawns and have mostly ornamental vegetation with only scattered remnants of native trees (USACE 2024a, p. 78). These conditions indicate that a lack of native vegetation, reduced capacity for LWD recruitment, and increased shoreline erosion from fewer native riparian plants and boating are a part of the environmental baseline.

Construction Activities In and Near Water

Construction activities such as staging materials and operation of heavy machinery may result in loss of riparian and upland vegetation. Conservation measures require protecting existing native shoreline or riparian vegetation to the maximum extent possible and re-vegetating disturbed soil with non-invasive plant species within the current or next appropriate planting season. In addition, IDEQ condition 42 requires riparian and wetland vegetation to be successfully reestablished to function for water quality benefit at pre-project levels or greater at the completion of authorized work (see A.2 IDEQ WQC Conditions). Combined, these conservation measures limit the duration of effects and require site restoration to previous functioning, preventing long term loss of riparian and shoreline from construction activities; therefore, effects to bull trout are expected to be *insignificant*.

Installation of Structures

The maximum semi-permanent shoreline is estimated to be 2.04 miles and would amount to less than 0.9 percent of the action area (See 4.3.1 Turbidity and Suspended Sediment: *Installation of Structures*). Effects to shoreline habitat from semi-permanent modification from structure installation would be most evident in the localized area of each project. Given the minimal amount of semi-permanent shoreline modification associated with the proposed action, the Service does not expect habitat loss to rise to a level that would adversely impact bull trout within the action area. Therefore, the effects to bull trout are expected to be *insignificant.*

Increased Boating

Although boat use is already common within the action area, a level of boat use commensurate with the life of permitted structures is attributable to the proposed action. Boating near the shoreline can create wakes that can erode shorelines and reduce riparian and shoreline vegetation. Boat wakes can be influenced by vessel length, water depth, boat speed, shoreline structure, and the amount of shoreline vegetation (Bilkovic et al. 2019, p. 2). Considering current boating levels in the action area, loss of shoreline and riparian habitat associated with increased boating traffic would be difficult to distinguish from the baseline.

Within the action area, most boating occurs during high water levels as most boat ramps and docks do not extend to the low water level (USACE 2024a, p. 92). County regulations that limit boat speeds and mandate a no wake zone buffer of 200 feet from the shoreline (see 4.3.1 Turbidity and Suspended Sediment) provide additional protection to shoreline and riparian habitats. Though riparian and shoreline habitats in the action area are already negatively impacted by existing boating and development, Albeni Falls dam operations likely have the most substantial impact on riparian and shoreline habitats as seasonal dewatering drops water to below the vegetated summer shoreline. Winter conditions during low water are unfavorable for plant growth or recolonization of bare lakebed, resulting in shoreline that is largely barren for months out of the year. While increased boating may impact riparian and shoreline habitat by increasing erosion and reducing vegetation, it would be difficult to distinguish from baseline boating conditions. Furthermore, the magnitude of the impact would be minimal relative to other baseline conditions, such as dam operations, which completely alter the shoreline on a seasonal basis. Overall, increased boating would not have a measurable effect on shoreline and riparian vegetation relative to baseline conditions, so effects to bull trout would be *insignificant.*

4.3.5 Reduced Water Volume

Small waterline intakes installed under the proposed action are anticipated to remove water from the action area. The Corps anticipates that water intake lines would be used on a seasonal and intermittent basis and that the pumps installed would have an estimated water withdrawal of 92 gallons/minute or 0.41 acre-feet per day if run continuously (USACE 2024a, p. 79). Active storage of the lake is approximately 1,155,000 acre feet of water, and the percent of water removed per day per individual intake line would then be approximately 3.55×10^{-5} percent if the pump was run continuously for a 24-hour period (USACE 2024a, p. 79). As the proposed action covers 500 permits, 500 waterline intakes actively pumping water during a 90-day use season would result in 18,450 acre-feet of water removed annually, or 1.6 percent of total volume. It is unlikely that the pumps would run continuously; therefore, the overall water reduction would likely be lower. Reduced water volume will be minimal and is unlikely to result in an actual change in the water volume, as water levels are primarily determined by Albeni Falls Dam operations. Given that Albeni Falls Dam maintains the action area on a hydrograph that is approximately 99 percent consistent year to year (see Figure 3), water withdrawals from small waterline intakes are unlikely to have to a measurable impact on water levels within the action area and effects to bull trout will likely be *insignificant.*

4.3.6 Entrainment and Impingement

The installation and use of small diameter water lines (two inches or less) and associated pumps may pose a risk to bull trout by entraining them through the water lines or impinging them due to the velocities created on fish screens, which may exceed the escape capabilities of the fish. Impingement can injure a fish, and prolonged contact with a screen surface or bar rack can result in mortality (NMFS 2022, p. 30). The use of NMFS fish screen criteria with openings of 3/32nd of an inch will keep bull trout from being entrained and, therefore, effects to bull trout are expected to be *discountable*.

Adult and sub-adult bull trout are not likely to be susceptible to impingement onto the screens of 2-inch water intakes due to their body size and burst swimming ability. However, juvenile bull trout are much more susceptible to impingement due to their smaller body size. The NMFS screening criteria will protect fingerling salmonids greater than 2.36 inches (60 mm), which is approximately 25 percent larger than an age-0 bull trout and roughly half the size of an age-1 bull trout. Age-1 and older bull trout are likely to exhibit a greater swimming capacity than smaller salmonid fingerlings, therefore the NMFS screen criteria serves as adequate protection for age-1 and greater bull trout.

Juvenile bull trout typically rear one to four years in their natal (or birth) stream before migrating. However, age-0 bull trout have been found to emigrate into LPO from spawning and rearing streams that drain directly into it, such as Trestle Creek. Age-0 bull trout are not known to survive to reproductive maturity in large numbers, if at all, in the lake (Downs et al. 2006, p. 199). The Service expects that age-0 emigrants may be present in the mouths of shorter SR streams that connect directly to LPO as age-0 emigrants may follow the current downstream to find suitable rearing habitat, and due to the limited rearing habitat available, may emigrate all the way to LPO. Additionally, the Service anticipates that the likelihood of age-0 fish emigrating to LPO would be reduced the farther the distance is between LPO and the spawning grounds, as it would entail a longer migration and it’s more likely that age-0 fish would find suitable rearing habitat prior to reaching the lake.

An abundance of rearing habitat between spawning grounds and the PO River would likely reduce the likelihood of age-0 bull trout emigrating all the way to the PO River from SR habitat upstream. Emigrating juvenile bull trout in this area must first go down the Middle Fork East

River, into and down the Priest River, then into the PO River, and then migrate upstream against the current to reach LPO. Given the long migration and the amount of rearing habitat available, emigrants going up the PO River are likely to be older than age-0. In addition, bull trout that migrate up the PO River would require a greater swimming speed to perform such a long migration against the river current compared to downstream emigrants and would likely have the swimming capacity necessary to prevent impingement. The chance of bull trout being impinged by water intakes is *discountable* in the PO River because sub-2.36-inch bull trout are unlikely to be in the PO River and NMFS screen criteria provide protection to larger bull trout.

Fish are cold blooded, and their metabolism increases exponentially with increasing ambient water temperatures. Eventually, warm water temperatures may result in death for bull trout due to increased metabolic demands and decreased feeding capacity (Selong et al. 2001, pp. 1032–1033). The shallow nearshore areas of the lake during the summer are not ideal habitat for bull trout due to the thermally stratified warm water temperature which increases metabolic demands that temperature puts on the species, reducing the likelihood that age-0 bull trout spend time in the nearshore. In addition, the buffer of 100 yards on each side of excluded streams is expected to provide protection from intakes; therefore, sub-2.36-inch bull trout are not expected to be present in parts of the lake where small diameter water lines will be installed, except for North Gold Creek, the only SR stream not included within the proposed action's excluded streams., the likelihood of bull trout being impinged by water intakes in LPO is *discountable,* except for the mouth of North Gold Creek. This is because sub-2.36 inch bull trout are rare in LPO, are unlikely to inhabit shallow, warm nearshore areas, and the 100-yard exclusion buffer on each side of excluded streams would significantly decrease the potential for age-0 bull trout to become impinged. Since the same protections for age-0 bull trout are not present at North Gold Creek, small water line intakes are *likely to adversely affect* age-0 bull trout in this location. Current property boundaries indicate that three properties fall within the 100-yard exclusion buffer, so at present, a maximum of three small waterline intakes may be installed in areas of North Gold Creek where age-0 bull trout may risk becoming impinged (Acres.com 2024, accessed December 27, 2024).

4.3.7 Predation

The action area has a diverse array of fish species that have complex interactions with each other in terms of predator-prey dynamics. Within the action area, piscivorous fish species such as northern pikeminnow, brown trout, rainbow trout, walleye, northern pike, cutthroat trout, lake trout, brook trout, largemouth bass, smallmouth bass, and bull trout may prey on other bull trout. Due to their smaller size, juvenile and subadult bull trout are more susceptible to predation than adult bull trout. The installation of structures authorized under RGP-27 may change habitat in the nearshore area, which could impact fish assemblages and fish interactions, such as predator-prey dynamics.

Predatory-prey dynamics are multifactorial and to determine predation rates on bull trout, factors such as predator-prey aggregations, predator-prey interactions, predator efficiency, and prey vulnerability all play a significant role. In a literature review on anthropogenic contact points between fish, there was conflicting evidence on how docks and piers influence predator and prey aggregations, and no studies reviewed specifically addressed predator-prey interactions, predator efficiency, or prey vulnerability (Lehman et al. 2019, p. 9). Within the action area, data on fish assemblages and piscivore diets provides information on predator and prey aggregations and some predator-prey dynamics, though the Service is unaware of any research regarding predator efficiency or prey vulnerability as they relate to the structures authorized under RGP-27. In addition, while various studies have shown bull trout will use nearshore habitats within the action area, there are limited data regarding their interactions with installed structures such as docks and piers.

A study that investigated how developed sites (near overwater structures) and paired undeveloped littoral areas influenced fish assemblages and piscivore diet in LPO found that species diversity, evenness, and dominance did not statistically differ between developed and undeveloped sites in any season (spring, summer, fall) during either the day or night (Bellgraph et al. 2012, p. 4.7-4.8). The most commonly observed species during snorkel surveys were unidentified non-salmonids (~1532), unidentified centrarchids (~1251), and smallmouth bass (~800). Only 18 individuals, or 0.4 percent of fish, were positively identified as native species, being largescale sucker, longnose sucker, and northern pikeminnow (Bellgraph et al. 2012, p. 4.1). Gut analysis of piscivorous fish captured during electrofishing indicated that there was no statistical difference in predatory fish diets between developed and undeveloped sites, or between seasons, though significant differences were found amongst geographic sites (Bellgraph et al. 2012, p. 4.24).

Species richness was statistically greater at developed sites during the daylight in summer, though it did not differ between developed and undeveloped sites in any other season during the day or night (Bellgraph et al. 2012, p. 4.7). During summer daylight, snorkeling surveys found high relative abundances of smallmouth bass and unidentified centrarchids (most unidentified fish were young of year that could not be identified to species level; Bellgraph et al. 2012, p. 4.3). Altered hydrological regimes may contribute to the notable differences during the summer, as habitat alterations caused by structures, namely shading from overwater structures, would have the greatest effect at this time of year when water is highest. As water levels drop and the gap between docks and the water increases, more light will be able to penetrate the waters below the structures. This change will reduce the difference between those habitats and surrounding habitats, though pilings and anchors would still provide some level of added habitat complexity. Many of the structures authorized by RGP-27 would be unlikely to influence fish assemblages during the winter, as water withdrawals leave them in the dry.

Overall, the relative abundance of predatory fish (>100mm in length) was only greater at developed sites compared to undeveloped sites during the day in summer, primarily due to high numbers of smallmouth bass. There were no significant differences observed during any other diel period in any other season (Bellgraph et al. 2012, p. 4.5). It is unclear if this relative abundance indicates a diel behavioral site-preference or an actual increase in the number of predatory smallmouth bass within the action area. Given that unidentifiable, typically young-of-year, non-salmonids and centrarchids were the most frequently observed fishes, it's possible that smallmouth bass predatory aggregations under docks are attributable to an abundance of non-salmonid prey species aggregated there.

The aggregation of predatory fish near developed sites and overwater structures does not necessarily imply that there would be an increase in predation on bull trout specifically. A study on the impacts of ferry terminals on juvenile salmonids in Puget Sound found that potential salmon predators were more abundant at ferry terminals than along shorelines without overwater structures; however, there was no evidence that predators consumed more juvenile salmon near ferry terminals than at paired natural reference sites (Williams et al. 2003, pp. 19–24). The ecosystem interactions of fish, particularly in a large and diverse system like LPO, is complex, Habitat variables such as water temperature and substrate likely factor into fish species' habitat preferences. Additionally, factors like shading, water depth, and the presence of other fish species can contribute to increased competition or predation risk.

While there are numerous predatory fish species that can prey on bull trout, particularly smaller juveniles and subadults, increased predation resulting from habitat alterations created by the structures authorized under RGP-27 would be most attributable to smallmouth bass due to their relatively higher abundance at developed sites during the day in summer than undeveloped sites. However, aggregations of a single species does not necessarily result in the increased predation of another species within a complex food web, so predator-prey dynamics between smallmouth bass and bull trout should also be considered when assessing whether there would be an increase in predation compared to baseline conditions.

Smallmouth bass have been shown to prey on juvenile salmonids and are capable of consuming salmonids up to 56.6 percent of their size, though consumed salmonids typically averaged 25 percent of smallmouth bass length (Fritts and Pearsons 2006, entire). While there is the potential for a smallmouth bass to opportunistically forage on a juvenile bull trout that may pass under an overwater structure, it is unclear if this would constitute an increase in bull trout predation relative to the baseline predation rates or if this predation would be solely due to a predatory advantage gained due to shading from the dock. No bull trout were identified during snorkel surveys at either developed or undeveloped sites, though two were captured during nearshore electrofishing at an undeveloped site, with total lengths of 295mm and 318mm, both of which would be likely be too large to be preyed on by smallmouth bass which range from 212 to 415mm (Bellgraph et al. 2012, p. 4.19; Paluch 2023, entire). Given the diverse array of predatory fish species within the action area, overall predation rates on juvenile and subadult bull trout are already significant and the mean apparent survival rate for juvenile and subadult bull trout within LPO is estimated at 0.18 and 0.59 respectively (Mucciarone et al. 2022, pp. 18–19). In addition, a study in Trestle Creek indicated that successful bull trout emigrants ranged from ages-1 to 5, with no age-0 fish returning, presumably because of the low survival rates observed in LPO (Downs et al. 2006, pp. 195–198).

There is limited information on how juvenile bull trout use the LPO basin, though studies have typically shown bull trout fry emigrate from SR streams in spring and fall (Downs et al. 2006, p. 198; Bouwens and Jakubowski 2017, pp. 30–32). Field and laboratory studies have shown juvenile bull trout are often associated with benthic habitats, often concealing themselves under large substrate during the day, and primarily emerging during the night, though they are still frequently found resting near or on top of the substrate (Thurow 1997, p. 4; Thurow et al. 2020, pp. 7–9). In this case, aggregations of smallmouth bass during the day would be less likely to result in juvenile bull trout predation due to the differences in temporal behavioral patterns, with smallmouth bass posing the greatest predation threat during the day while juvenile bull trout more likely to conceal themselves during that time.

If juvenile or subadult bull trout were found to aggregate under docks, there could be a greater chance of predation by smallmouth bass due to higher concentrations of both species within a smaller area. Within the action area, the Service anticipates that juvenile and subadult bull trout are likely to have the highest concentrations near the mouths of spawning and rearing streams. The narrow width of streams would create a bottleneck effect for migrating bull trout compared to the open expanse of water in LPO. Structures around these narrower migratory corridors may increase the relative abundance of bull trout in these areas, which may increase the potential risk of predation. However, conservation measures outlined in the proposed action limit the potential impacts that authorized structures could have in this area. There is a 100-yard radius buffer around the excluded streams where authorized structures would not be permitted under RGP-27. Additionally, there is a further 0.25-mile radius buffer that mandates the use of light-penetrative decking, which would reduce shading from overwater structures and the subsequent effects. While shading may not directly impact bull trout during migration, as they generally migrate during the night, these buffers may reduce the potential for some predatory fish, such as smallmouth bass, to aggregate within the localized areas where the highest concentrations of juvenile bull trout are most likely to be found.

Beyond the mouths of SR streams, there is limited evidence that associates juvenile and subadult bull trout with overwater structures in LPO, despite evidence of bull trout presence in shallower littoral areas. Bellgraph et al. (2012, p. 5.1) did not identify any bull trout in the stomach contents of smallmouth bass or other predators at either developed sites, though there were unidentifiable salmonids found in gut contents. A study by Vidergar (2000, p. 52) on predatory fish diets in LPO captured 337 smallmouth bass and did not identify any bull trout or unidentified salmonids within the stomach contents, and found smallmouth bass primarily consumed redside shiners, unidentifiable non-salmonids, larval fish, and pikeminnow. Within that study, kamloops, lake trout, and northern pikeminnow were found to prey on bull trout, though kokanee were the preferred prey species for pelagic predatory fish in LPO (Vidergar 2000, pp. 44–53). While smallmouth bass have the potential to prey on smaller bull trout, data specific to the LPO basin suggest bull trout are not a preferred or frequent prey species for smallmouth bass and, therefore, aggregations of smallmouth bass under docks are unlikely to increase predation on bull trout populations.

The risk of increased predation on bull trout due to the installation of structures authorized under RGP-27 is heavily influenced by the fish assemblages and subsequent predatory-prey interactions that constitute the baseline environmental conditions. These assemblages may change over time, but the Service does not anticipate significant changes to occur during the five-year term of the action, as state management actions, such as kokanee stocking and predator suppression programs are expected to continue during that period. Current data indicate that the primary risk for increased predation of bull trout would stem from statistically significant aggregations of smallmouth bass present at developed sites during the daylight in summer. However, studies examining gut contents have not revealed bull trout in the stomachs of smallmouth bass within LPO, suggesting that bull trout are not a common or frequent prey resource for smallmouth bass in this ecosystem. In addition, juvenile bull trout most susceptible to predation by smallmouth bass exhibit different temporal behavioral patterns, reducing potential points of contact between the two species. Given the weak predator-prey relationship between smallmouth bass and bull trout, it is unlikely that the aggregation of smallmouth bass under docks and piers would result in a localized increased rate of predation on bull trout relative to undeveloped sites. Furthermore, the total surface area likely to be shaded by authorized structures is only 0.02 percent of the total surface area of the action area (Table 5). Since approximately 27 percent of LPO is littoral zone habitat (Madsen and Wersal 2008, p. 4), shading relative to littoral surface area would be 0.07 percent. Therefore, changes to habitat are expected to be so minimal that they are unlikely to impact overall fish assemblages within the action area, and subsequently will have an *insignificant* effect on the rate of predation of bull trout.

4.3.8 Littoral Productivity

Structures authorized under RGP-27 can create shading in the littoral zone that may reduce the growth of aquatic plants and phytoplankton by decreasing the amount of light available for photosynthesis. Impacts to primary production can lead to changes at higher trophic levels such as invertebrates and fish, which in turn could impact bull trout.

Due to factors in the environmental baseline of the action area, effects from shading would primarily be limited to higher water conditions. Altered hydrological regimes resulting from Albeni Falls Dam operations cause many shoreline structures to be exposed during the winter months. As a result, these structures are unlikely to have a significant impact on littoral productivity during this time of year. During the transition between high and lower water, receding water levels will increase the distance between overwater structures and the water column, allowing for more light to penetrate under overwater structures. The seasonal water changes associated with the altered hydrological regime will also impact what plants are able to grow and survive within the nearshore area that experiences seasonal flooding followed by seasonal dewatering. In addition, the climate in the action area limits the growing season for plants, as most plants will go dormant or die in response to freezing temperatures.

