United States Department of the Interior

U.S. Fish and Wildlife Service

Idaho Fish and Wildlife Office - Spokane
11103 East Montgomery Drive
Spokane Valley, Washington 99206
Telephone (509) 891-6839
www.fws.gov/idaho

Lt. Col. Christian Dietz
Department of the Army, Corps of Engineers
Northwestern Division, Walla Walla District
Regulatory Division
201 N. 3rd Ave.
Walla Walla, WA 99362

March 17, 2020

Subject: Regional General Permit 27 – Lake Pend Oreille and Pend Oreille River—Bonner County, Idaho—Biological Opinion
In Reply Refer to: 01EIFW00-2020-F-0423

Dear Lt. Col. Dietz:

Enclosed are the U.S. Fish and Wildlife Service's (Service) Biological Opinion (Opinion) and concurrence with the Army Corps of Engineers' (Corps) determinations of effect on species listed under the Endangered Species Act (Act) of 1973, as amended, for the proposed Regional General Permit 27 – Lake Pend Oreille and the Pend Oreille River - 2020 in Bonner County, Idaho. In an email dated November 25, 2019 and received by the Service on the same date, the Corps provided a final Biological Assessment (Assessment) accepted by the Service, which initiated formal consultation on the determination under section 7 of the Act. The Corps determined that the proposed action is likely to adversely affect bull trout (*Salvelinus confluentus*) and is not likely to adversely affect bull trout critical habitat. The Corps also determined that the proposed project will have no effect on Canada lynx (*Lynx canadensis*) and grizzly bear (*Ursus horribilis*) (Corps 2019, p. 42). The Service acknowledges these determinations.

The enclosed Opinion and concurrence are based primarily on our review of the proposed action, as described in the Assessment, and the anticipated effects of the action on listed species, and were prepared in accordance with section 7 of the Act. Our Opinion concludes that the proposed project will not jeopardize the survival and recovery of bull trout. A complete record of this consultation is on file at this office.

<u>Clean Water Act and Rivers and Harbors Act:</u>

This Opinion is also intended to address section 7 consultation requirements for the issuance of any project-related Department of the Army (DA) permits required under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899. Use of this letter and associated 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 DA permitting process must be consistent with the proposed project 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 DA permit must also be consistent with conservation measures and terms and conditions as described in the Assessment and addressed in this letter and Biological Opinion.

Thank you for your continued interest in the conservation of threatened and endangered species. Please contact Cara Christofferson (509) 891-6839 at the Service's Northern Idaho Field Office in Spokane or Chris Reighn at (208) 378-5264 at the Service's Idaho Fish and Wildlife Office in Boise if you have questions concerning this Opinion.

Sincerely,

Patricia C. Johnson-Hughes

for Christopher Swanson
Acting State Supervisor

Enclosure

cc: USACE, Walla Walla (W. Schrader)
Service, NIFO (C. Christofferson)
Service, IFWO (C. Reighn)

BIOLOGICAL OPINION
FOR THE
Regional General Permit 27 – Lake Pend Oreille and Pend Oreille River - 2020

Project Number: 01EIFW00-2020-0423

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

Supervisor Patricia C. Johnson-Hughes
for Christopher Swanson
Acting State Supervisor

Date ____March 17, 2020______________________

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1. BACKGROUND AND INFORMAL CONSULTATION

1.1 Introduction

The U.S. Fish and Wildlife Service (Service) has prepared this Biological Opinion (Opinion) of the effects of the Regional General Permit 27 (RGP-27) – Lake Pend Oreille and Pend Oreille River on bull trout (*Salvelinus confluentus*). In an email dated November 25, 2019 and received by the Service on the same date, the U.S. Army Corps of Engineers, Walla Walla District (Corps) provided a final Biological Assessment (Assessment) accepted by the Service, which initiated formal consultation on the determination under section 7 of the Act. The Corps that the proposed action is likely to adversely affect bull trout (*Salvelinus confluentus*) and is not likely to adversely affect bull trout critical habitat. The Corps also determined that the proposed project and will have no effect on Canada lynx (*Lynx canadensis*) and grizzly bear (*Ursus horribilis*) (Corps 2019, p. 42). The Service acknowledges these determinations.