In a study on overwater structures within LPO, Bellgraph et al. (2012, p. 4.11-4.13) found that overwater structures reduced the proportion of light available at developed sites in all seasons, with the lowest mean photosynthetically active radiation occurring in the summer. Structures attenuated light at different rates, depending on the structure type, and docks, boat garages, and raised walkways attenuated more light than grated walkways and areas unshaded by overwater structures (Bellgraph et al. 2012, p. 4.12). While shading may result in reduced primary production immediately below overwater structure, the impacts of reduced radiation did not lead to reduced overall macrophyte volume around developed sites which often had a higher macrophyte volume than undeveloped sites (Bellgraph et al. 2012, p. 4.14). Evidence for this is further supported in a study by Rosenberger et al. (2008, p. 1680) that measured higher productivity based on chlorophyll *a* and pheophytin *a* at developed sites in LPO compared to undeveloped sites, a result potentially attributable to higher nutrient inputs being more likely at developed sites.

Given that private property along the lakeshore tends to have lawns and sparse woody vegetation (USACE 2024a, p. 57), nutrient inputs from lawn fertilizer, animal waste, or other sources at developed sites may counteract the reduction of primary productivity attributable to shading. While not every developed site is necessarily going to have higher nutrient inputs when compared to undeveloped sites, there was on average more productivity at developed sites in the action area, so shading created by overwater structures does not seem to have a significant impact on rates of primary production at developed sites when compared to other environmental factors such as nutrient availability. Since primary production is not measurably reduced, the Service does not anticipate there to be significant reductions in littoral productivity or that higher trophic levels would be subsequently impacted. In addition, the total amount of surface area impacted by overwater shading relative to the littoral surface area is expected to only be 0.07 percent. Given the minimal amount of shading expected and the limited impact of shading on site littoral productivity, the impacts to bull trout are likely to be *insignificant*.

4.3.9 Chemical Contamination

Construction activities in and near water, installation of authorized structures, and a level of increased boating commensurate with the life of authorized structures may cause chemical contamination that could degrade water quality and cause harm to bull trout through physical contact, ingestion, absorption, or chemical reactions. Sources of chemical contamination may include wet concrete, treated wood, and leaks and spills from construction machinery or watercrafts.

Curing concrete can change the pH of water, which can cause a chemical reaction harmful to fish if exposed (D. McLeay & Associates LTD 1983, p. ii). Concrete may be used during the filling of excavated lakebed for pile footings and small waterline intakes, for marine launching rail plank ties, and for mooring buoy anchors, but the proposed action limits this activity to being performed in the dry and no in-water or overwater concrete pouring is authorized under RGP-27. Since all concrete work is performed in the dry, the potential for curing concrete to change the pH of surroundings waters is *discountable.*

Machinery used for construction may introduce contaminants into waterways through leaks and spills of fluids such as fuel, hydraulic fluid, or coolant that may contain polycyclic aromatic hydrocarbons or ethylene glycol, all of which may have lethal or sublethal impacts to salmonids (Neff 1985, pp. 432–433; Verep and Balta 2019, p. 41). Only barge mounted machinery and huwill operate directly within waters. Land based machinery will at times operate below the OHWM but will not enter the water or operate directly within waters other than to place or remove materials via excavator arm extension or other similar devices. The potential risk of an accidental spill of hazardous materials or leakage of a petroleum-based product during performance of a covered activity is small due to conservation measures and IDEQ conditions. These include the following measures: 1) any equipment operating over water will be required to replace hydraulic fluid with vegetable or mineral oil, which is far less toxic to fish and other aquatic organisms, 2) petroleum products and other hazardous materials shall be not be stored or disposed of in a way that will allow them to enter the water, 3) daily inspections must be performed on all fluid systems on construction equipment to be used in or near water to ensure there are no leaks, 4) all machinery must be steam cleaned in an upland location or staging area to remove grease and oil prior to be used in water, 5) machinery must be removed from the vicinity of water prior to refueling, repair, or maintenance, and 6) procedures must be in place to address emergency spills. These measures significantly reduce the likelihood of chemical contamination from the operation of construction machinery and, therefore, effects to bull trout are expected to be *discountable.*

Watercrafts may discharge contaminants such as fuel, coolant, or lubricants into the waterway from leaks and spills that have the same effects to bull trout as those listed in construction machinery above. Unlike machinery used only during construction, watercrafts may release chemical contaminants into aquatic resources multiple times over the life of the structures. Increased boating activity is likely to increase chemical contamination caused by watercrafts. Due to the size of the action area, the Service anticipates minor leaks from watercrafts would diffuse into surrounding waters to concentrations that are unlikely to adversely affect bull trout and therefore, effects would likely be *insignificant.*

Similarly, hydraulic boat lifts are semi-permanent structures that can leak pollutants. The Corps states that, “any hydraulic boat or waterski lifts are required to replace hydraulic fluid with Environmentally Acceptable Lubricants, or to comply with any State water quality standards relative to hydraulic oil, whichever is more stringent” (USACE 2025, entire). There are no regulatory standards for Environmentally Acceptable Lubricants (EALs); however, these products are designed to be biodegradable, exhibit low toxicity to aquatic organisms, and have a low potential for bioaccumulation (Environmental Protection Agency 2011, p. 3). The Service expects leaks from boat and ski lifts to remain small in volume as the function of the equipment would be diminished and boat owners would need to repair any leaks in the hydraulic system of the lift to continue using it. This leaked hydraulic fluid would likely dissipate relatively quickly into the water column, and since it would be biodegradable and have low toxicity to aquatic life, the Service expects effects to bull trout would likely be *insignificant*.

The installation of structures may involve the use of treated wood, which could leach chemical preservatives into the surrounding waters. To minimize the risk of chemical contamination, creosote, pentachlorophenol, chromated copper arsenate, and comparably toxic compounds not approved for freshwater use cannot be used for any portion of the activities covered under RGP-27 (USACE 2024a, p. 95). All pressure-treated wood must be treated in a manner consistent with the pesticide’s EPA-approved labeling and in accordance with standards established by the American Wood Protection Association (see Appendix A: IDL Standards and IDEQ Conditions for more details). According to IDEQ's Guidance for the Use of Wood Preservatives and Preserved Wood Products In or Around Aquatic Environments (Idaho Department of Water Quality 2008, entire), the following preservative chemicals are registered by the U.S. Environmental Protection Agency (EPA) and may be used to pressure-treat wood products that will be used in or around waters of the state: alkaline copper quarternary (ACQ), ammoniacal copper zinc arsenate (ACZA), copper azole (CA-B), chromated copper arsenate (CCA), creosote, copper naphthenate, and pentachlorophenol (Penta). However, as some of these are excluded, the remaining chemicals allowed for use under RGP-27 include ACQ, ACZA, CA-B, and copper naphthenate, which all have the potential to leach chemicals including arsenic, zinc, and copper into the water column either through direct contact with water or from precipitation events.

Of these chemicals, dissolved copper is of most concern to fish because it leaches from treated wood products at rates that can affect aquatic resources (National Oceanic Atmospheric Administration 2009, p. 7). The quantity of dissolved copper released into the environment depends on the type of chemical used, the amount of chemical used to the treat the wood, the quantity of treated wood installed, the amount of wood below and above the water, leaching rates, which BMPs are applied, and water chemistry. Leaching from treated wood has been shown to be highest during the first few weeks after installation and then sharply decreases to low concentrations (National Oceanic Atmospheric Administration 2009, p. 14; Western Wood Preservers Institute et al. 2006, p. 13). In addition to copper released from leaching, concentrations of dissolved copper adjacent to the proposed structures depend on flow/mixing conditions and water quality parameters including temperature pH, and other variables (National Oceanic Atmospheric Administration 2009, p. 14). The Service expects higher concentrations of dissolved copper in parts of the action area with lower flow rates, resulting in localized areas with elevated dissolved copper levels. The elevated concentration of copper would be limited in space, time, and duration because affected areas will be isolated to within the immediate vicinity of the treated wood and the duration of impacts to water quality would primarily be limited to a few weeks post-installation of any treated wood.

Sub-lethal concentrations of dissolved copper have been shown to impair olfactory function in salmonids in freshwater (Tierney et al. 2010, p. 11), which may lead to a reduction in predator avoidance (McIntyre et al. 2012, p. 1468). However, research suggests that salmonids will actively avoid dissolved copper at levels at relatively low levels (under 10 µg/L) above background if their olfactory abilities are not yet impaired, with sensitivity in rainbow trout suggesting a threshold of avoidance as low as 1.2 µg/L (Hansen et al. 1999, pp. 315–317). Within most of the action area, the Service expects that bull trout would be able to detect sub-lethal concentrations of dissolved copper and avoid higher concentrations that could be harmful. However, between Cabinet Gorge dam and the delta with LPO, IDEQ found the Lower Clark Fork River "not supporting" of cold water aquatic life and salmonid spawning due to copper levels (Idaho Department of Environmental Quality 2022, accessed October 2, 2024). Due to elevated baseline copper levels, the avoidance response of bull trout to dissolved copper may not be elicited in the Lower Clark Fork River. However, mean monthly discharge rates for the Lower Clark Fork River on average ranged from 8,370 cubic feet per second (cfs) to 45,800 cfs between 2020 and 2023 (USGS 2024, accessed November 29, 2024). Given the higher flow rate in this area, the Service expects that the elevated copper leaching in the first few weeks of installation of treated wood would more rapidly be carried away from the immediate vicinity of the structure, reducing copper levels to sub-lethal concentrations.

The Service expects the effects to bull trout to be restricted to behavioral responses, mainly the avoidance of waters around structures made with treated wood in which elevated, sub-lethal levels of dissolved copper may be present. Bull trout exposure to elevated dissolved copper concentration is anticipated to be short-term due to avoidance behaviors and focused in the areas immediately adjacent to structures built with treated wood. Since the Service does not expect these exposures to measurably disrupt their normal behaviors, effects associated with minor impacts to water quality with the use of treated wood are considered *insignificant*.

Prey Resources

Prey resources such as forage fish and invertebrates may be exposed to chemical contamination. As mentioned above, chemical contamination from increased boating and from use of treated wood are likely to occur. Given the water volume of the action area, chemical contaminants associated with increased boating are expected to diffuse into surrounding waters to concentrations that are unlikely to have a measurable impact on most aquatic life forms and are not expected to measurably impact prey resources. Chemical contamination from treated wood is expected to be localized to structures made of treated wood and concentrations that could adversely impact prey resources are expected to last for a few weeks until leaching rates are reduced. Since higher concentrations of copper will be localized and limited to a few weeks, the Service does not anticipate measurable impact to prey resources from treated wood use.

4.3.10 Summary of Effects

The proposed action may cause increased turbidity and suspended sediment, noise and disturbance, percussive damage, loss of benthic habitat, loss of riparian and shoreline habitat, reduced water volume, entrainment and impingement, changes in predation, reduced littoral productivity, and chemical contamination. Construction activities and increased boating traffic are anticipated to mobilize sediment and increase turbidity levels; however, implementation of IDEQ water quality conditions (Appendix A: IDL Standards and IDEQ Conditions and existing boating regulations are expected to mitigate these effects, resulting in insignificant effects to bull trout. Noise and disturbance created by construction near or in water, operation of heavy machinery (e.g. excavators), and motorized boating may temporarily displace bull trout and disrupt their feeding behavior, but these effects are anticipated to be insignificant due to noise levels remaining below harmful thresholds or being indistinguishable from baseline boating activities.

The proposed action involves vibratory and impact pile driving and while vibratory pile driving is anticipated to have minimal behavioral effects on bull trout, impact pile driving is expected to result in harmful pressure waves that are likely to adversely affect bull trout within a 109-foot radius based on a daily limit of 16 piles per day with up to 12 strikes per pile.

Structures built under RGP-27 may result in localized benthic habitat loss, primarily affecting bull trout through temporary reductions in foraging opportunities due to decreased benthic invertebrate populations; however, the overall impact is expected to be insignificant, as the area affected is small compared to the action area's total benthic habitat and invertebrates are anticipated to quickly recover. Similarly, authorized structures may lead to temporary and the semi-permanent loss of riparian and shoreline vegetation; however, these impacts are expected to be insignificant due to conservation measures that require revegetation and the relatively small area of shoreline that will be semi-permanently occupied by structures.

The installation of small waterline intakes under the proposed action is expected to result in minimal water withdrawals that are unlikely to measurably impact water levels in the action area or affect bull trout, as water volume is primarily controlled by Albeni Falls Dam operations. Operation of small diameter water lines may result in entrainment or impingement, but NMFS fish screen criteria would effectively prevent entrainment of bull trout. While adults and sub-adults are expected to have adequate swimming capacity to prevent impingement, age-0 bull trout emigrating into LPO directly from SR streams are likely to be adversely affected where exclusion buffers do not exist.

Shading provided by overwater structures may reduce littoral productivity and impact fish assemblages by providing habitat ideal for some predatory fish. The small amount of shading relative to the size of the action area is unlikely to significantly impact littoral productivity within the action area or significantly change fish populations. While shading has the potential to impact predator-prey dynamics among fish species, the only predatory fish species found in greater relative abundance near overwater structures studies in LPO were smallmouth bass, and due to the weak predator-prey relationship between smallmouth bass and bull trout within this system, the Service does not anticipate a measurable increase in the rate of predation of bull trout.

Construction activities and the installation of authorized structures under RGP-27 may introduce chemical contaminants that could degrade water quality and harm bull trout through physical contact or ingestion; however, the implementation of conservation measures greatly reduces the likelihood of significant chemical pollution from sources like wet concrete, construction machinery, and treated wood. While there may be temporary localized increases in contaminants such as dissolved copper from treated wood leaching, these effects are expected to be short-term and insufficient to measurably impact bull trout or their prey resources.

The proposed action is likely to result in adverse effects to bull trout through percussive damage from impact pile driving of steel piles and through impingement of age-0 bull trout at the mouth of North Gold Creek. The maximum area occupied by all structures authorized under the 500 permits proposed is small compared to the size of the action area and habitat changes associated with the action will be minimal. Harm from impact pile driving would be limited to a relatively small radius and, given the relative abundance of bull trout within the action area, relatively few bull trout are likely to be affected by each permitted action. Age-0 bull trout show limited survival ability in LPO, so impingement of juveniles near the mouth of a single SR stream is not expected to have an impact at the population level. Other effects not related to percussive damage or impingement are expected to be discountable or insignificant to bull trout. While adverse effects are likely to result in harm to some individual bull trout within the action area, the proposed action is unlikely to significantly affect subpopulation indicators at the watershed or Recovery Unit scales.

4.4 Cumulative Effects

The implementing regulations for section 7 define cumulative effects to include the effects of future State or private activities that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

As the human population in Idaho continues to grow, increased development and recreation is likely to occur. Road construction, loss of native vegetation, habitat fragmentation, removal of large woody debris along the shoreline, timber removal, increased inputs of nitrogen and phosphorous, and increased exposure to chemical contamination are likely to result in further habitat degradation and reduced water quality. Together, these impacts are likely to diminish the potential for recovery of bull trout within the action area.

Some state and private actions, however, may benefit bull trout and their habitat in the action area and contribute to their recovery. Educational programs, such as the IDFG's WaterLife Discovery Center, can help educate residents on local ecosystems and how to conserve them. Other state management actions include the IDFG regularly stocking LPO with kokanee salmon and conducting a predator control program for lake trout. Large numbers of kokanee provide quality forage for bull trout and other apex predatory fish, which may influence competition and predation amongst these species. The removal of lake trout and other non-native apex predatory fish reduces competition for prey and may reduce direct predation of bull trout. In addition, multiple entities cooperate on habitat improvement projects, such as the removal of invasive aquatic plants like Eurasian watermilfoil and flowering rush, which are shown to adversely impact benthic habitat and native riparian and aquatic plants.

The LPO basin is a large, complicated ecosystem with a diverse array of species and a high degree of habitat heterogeneity. Continued research and data collection from state, academic, and volunteer groups within the action area will likely continue to provide valuable information that could contribute to our ecological knowledge of the action area and be used to further recovery efforts for bull trout.

4.5 Conclusion

After reviewing the current status of bull trout, the environmental baseline in the action area, effects of the proposed action, and cumulative effects, it is the Service's biological opinion that the proposed action is not likely to jeopardize the continued existence of bull trout. The Service's rationale for this conclusion is presented below.

Structures authorized under RGP-27 have a relatively small footprint and the issuance of 500 permits would result in less than one percent of shoreline habitat being semi-permanently altered. This includes up to 0.02 percent of overwater shading relative to total surface area, up to 0.07 percent of overwater shading occurring in the littoral zone, and up to 0.03 percent of benthic habitats being altered. Some habitat changes are expected to be long term; however, sufficient suitable habitat exists within the action area that the Service does not expect measurable impacts to bull trout populations as a result of habitat alterations analyzed within this Opinion.

The proposed action is likely to adversely affect bull trout through impact pile driving and the operation of small waterline intakes within North Gold Creek or within 100 yards of either side of the mouth of North Gold Creek. Given the size of the action area and the relative abundance of bull trout present, the Service does not anticipate that high densities of bull trout would be exposed to impact pile driving in localized permitted sites. Operation of small waterline intakes in North Gold Creek or within 100 yards of either side of the mouth of North Gold Creek could impinge age-0 bull trout, which have been found to emigrate out of SR streams directly into LPO and, therefore, effects are expected to be geographically isolated to a specific age group. Overall, effects to bull trout from the proposed action are likely to be negligible on the population scale within the Lake Pend Oreille Core Area and the Columbia Headwaters Recovery Unit.

4.6 Incidental Take Statement

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened fish and wildlife species, respectively, without specific exemption. Take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct." Harm is defined by the Service as an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering" (50 CFR 17.3).

Incidental take is defined as take "that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant" (50 CFR 402.02). Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of an Incidental Take Statement.

4.6.1 Form and Amount or Extent of Take Anticipated

Projects authorized under RGP-27 will take place beside and within aquatic habitats that are reasonably certain to be occupied by bull trout. Take is anticipated to occur as a result of impact pile driving of steel piles and through the operation of small waterline intakes within North Gold Creek or within 100 yards of either side of the mouth of North Gold Creek.

The Service anticipates incidental take of bull trout will be difficult to detect for one or more of the following reasons:

1. Bull trout are wide-ranging within suitable habitat in the action area and are difficult to detect.
2. Changes in bull trout numbers in the action area are often difficult to quantify due to natural, seasonal fluctuations in bull trout numbers due to migration.
3. Mortality resulting from the proposed action may be delayed.
4. Documenting dead or injured bull trout is unlikely.

However, pursuant to 50 CFR 402.14(i)(1)(i), a surrogate can be used to express the anticipated level of take in an Incidental Take Statement, provided three criteria are met: (1) measuring take impacts to a listed species is not practical; (2) a link is established between the effects of the action on the surrogate and take of the listed species; and (3) a clear standard is set for determining when the level of anticipated take based on the surrogate has been exceeded.
The following presents the Service's analysis and findings with respect to the three regulatory criteria for use of a surrogate in this Incidental Take Statement to express the anticipated level of take likely to be caused by the proposed action.

A coextensive surrogate based on specific project components is necessary to express the extent of take of bull trout because it is not practical to monitor take in terms of individual bull trout due to the extremely low likelihood of finding dead or injured individuals due to the large geographic extent of the action area.

The coextensive surrogate is the direct source of the stressors causing the taking, and a clear standard for take exceedance can be established under the monitoring requirements (below) using this surrogate. On that basis, the extent of take of bull trout addressed in this Incidental Take Statement is categorized below by project components and described using a coextensive surrogate.

The Service anticipates the following forms and amounts of take of bull trout as a result of the proposed action on average per year for a duration of five years beginning the date this biological opinion is signed:

1. Take in the form of harm of juvenile, sub-adult, and adult bull trout from exposure to impact pile driving of up to 5,840 steel piles 10 inches or less in diameter. Injury is reasonably certain to occur to bull trout ≤2 and >2 grams located within 109 and 59 feet of impact pile driving, respectively.

2. Take in the form of harm of age-0 bull trout from impingement on three small waterline intakes installed in North Gold Creek or within 100 yards of either side of the mouth of North Gold Creek.

4.6.2 Effect of the Take

The Service determined that the level of anticipated take is not likely to jeopardize the continued existence of the bull trout across its range.

The action area primarily serves as feeding, migrating, rearing, and overwintering habitat for bull trout. These functions are expected to continue, but harmful sound exposure from impact pile driving is likely to result in bull trout injury or mortality and impingement on small waterline intakes in North Gold Creek or on 100 yards of either side of the mouth of North Gold Creek is likely to result in injury or mortality to age-0 bull trout. Since population level effects are not expected, the effects of activities implemented under RGP-27 are unlikely to change subpopulation indicators of bull trout at the watershed or Recovery Unit scales.

4.6.3 Reasonable and Prudent Measures

The Service finds that compliance with the proposed action outlined in the Assessment, including proposed conservation measures, is essential to minimizing the impacts of incidental take of bull trout. If the proposed action, including conservation measures, is not implemented as described in the Assessment and this Opinion, there may be effects of the action that were not considered in this Opinion and reinitiation of consultation may be warranted.

The Service also finds that the following reasonable and prudent measures are necessary and appropriate to minimize the impact of the take of bull trout reasonably certain to be caused by the proposed action.

1. Minimize incidental take from construction and installation of authorized structures.
2. Monitor the amount and extent of incidental take of bull trout resulting from exposure to impact pile driving and proofing.
3. Minimize incidental take from small waterline intakes.

4.6.4 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Corps must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

1. To implement RPM #1, the Corps shall:
   a. Confine construction impacts to the minimum area necessary to complete each activity.
   b. Ensure in-water work is kept at a minimum and performed only when necessary.
   c. Limit all construction activities to occur only between sunrise and sunset to reduce the potential for disturbance to migrating bull trout.
   d. Only permit treated wood if it is treated with alkaline copper quaternary (ACQ), ammoniacal copper zinc arsenate (ACZA), copper azole (CA-B), or copper naphthenate. Wood treated with chromated copper arsenate (CCA), creosote, or pentachlorophenol (Penta) is not covered under this Opinion.
   e. Inform applicant to adhere to IDL standards and IDEQ Conditions listed in Appendix A.
   f. Require treated wood in the Lower Clark Fork River to be sealed with an inert wrapping or coating (such as industrial-grade plastic wrapping, fiberglass wrapping, polyurea coating, or epoxy coating) to encapsulate the treated wood and minimize leaching of preservatives since copper contamination is elevated in this area.

2. To implement RPM #2, the Corps shall:
   a. Ensure that annual monitoring reports include the total number of steel piles installed per year using impact pile driving or impact pile proofing.
   b. Inform the applicant to notify the Service within three working days upon locating a dead, injured, or sick endangered or threatened species specimen. Initial notification must be made to the nearest U.S. Fish and Wildlife Service Law Enforcement Office. Notification must include the date, time, precise location of the injured animal or carcass, and any other pertinent information. Care should be taken in handling sick or injured specimens to preserve biological materials in the best possible state for later analysis of cause of death, if that occurs. In conjunction with the care of sick or injured endangered or threatened species or preservation of biological materials from a dead animal, the finder has the responsibility to ensure that evidence associated with the specimen is not unnecessarily disturbed. Contact the resident agent-in-charge at the U.S. Fish and Wildlife Service Law Enforcement Office at (425) 883-8122, or the Service's Coeur d’Alene Idaho Fish and Wildlife Office at (218) 918-2155.

3. To implement RPM #3, the Corps shall:
   a. Provide North Gold Creek with the same conservation measures as other excluded streams (Gold Creek, West Gold Creek, Granite Creek, Trestle Creek, Lightning Creek, Strong Creek, and Priest River) as listed in 2.1 Action Area.

4.6.5 Reporting and Monitoring Requirement

In order to monitor the impacts of incidental take, the Federal agency or any applicant must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement per 50 CFR 402.14 (i)(3).

The Corps shall submit the tracking and monitoring reports found in Appendix C: Monitoring and Tracking Reports, to the Service on an annual basis no later than January 31 of the subsequent year for a period of five years. In addition, the Corps will include a summary document that discusses any compliance or enforcement issues associated with RGP-27, how these issues were resolved, and any proposal for revisions to the consultation.

5. Conservation Recommendations

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery programs, or to develop new information on listed species.

1. Limit the use of in-water pile driving to only when necessary.
2. Limit the use of treated wood to only when necessary.
3. Seal treated wood that will be in direct contact with water with an inert wrapping or coating (such as industrial-grade plastic wrapping, fiberglass wrapping, polyurea coating, or epoxy coating) such that treated wood will not leach toxic chemicals into surrounding waters. The wrapping or coating should extend from below the waterline to above the high-water level, be monitored periodically throughout the life of the structure, and be replaced if it begins to deteriorate.
4. Apply a coating (such as a semitransparent penetrating stain or a durable epoxy sealer) to treated wood decking used in overwater structures to reduce leaching associated with precipitation events. Maintenance and reapplication of the coating should follow BMPs to minimize the risk of chemical contamination.
5. Revegetate upland disturbed areas with native, locally adapted plants in lieu of using ornamental vegetation.
6. Revegetate riparian and shoreline areas with native riparian vegetation to reduce sediment mobilization and minimize habitat alteration.
7. During revegetation, limit the use of fertilizers and pesticides on upland vegetation where precipitation run-off could flow into the action area to protect water quality.

8. Install light penetrative decking with at least 60 percent open area on grating or greater than 90 percent light transmittance for clear translucent material (as rated by the manufacturer) to minimize shading effects on the aquatic habitat.
9. Assist the Service in assessing bull trout interactions with structures authorized by RGP-27.
10. Prevent invasion, facilitate control, and cooperate with others to manage invasive, nonnative species like flowering rush (*Butomus umbellatus*), Eurasian watermilfoil (*Myriophyllum spicatum*), hybrid milfoil (hybrid between Eurasian and northern milfoil (*Myriophyllum sibiricum*)), Asian clams (*Corbicula fluminea*), quagga mussels (*Dreissena bugensis*), and zebra mussels (*Dreissena polymorpha*) within and beyond the action area. For additional guidance on invasive species management, see 5.1 below.

5.1 Best Management Practices for Invasive Species Management

The best management practices for invasive species listed below supplement any applicable laws and regulations for invasive species control, including state watercraft inspection requirements.

5.1.1 Use Local, Low-risk Sources of Materials

1. Locally-sourced materials typically do not present invasive species risks that are not already found within the action area. Plants, seeds, and bulbs necessary for habitat restoration or other purposes should be from sources certified as weed-free or otherwise evaluated to ensure that they are not harboring invasive species. Nurseries providing materials should be using best management practices to validate that plants are labeled correctly and are not infested by disease or pests.
2. Soil, rocks, gravel, mulch, and other fill material for habitat restoration, road construction, or other purposes should be from sources that have been inspected (and treated, as warranted) for the presence of invasive species prior to transport.
3. Water transported for fire management, vegetation irrigation, or other purposes should come from potable sources and/or water bodies not known to harbor invasive species.
4. Logs, branches, dimensional lumber, and other woody material for habitat restoration or other purposes should be locally sourced to the extent practical, inspected, and treated (as appropriate to intended use) to minimize infestation by invasive species, including wood-boring insects.

5.1.2 Reduce Exposure

1. Field work within sites with existing invasive species should be planned to avoid routes of transit through areas of heavy invasive species density, and to work in invaded portions and/or downstream areas last to avoid introduction into uninvaded portions.

2. Activity should be timed when feasible to avoid exposure to reproductive stages of invasive species (e.g., seasons when seed production is prevalent).
3. Vehicles should be parked on pavement, gravel, or other sites that are away from vegetation; or in designated parking areas that help contain the spread of invasive species.

5.1.3 Inspect and Decontaminate Vehicles, Gear, Materials and Equipment

1. Prior to arrival at a new field site, all vehicles, equipment, gear, and materials imported from outside of the watershed should be thoroughly cleaned to remove all visible plants and animals (even if they appear dead), mud, and other material. Where possible, particularly for water-based equipment, a hot water pressure washer should be used to apply constant exposure at a minimum of 140°F (60°C) and minimal pressure of 90 pounds/square inch (PSI) for a minimum of 15 seconds on hard/nonporous surfaces. Alternatively, or as extra protection, a brush with a combination of soft and stiff bristles should be used to remove unwanted material, paying special attention to crevices and other surface features (e.g., carpeting, Velcro, felt soles) more likely to accumulate debris or harbor invasive species.

6. REINITIATION NOTICE

This concludes formal consultation on the *Regional General Permit 27 for Lake Pend Oreille and Pend Oreille River*. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if:

1. The amount or extent of incidental take is exceeded.
2. New information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion.
3. The agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this Opinion. *Note: The IDL standards and IDEQ conditions listed in Appendix A are inherently linked to the proposed action, and changes to the standards and conditions listed in Appendix A could cause effects to bull trout and would be considered a change in the proposed action.*
4. A new species is listed or critical habitat designated that may be affected by the action.

7. LITERATURE CITED

7.1 Published Literature

Acres.com. 2024. Acres. Available at: acres.com (Accessed December 27, 2024).

Adams, S. 1994. Bull trout distribution and habitat use in the Weiser River drainage, Idaho. M.S. Thesis. University of Idaho, Moscow, Idaho. 96 pp.

Ardren, W.R., P.W. DeHaan, C.T. Smith, E.B. Taylor, R. Leary, C.C. Kozfkay, L. Godfrey, M. Diggs, W. Fredenberg, J. Chan, C.W. Kilpatrick, M.P. Small, and D.K. Hawkins. 2011. Genetic structure, evolutionary history, and conservation units of bull trout in the coterminous United States. Transactions of the American Fisheries Society 140: 506–525.

Avista. 2023. Avista 2023 annual report: the Clark Fork project FERC project no. 2058. 2023 Annual Report Avista Corp., 99 pp.

Barlett, M., and G. Wilson. 2002. Characteristics of small boat acoustic signatures. Journal of The Acoustical Society of America - J ACOUST SOC AMER 112: 2221–2221.

Barrows, M.G., Davis, B., Bailey, E., Koski, M. L., and Starcevich, S. 2017. Clackamas River bull trout reintroduction project. 2016 Annual Report U.S. Fish and Wildlife Service and the Oregon Department of Fish and Wildlife, 66 pp.

Barton, G.J., and A.M. Dux. 2013. Bathymetry, morphology, and lakebed geologic characteristics of potential kokanee salmon spawning habitat in Lake Pend Oreille, Bayview, and Lakeview quadrangles, Idaho.

Bassista, T.P., M.A. Maiolie, and M.A. Duclos. 2003. Lake pend oreille predation research. Annual Report Idaho Department of Fish and Game, Boise, Idaho. 42 pp.

Baxter, C.V. 2002. Fish Movement and Assemblage Dynamics in a Pacific Northwest Riverscape. PhD Dissertation. Oregon State University, Corvallis, Oregon. 188 pp.

Beauchamp, D.A., and J.J. Van Tassell. 2001. Modeling seasonal trophic interactions of adfluvial bull trout in Lake Billy Chinook, Oregon. Transactions of the American Fisheries Society 130: 204–216.

Bellgraph, B., R. Harnish, L. Ortega, M. Paluch, D. Sontag, A. Scholz, and A. Black. 2012. Evaluation of Fish Assemblages and Piscivore Diets in Developed and Undeveloped Littoral Areas of Lake Pend Oreille. Batelle, Richland, Washington. 118 pp.

Bilkovic, D.M., M.M. Mitchell, J. Davis, J. Herman, E. Andrews, A. King, P. Mason, N. Tahvildari, J. Davis, and R.L. Dixon. 2019. Defining boat wake impacts on shoreline stability toward management and policy solutions. Ocean & Coastal Management 182: 104945.

Birdsall, B.D., and A.L. Ransom. 2023. Lake Pend Oreille nearshore index netting 2015-2022. Idah Department of Fish and Game, Boise, Idaho.

Boag, T.D. 1987. Food habits of bull char, *Salvelinus confluentus*, and rainbow trout *Salmo gairdneri*, coexisting in a foothils stream in northern Alberta. Canadian Field-Naturalist 10: 56–62.

Bond, C.E. 1992. Notes on the nomenclature and distribution of the bull trout and the effects of human activity on the species. Pages 1–4 *in* Proceedings of the Gearhart Mountain Bull Trout Workshop. Oregon Chapter of the American Fisheries Society. Corvallis, Oregon.

Bonneau, J.L., and D.L. Scarnecchia. 1996. Distribution of juvenile bull trout in a thermal gradient of a plunge pool in Granite Creek, Idaho. Transactions of the American Fisheries Society 125: 628–630.

Bonner County Idaho. Waterways. Available at: https://www.bonnercountyid.gov/waterways (Accessed October 3, 2024).

Bonner County Planning Department. 2023. Bonner County comprehensive plan. Sandpoint, Idaho. 14 pp.

Bouwens, K.A., and R. Jakubowski. 2017. Idaho Tributary Habitat Acquisition and Enhancement Program, Appendix A. Idaho Fish and Game, 42 pp.

Brenkman, S.J., and S.C. Corbett. 2005. Extent of anadromy in bull trout and implications for conservation of a threatened species. North American Journal of Fisheries Management 25: 1073–1081.

Brewin, P.A., and M.K. Brewin. 1997. Distribution maps for bull trout in Alberta. Pages 206–216 *in* Proceedings of the Friends of the Bull Trout Conference.

Buchanan, D.M., and S.V. Gregory. 1997. Development of water temperature standards to protect and restore habitat for bull trout and other colder water species in Oregon. Pages 1–8 *in* Proceedings of the Friends of the Bull Trout Conference.

Burkey, T.V. 1989. Extinction in nature reserves: the effect of fragmentation and the importance of migration between reserve fragments. Oikos 55: 75–81.

California Department of Transportation. 2020. Technical Guidance for the Assessment of the Hydroacoustic Effects of Pile Driving on Fish. 533 pp.

Carlson, T.J., G. Ploskey, R.L. Johnson, R.P. Mueller, M.A. Weiland, Pacific Northwest National Laboratory, P.N. Johnson, and AScI Corporation. 2001. Observations of the behavior and distribution of fish in relation to the columbia river navigation channel and channel maintenance activities. PNNL-12595. Pacific Northwest National Laboratory, Richland, Washington. 114 pp.

Carrasquero, J. 2001. Over-water structures: freshwater issues. White Paper submitted to Washington Department of Fish and Wildlife, Washington Department of Ecology, Washington Department of Transportation, 129 pp.

Cavender, T.M. 1978. Taxonomy and distribution of the bull trout, *Salvelinus confluentus* (Suckley), from the American Northwest. California Fish and Game 64: 139–174.

Costello, A.B., T.E. Down, S.M. Pollard, C.J. Pacas, and E.B. Taylor. 2003. The influence of history and contemporary stream hydrology on the evolution of genetic diversity within species: an examination of microsatellite DNA variation in bull trout, *Salvelinus confluentus* (Pisces: Salmonidae). Evolution 57: 328–344.

D. McLeay & Associates LTD. 1983. Toxicity of Portland Cement to Salmonid Fish.

De Robertis, A., and N.O. Handegard. 2013. Fish avoidance of research vessels and the efficacy of noise-reduced vessels: a review. ICES Journal of Marine Science 70: 34–45.

DeHaan, P., and L. Godfrey. 2009. Bull trout population genetic structure and entrainment in Warm Springs Creek, Montana. final. U. S. Fish and Wildlife Service, Abernathy Fish Technology Center, Longview, Washington. 32 pp.

DeHaan, P., and J. Neibauer. 2012. Analysis of genetic variation within and among Upper Columbia River bull trout populations. Final Report Abernathy Fish Technology Center, Conservation Genetics Program, Longview, Washington. 36 pp.

Donald, D.B., and D.J. Alger. 1993. Geographic distribution, species displacement, and niche and bull trout in mountain lakes. Canadian Journal of Zoology 71: 238–247.

Downs, C.C., D. Horan, E. Morgan-Harris, and R. Jakubowski. 2006. Spawning demographics and juvenile dispersal of an adfluvial bull trout population in Trestle Creek, Idaho. North American Journal of Fisheries Management 26: 190–200.

Dunham, J.B., B. Rieman, and G. Chandler. 2003. Influences of temperature and environmental variables on the distribution of bull trout within streams at the southern margin of its range. North American Journal of Fisheries Management 23: 894–904.

Dunham, J.B., and B.E. Rieman. 1999. Metapopulation structure of bull trout: influences of physical, biotic, and geometrical landscape characteristics. Ecological Applications 9: 642–655.

Dupont, J.J., R.S. Brown, and D.R. Geist. 2007. Unique allucustrine migration patterns of a bull trout population in the Pend Oreille River drainage, Idaho. North American Journal of Fisheries Management 27: 1268–1275.

Dux, A.M., M.J. Hansen, M.P. Corsi, N.C. Wahl, J.P. Fredericks, C.E. Corsi, D.J. Schill, and N.J. Horner. 2019. Effectiveness of lake trout (*Salvelinus namaycush*) suppression in Lake Pend Oreille, Idaho: 2006–2016. Hydrobiologia 840: 319–333.

Environmental Protection Agency. 2011. Environmentally acceptable lubricants. EPA 800-R-11-002. Environmental Protection Agency, Office of Wastewater Management, Washington D.C., USA. 27 pp.

Federal Highway Administration. 2006. FHWS Highway Construction Noise Handbook. Final Report FHWA-HEP-06-015. Federal Highway Administration, 185 pp.

Fraley, J.J., and B.B. Shepard. 1989. Life history, ecology and population status of migratory bull trout (*Salvelinus confluentus*) In the Flathead Lake and River system, Montana. Montana Northwest Science 63: 133–143.

Fredenberg, W. 2002. Further evidence that lake trout displace bull trout in mountain lakes. Intermountain Journal of Sciences 8: 143–152.

Fredenberg, W., P. DeHaan, and W. Ardren. 2007. Genetic analysis and photo documentation of hybridization between bull trout and brook trout in the Swan River Basin, Montana. 34 pp.

Frissell, C.A. 1999. An ecosystem approach to habitat conservation for bull trout: groundwater and surface water protection. Number 156-99 Open File Report. Flathead Lake Biological Station, The University of Montana, Polson, Montana. 46 pp.

Fritts, A.L., and T.N. Pearsons. 2006. Effects of Predation by Nonnative Smallmouth Bass on Native Salmonid Prey: The Role of Predator and Prey Size. Transactions of the American Fisheries Society 135: 853–860.

Getsinger, K.D., and J.D. Madsen. 2021. Drawdown herbicide applications for control of flowering rush on dewatered littoral sites. J. Aquat. Plant Manage. 59: 85–89.

Goetz, F. 1989. Biology of the bull trout, *Salvelinus confluentus*, a literature review. February. Willamette National Forest, 53 pp.

Goetz, F., E. Jeanes, and E. Beamer. 2004. Bull trout in the nearshore. Preliminary draft (June) U. S. Army Corps of Engineers, Seattle, Washington, 396 pp.

Graham, A.L., and S.J. Cooke. 2008. The effects of noise disturbance from various recreational boating activities common to inland waters on the cardiac physiology of a freshwater fish, the largemouth bass (*Micropterus salmoides*). Aquatic Conservation: Marine and Freshwater Ecosystems 18: 1315–1324.