The enclosed Opinion and concurrence are based primarily on our review of the proposed action, as described in your November 25, 2019 Assessment, and the anticipated effects of the action on listed species, and were prepared in accordance with section 7 of the Act. Our Opinion concludes that the proposed project will not jeopardize the survival and recovery of bull trout. A complete record of this consultation is on file at this office.

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.

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)).

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. 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. 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. The history identified below is specifically for this Opinion covering 2020 through 2025.

November 1, 2019	The Corps provided a draft Assessment to the Service.
November 6-7, 2019	The Service and Corps discussed whether any triggers for reinitiation of consultation have occurred, other than authorized take as determined by the number of permits issued.
November 25, 2019	The Corps agreed with comments and edits in draft Assessment. The Service accepted the Assessment as sufficient to initiate formal consultation.
January 6, 2020	The Corps and Service agree on effects of the action.
February 10, 2020	The Service provided a draft Opinion to the Corps for review.
February 11, 2020	The Corps provided comments on the draft Opinion to the Service.

1.3 Informal Consultations

The Corps has determined the proposed Program is not likely to adversely affect bull trout critical habitat. Rationale for the Service's concurrence with the Corps' findings is provided below and is based on information provided in the Assessment and other sources.

1.3.1 Bull trout Critical Habitat

Service concurrence that the proposed Program is not likely to adversely affect bull trout Critical Habitat is based on the following rationale:

- All Critical Habitat within the action area is Foraging, Migrating, and Overwintering (FMO). No spawning or rearing habitat occurs within the action area.
- Permit activities will occur within or adjacent to bull trout Critical Habitat, but design features and conservation measures described in the proposed action would reduce to insignificant or eliminate potential effects to physical and biological factors (PBFs).
- The proposed action is expected to cause slight degradation of several baseline indicators related to littoral productivity and the shoreline environment, and to increase predator habitat. Such impacts would be minimized and would be expected to have especially minor effects because of conservation measures.
- Sound pressure waves and clouds of turbidity produced by pile driving activities would temporarily affect PBF's 2 and 8 (impediments to foraging and other movements and water quality, respectively), but effects are insignificant because they would occur in a small area and for a short period of time.
- Littoral productivity (PBF 3) reduced by overhead shading caused by piers, docks, and marine launching rails is insignificant due to the small amount of area becoming shaded.

This affect is also reduced through design features required translucent surfaces of some features within some areas.

- Effects to PBF 4 (complex shoreline environments) are not significant because of the small amount of shoreline to be affected.
- Water temperature (PBF 5) may be slightly improved for bull trout (cooler) but would be insignificant due the small amount of area becoming shaded.
- Water quality (PBF 8) will not be significantly affected because the amount of water withdrawn through water intakes is negligible and the turbidity clouds resulting from pile-driving will be small and short-term.
- The amount of non-native, predatory fish (PBF 9) may be affected, however, it likely that the populations will stay the same but concentrate more around structure provided by piers, docks, and marine launching rails.

2. BIOLOGICAL OPINION

2.1 Description of the Proposed Action

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

2.1.1 Action Area

The action area is the portions of Lake Pend Oreille, Pend Oreille River, and their tributaries that are inundated by the summer pool elevation of 2062.5 feet, in Bonner and Kootenai Counties, Idaho. Certain areas within these waters are excluded from RGP-27 and are described below.

2.1.2 Proposed Action

The proposed action is to renew RGP-27. The RGP-27 allows the Corps to authorize installation, replacement, repair 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. These activities were submitted in the Corps' Assessment and are identified below.

Piers and Floating Docks

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

- One pier or floating dock is authorized for each riparian property owner.
- The facility will be for noncommercial activities only.
- Piers or floating docks will extend into the waterway no further than the line of navigation. In no case will the pier or dock extend more than 100 feet waterward of the elevation 2,062.5 National Geodetic Vertical Datum (NGVD), regardless of depth.
- Total deck area of a single-use pier or floating dock, including the access ramp, will not exceed 700 square feet. Total deck area of a joint-use pier or floating dock, including portions of the access ramp extending waterward of elevation 2,062.5 NGVD, will not exceed 1,100 square feet.
- Only open-pile pier construction is authorized. The maximum size for steel piles is 10-inches in diameter. Pilings will be driven directly into the lake/stream substrate or set in excavated footings. No more than 10 cubic yards will be excavated for footings. Footings will be backfilled with native material, concrete, sand, gravel, grout or epoxy. All excavation and filling of footings will be done in the dry during low water conditions. All excess excavated material will 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. Concrete piles may occasionally be used but will only be constructed in the dry during low water conditions because they require footings.