Gregory, R.S., and T.G. Northcote. 1993. Surface, planktonic, and benthic foraging by juvenile Chinook salmon (*Oncorhynchus tsawytscha*) in turbid laboratory conditions. Can. J. Fish. Aquat. Sci. 50: 233–240.

Gregory, S.V. 1983. Plant-herbivore interactions in stream systems. In: J.R. Barnes, and G.W. Minshall, eds. Stream ecology application and testing of general ecological theory. 157.

Haas, G.R., and J.D. McPhail. 2001. The post-Wisconsinan glacial biogeography of bull trout (*Salvelinus confluentus*): a multivariate morphometric approach for conservtion biology and management. Can. J. Fish. Aquat. Sci 58: 2189–2203.

Hansen, A., M. Polacek, K. Connelly, J. Gardner, and D. Beauchamp. 2017. Food web interactions in Kachess and Keechelus Reservoirs, Washington: implications for threatened adfluvial bull trout and management of water storage.

Hansen, J.A., D.F. Woodward, E.E. Little, A.J. DeLonay, and H.L. Bergman. 1999. Behavioral avoidance: Possible mechanism for explaining abundanc and distribution of trout species in a metal-impacted river. Environmental Toxicology and Chemistry 18: 313–317.

Hastings, M.C., and A. Popper N. 2005. Effects of sound on fish. No. CA05-0537. California Department of Transportation, Sacramento, California. 85 pp.

Hoelscher, B., and T.C. Bjornn. 1989. Habitat, density and potential production of trout and charr in Pend Oreille Lake tributaries. Project F-71-R-10, Subproject III, Job 8. Idaho Department of Fish and Game, Boise, Idaho, 67 pp. pp.

Howell, P.J., J.B. Dunham, and P.M. Sankovich. 2010. Relationships between water temperatures and upstream migration, cold water refuge use, and spawning of adult bull trout from the Lostine River, Oregon, USA. Ecology of Freshwater Fish 19: 96–106.

Idaho Conservation League. 2024. Water Quality Monitoring Program. Available at: https://www.idahoconservation.org/our-work/lakes-program/water-quality-monitoring-program/ (Accessed October 2, 2024).

Idaho Department of Environmental Quality. 2019. Re: Final 401 Water Quality Certification for reissuance of Regional General Permit 27 (RGP-27).

Idaho Department of Environmental Quality. 2022. Final 2022 §305(b) integrated report map. Available at: https://mapcase.deq.idaho.gov/wq2022/ (Accessed October 2, 2024).

Idaho Department of Environmental Quality. IDAPA 58 – Department of Environmental Quality Surface and Wastewater Division 58.01.02 – Water quality standards. Idaho Department of Environmental Quality, 187 pp.

Idaho Department of Fish and Game. Lake Pend Oreille. Available at: https://idfg.idaho.gov/ifwis/fishingplanner/water/1163468481594 (Accessed October 2, 2024).

Idaho Department of Lands. 2024. IDAPA 20 – Idaho Department of Lands Resource Protection and Assistance Bureau 20.03.04 – Rules for the regulation of beds, waters, and airspace over navigable lakes in the state of Idaho. Idaho Department of Lands, 21 pp.

Idaho Department of Water Quality. 2008. Guidance for the use of wood preservatives and preserved wood products in or around aquatic environments. Idaho Department of Water Quality, 3 pp.

Isaak, D.J., E.E. Peterson, J.M. Ver Hoef, S.J. Wenger, J.A. Falke, C.E. Torgersen, C. Sowder, E.A. Steel, M.-J. Fortin, C.E. Jordan, A.S. Ruesch, N. Som, and P. Monestiez. 2014. Applications of spatial statistical network models to stream data. WIREs Water 1: 277–294.

Isaak, D.J., M.K. Young, D.E. Nagel, D.L. Horan, and M.C. Groce. 2015. The cold-water climate shield: delineating refugia for preserving salmonid fishes through the 21st century. Global Change Biology 21: 2540–2553.

Jakubowski, R., B. Birdsall, and K.A. Bouwens. 2024. Pend Oreille Basin Bull Trout Redd Monitoring 2023 Annual Project Update. Idaho Department of Fish and Game, Boise 42.

Koopman, M.E., R.S. Nauman, B.R. Barr, S.J. Vynne, and G.R. Hamilton. 2009. Projected future conditions in the Klamath basin of southern Oregon and northern California. National Center for Conservation Science and Policy, Ashland, Oregon. 30 pp.

Kootenai County Idaho. Boating Rules and Regulations. Available at: https://www.kcgov.us/448/Boating-Rules-Regulations (Accessed October 3, 2024).

Kovach, R.P., R. Al-Chokhachy, D.C. Whited, D.A. Schmetterling, A.M. Dux, and C.C. Muhlfeld. 2017. Climate, invasive species and land use drive population dynamics of a cold-water specialist A. Strecker [ed.]. Journal of Applied Ecology 54: 638–647.

Leary, R.F., and F.W. Allendorf. 1997. Genetic confirmation of sympatric bull trout and Dolly Varden in Western Washington. Transactions of the American Fisheries Society 126: 715–720.

Leathe, S.A., and P.J. Graham. 1982. Flathead Lake fish food habits study. Contract R008224-01-4. Environmental Protection Agency, Region VIII, Water Division, Denver, Colorado. 209 pp.

Lehman, B.M., M.P. Gary, N. Demetras, and C.J. Michel. 2019. Where Predators and Prey Meet: Anthropogenic Contact Points Between Fishes in a Freshwater Estuary. San Francisco Estuary and Watershed Science 17.

Lloyd, D.S. 1987. Turbidity as a water quality standard for salmonid habitats in Alaska. North American Journal of Fisheries Management 7: 34–45.

Madsen, J.D., and R.M. Wersal. 2008. Assessment of Eurasian watermilfoil (*Myriophyllum spicatum L.*) populations in Lake Pend Oreille, Idaho for 2007. GeoResources Institute 5028. Mississippi State University, Mississippi State, Mississippi. 116 pp.

Madsen, J.D., R.M. Wersal, and T.E. Woolf. 2015. Operational Control of Eurasian Watermilfoil (*Myriophyllum spicatum*) and Impacts to the Native Submersed Aquatic Macrophyte Community in Lake Pend Oreille, Idaho. Invasive plant sci. manag. 8: 219–232.

McCubbins, J.L. 2013. Population dynamics of bull trout in Lake Pend Oreille, Idaho. Masters. University of Wisconsin - Stevens Point, Stevens Point, Wisconsin, USA. 48 pp.

McIntyre, J.K., D.H. Baldwin, D.A. Beauchamp, and N.L. Scholz. 2012. Low-level copper exposures increase visibility and vulnerability of juvenile coho salmon to cutthroat trout predators. Ecological Applications 22.

McPhail, J.D., and J.S. Baxter. 1996. A review of bull trout (*Salvelinus confluentus*) life-history and habitat use in relation to compensation and improvement opportunities. Fisheries Management Report No. 104. Department of Zoology, University of British Columbia, Vancouver, British Columbia. 36 pp.

Meeuwig, M.H., C.S. Guy, and W.A. Fredenberg. 2008. Influence of landscape characteristics on fish species richness among lakes of Glacier National Park, Montana. Intermountain Journal of Sciences 14: 1–16.

Meffe, G.K., and C.R. Carroll. 1994. Principles of conservation biology. Sinauer Associates, Inc., Sunderland, MA. 600 pp.

Meyer, K.A., E.O. Garton, and D.J. Schill. 2014. Bull Trout Trends in Abundance and Probabilities of Persistence in Idaho. North American Journal of Fisheries Management 34: 202–214.

Montana Bull Trout Scientific Group. 1998. The relationship between land management activities and habitat requirements of bull trout. The Montana Bull Trout Restoration Team, c/o Montana Fish, Wildlife, and Parks, Helena, Montana. 77 pp.

Mote, P., A.K. Snover, S. Capalbo, S.D. Eigenbrode, P. Glick, J. Littell, R. Raymondi, and S. Reeder. 2014. Chapter 21: Northwest. Pages 487–513 *in* J.M. Melillo, T.C. Richmond, and G.W. Yohe [eds.], Climate Change Impacts in the United States: The Third National Climate Assessment. U.S. Global Change Research Program.

Mucciarone, N.G., M.P. Corsi, J.L. McCormick, E. Roche, K.A. Bouwens, and P. Kusnierz. 2022. Demography of Adfluvial Bull Trout in Lake Pend Oreille, Idaho Project Completion Report. Avista Corporation and Idaho Department of Fish and Game, Noxon, Montana and Coeur d'Alene, Idaho.

Muck, J. 2010. Biological effects of sediment on bull trout and their habitat – guidance for evaluating effects. U.S. Fish and Wildlife Service Washington Fish and Wildlife Office, Lacey, Washington. 57 pp.

Mueller, G. 1980. Effects of recreational river traffic on nest defense by longear sunfish. Transactions of the American Fisheries Society 109: 248–251.

Myrick, C.A., F.T. Barrow, J.B. Dunham, B.L. Gamett, G. Haas, J.T. Peterson, B. Rieman, L.A. Weber, and A.V. Zale. 2002. Bull trout temperature thresholds: peer review summary. U.S. Fish and Wildlife Service, Lacey, Washington. 14 pp.

National Marine Fisheries Service. 2023. National Marine Fisheries Service: Summary of Endangered Species Act Acoustic Thresholds (Marine Mammals, Fishes, and Sea Turtles). National Marine Fisheries Service, 10 pp.

National Oceanic Atmospheric Administration. 2009. The use of treated wood products in aquatic environments: guidelines to West Coast NOAA fisheries staff for endangered species act and essential fish habitat consultations in the Alaska, Northwest and Southwest regions. 58.

National Oceanic Atmospheric Administration. Section 7 Effects Analysis: Turbidity in the Greater Atlantic Region. Available at: https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-effects-analysis-turbidity-greater-atlantic-region (Accessed October 3, 2024).

Naylor Systems Inc. Marine Railways. Available at: https://naylorsystems.com/product-category.php?id=10 (Accessed October 3, 2024).

Neff, J.M. 1985. Polycyclic aromatic hydrocarbons. Pages 416–454 *in* G.M. Rand and S.R. Petrocelli [eds.], Fundamentals of aquatic toxicology. Hemisphere Publishing Corp. New York.

Newcombe, C.P., and J.O.T. Jensen. 1996. Channel suspended sediment and fisheries: a synthesis for quantitative assessment of risk and impact. North American Journal of Fisheries Management 16: 693–727.

NMFS. 2022. NOAA Fisheries West Coast Region Anadromous Salmonid Passage Design Manual. National Marine Fisheries Service West Coast Region Environmental Service Branches, Portland, Oregon. 181 pp.

Oregon Department of Environmental Quality. 1995. 1992-1994 water quality standards review: dissolved oxygen. Final Issue Paper Portland, Oregon. 159 pp.

Paluch, M. 2023. Bellgraph supplemental bull trout data.

Poff, N., M. Brinson, and J. Day. 2002. Aquatic ecosystems & global climate change – potential impacts on inland freshwater and coastal wetland ecosystems in the United States. Pew Center for Global Change, 26 pp.

Point Reyes Bird Observatory (PRBO) Conservation Science. 2011. Projected effects of climate change in California: ecoregional summaries emphasizing consequences for wildlife. PRBO Conservation Science, 59 pp.

Popper, A.N. 2008. Effects of Mid- and High-Frequency Sonars on Fish. Contract N66604-07M-6056. Environmental BioAcoustics, LLC, Rockville, Maryland. 52 pp.

Pratt, K.L. 1984. Pend Oreille trout and char life history study. Idaho Department of Fish and Game in cooperation with Lake Pend Oreille Idaho Club, 95 pp.

Pratt, K.L. 1992. A review of bull trout life history. Pages 5–9 *in Oregon Chapter of the American Fisheries Society*. Proceedings of the Gearhart Mountain Bull Trout Workshop. Corvallis, Oregon.

Pratt, K.L., and J.E. Huston. 1993. Status of bull trout (*Salvelinus confluentus*) in Lake Pend Oreille and the Lower Clark Fork River. Draft Washington Water Power Company, Spokane, Washington. 200 pp.

PTAGIS PIT Tag Information System (PTAGIS). 2015. Queries/reports for PIT tagged bull trout. Movements observed between core areas.

Ratliff, D.E., and P.J. Howell. 1992. The status of bull trout populations in Oregon. Pages 10–17 *in* Proceedings of the Gearhart Mountain Bull Trout Workshop. Oregon Chapter of the American Fisheries Society. Corvallis, Oregon.

Rich Jr., C.F. 1996. Influence of abiotic and biotic factors on occurrence of resident bull trout in fragmented habitats, western Montana. PhD Thesis.

Rieman, B.E., and J. Clayton. 1997. Wildfire and native fish: issues of forest health and conservation of sensitive species. Fisheries 22: 6–15.

Rieman, B.E., and J.B. Dunham. 2000. Metapopulations and salmonids: a synthesis of life history patterns and empirical observations. Ecology of Freshwater Fish 9: 51–64.

Rieman, B.E., D. Isaak, S. Adams, D. Horan, D. Nagel, C. Luce, and D. Myers. 2007. Anticipated climate warming effects on bull trout habitats and populations across the interior Columbia River Basin. Transactions of the American Fisheries Society 136: 1552–1565.

Rieman, B.E., and J.D. McIntyre. 1993. Demographic and habitat requirements for conservation of bull trout. General Technical Report Rocky Mountain Research Station. 38 pp.

Rieman, B.E., and J.D. McIntyre. 1995. Occurrence of Bull Trout in Naturally Fragmented Habitat Patches of Varied Size. Transactions of the American Fisheries Society 124: 285–296.

Rieman, B.E., and J.D. McIntyre. 1996. Spatial and temporal variability in bull trout redd counts. North American Journal of Fisheries Management 16: 132–141.

Ringel, B.M.K., J. Neibauer, K. Fulmer, and M.C. Nelson. 2014. Migration patterns of adult bull trout in the Wenatchee River, Washington 2000-2004. US Fish and Wildlife Service, 81 pp.

Rosenberger, E.E., S.E. Hampton, S.C. Fradkin, and B.P. Kennedy. 2008. Effects of shoreline development on the nearshore environment in large deep oligotrophic lakes. Freshwater Biology 53: 1673–1691.

Rust, P., S.M. Wilson, N.G. Mucciarone, R.S. Hardy, M.P. Corsie, J. Strait, and W.H. Harryman. 2022. Lake Pend Oreille research, 2019 Lake Pend Oreille fishery recovery project. Annual progress report 22–04. Idah Department of Fish and Game, Boise, Idaho.

Saunders, D.A., R.J. Hobbs, and C.R. Margules. 1991. Biological consequences of ecosystem fragmentation: a review. Conservation Biology 5: 18–32.

Schaller, H., P. Budy, C. Newlon, S. Haeseker, J. Harris, M. Barrows, D. Gallion, R. Koch, T. Bowerman, M. Connor, R. Al-Chokhachy, J. Skalicky, and D. Anglin. 2014. Walla Walla River bull trout ten year retrospective analysis and implications for recovery planning. U.S. Fish and Wildlife Service, Columbia River Fisheries Program Office, and U.S. Geological Survey, Utah Cooperative Fish and Wildlife Research Unit, Department of Watershed Sciences, Utah State University, Vancouver, Washington and Logan, Utah. 520 pp.

Schmetterling, D. 2001. 2000 Northern Pike Investigations in Milltown Reservoir.

Scholik, A.R., and H.Y. Yan. 2002. Effects of boat engine noise on the auditory sensitivity of the fathead minnow, *Pimephales promelas*. Environmental Biology of Fishes 63: 203–209.

Scholz, A., H. McLellan, D. Geist, R. Brown, U.S. Army Corps of Engineers, Seattle District, and Eastern Washington University. 2005. Investigations of migratory bull trout (Salvelinus confluentus) in relation to fish passage at Albeni Falls Dam. Biology Faculty Publications 17.

Sedell, J.R., and F.H. Everest. 1991. Historic changes in pool habitat for Columbia River basin salmon under study for TES listing. Draft. Pacific Northwest Research Station, Corvallis, OR. 6 pp.

Selong, J.H., T.E. McMahon, A.E. Zale, and F.T. Barrows. 2001. Effect of temperature on growth and survival of bull trout, with application of an improved method for determining thermal tolerance in fishes. Transactions of the American Fisheries Society 130: 1026–1037.

Sexauer, H.M., and P.W. James. 1997. Microhabitat use by juvenile bull trout in four streams located in the Eastern Cascades, Washington. Pages 361–370 *in Bull Trout Task Force (Alberta)*. Trout Unlimited. Calgary, Alberta, Canada.

Simpson, J.C., and R.L. Wallace. 1982. Fishes of Idaho. University of Idaho Press, Moscow, Idaho. 93 pp.

Spruell, P., A.R. Hemmingsen, P.J. Howell, N. Kanda, and F.W. Allendorf. 2003. Conservation genetics of bull trout: Geographic distribution of variation at microsatellite loci. Conservation Genetics 4: 17–29.

Spruell, P., B.E. Rieman, K.L. Knudsen, F.M. Utter, and F.W. Allendorf. 1999. Genetic population structure within streams: microsatellite analysis of bull trout populations. Ecology of Freshwater Fish 8: 114–121.

Starcevich, S.J., P.J. Howell, S.E. Jacobs, and P.M. Sankovich. 2012. Seasonal movement and distribution of fluvial adult bull trout in selected watersheds in the Mid-Columbia River and Snake River Basins. PLOS ONE 7: e37257.

Stewart, D.B., N.J. Mochnacz, C.D. Sawatzky, T.J. Carmichael, and J.D. Reist. 2007. Fish life history and habitat use in the Northwest Territories: bull trout (*Salvelinus confluentus*). Fisheries and Oceans, Canada, 54 pp.

Swanberg, T.R. 1997. Movements of and habitat use by fluvial bull trout in the Blackfoot River, Montana. Transactions of the American Fisheries Society 126: 735–746.

Taylor, E.B., and A.B. Costello. 2006. Microsatellite DNA analysis of coastal populations of bull trout (*Salvelinus confluentus*) in British Columbia: zoogeographic implications and its application to recreational fishery management. Canadian Journal of Fisheries and Aquatic Sciences 63: 1157–1171.

Taylor, E.B., S. Pollard, and D. Louie. 1999. Mitochondrial DNA variation in bull trout (*Salvelinus confluentus*) from northwestern North America: implications for zoogeography and conservation. Molecular Ecology 8: 1155–1170.

The Dock Doctors. 2024. The Dock Doctors Waterfront Specialists 2024 Stock Catalog.

Thomas, G. 1992. Status of bull trout in Montana. Montana Department of Fish, Wildlife and Parks, Helena, Montana. 83 pp.

Thurow, R.F. 1997. Habitat utilization and diel behavior of juvenile bull trout (*Salvelinus confluentus*) at the onset of winter. Ecology of Freshwater Fish 6: 1–7.

Thurow, R.F., J.T. Peterson, G.L. Chandler, C.M. Moffitt, and T.C. Bjornn. 2020. Concealment of juvenile bull trout in response to temperature, light, and substrate: Implications for detection. PLOS ONE 15: e0237716.

Tierney, K.B., D.H. Baldwin, T.J. Hara, P.S. Ross, N.L. Scholz, and C.J. Kennedy. 2010. Olfactory toxicity in fishes. Aquatic Toxicology 96: 2–26.

Town of Marshfield. 2010. Mooring, Skiff Regulations, and Specifications.

U.S. Army Corps of Engineers. 2018. Albeni Falls project master plan final environmental assessment & FONSI, 2018 master plan. U.S. Army Corps of Engineers, Seattle District, Bonner County, Idaho. 275 pp.

U.S. Environmental Protection Agency. 2007. Clark Fork-Pend Oreille Watershed management plan management strategies for the next decade 2007-2017. 112.

USACE. 2005. Silt curtains as a dredging project management practice. ERDC TN-DOER-E21. USACE, 18 pp.

USACE. 2024a. Programmatic Biological Assessment Regional General Permit 27 for Lake Pend Oreille and Pend Oreille River, Bonner and Kootenai Counties, Idaho. NWW-2007-00475. U.S. Army Corps of Engineers Walla Walla District Regulatory Division, 156 pp.

USACE. 2024b. Response to Request for Additional Information for NWW-2007-00475, Regional General Permit (RGP) 27.

USFWS. 2002a. Regional General Permit 27 re-issuance – section 7 informal consultation Pend Oreille subbasin, Idaho. Upper Columbia Fish and Wildlife Office, Spokane, Washington. 2 pp.

USFWS. 2002b. Bull trout (*Salvelinus confluentus*) draft recovery plan (Klamath River, Columbia River, and St. Mary-Belly River distinct population segments). U.S. Fish and Wildlife Service, Portland, Oregon. 387 pp.

USFWS. 2004a. Draft recovery plan for the Coastal-Puget Sound distinct population segment of bull trout (*Salvelinus confluentus*). Volume I: Puget Sound Management Unit, 389 + xvii p., and Volume II: Olympic Peninsula Management Unit, Portland, Oregon. 277 pp.

USFWS. 2004b. Draft recovery plan for the Jarbidge River distinct population segment of bull trout (*Salvelinus confluentus*). U. S. Fish and Wildlife Service, Portland, Oregon, 148 pp.

USFWS. 2005a. Bull trout core area templates - complete core area by core area analysis. U.S. Fish and Wildlife Service, Portland, Oregon. 668 pp.

USFWS. 2005b. Bull trout core area conservation status assessment. U.S. Fish and Wildlife Service, Portland, Oregon. 96 pp.

USFWS. 2006. *in litt.* Memorandum from Director (U.S. Fish and Wildlife Service) to Regional Directors and Manager (U.S. Fish and Wildlife Service). Subject: Recovery Units and Jeopardy Determinations under Section 7 of the Endangered Species Act.

USFWS. 2008. Bull Trout (Salvelinus confluentus) 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service, Portland, Oregon. 53 pp.

USFWS. 2009a. Biological opinion Regional General Permit 27 – Lake Pend Oreille and Pend Oreille River - 2020. Eastern Washington Field Office, Spokane, Washington. 55 pp.

USFWS. 2009b. Bull trout core area templates - complete core area by core area re-analysis. U. S. Fish and Wildlife Service, Portland, Oregon. 1895 pp.

USFWS. 2010. Bull trout final critical habitat justification: rationale for why habitat is essential, and documentation of occupancy. September. Idaho Fish and Wildlife Office, 1035 pp.

USFWS. 2015a. Regional General Permit 27 – Lake Pend Oreille and Pend Oreille River - 2015. Idaho Fish and Wildlife Office, Spokane Valley, Washington. 65 pp.

USFWS. 2015b. Recovery plan for the coterminous United States population of bull trout (*Salvelinus confluentus*). U.S. Fish and Wildlife Service, Portland, Oregon. 179 pp.

USFWS. 2015c. Bull trout 5-year review, short form summary. U.S. Fish and Wildlife Service, Boise, Idaho. 7 pp.

USFWS. 2015d. Columbia headwaters recovery unit implementation plan for bull trout (*Salvelinus confluentus*). Montana Ecological Services Office, Northern Idaho Field Office, and Eastern Washington Field Office, Kalispell, Montana and Spokane, Washington. 179 pp.

USFWS. 2015e. Coastal recovery unit implementation plan for bull trout (*Salvelinus confluentus*). Washington Fish and Wildlife Office and Oregon Fish and Wildlife Office, Lacey, Washington and Portland, Oregon. 155 pp.

USFWS. 2015f. Klamath recovery unit implementation plan for bull trout (*Salvelinus confluentus*). Klamath Falls Fish and Wildlife Office, Klamath Falls, Oregon. 35 pp.

USFWS. 2015g. Mid-Columbia recovery unit implementation plan for bull trout (*Salvelinus confluentus*). Oregon Fish and Wildlife Office, Central Washington, Northern Idaho, and Eastern Washington Field Offices, and Oregon Department of Fish and Wildlife Conservation and Recovery Program, Portland, Oregon. 345 pp.

USFWS. 2015h. Saint Mary recovery unit implementation plan for bull trout (*Salvelinus confluentus*). Montana Ecological Services Office, Kalispell, Montana. 30 pp.

USFWS. 2015i. Upper Snake recovery unit implementation plan for bull trout (*Salvelinus confluentus*). Idaho Fish and Wildlife Office, Boise, Idaho. 113 pp.

USFWS. 2020a. Regional General Permit 27 – Lake Pend Oreille and Pend Oreille River - 2020. Idaho Fish and Wildlife Office, 73 pp.

USFWS. 2020b. Biological opinion addressing operations and maintenance of the Columbia River system in Washington, Oregon, Idaho, and Montana. U.S. Fish and Wildlife Service, Portland, Oregon. 442 pp.

USFWS. 2023. Sound exposure level calculator for marbled murrelet and bull trout.

USFWS. 2024. Species status assessment for the coterminous distinct population segment of bull trout (*Salvelinus confluentus*). Draft Version 1.1 U.S. Fish and Wildlife Service, Boise, Idaho. 182 pp.

USFWS and NMFS. 1998. Endangered Species Act consultation handbook: procedures for conducting section 7 consultations and conferences. U.S. Fish and Wildlife Service, National Marine Fisheries Service, 148 pp.

USGS. 2024. USGS 12391950 Clark Fork River below Cabinet Gorge Dam ID. Available at: https://waterdata.usgs.gov/nwis/monthly?referred_module=sw&search_site_no=12391950&format=sites_selection_links (Accessed November 29, 2024).

Verep, B., and F. Balta. 2019. Acute Toxic Effects of the Antifreeze (Ethylene Glycol) On Rainbow Trout (Oncorhynchus mykiss).

Vidergar, D.T. 2000. Population estimates, food habits and estimates of consumption of selected predatory fishes in Lake Pend Oreille, Idaho. Master's. University of Idaho, 109 pp.

Washington Department of Ecology. 2002. Evaluating criteria for the protection of freshwater aquatic life in Washington's surface water quality standards - dissolved oxygen: Draft discussion paper and literature summary. Publication Number 00-10-071. Watershed Management Unit, Olympia, Washington. 90 pp.

Washington Department of Fish and Wildlife, FishPro Inc., and Beak Consultants. 1997. Grandy Creek trout hatchery biological assessment. 47 pp.

Washington State Department of Transportation. 2023. Chapter 7 construction noise impact assessment. Pages 95 *in* WSDOT BA preparation manual. Washington State Department of Transportation. Washington.

Watson, G., and T.W. Hillman. 1997. Factors affecting the distribution and abundance of bull trout: an investigation at hierarchical scales. North American Journal of Fisheries Management 17: 237–252.

Westerling, A.L., H.G. Hidalgo, D.R. Cayan, and T.W. Swetnam. 2006. Warming and earlier spring increase Western U.S. forest wildfire activity. Science 313: 940–943.

Western Wood Preservers Institute, Southern Pressure Treaters Association, and Timber Piling Council. 2006. Treated wood in aquatic environments a specification and environmental guide to selecting, installing and managing wood preservation systems in aquatic and wetland environments. Western Wood Preservers Institute, 36 pp.

Whiteley, A.R., P. Spruell, and F.W. Allendorf. 2003. Population genetics of Boise Basin bull trout (*Salvelinus confluentus*). Final Report Contract JV-1122014-561. Rocky Mountain Research Station, University of Montana, Missoula, Montana. 37 pp.

Whitesel, T.A., J. Brostrom, T. Cummings, J. Delavergne, W. Fredenberg, H. Schaller, P. Wilson, and G. Zydlewski. 2004. Bull trout recovery planning: A review of the science associated with population structure and size. Science Team report #2004-1. May. 68 pp.

Williams, G.D., R.M. Thom, D.K. Shreffler, J.A. Southard, L.K. O'Rourke, S.L. Sargeant, V.I. Cullinan, R. Moursund, and M. Stamey. 2003. Assessing overwater structure-related predation risk on juvenile salmon: field observations and recommended protocols. PNNL-SA-39451. Pacific Northwest National Laboratory, Sequim, Washington. 74 pp.

7.2 *In Litteris* References

U.S. Fish and Wildlife Service. 2006, *in litt.* Memorandum from Director (U.S. Fish and Wildlife Service) to Regional Directors and Manager (U.S. Fish and Wildlife Service). Subject: Recovery Units and Jeopardy Determinations under Section 7 of the Endangered Species Act.

7.3 Personal Communications

Paluch, M. 2023. Bellgraph supplemental bull trout data.

USACE. 2024b. Response to Request for Additional Information for NWW-2007-00475, Regional General Permit (RGP) 27.

USACE. 2025. RE: Discuss RGP-27 draft BO Sections 2.2, 2.6, 4.6, 5, and Appendix C: Hydraulic Lifts.

APPENDICES

Appendix A: IDL Standards and IDEQ Conditions

Idaho Department of Lands (IDL) standards and IDEQ WQC conditions are incorporated into the proposed action as an Applicant must obtain an IDL encroachment permit and RGP-27 condition 2.b. states that Applicants must comply with the conditions listed in the IDEQ WQC (USACE 2024a, p. 142 and Appendix B). The Service acknowledges that the Corps considers these State standards and conditions associated with the proposed action outside of their regulatory authority. The Applicant is required to adhere to state laws as they pertain the IDL standards and the IDEQ WQC conditions and must ensure that any hired Contractor adheres to these standards and conditions as well.

As the Corps has incorporated these standards and conditions into their analysis, the Service has done so as well. These regulations affect the analysis and the subsequent determination for bull trout within the action area. Therefore, any project that does not adhere to the regulatory standards and conditions listed below would not be covered by this Opinion. Furthermore, the Service cannot anticipate changes in IDL standards and IDEQ conditions and analyzed the proposed action with the standards and conditions in place at the time of writing this Opinion. It is reasonably certain that regulations may change over time; as such, any changes to the IDL standards and IDEQ Conditions below that could change the effects analysis would preclude coverage under this Opinion for the RGP-27 permit.

A.1 IDL Standards

The following standards have been included from “IDAPA 20 – Idaho Department of Lands Resource Protection and Assistance Bureau 20.03.04 – Rules for the regulation of beds, waters, and airspace over navigable lakes in the state of Idaho” (Idaho Department of Lands 2024, pp. 6–12). Please note that original numbering has been retained and standards that the Service did not deem relevant to the analysis have been removed, so the numbering below reflects this. For clarification, 13b references installation of jet ski lifts and more than two boat lifts. These are not considered a part of the RGP-27 action, and the effects of jet ski lifts or more than two boat lifts is not addressed within this programmatic, but these standards are listed because other elements within those sections were incorporated into the analysis.

015. ENCROACHMENT STANDARDS.

01. Single-Family and Two-Family Docks. The following parameters govern the size and dimensions of single-family docks and two-family docks. (3-18-22)

> a. No part of the structure waterward of the natural or ordinary high water mark or artificial high water mark may exceed ten (10) feet in width, excluding the slip cut out. (3-18-22)

b. Total surface decking area waterward of the natural or ordinary or artificial high water mark may not exceed seven hundred (700) square feet, including approach ramp and walkway for a single-family dock and may not exceed one thousand one hundred (1,100) square feet, including approach ramp and walkway for a two-family dock. (3-18-22)

c. No portion of the docking facility may extend beyond the line of navigability. Shorter docks are encouraged whenever practical and new docks normally will be installed within the waterward extent of existing docks or the line of navigability. (3-18-22)

d. A variance to the standards in this Subsection 015.01 may be approved by the Department when justified by site specific considerations, such as the distance to the established line of navigability. (3-18-22)

<u>04. Covered Slip</u>. (3-18-22)

a. Covered slips, regardless of when constructed, may not have a temporary or permanent residential area. (3-18-22)

b. Slip covers should have colors that blend with the natural surroundings and are approved by the Department. (3-18-22)

c. Covered slips may not be supported by extra piling nor constructed with hard roofs. (3-18-22)

d. Slip covers with permanent roofs and up to three (3) walls may be maintained or replaced at their current size if they were previously permitted or if they were constructed prior to January 1, 1975. These structures may not be expanded nor converted to boat garages. (3-18-22)

e. Fabric covered slips must be constructed as canopies without sides unless the following standards are followed: (3-18-22)

i. At least two (2) feet of open space is left between the bottom of the cover and the dock or pier surface; and (3-18-22)

ii. Fabric for canopy and sides will transmit at least seventy-five percent (75%) of the natural light. (3-18-22)

<u>09. Mooring Buoys</u>. Buoys must be installed a minimum of thirty (30) feet away from littoral right lines of adjacent littoral owners. One (1) mooring buoy per littoral owner may be allowed. (3-18-22)

<u>13. General Encroachment Standards. (3-18-22)</u>

a. Square Footage. The square footage limitations in Subsections 015.01 and 015.02 include all structures beyond the ordinary or artificial high water mark such as the approach, ramp, pier, dock, and all other floating or suspended structures that cover the lake surface, except for: (3-18-22)

i. Boat lifts as allowed pursuant to Paragraph 015.13.b. (3-18-22)

iii. Slip covers. (3-18-22)

b. Boat Lifts and Jet Ski Lifts. (3-18-22)

i. Single-family docks are allowed a single boat lift and two (2) jet ski lifts, or two (2) boat lifts, without adding their footprint to the dock square footage. Additional lifts will require that fifty percent (50%) of the footprint of the largest lifts be included in the allowable square footage of the dock or pier as per Subsection 015.01. (3-18-22)

ii. Two-family docks are allowed two (2) boat lifts and four (4) jet ski lifts, or four (4) boat lifts, without adding their footprint to the dock square footage. Additional lifts will require that fifty percent (50%) of the footprint of the largest lifts be included in the allowable square footage of the dock or pier as per Subsection 015.01. (3-18-22)

iii. A boat lift or jet ski lift within lines drawn perpendicular from the shore to the outside dock edges will not require a separate permit if the lift is outside the ten (10) foot adjacent littoral owner setback, the lift does not extend beyond the line of navigability, and the lift does not count toward the square footage of the dock as outlined in Subparagraphs 015.13.b.i. and 015.13.b.ii. The permittee (Applicant) must send a revised permit drawing with the lift location as an application to the Department. If the lift meets the above conditions, the application will be approved as submitted. Future applications must include the lifts. (3-18-22)

c. Angle from Shoreline. (3-18-22)

i. Where feasible, all docks, piers, or similar structures must be constructed so as to protrude as nearly as possible at right angles to the general shoreline, lessening the potential for infringement on adjacent littoral rights. (3-18-22)

i. Beaded Foam Flotation. Beaded foam flotation must be completely encased in a manner that will maintain the structural integrity of the foam. The encasement must be resistant to the entry of rodents. (3-18-22)

A.2 IDEQ WQC Conditions

The following conditions have been included from a letter from State of Idaho IDEQ to USACE on “401 Water Quality Certification for reissuance of Regional General Permit 27 (RGP-27)” (Idaho Department of Environmental Quality 2019, entire). Please note that original numbering has been retained and conditions that the Service did not deem relevant to the analysis have been removed, so the numbering below reflects this. In addition, condition #50 on use of treated wood provided a link to another IDEQ document titled, “Guidance for the Use of Wood Preservatives and Preserved Wood Products In or Around Aquatic Environments” (Idaho Department of Water Quality 2008, entire). The Service included information from this document that was relevant to the analysis below condition #50.

General Conditions

1. This certification is conditioned upon the requirement that any modification (e.g., change in BMPs, work windows, etc.) of the permitted activity shall first be provided to DEQ for review to determine compliance with Idaho WQS and to provide additional certification pursuant to Section 401. Such modifications may not be implemented until DEQ has determined whether

additional certification is necessary.

2. DEQ reserves the right to modify, amend, or revoke this certification if DEQ determines that, due to changes in relevant circumstances-including without limitation, changes in project activities, the characteristics of the receiving water bodies, or state WQS-there is no longer reasonable assurance of compliance with WQS or other appropriate requirements of state law.

4. A copy of this certification must be kept on the job site and readily available for review by any contractor working on the project and any federal, state, or local government personnel.

5. Project areas shall be clearly identified in the field prior to initiating land-disturbing activities to ensure avoidance of impacts to waters of the state beyond project footprints.

6. The applicant shall provide access to the project site and all mitigation sites upon request by DEQ personnel for site inspections, monitoring, and/or to ensure that conditions of this certification are being met.

7. The applicant is responsible for all work done by contractors and must ensure the contractors are informed of and follow all the conditions described in this certification and the Section 404 permit.

8. Portable boat and jet ski lift stations shall be installed and operated in a manner that precludes any discharge to waters of the State.

Fill Material

9. Fill material subject to suspension shall be free of organic and easily suspended fine material. The fill material to be placed shall be clean material only and may include native material, concrete, sand, gravel, grout or epoxy. When sand is utilized as fill material, the appropriate BMPs shall be implemented to ensure sand will not be easily dispersed (e.g., filter fabric anchored over the sand or other confinement).

10. Fill material shall not be placed in a location or in a manner that impairs surface or subsurface water flow into or out of any wetland area.

11. Placement of fill material in existing vegetated wetlands shall be minimized to the greatest extent possible.

12.Excavated or staged fill material must be placed so it is isolated from the water edge or wetlands and not placed where it could re-enter waters of the state uncontrolled.

Turbidity

13. Sediment resulting from this activity must be mitigated to prevent violations of the turbidity standard as stipulated under the Idaho WQS (IDAPA 58.01.02). Any violation of

this standard must be reported to the DEQ regional Office immediately. Coeur d'Alene Regional Office: 208-769-1422/ 877-370-0017

14. All practical BMPs on disturbed banks and within the waters of the state must be implemented to minimize turbidity. Visual observation is acceptable to determine whether BMPs are functioning properly. If a plume is observed, the project may be causing an exceedance of WQS and the permittee (Applicant) must inspect the condition of the projects BMPs. If the BMPs appear to be functioning to their fullest capability, then the permittee (Applicant) must modify the activity or implement additional BMPs (this may also include modifying existing BMPs).

15. Containment measures such as silt curtains, geotextile fabrics, and silt fences must be implemented and properly maintained to minimize instream sediment suspension and resulting turbidity.

Erosion and Sediment Control

16. BMPs for sediment and erosion control suitable to prevent exceedances of state WQS shall be selected and installed before starting construction at the site. One resource that may be used in evaluating appropriate BMPs is DEQ's Catalog of Stormwater Best Management Practices for Idaho Cities and Counties. Other resources may also be used for selecting appropriate BMPs.

17. One of the first construction activities shall be placing permanent and/or temporary erosion and sediment control measures around the perimeter of the project or initial work areas to protect the project water resources.

18. Permanent erosion and sediment control measures shall be installed in a manner that will provide long-term sediment and erosion control to prevent excess sediment from entering waters of the state.

19. Permanent erosion and sediment control measures shall be installed at the earliest practicable time consistent with good construction practices and shall be maintained as necessary throughout project operation.

20. Structural fill or bank protection shall consist of materials that are placed and maintained to withstand predictable high flows in the waters of the state.

21. A BMP inspection and maintenance plan must be developed and implemented. At a minimum, BMPs must be inspected and maintained daily during project implementation.

22.BMP effectiveness shall be monitored during project implementation. BMPs shall be replaced or augmented if they are not effective.

23. All construction debris shall be properly disposed of so it cannot enter waters of the state or cause water quality degradation.