- No other structures, such as living quarters, toilets, fueling facilities, or hard-covered boat moorages shall be constructed or installed on any dock or pier.
- Floating docks shall be designed to contain encapsulated flotation material under all conditions. Open cell polystyrene (beaded Styrofoam) or industrial drums are not allowed under any circumstance.
- Piers and floating docks will be constructed perpendicular to the shore and no more than eight feet of shoreline vegetation will be disturbed at the access point to the pier or dock.
- In-water pile driving will use a bubble curtain and a six-inch minimum thick wood, rubber, or synthetic cushion block between the driving apparatus and the pile while driving the piles.
- 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 United States.

Marine Launching Rails

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

- Marine launching rails will 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 will not extend more than 200 feet waterward of the elevation 2,062.5 NGVD and will not be greater than 10 feet in width.
- Construction of marine launching rails will be done in the dry during low water conditions.

Mooring Piles

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

- Mooring piles will be for noncommercial use.
- Piles will be single, separate and not constructed so as to form a dolphin (a group of piles, typically 3 or 4, tied together).
- 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 (up to 100 feet waterward).

- In-water pile driving will use a bubble curtain and a six-inch minimum thick wood, rubber, or synthetic cushion block between the driving apparatus and the pile. Steel piles may not be larger than 10-inches in diameter.
- Concrete piles may occasionally be used but will only be constructed in the dry during low-water conditions because they require footings.

Portable Boat Lift Stations

A maximum of two portable, pneumatic 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 existing, authorized float 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.

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 two inches, though the intake manifold may be larger.
- 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 the 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.

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 ordinary high water mark or to length of the permitted dock (up to 100 feet waterward).

The renewal of RGP-27 will last for five years, and it is estimated that approximately 200 to 250 permits will be issued (for both new construction and maintenance/repair of facilities) during the five-year term of this RGP-27. The majority of these would include a dock or pier, with a lesser number of associated structures (i.e. marine launching rails, mooring piles, portable boat lift stations, water intakes, or mooring buoys). The purpose of RGP-27 is to expedite the authorization of recurring activities that are similar in nature.

Conservation Measures

During the 2002 consultation for RGP-27, exclusion areas were designated to avoid or minimize the effects of activities implemented under RGP-27 on bull trout. The 2020 proposed action no longer includes the upper end of Sagle Slough and Fry Creek as designated exclusion areas. This is based on the limited use of bull trout in Sagle Slough due to high water temperatures and no bull trout of any lifestage being found in Fry Creek during an electrofishing survey conducted in the summer of 2018 (Dux pers. comm. 2019). These exclusion areas prohibit the use of RGP-27 to authorize the construction of the non-commercial structures addressed herein for a radius of 100 yards of either side of the mouth of bull trout spawning streams. The exclusion areas are listed below and identified in Figure 1.

Exclusion areas include:

- 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, and;
- areas that provide important wildlife habitat:
    - Clark Fork Delta, from the confluence of Lightning Creek and the Clark Fork River, west to the range line between Range 1E and Range 2E,
    - Denton Slough, located in 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 Pend Oreille River from the half section line of Section 16, T 56 N, R 3W, south to the south section line of Sec. 21, T 56N, R 3W,
    - Cocolalla Slough/Creek, upstream from the Spokane International Railroad Bridge across the slough,
    - Scenic Bay of Lake Pend Oreille which provides important kokanee spawning habitat, and
    - Areas within 0.5 miles of an active bald eagle nest.

Installation of light penetrative decking (e.g. grating or clear translucent material) will be required for docks constructed between 100 yards and one-quarter mile on each side of the mouth of exclusion streams. Light penetrative decking will also be required for construction of docks near known kokanee spawning areas to reduce potential impacts to kokanee as they are a prey base for bull trout. Grating or clear translucent material will be required to cover the entire surface area of the piers and ramps; grating must have at least 60 percent open area and clear translucent material must have greater than 90 percent light transmittance (as rated by the manufacturer).