24. Disturbed areas suitable for vegetation shall be seeded or revegetated to prevent subsequent soil erosion.

25. Maximum fill slopes shall be such that material is structurally stable once placed and does not slough into the river channel during construction, during periods prior to revegetation, or after vegetation is established.

26. To the extent reasonable and cost-effective, the activity submitted for certification shall be designed to minimize subsequent maintenance.

27. Sediment from disturbed areas or able to be tracked by vehicles onto pavement must not be allowed to leave the site in amounts that would reasonably be expected to enter waters of the state. Placement of clean aggregate at all construction entrances or exits and other BMPs such as truck or wheel washes, if needed, must be used when earth-moving equipment will be leaving the site and traveling on paved surfaces.

In-water Work

28. Work in open water is to be kept at a minimum and only when necessary. Equipment shall work from an upland site to minimize disturbance of waters of the state. If this is not practicable, appropriate measures must be taken to ensure disturbance to the waters of the state is minimized.

29. Construction affecting the bed or banks shall take place only during periods of low flow or maximum annual drawdown (low pool).

31. Heavy equipment working in wetlands shall be placed on mats or suitably designed pads to prevent damage to the wetlands.

33. Work in waters of the State shall be restricted to areas specified in the application.

34. Measures shall be taken to prevent wet concrete from entering into waters of the state when placed in forms and/or from truck washing.

35. Activities that include constructing and maintaining intake structures must include adequate fish screening devices with a minimum mesh size of ¼ inch to minimize fish entrainment or capture.

37.To minimize sediment transport, stream channel or stream bank stabilization must be completed prior to returning water to a dewatered segment.

Vegetation Protection and Restoration

38. Disturbance of existing wetlands and native vegetation shall be kept to a minimum.

39. To the maximum extent practical, staging areas and access points should be placed in open, upland areas.

40. Fencing and other barriers should be used to mark the construction areas.

41. Where possible, alterative equipment should be used (e.g., spider hoe or crane).

42.If authorized work results in unavoidable vegetative disturbance, riparian and wetland vegetation shall be successfully reestablished to function for water quality benefit at pre-project levels or improved at the completion of authorized work.

Dredge Material Management

43. Upland disposal of dredged material must be done in a manner that prevents the material from re-entering waters of the state.

Management of Hazardous or Deleterious Materials

44. Petroleum products and hazardous, toxic, and/or deleterious materials shall not be stored, disposed of, or accumulated adjacent to or in the immediate vicinity of waters of the state. Adequate measures and controls must be in place to ensure that those materials will not enter waters of the state as a result of high water, precipitation runoff, wind, storage facility failure, accidents in operation, or unauthorized third-party activities.

45. Daily inspections of all fluid systems on equipment to be used in or near waters of the state shall be done to ensure no leaks or potential leaks exist prior to equipment use. A log book of these inspections shall be kept on site and provided to DEQ upon request.

46. Equipment and machinery must be removed from the vicinity of the waters of the state prior to refueling, repair, and/or maintenance.

47. Equipment and machinery shall be steam cleaned of oils and grease in an upland location or staging area with appropriate wastewater controls and treatment prior to entering a water of the state. Any wastewater or wash water must not be allowed to enter a water of the state.

48. Emergency spill procedures shall be in place and may include a spill response kit (e.g., oil absorbent booms or other equipment).

49. In accordance with IDAPA 58.01.02.850, in the event of an unauthorized release of hazardous material to state waters or to land such that there is a likelihood that it will enter state waters, the responsible persons in charge must:

a. Make every reasonable effort to abate and stop a continuing spill.
b. Make every reasonable effort to contain spilled material in such a manner that it will not reach surface or ground waters of the state.
c. Call 911 if immediate assistance is required to control, contain, or clean up the spill. If no assistance is needed in cleaning up the spill, contact the appropriate DEQ

regional office during normal working hours or Idaho State Communications Center after normal working hours (1-800-632-8000). If the spilled volume is above federal reportable quantities, contact the National Response Center (l-800-424-8802).
Coeur d'Alene Regional Office: 208-7 69-1422 I 87 7 -370-001 7
d. Collect, remove, and dispose of the spilled material in a manner approved by DEQ.

Treated Wood

50. DEQ's Guidance for the Use of Wood Preservatives and Preserved Wood Products In or Around Aquatic Environments must be considered when using treated wood materials in the aquatic environment. Within this guidance document DEQ references the Best Practices the Use Treated Wood in Environments. This document provides recommended guidelines for the production and installation of treated wood products destined for use in sensitive environments.

Note: the below section details information from the DEQ's Guidance for the Use of Wood Preservatives and Preserved Wood Products In or Around Aquatic Environments (Idaho Department of Water Quality 2008, entire):

Pressure-Treated Wood

1. The following preservative chemicals are registered by the U.S. Environmental Protection Agency (EPA) and may be used to pressure-treat wood products that will be used in or around waters of the State: alkaline copper quarternary (ACQ), ammoniacal copper zinc arsenate (ACZA), copper azole (CA-B), chromated copper arsenate (CCA), creosote, copper naphthenate, and pentachlorophenol (Penta).

2. Treated wood materials should be produced in compliance with the Best Management Practices (BMPs) for the Use of Treated Wood in Aquatic and Other Sensitive Environments (“BMP Manual”) published by the “Supporting Organizations”1 (August 2006). DEQ understands that the Supporting Organizations may modify the BMP Manual from time to time. If a modified BMP is to be used, DEQ requests copies of the revised BMP manual in a form to facilitate comparison so that the modification(s) may be reviewed.

3. Prior to placement of treated wood products, assurance of compliance with the BMP Manual should be demonstrated by an independent third-party inspection agency via a BMP Mark or a certificate of compliance.

4. The treated wood material to be used in or around waters of the State is to be appropriate for the intended use, performance, and environmental conditions. Information on properly selecting and specifying pressure-treated wood can be obtained from Treated Wood in Aquatic Environments — A Specification and Environmental Guide to Selecting, Installing and Managing Wood Preservation Systems in Aquatic and Wetland Environments (“Specification Guide”) (Western Wood Preservers Institute, 2002). This document can be downloaded from the following URL: http://www.wwpinstitute.org/. More detailed information can be found in the American Wood Protection Association (AWPA) Book of Standards (www.awpa.com).

5. The applicant and contractors working on the project should be familiar with and follow the appropriate handling, installation, and maintenance guidelines for treated wood as outlined in the BMP Manual (see #2 above) and the Specification Guide (see #4 above)

A site-specific risk assessment may be required where DEQ determines that a proposal calls for placement of a significant volume of treated wood in, over, or around a small body of water with low flow velocity. If, based on the review, DEQ determines that there is an unacceptably high risk to water quality or the aquatic environment, use of the product as proposed may be prohibited. An alternative proposal may be allowed should the applicant demonstrate that such a proposal will not impair water quality or beneficial uses and will otherwise comply with Idaho Water Quality Standards.

General Guidelines

1. If field cutting, drilling, sanding, or fabrication of chemically-treated wood products is necessary, it should be performed at least 75 feet above the high water mark. Collect and dispose of all waste, including sawdust, in accordance with applicable laws.

2. If field cutting, drilling, sanding, or fabrication of chemically-treated wood products must be done over water or a dry lake or river bed, all waste is to be contained, removed from these locations, and disposed of in accordance with applicable laws.

3. The removal of existing treated wood products in waters of the State should be done in a manner that minimizes the potential for treated debris to enter the environment. Collect and dispose of all waste, including sawdust, in accordance with applicable laws. Use Restrictions Treated wood should not be used where it comes into direct or indirect contact with water used for human consumption without consultation with DEQ, except for uses involving incidental contact such as docks and bridges. For further information, please contact your local DEQ regional office.

Appendix B: Bull Trout Status of the Species, continued

B.1 Status of Bull Trout

This section provides information about the bull trout's life history, habitat preferences, geographic distribution, population trends, threats, and conservation needs. This includes a description of the effects of past human activities and natural events that have led to the current status of the bull trout. This information provides the background for analyses in later sections of the biological opinion. The proposed and final listing rules contain a physical species description (63 FR 31647, June 10, 1998; 64 FR 58910). Additional information can be found at https://ecos.fws.gov/ecp/species/8212.

B.1.1 Listing Status and Current Range

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

The final listing rule for the United States coterminous population of the bull trout discusses the consolidation of five distinct population segments (DPSs) into one listed taxon and the application of the jeopardy standard in accordance with the requirements of section 7 of the Act relative to this species and established five interim RUs for each of these DPSs for the purposes of consultation and recovery (64 FR 58930).

The final Recovery Plan for the Coterminous Bull Trout Population (bull trout recovery plan) established six RUs (see Figure 3; USFWS 2015b, pp. 36–42). The final recovery units replace the previous five interim recovery units and will be used in the application of the jeopardy standard for section 7 consultation procedures. These RUs are needed to ensure a resilient, redundant, and representative distribution of bull trout populations throughout the range of the listed entity.

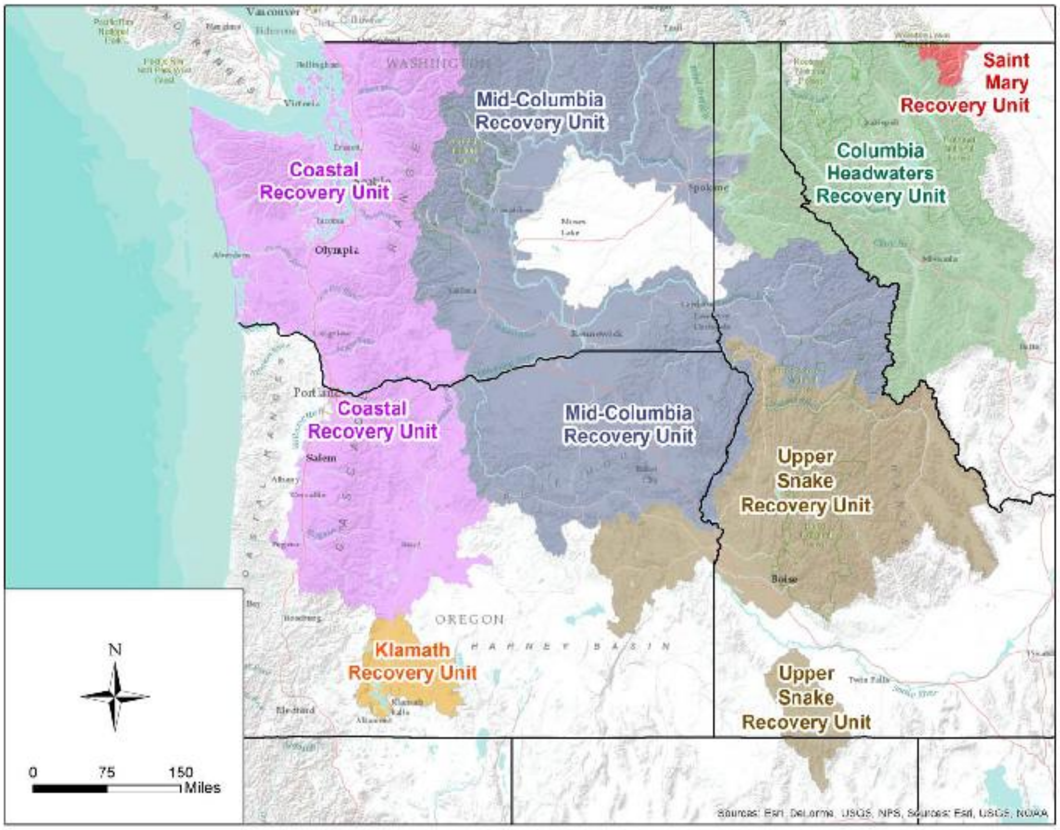

Figure 6. Locations of the six bull trout recovery units in the coterminous United States.

B.1.2 Reasons for Listing and Threats

Throughout its range, the bull trout is threatened by the combined effects of habitat degradation, fragmentation, and alterations associated with dewatering, road construction and maintenance, mining, grazing, the blockage of migratory corridors by dams or other diversion structures; poor water quality; incidental angler harvest; entrainment (a process by which aquatic organisms are pulled through a diversion or other device) into diversion channels; and introduced nonnative species (63 FR 31647; 64 FR 58910). Poaching and incidental mortality of bull trout during other targeted fisheries are identified and described in the bull trout recovery plan (see Threat Factors B and D) as additional threats (USFWS 2015b, p. 150). Since the time of coterminous listing of the species (64 FR 58910) and designation of its critical habitat (69 FR 59996, October 6, 2004; 70 FR 56212, September 26, 2005; 75 FR 63898), a great deal of new information has been collected on the status of bull trout. The Service's Science Team report (Whitesel et al. 2004, entire), the bull trout core areas templates (USFWS 2005a, entire, 2009b, entire), Conservation Status Assessment (USFWS 2005b, entire), and 5-year reviews (USFWS 2008, entire, 2015b, entire) have provided additional information about threats and status. The final recovery plan lists other documents and meetings that compiled information about the status of bull trout (USFWS 2015b, p. 3). The 2015 5-year status review also maintains the listing status as threatened based on the information compiled in the final bull trout recovery plan (USFWS

2015b, p. 3) and the Recovery Unit Implementation Plans (RUIPs) (USFWS 2015e, entire, d, entire, f, entire, g, entire, h, entire, i, entire).

When first listed, the status of bull trout and its threats were reported by the Service at subpopulation scales. In 2002 and 2004, the draft recovery plans (USFWS 2002b, entire, USFWS 2004a, entire, USFWS b, entire) included detailed information on threats at the RU scale (i.e., similar to subbasin or regional watersheds); thus, incorporating the metapopulation concept with core areas and local populations. In the 2008 5-year review, the Service established threats categories (i.e., dams, forest management, grazing, agricultural practices, transportation networks, mining, development and urbanization, fisheries management, small populations, limited habitat, and wildfire; USFWS 2008, entire). In the final recovery plan, threats and recovery actions are described for all 109 core areas for the species, forage/migration and overwintering areas, historical core areas, and research needs areas in each of the six RUs (USFWS 2015b, pp. 10–11). Primary threats are described in three broad categories – Habitat, Demographic, and Nonnative Fish – for all RUs and core areas within the listed range of the species. The 2015 5-year status review references the final recovery plan and the RUIPs and incorporates by reference the threats described therein (USFWS 2015b, entire). Although significant recovery actions have been implemented since the time of listing, the 5-year review concluded that the listing status should remain as “threatened” (USFWS 2015b, entire).

New or Emerging Threats

The bull trout recovery plan describes new or emerging threats, climate change, and other threats (USFWS 2015b, entire). Climate change was not addressed as a known threat when bull trout was listed. The 2015 bull trout recovery plan and RUIPs (USFWS 2015e, entire, d, entire, f, entire, g, entire, h, entire, i, entire) summarize the threat of climate change and acknowledge that some bull trout local populations and core areas may not persist into the future due to small populations, isolation, and effects of climate change (USFWS 2015c, p. 48). The recovery plan further states that use of best available information will ensure future conservation efforts that offer the greatest long-term benefit to sustain bull trout and their required coldwater habitats (USFWS 2015b, p. vii and pp. 17–20). Mote et al. (2014, pp. 487–513) summarized climate change effects in the Pacific Northwest to include rising air temperature, changes in the timing of streamflow related to changing snowmelt, increases in extreme precipitation events, lower summer stream flows, and other changes. A warming trend in the mountains of western North America is expected to decrease snowpack, hasten spring runoff, reduce summer stream flows, and increase summer water temperatures (Koopman et al. 2009, entire; Poff et al. 2002, entire; Point Reyes Bird Observatory (PRBO) Conservation Science 2011, entire). Lower flows as a result of smaller snowpack could reduce habitat, which might adversely affect bull trout reproduction and survival. Warmer water temperatures could lead to physiological stress and could also benefit nonnative fishes that prey on, or compete with, bull trout. Increases in the number and size of forest fires could also result from climate change (Westerling et al. 2006, p. 940) and could adversely affect watershed function by resulting in faster runoff, lower base flows during the summer and fall, and increased sedimentation rates. Lower flows also may result in increased groundwater withdrawal for agricultural purposes and resultant reduced water availability in certain stream reaches occupied by bull trout (USFWS 2015f, p. B10). Although all salmonids are likely to be affected by climate change, bull trout are especially vulnerable given that spawning and rearing are constrained by their location in upper watersheds and the requirement for cold water temperatures (Rieman et al. 2007, p. 1552). Climate change is expected to reduce the extent of coldwater habitat (Isaak et al. 2015, p. 2549, Figure 7), and increase competition with other fish species [lake trout (*Salvelinus namaycush*), brown trout (*Salmo trutta*), brook trout (*Salvelinus fontinalis*), and northern pike (*Esox lucius*)] for resources in remaining suitable habitat. Several authors project that brook trout, a fish species that competes for resources with, and predates on, the bull trout, will continue increasing their range in several areas (an elevation shift in distribution) due to the effects from climate change (Isaak et al. 2014, p. 114).

B.1.3 Life History and Population Dynamics

Distribution

The historical range of bull trout includes major river basins in the Pacific Northwest at about 41 to 60 degrees North latitude, from the southern limits in the McCloud River in northern California and the Jarbidge River in Nevada to the headwaters of the Yukon River in the Northwest Territories, Canada (Bond 1992, p. 2; Cavender 1978, pp. 165–166). To the west, the bull trout's range includes Puget Sound, various coastal rivers of British Columbia, Canada, and southeast Alaska (Bond 1992, p. 2). Bull trout occur in portions of the Columbia River and tributaries within the basin, including its headwaters in Montana and Canada. Bull trout also occur in the Klamath River basin of south-central Oregon. East of the Continental Divide, bull trout are found in the headwaters of the Saskatchewan River in Alberta and Montana and in the MacKenzie River system in Alberta and British Columbia, Canada (Brewin and Brewin 1997, entire; Cavender 1978, pp. 165–166).

Reproductive Biology

The iteroparous reproductive strategy (fishes that spawn multiple times and therefore require safe two-way passage upstream and downstream) of bull trout has important repercussions for the management of this species. Bull trout require passage both upstream and downstream, not only for repeat spawning but also for foraging. Most fish ladders, however, were designed specifically for anadromous semelparous salmonids (fishes that spawn once and then die, and therefore require only one-way passage upstream). Therefore, even dams or other barriers with fish passage facilities may be a factor in isolating bull trout populations if they do not provide a downstream passage route. Additionally, in some core areas, bull trout that migrate to marine waters must pass both upstream and downstream through areas with net fisheries at river mouths. This can increase the likelihood of mortality to bull trout during these spawning and foraging migrations.

Growth varies depending upon life-history strategy. Resident adults range from 15 to 30 centimeters (6 to 12 inches) total length, and migratory adults commonly reach 61 centimeters (24 inches) or more (Goetz 1989, p. 30; Pratt 1984, pp. 28–34). The largest verified bull trout is a 14.5 kilograms (32 pounds) specimen caught in Lake Pend Oreille, Idaho, in 1949 (Simpson and Wallace 1982, p. 95).

Bull trout typically spawn from August through November during periods of increasing flows and decreasing water temperatures. Preferred spawning habitat consists of low-gradient stream reaches with loose, clean gravel (Fraley and Shepard 1989, p. 141). Redds are often constructed in stream reaches fed by springs or near other sources of cold groundwater (Goetz 1989, pp. 15–16; Pratt 1992, pp. 6–7; Rieman and McIntyre 1996, p. 133). Depending on water temperature, incubation is normally 100 to 145 days (Pratt 1992, p. 1). After hatching, fry remain in the substrate, and time from egg deposition to emergence may surpass 220 days. Fry normally emerge from early April through May, depending on water temperatures and increasing stream flows (Pratt 1992, p. 1; Ratliff and Howell 1992, p. 10). Early life stages of fish, specifically the developing embryo, require the highest inter-gravel dissolved oxygen (IGDO) levels, and are the most sensitive life stage to reduced oxygen levels. The oxygen demand of embryos depends on temperature and on stage of development, with the greatest IGDO required just prior to hatching.

A literature review conducted by the Washington Department of Ecology (2002, p. 9) indicates that adverse effects of lower oxygen concentrations on embryo survival are magnified as temperatures increase above optimal (for incubation). Normal oxygen levels seen in rivers used by bull trout during spawning ranged from 8 to 12 mg/L (in the gravel), with corresponding instream levels of 10 to 11.5 mg/L (Stewart et al. 2007, p. 10). In addition, IGDO concentrations, water velocities in the water column, and especially the intergravel flow rate, are interrelated variables that affect the survival of incubating embryos (Oregon Department of Environmental Quality 1995, pp. 23–24). Due to a long incubation period of 220+ days, bull trout are particularly sensitive to adequate IGDO levels. An IGDO level below 8 mg/L is likely to result in mortality of eggs, embryos, and fry.

Population Structure

Bull trout exhibit both resident and migratory life history strategies. Both resident and migratory forms may be found together, and either form may produce offspring exhibiting either resident or migratory behavior (Rieman and McIntyre 1993, p. 2). Resident bull trout complete their entire life cycle in the tributary (or nearby) streams in which they spawn and rear. The resident form tends to be smaller than the migratory form at maturity and also produces fewer eggs (Goetz 1989, p. 15). Migratory bull trout spawn in tributary streams where juvenile fish rear one to four years before migrating to either a lake (adfluvial form), river (fluvial form) (Fraley and Shepard 1989, p. 138; Goetz 1989, p. 24), or saltwater (anadromous form) to rear as subadults and to live as adults (Brenkman and Corbett 2005, entire; McPhail and Baxter 1996, p. I; Washington Department of Fish and Wildlife et al. 1997, p. 16). Bull trout normally reach sexual maturity in four to seven years and may live longer than 12 years. They are iteroparous (they spawn more than once in a lifetime). Repeat- and alternate-year spawning has been reported, although repeat-spawning frequency and post-spawning mortality are not well documented (Fraley and Shepard 1989, p. 135; Leathe and Graham 1982, p. 95; Pratt 1992, p. 8; Rieman and McIntyre 1996, p. 133).

Bull trout are naturally migratory, which allows them to capitalize on temporally abundant food resources and larger downstream habitats. Resident forms may develop where barriers (either natural or manmade) occur or where foraging, migrating, or overwintering habitats for migratory fish are minimized (Swanberg 1997, entire; Brenkman and Corbett 2005, pp. 1075–1076; Goetz et al. 2004, p. 105; Starcevich et al. 2012, entire). For example, multiple life history forms (e.g., resident and fluvial) and multiple migration patterns have been noted in the Grande Ronde River (Baxter 2002, pp. 96, 98–106). Some river systems have retained habitat conditions that allow free movement between spawning and rearing areas and the mainstem rivers. In these areas with connectivity, bull trout can migrate between large rivers, lakes, and spawning tributaries. Other migrations in Central Washington have shown that fluvial and adfluvial life forms travel long distances, migrate between core areas, and mix together in many locations where there is connectivity (Ringel et al. 2014, pp. 61–64). Such multiple life history strategies help to maintain the stability and persistence of bull trout populations to environmental changes. Benefits of connected habitat to migratory bull trout include greater growth in the more productive waters of larger streams, lakes, and marine waters; greater fecundity resulting in increased reproductive potential; and dispersing the population across space and time so that spawning streams may be recolonized should local populations suffer a catastrophic loss (Frissell 1999, pp. 861–863; Montana Bull Trout Scientific Group 1998, p. 13; Rieman and McIntyre 1993, pp. 2–3). In the absence of the migratory bull trout life form, isolated populations cannot be replenished when disturbances make local habitats temporarily unsuitable. Therefore, the range of the species is diminished, and the potential for a greater reproductive contribution from larger sized fish with higher fecundity is lost (Rieman and McIntyre 1993, p. 2).

Whitesel et al. (2004, p. 2) noted that although there are multiple resources that contribute to the subject, Spruell et al. (2003, entire) best summarized genetic information on bull trout population structure. Spruell et al. (2003, entire) analyzed 1,847 bull trout from 65 sampling locations, four located in three coastal drainages (Klamath, Queets, and Skagit Rivers), one in the Saskatchewan River drainage (Belly River), and 60 scattered throughout the Columbia River basin. They concluded that there is a consistent pattern among genetic studies of bull trout, regardless of whether examining allozymes, mitochondrial DNA, or most recently microsatellite loci. Typically, the genetic pattern shows relatively little genetic variation within populations but substantial divergence among populations. Microsatellite loci analysis supports the existence of at least three major genetically differentiated groups (or evolutionary lineages) of bull trout (Spruell et al. 2003, p. 17). They were characterized as:

1. "Coastal," including the Deschutes River and all of the Columbia River drainage downstream, as well as most coastal streams in Washington, Oregon, and British Columbia. A compelling case also exists that the Klamath basin represents a unique evolutionary lineage within the coastal group.
2. "Snake River," which also included the John Day, Umatilla, and Walla Walla Rivers. Despite close proximity of the John Day and Deschutes Rivers, a striking level of divergence between bull trout in these two systems was observed.
3. "Upper Columbia River," which includes the entire basin in Montana and northern Idaho. A tentative assignment was made by Spruell et al. (2003, p. 25) of the Saskatchewan River drainage populations (east of the Continental Divide), grouping them with the Upper Columbia River group.

Spruell et al. (2003, p. 17) noted that within the major assemblages, populations were further subdivided, primarily at the level of major river basins. Taylor et al. (1999, entire) surveyed bull trout populations, primarily from Canada, and found a major divergence between inland and coastal populations. Costello et al. (2003, p. 328) suggested the patterns reflected the existence of two glacial refugia, consistent with the conclusions of Taylor and Costello (2006, pp. 1165–1170), Spruell et al. (2003, p. 26), and the biogeographic analysis of Haas and McPhail (2001, entire). Both Taylor et al. (1999, p. 1166) and Spruell et al. (2003, p. 21) concluded that the Deschutes River represented the most upstream limit of the coastal lineage in the Columbia River basin.

More recently, the Service identified additional genetic units within the coastal and interior lineages (Ardren et al. 2011, p. 18). Based on a recommendation in the Service's 5-year review of the species' status (USFWS 2008, p. 45), the Service reanalyzed the 27 RUs identified in the 2002 draft bull trout recovery plan (USFWS 2002b, p. 48) by utilizing, in part, information from previous genetic studies and new information from additional analysis (Ardren et al. 2011, entire). In this examination, the Service applied relevant factors from the joint Service and NMFS DPS policy (61 FR 4722, February 7, 1996) and subsequently identified six draft RUs that contain assemblages of core areas that retain genetic and ecological integrity across the range of bull trout in the coterminous United States. These six RUs were used to inform designation of critical habitat for bull trout by providing a context for deciding what habitats are essential for recovery (75 FR 63898). These six RUs, which were identified in the final bull trout recovery plan (USFWS 2015b, entire) and described further in the RUIPs (USFWS 2015e, entire, d, entire, f, entire, g, entire, h, entire, i, entire) include: Coastal, Klamath, Mid-Columbia, Columbia Headwaters, Saint Mary, and Upper Snake. A number of additional genetic analyses within core areas have been completed to understand uniqueness of local populations (DeHaan and Neibauer 2012, entire).

Population Dynamics

Although bull trout are widely distributed over a large geographic area, they exhibit a patchy distribution, even in pristine habitats (Rieman and McIntyre 1993, p. 4). Increased habitat fragmentation reduces the amount of available habitat and increases isolation from other populations of the same species (Saunders et al. 1991, entire). Burkey (1989, entire) concluded that when species are isolated by fragmented habitats, low rates of population growth are typical in local populations, and their probability of extinction is directly related to the degree of isolation and fragmentation. Without sufficient immigration, growth for local populations may be low and probability of extinction high (Burkey 1989, entire).

Metapopulation concepts of conservation biology theory have been suggested relative to the distribution and characteristics of bull trout, although empirical evidence is relatively scant (Dunham and Rieman 1999, entire; Rieman and McIntyre 1993, p. 15; Rieman and Dunham 2000, entire). A metapopulation is an interacting network of local populations with varying frequencies of migration and gene flow among them (Meffe and Carroll 1994, pp. 189–190). For inland bull trout, metapopulation theory is likely most applicable at the watershed scale where habitat consists of discrete patches or collections of habitat capable of supporting local populations; local populations are for the most part independent and represent discrete reproductive units; and long-term, low-rate dispersal patterns among component populations influences the persistence of at least some of the local populations (Rieman and Dunham 2000, entire). Ideally, multiple local populations distributed throughout a watershed provide a mechanism for spreading risk because the simultaneous loss of all local populations is unlikely. However, habitat alteration, primarily through the construction of impoundments, dams, and water diversions has fragmented habitats, eliminated migratory corridors, and in many cases, isolated bull trout in the headwaters of tributaries (Dunham and Rieman 1999, p. 645; Rieman and Clayton 1997, pp. 10–12; Rieman and Dunham 2000, p. 55; Spruell et al. 1999, pp. 118–120).

Human-induced factors as well as natural factors affecting bull trout distribution have likely limited the expression of the metapopulation concept for bull trout to patches of habitat within the overall distribution of the species (Dunham and Rieman 1999, entire). However, despite the theoretical fit, the relatively recent and brief time period during which bull trout investigations have taken place does not provide certainty as to whether a metapopulation dynamic is occurring (e.g., a balance between local extirpations and recolonizations) across the range of the bull trout or whether the persistence of bull trout in large or closely interconnected habitat patches (Dunham and Rieman 1999, entire) is simply reflective of a general deterministic trend towards extinction of the species where the larger or interconnected patches are relics of historically wider distribution (Rieman and Dunham 2000, pp. 5–57). Research does, however, provide genetic evidence for the presence of a metapopulation process for bull trout, at least in the Boise River basin of Idaho (Whiteley et al. 2003, entire), while Whitesel et al. (2004, pp. 18–21) summarizes metapopulation models and their applicability to bull trout.

Habitat Characteristics

The habitat requirements of bull trout are often generally expressed as the four “Cs”: cold, clean, complex, and connected habitat. Cold stream temperatures, clean water quality that is relatively free of sediment and contaminants, complex channel characteristics (including abundant large wood and undercut banks), and large patches of such habitat that are well connected by unobstructed migratory pathways are all needed to promote conservation of bull trout throughout all hierarchical levels.

Bull trout have more specific habitat requirements than most other salmonids (Rieman and McIntyre 1993, p. 4). Habitat components that influence bull trout distribution and abundance include water temperature, cover, channel form and stability, valley form, spawning and rearing substrate, and migratory corridors (Fraley and Shepard 1989, entire; Goetz 1989, pp. 23, 25; Hoelscher and Bjornn 1989, pp. 19, 25; Pratt 1992, entire; Rich Jr. 1996, p. 17; Rieman and McIntyre 1993, pp. 4–6, 1995, entire; Sedell and Everest 1991, entire; Watson and Hillman 1997, entire). Watson and Hillman (1997, pp. 247–250) concluded that watersheds must have specific physical characteristics to provide the habitat requirements necessary for bull trout to successfully spawn and rear and that these specific characteristics are not necessarily present throughout these watersheds. Because bull trout exhibit a patchy distribution, even in pristine habitats (Rieman and McIntyre 1993, pp. 4–6), bull trout should not be expected to simultaneously occupy all available habitats.

Migratory corridors link seasonal habitats for all bull trout life histories. The ability to migrate is important to the persistence of bull trout (Rieman and McIntyre 1993, p. 2). Migrations facilitate gene flow among local populations when individuals from different local populations interbreed or stray to non-natal streams. Local populations that are extirpated by catastrophic events may also become reestablished by bull trout migrants. However, it is important to note that the genetic structuring of bull trout indicates there is limited gene flow among bull trout populations, which may encourage local adaptation within individual populations, and that reestablishment of extirpated populations may take a long time (Rieman and McIntyre 1993, p. 2; Spruell et al. 1999, entire). Migration also allows bull trout to access more abundant or larger prey, which facilitates growth and reproduction. Additional benefits of migration and its relationship to foraging are discussed below under *Diet*.

Cold water temperatures play an important role in determining bull trout habitat quality, as these fish are primarily found in colder streams, and spawning habitats are generally characterized by temperatures that drop below 9˚C in the fall (Fraley and Shepard 1989, p. 137; Pratt 1992, p. 5; Rieman and McIntyre 1993, p. 2).

Thermal requirements for bull trout appear to differ at different life stages. Spawning areas are often associated with cold-water springs, groundwater infiltration, and the coldest streams in a given watershed (Pratt 1992, pp. 7–8; Rieman and McIntyre 1993, p. 7). Optimum incubation temperatures for bull trout eggs range from 2 ˚C to 6 ˚C, whereas optimum water temperatures for rearing range from about 6 ˚C to 10 ˚C (Buchanan and Gregory 1997, p. 4; Goetz 1989, p. 22). In Granite Creek, Idaho, Bonneau and Scarnecchia (1996, entire) observed that juvenile bull trout selected the coldest water available in a plunge pool, 8˚C to 9˚C, within a temperature gradient of 8 ˚C to 15 ˚C. In a landscape study relating bull trout distribution to maximum water temperatures, Dunham et al. (2003, p. 900) found that the probability of juvenile bull trout occurrence does not become high (i.e., greater than 0.75) until maximum temperatures decline to 11 ˚C to 12 ˚C.

Although bull trout are found primarily in cold streams, occasionally these fish are found in larger, warmer river systems throughout the Columbia River basin (Buchanan and Gregory 1997, p. 2; Fraley and Shepard 1989, pp. 133, 135; Rieman and McIntyre 1993, pp. 3–4, 1995, p. 287). Availability and proximity of cold water patches and food productivity can influence bull trout ability to survive in warmer rivers (Myrick et al. 2002, pp. 6, 13).

All life history stages of bull trout are associated with complex forms of cover, including large woody debris, undercut banks, boulders, and pools (Fraley and Shepard 1989, p. 137; Goetz 1989, p. 19; Hoelscher and Bjornn 1989, p. 38; Pratt 1992, entire; Rich Jr. 1996, pp. 4–5; Sedell and Everest 1991, entire; Sexauer and James 1997, entire; Thomas 1992, pp. 4–6; Watson and Hillman 1997, p. 238). Maintaining bull trout habitat requires stable and complex stream channels and stable stream flows (Rieman and McIntyre 1993, pp. 5–6). Juvenile and adult bull trout frequently inhabit side channels, stream margins, and pools with suitable cover (Sexauer and James 1997, p. 364). These areas are sensitive to activities that directly or indirectly affect stream channel stability and alter natural flow patterns. For example, altered stream flow in the fall may disrupt bull trout during the spawning period, and channel instability may decrease survival of eggs and young juveniles in the gravel from winter through spring (Fraley and Shepard 1989, p. 141; Pratt 1992, p. 6; Pratt and Huston 1993, p. 70). Pratt (1992, p. 6) indicated that increases in fine sediment reduce egg survival and emergence.

Diet

Bull trout are opportunistic feeders, with food habits primarily a function of size and life-history strategy. Fish growth depends on the quantity and quality of food that is eaten, and as fish grow, their foraging strategy changes as their food changes in quantity, size, or other characteristics. Resident and juvenile migratory bull trout prey on terrestrial and aquatic insects, macrozooplankton, and small fish (Boag 1987, p. 58; Pratt and Huston 1993; Donald and Alger 1993, pp. 242–243; Goetz 1989, pp. 33–34). Subadult and adult migratory bull trout generally feed on various fish species (Donald and Alger 1993, pp. 241–243; Fraley and Shepard 1989, pp. 135, 138; Leathe and Graham 1982, pp. 50–56). Bull trout of all sizes other than fry have been found to eat fish half their length (Beauchamp and Van Tassell 2001, p. 204). In nearshore marine areas of western Washington, bull trout feed on Pacific herring (*Clupea pallasi*), Pacific sand lance (*Ammodytes hexapterus*), and surf smelt (*Hypomesus pretiosus*) (Goetz et al. 2004, p. 105; Washington Department of Fish and Wildlife et al. 1997, p. 23).

Bull trout migration and life history strategies are closely related to their feeding and foraging strategies and their environment. Migration allows bull trout to access optimal foraging areas and exploit a wider variety of prey resources both within, and between, core areas. Connectivity between the spawning, rearing, overwintering, and forage areas maintains this diversity. There have been recent studies documenting movement patterns in the Columbia River basin that document long distance migrations (Barrows, M.G. et al. 2017, entire; Schaller et al. 2014, entire). For example, a data report documented a juvenile bull trout from the Entiat River made over a 322-kilometer (200-mile) migration between spawning grounds in the Entiat River to foraging and overwintering areas in the Columbia and Yakima Rivers near Prosser Dam (Tag Code 3D9.1C2CCD42DD; PTAGIS 2015). In the Skagit River system, anadromous bull trout similarly make migrations as long as 195 kilometers (121 miles) between marine foraging areas in Puget Sound and headwater spawning grounds, foraging on salmon eggs and juvenile salmon along their migration route (Washington Department of Fish and Wildlife et al. 1997, p. 25). Anadromous bull trout also use marine waters as migration corridors to reach seasonal habitats in non-natal watersheds to forage and possibly overwinter (Brenkman and Corbett 2005, pp. 1078–1079; Goetz et al. 2004, entire).

B.1.4 Conservation Needs

The 2015 recovery plan for bull trout established the primary strategy for recovery of bull trout in the coterminous United States: (1) conserve bull trout so that they are geographically widespread across representative habitats and demographically stable; (2) manage and ameliorate the primary threats in each of six RUs at the core area scale such that bull trout are not likely to become endangered in the foreseeable future; (3) work cooperatively with partners to develop and implement bull trout recovery actions in each of the six RUs; and (4) account for new information and future climate effects, apply adaptive management principles and focus on actions, and potentially locations, that provide the greatest resilience to climate-based threats (USFWS 2015b, p. 24).

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

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

The Service has developed a recovery approach that: (1) focuses on the identification of, and effective management of, known and remaining threat factors to bull trout in each core area; (2) acknowledges that some extant bull trout core area habitats will likely change (and may be lost) over time; and (3) identifies and focuses recovery actions in those areas where success is likely to meet our goal of ensuring the certainty of conservation of genetic diversity, life history features, and broad geographical representation of remaining bull trout populations so that the protections of the Act are no longer necessary (USFWS 2015b, pp. 45–46).

To implement the recovery strategy, the bull trout recovery plan establishes the recovery of bull trout will entail effectively managing threats to ensure the long-term persistence of populations and their habitats, ensuring the security of multiple interacting groups of bull trout, and providing habitat conditions and access to them that allow for the expression of various life history forms within each of the six RUs (USFWS 2015b, pp. 50–51). The recovery plan defines four categories of recovery actions that, when implemented and effective, should:

1. Protect, restore, and maintain suitable habitat conditions for bull trout;
2. Minimize demographic threats to bull trout by restoring connectivity or populations where appropriate to promote diverse life history strategies and conserve genetic diversity;
3. Prevent and reduce negative effects of nonnative fishes and other nonnative taxa on bull trout; and
4. Result in actively working with partners to conduct research and monitoring to implement and evaluate bull trout recovery activities consistent with an adaptive

management approach using feedback from implemented, site-specific recovery tasks, and considering the effects of climate change (USFWS 2015b, pp. 50–51).

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

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

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

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

B.1.5 Population Units

The final bull trout recovery plan (USFWS 2015b, entire) designates six bull trout RUs as described above. These units replace the five interim RUs previously identified (64 FR 58910). The Service will address the conservation of these final RUs in our section 7(a)(2) analysis for proposed Federal actions. The recovery plan (USFWS 2015b, entire) identified threats and factors affecting the bull trout within these units. A detailed description of recovery implementation for each RU is provided in separate RUIPs (USFWS 2015e, entire, d, entire, f, entire, g, entire, h, entire, i, entire), which identify recovery actions and conservation recommendations needed for each core area, FMO areas, historical core areas, and research needs areas. Each of the following RUs below is necessary to maintain the bull trout's numbers and distribution, as well as its genetic and phenotypic diversity, all of which are important to ensure the species' resilience to changing environmental conditions. For more details on Federal, State, and tribal conservation actions in this unit, see the actions since listing, contemporaneous actions, and environmental baseline discussions below.

Coastal Recovery Unit

The Coastal RUIP describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015e, entire). The Coastal RU is located within western Oregon and Washington. The RU is divided into three geographic regions: Puget Sound, Olympic Peninsula, and the Lower Columbia River regions. This RU contains 20 core areas comprising 84 local populations and a single potential local population in the historical Clackamas River core area where bull trout had been extirpated and were reintroduced in 2011. This RU also has four historically-occupied core areas that could be re-established (USFWS 2015b, p. 47, e, p. A2).

Although population strongholds do exist across the three regions, populations in the Puget Sound region generally have better demographic status while the Lower Columbia River region exhibits the least robust demography (USFWS 2015e, p. A6). Puget Sound and the Olympic Peninsula currently support the only anadromous local populations of bull trout. This recovery unit also contains ten shared FMO habitats which allow for the continued natural population dynamics in which the core areas have evolved (USFWS 2015e, p. A5). There are four core areas within the Coastal RU that have been identified as current population strongholds: Lower Skagit, Upper Skagit, Quinault, and Lower Deschutes Rivers (USFWS 2015b, p. 79, e, p. A3). These are the most stable and abundant bull trout populations in the RU. The Puget Sound region supports at least two core areas containing a natural adfluvial life history.

The demographic status of the Puget Sound populations is better in northern areas. Barriers to migration in the Puget Sound region are few, and significant amounts of headwater habitat occur in protected areas (USFWS 2015e, p. A7). The current condition of the bull trout in this RU is attributed to the adverse effects of climate change, loss of functioning estuarine and nearshore marine habitats, development and related impacts (e.g., flood control, floodplain disconnection, bank armoring, channel straightening, loss of instream habitat complexity), agriculture (e.g., diking, water control structures, draining of wetlands, channelization, and the removal of riparian vegetation, livestock grazing), fish passage (e.g., dams, culverts, instream flows), residential development, urbanization, forest management practices (e.g., timber harvest and associated road building activities), connectivity impairment, mining, and the introduction of nonnative species (USFWS 2015e, pp. A1–A25). Conservation measures or recovery actions implemented or ongoing include relicensing of major hydropower facilities that have provided upstream and downstream fish passage or complete removal of dams, land acquisition to conserve bull trout habitat, floodplain restoration, culvert removal, riparian revegetation, levee setbacks, road removal, and projects to protect and restore important nearshore marine habitats (USFWS 2015e, pp. A33–A34).

Klamath Recovery Unit

The Klamath RUIP describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015f, entire). The Klamath RU is located in southern Oregon and northwestern California. The Klamath RU is the most significantly imperiled RU, having experienced considerable extirpation and geographic contraction of local populations and declining demographic condition, and natural re-colonization is constrained by dispersal barriers and presence of nonnative brook trout (USFWS 2015b, p. 39). This RU currently contains three core areas and eight local populations (USFWS 2015b, p. 47, f, p. B1). Nine historical local populations of bull trout have become extirpated (USFWS 2015f, p. B1). All three core areas have been isolated from other bull trout populations for the past 10,000 years (USFWS 2015f, p. B3). The current condition of the bull trout in this RU is attributed to the adverse effects of climate change, habitat degradation and fragmentation, past and present land use practices, agricultural water diversions, nonnative species, and past fisheries management practices (USFWS 2015f, pp. B13–B14). Conservation measures or recovery actions implemented include removing nonnative fish (e.g., brook trout, brown trout, and hybrids), acquiring water rights for instream flows, replacing diversion structures, installing fish screens, constructing bypass channels, installing riparian fencing, replacing culverts, and restoring habitat (USFWS 2015f, pp. B10–B11).

Mid-Columbia Recovery Unit

The Mid-Columbia RUIP describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015g, entire). The Mid-Columbia RU is located within eastern Washington, eastern Oregon, and portions of central Idaho. The Mid-Columbia RU is divided into four geographic regions: Lower Mid-Columbia, Upper Mid-Columbia, Lower Snake, and Mid-Snake geographic regions. This RU contains 24 occupied core areas comprising 142 local populations, 2 historically-occupied core areas, 1 research needs area, and 7 FMO habitats (USFWS 2015g, pp. C1–C4, b, p. 47). The current condition of the bull trout in this RU is attributed to the adverse effects of climate change, agricultural practices (e.g., irrigation, water withdrawals, livestock grazing), fish passage (e.g., dams, culverts), nonnative species, forest management practices, and mining (USFWS 2015g, pp. C9–C34). Conservation measures or recovery actions implemented include road removal, channel restoration, mine reclamation, improved grazing management, removal of fish barriers, and instream flow requirements (USFWS 2015g, pp. C37–C40).

Columbia Headwaters Recovery Unit

The Columbia Headwaters RUIP describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015d, entire). The Columbia Headwaters RU is located in western Montana, northern Idaho, and the northeastern corner of Washington. The Columbia Headwaters RU is divided into five geographic regions: Upper Clark Fork, Lower Clark Fork, Flathead, Kootenai, and Coeur d'Alene geographic regions (USFWS 2015d, pp. D2–D4). This RU contains 35 bull trout core areas, 15 of which are complex core areas as they represent larger interconnected habitats and 20 simple core areas as they are isolated headwater lakes with single local populations. The 20 simple core areas are each represented by a single local population, many of which may have persisted for thousands of years despite small populations and isolated existence (USFWS 2015d, p. D1). Fish passage improvements within the RU have reconnected some previously fragmented habitats (USFWS 2015d, p. D42), while others remain fragmented. Unlike the other RUs in Washington, Idaho, and Oregon, the Columbia Headwaters RU does not have any anadromous fish overlap (USFWS 2015d, p. D42). Therefore, bull trout within the Columbia Headwaters RU do not benefit from the recovery actions for salmon (USFWS 2015d, p. D42). The current condition of the bull trout in this RU is attributed to the adverse effects of climate change, mostly historical mining and contamination by heavy metals, expanding populations of nonnative fish predators and competitors, modified instream flows, migratory barriers (e.g., dams), habitat fragmentation, forest practices (e.g., logging, roads), agriculture practices (e.g., irrigation, livestock grazing), and residential development (USFWS 2015d, pp. D10-25). Conservation measures or recovery actions implemented include habitat improvement, fish passage, and removal of nonnative species (USFWS 2015d, pp. D42–D43).

Upper Snake Recovery Unit

The Upper Snake RUIP describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015i, entire). The Upper Snake RU is located in central Idaho, northern Nevada, and eastern Oregon. The Upper Snake RU is divided into seven geographic regions: Salmon River, Boise River, Payette River, Little Lost River, Malheur River, Jarbidge River, and Weiser River. This RU contains 22 core areas and 207 local populations, with almost 60 percent being present in the Salmon River Region (USFWS 2015b, p. 47, i, pp. E1–E2). The current condition of the bull trout in this RU is attributed to the adverse effects of climate change, dams, mining, forest management practices, nonnative species, and agriculture (e.g., water diversions, grazing; USFWS 2015i, pp. E15–E18). Conservation measures or recovery actions implemented include instream habitat restoration, instream flow requirements, screening of irrigation diversions, and riparian restoration (USFWS 2015i, pp. E19–E20).

Saint Mary Recovery Unit

The Saint Mary RUIP describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015h, entire). The Saint Mary RU is located in Montana but is heavily linked to downstream resources in southern Alberta, Canada. Most of the Saskatchewan River watershed, which the Saint Mary River flows into, is located in Canada. The United States portion includes headwater spawning and rearing habitat and the upper reaches of FMO habitat. This RU contains four core areas and seven local populations (USFWS 2015h, p. F1) in the U.S. headwaters. The current condition of the bull trout in this RU is attributed primarily to the outdated design and operations of the Saint Mary Diversion operated by the Bureau of Reclamation (e.g., entrainment, fish passage, instream flows), and, to a lesser extent, habitat impacts from development and nonnative species (USFWS 2015h, pp. F7–F8). Conservation measures or recovery actions implemented or ongoing are not identified in the Saint Mary RUIP; however, the Service is conducting interagency and tribal coordination to accomplish conservation goals for the bull trout (USFWS 2015h, p. F9).

B.1.6 Federal, State, and Tribal Actions Since Listing

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

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

At sites that are vulnerable to development, protection of land through fee title acquisition or conservation easements is important to prevent adverse impacts or allow conservation actions to be implemented. In several bull trout core areas, it is necessary to continue ongoing fisheries management efforts to suppress the effects of nonnative fish competition, predation, or hybridization (particularly brown trout, brook trout, lake trout, and northern pike; DeHaan and Godfrey 2009, entire; Fredenberg et al. 2007, entire). A more comprehensive overview of conservation successes from 1999-2013, described for each RU, is found in the Summary of Bull Trout Conservation Successes and Actions since 1999 (available at https://docslib.org/doc/2858051/usfws-u-s-fish-and-wildlife-service-2013-summary-of-bull-trout-conservation-successes-and-actions-since-1999).

Projects that have undergone section 7 consultation have occurred throughout the range of bull trout. Singly or in aggregate, these projects could affect the species' status. The Service has conducted periodic reviews of prior Federal "consulted-on" actions. A discussion of consulted-on effects in the proposed action area is provided in the environmental baseline section in 4.2.

Appendix C: Monitoring and Tracking Reports

Project Form

Dear Applicant: Please contact your project manager at the U.S. Army Corps of Engineers if there are changes to the information on this form after the project has been completed.

Permit No.: NWW-_______-______________

Applicant Name:____

Applicant Contact Information: ____

Name of Project:____

Date Project Installation to Begin: ____

Contractor Name: ____

Location of Project (lat/long):____

1. How many days will be needed to complete construction from start to finish? ________

2. Will in-water work occur during construction? **Circle: YES or NO**

3. Will this project include installation of a dock? **Circle: YES or NO**
   a. If yes, please provide dimensions in feet: ___________________________________

4. Will this project include installation of a pier? **Circle: YES or NO**
   a. If yes, please provide dimensions in feet: ___________________________________

5. Will this project include installation of a marine launching rail? **Circle: YES or NO**
   a. If yes, please provide dimensions in feet: ___________________________________

6. Will this project include installation of mooring piles? **Circle: YES or NO**
   a. If yes, please provide the number of piles to be installed:________________________

7. Will this project include installation of a portable boat lift station? **Circle: YES or NO**
   a. If yes, please provide dimensions in feet: ___________________________________
   b. If a second portable boat lift station will be installed, please provide the dimensions of it in feet:____

8. Will this project include installation of a small waterline intake? **Circle: YES or NO**

9. Will this project include installation of a mooring buoy? **Circle: YES or NO**
   a. If yes, what type of anchor was used? ______________________________________
   b. If yes, what were the dimensions of the anchor in feet? ________________________

10. Will impact pile driving or proofing of **steel** piles occur during construction?

Circle: YES or NO

   a. If yes, please provide the **total** number of steel piles that will be required to have impact pile driving or proofing for **all** authorized structures (docks, piers, and/or mooring piles) that will be installed under the permit ___________________________
   b. Please circle "NO" for 10 if:
      a. ONLY vibratory pile driving will occur or,
      b. No proofing of piles will occur, or
      c. Piles will not be not made of steel.

11. Will treated wood be used for any structure installed under this permit?

    Circle: YES or NO

    a. If yes, will treated wood have direct contact with water? **Circle: YES or NO**

12. Will light penetrative decking with at least 60 percent open area on grating or greater than 90 percent light transmittance for clear translucent material (as rated by the manufacturer) be used in the construction of a pier or dock?
Circle: YES or NO

Permit Number	Applicant Name	Project Name	Date Project Completed	GPS location in decimal degrees	Total Number of Days of Construction	Dimensions of Pier or Floating Dock (ft)	Dimensions of Marine Launching Rail (ft)	Number of Mooring Piles	Portable Boat Lift Stations - number installed and dimensions of each (ft for each)	Number of Small diameter waterline intakes with 3/32" screen (max 1)	Was the small diameter waterline installed within 1/4 mi of any excluded stream or North Gold Creek (yes or no)	Mooring Buoy - include type of anchor used and dimensions	Total number of piles driven or proofed using an impact hammer	Was treated wood used for any structure installed	If treated wood was used, is it in direct contact with water?

Appendix D: Calculator Screenshots

Sound Exposure Level Calculator for Marbled Murrelet and Bull Trout

This spreadsheet was developed as an in-house tool for USFWS staff to use when assessing the effects to marbled murrelets and/or bull trout from impact pile driving. The USFWS makes this spreadsheet available to other users, and assumes no responsibility for errors when this tool is used by non-USFWS staff. Use this spreadsheet to calculate the distance to various thresholds for both marbled murrelets and bull trout. The calculations incorporate the concept of effective quiet (EQ) wherein we assume that the energy from pile strikes below a certain SEL does not accumulate to cause injury.

Please contact the following USFWS staff member to report errors or submit questions: Lee Corum, USFWS, Washington Fish and Wildlife Office, Lacey, WA, 360-764-3527 or Lee_Corum@fws.gov

Inputs Select from drop-down menu or enter project-specific data	
Pile Material	Steel
Pile Type	Pipe
Pile Diameter (inches)	12-inch
	SteelPipe12-inch
Piles Per Day (Maximum)	16
Pile Strikes Per Pile (Maximum)	12
Pile Strikes Per Day (Maximum)	192
Minutes of pile driving per day (assuming 40 strikes per minute)	4.8
dB Attenuation (from devices such as bubble curtains)	

	Unattenuated	Other data
Peak Single Strike (dB re: 1μPa)	207	
RMS Single Strike (dB re: 1μPa)	189	
SEL Single Strike (dB re: 1μPa²s)	173	
Cumulative SEL (dB re: 1μPa²s)	196	
Distance of Sound Pressure Level measurements from source:	10	
Data Source:	Laughlin 2006	

Sound data for impact pile driving

Bull Trout Effects

Effects Category	Bull Trout Injury Threshold	Radii of Area of Effects (meters)	Radii of Area of Effects (feet)	Area of Effects (km^2)
Bull Trout ≤ 2 grams	183 dB_{SEL} re: 1 μPa²s	72	235	0.02
Bull Trout > 2 grams	187 dB_{SEL} re: 1 μPa²s	39	127	0.00
	206 dB_{Peak} re: 1 μPa	12	38	0.00

Murrelet-specific information

Murrelet stratum of work location	
Total Piles Installed During Summer (between April-Sept for Life of Project)	
Total Piles Installed During Winter (between Oct-Mar for Life of Project)	
Will Murrelet Monitoring Occur?	
Percentage of Total Murrelet Auditory Injury Area of Effect that is Land	

Marbled Murrelet Effects

Effects Category	Marbled Murrelet Thresholds	Radii of Area of Effects (meters)	Radii of Area of Effects (feet)	Area of Effects (km^2)
Masking (When impact pile-driving is more than intermittent proofing)	Piles ≤ 24 inches in diameter	42	138	0.01
Injury	202 dB_{SEL} re: 1 μPa²s	4	13	0.00
Barotrauma	208 dB_{SEL} re: 1 μPa²s	2	5	0.00

Constants and Thresholds / Guidelines	
Single Strike SEL for Effective Quiet	150
Transmission Loss Constant	15

Bull Trout & Marbled Murrelet Effects

Effects Category	Criteria	Radii of Area of Effects (meters)	Radii of Area of Effects (feet)	Area of Effects (km^2)
Effective Quiet	150 dB_{SEL} re: 1 μPa²s	341	1,120	0.37
Potential Behavioral Response	150 dB_{RMS} re: 1 μPa	3,981	13,058	49.79

Areas around the project where individuals may be affected by sound from pile driving

Figure 7: Impact Pile Driving Sound Calculation without Attenuation

Sound Exposure Level Calculator for Marbled Murrelet and Bull Trout

This spreadsheet was developed as an in-house tool for USFWS staff to use when assessing the effects to marbled murrelets and/or bull trout from impact pile driving. The USFWS makes this spreadsheet available to other users, and assumes no responsibility for errors when this tool is used by non-USFWS staff. Use this spreadsheet to calculate the distance to various thresholds for both marbled murrelets and bull trout. The calculations incorporate the concept of effective quiet (EQ) wherein we assume that the energy from pile strikes below a certain SEL does not accumulate to cause injury.

Please contact the following USFWS staff member to report errors or submit questions: Lee Corum, USFWS, Washington Fish and Wildlife Office, Lacey, WA, 360-784-3527 or Lee_Corum@fws.gov

Inputs Select from drop-down menu or enter project-specific data	
Pile Material	Steel
Pile Type	Pipe
Pile Diameter (inches)	12-inch
Piles Per Day (Maximum)	16
Pile Strikes Per Pile (Maximum)	12
Pile Strikes Per Day (Maximum)	192
Minutes of pile driving per day (assuming 40 strikes per minute)	4.8
dB Attenuation (from devices such as bubble curtains)	5

Sound data for impact pile driving	Attenuated	Other data
Peak Single Strike (dB re: 1 μPa)	202	
RMS Single Strike (dB re: 1 μPa)	184	
SEL Single Strike (dB re: 1 μPa²s)	168	
Cumulative SEL (dB re: 1 μPa²s)	191	
Distance of Sound Pressure Level measurements from source:	10	
Data Source:	Laughlin 2006	

Murrelet-specific information

Murrelet stratum of work location	
Total Piles Installed During Summer (between April-Sept for Life of Project)	
Total Piles Installed During Winter (between Oct-Mar for Life of Project)	
Will Murrelet Monitoring Occur?	
Percentage of Total Murrelet Auditory Injury Area of Effect that is Land	

Constants and Thresholds / Guidelines	
Single Strike SEL for Effective Quiet	150
Transmission Loss Constant	15

Areas around the project where individuals may be affected by sound from pile driving

Bull Trout Effects

Effects Category	Bull Trout Injury Threshold	Radii of Area of Effects (meters)	Radii of Area of Effects (feet)	Area of Effects (km²)
Bull Trout ≤ 2 grams	183 dB_{SEL} re: 1 μPa²s	33	109	0.00
Bull Trout > 2 grams	187 dB_{SEL} re: 1 μPa²s	18	59	0.00
	206 dB_{Peak} re: 1 μPa	5	18	0.00

Marbled Murrelet Effects

Effects Category	Marbled Murrelet Thresholds	Radii of Area of Effects (meters)	Radii of Area of Effects (feet)	Area of Effects (km²)
Masking (When impact pile-driving is more than intermittent proofing)	Piles ≤ 24 inches in diameter	42	138	0.01
Injury	202 dB_{SEL} re: 1 μPa²s	2	6	0.00
Barotrauma	208 dB_{SEL} re: 1 μPa²s	1	2	0.00

Bull Trout & Marbled Murrelet Effects

Effects Category	Criteria	Radii of Area of Effects (meters)	Radii of Area of Effects (feet)	Area of Effects (km²)
Effective Quiet	150 dB_{SEL} re: 1 μPa²s	158	520	0.08
Potential Behavioral Response	150 dB_{RMS} re: 1 μPa	1,848	6,061	10.73

Figure 8: Impact Pile Driving Sound Calculation with Attenuation