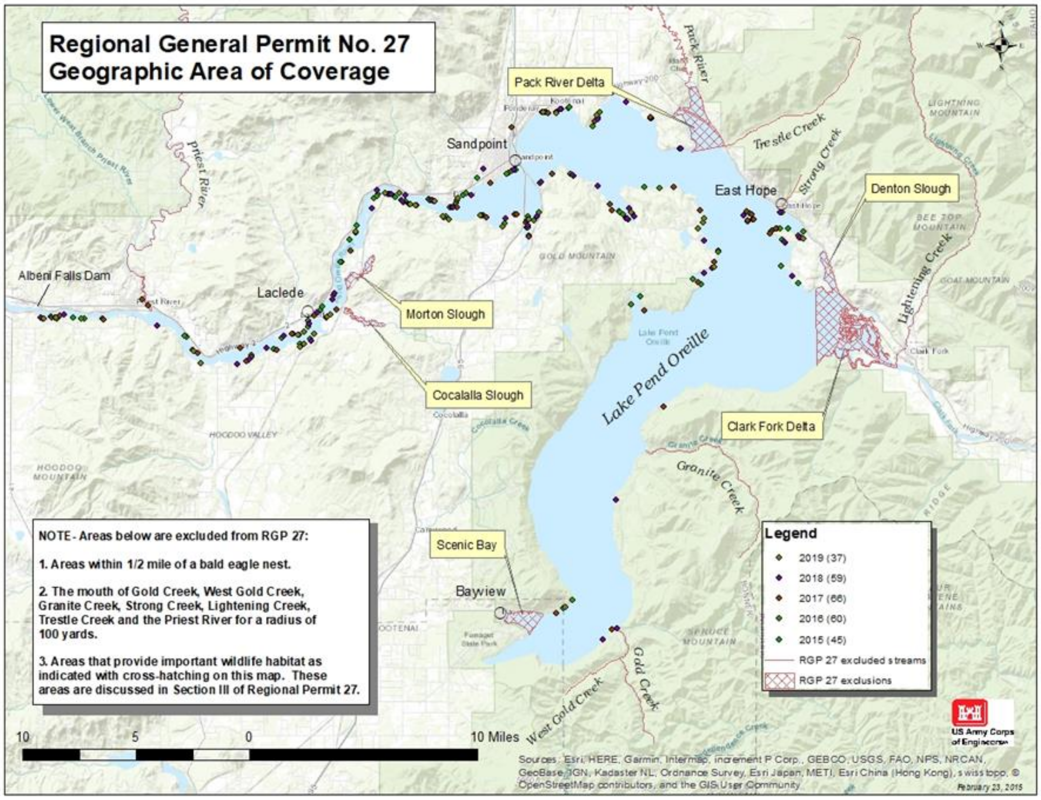

Figure 1. RGP-27 geographic area of coverage, exclusion areas and locations of authorized actions from 2015 to 2019.

Conservation measures designed to minimize the potential effects of riparian vegetation removal include the following:

- No more than eight linear feet of existing riparian vegetation will be cleared on any property to construct a pier or floating dock.
- 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.
- Disturbed shoreline or riverbank will be treated with appropriate soil erosion control measures to minimize sediment delivery into the water.
- Disturbed soils will be revegetated with native plant species.

Implementation of these conservation measures is mandatory, and thus, by definition, part of the proposed action.

Monitoring and Tracking

The Corps will submit regular tracking and monitoring reports (Appendix A) to the Service on the use of RGP-27. Monitoring reports will be submitted three and six months after completion of consultation, and then annually for a period of five years. The monitoring report will include a map indicating the locations of activities authorized under RGP-27, activity type (dock, pier, or launch rail, mooring pile, portable lift station, water intake, or mooring buoy), general footprint size of the facility, and general construction type. The monitoring report will also include a discussion of any compliance or enforcement issues associated with the RGP and how these issues were resolved and proposals for any revisions to the consultation. Revisions may include, but are not limited to, changes in general conservation measures, changes in approved work windows, changes in specific activity parameters, and/or additional activities. These revisions may require initiation of section 7 consultation by the Corps to authorize the individual applicant.

2.1.3 Term of the Action

This Opinion covers actions under RGP-27 as described in the proposed action from April 1, 2020 through March 31, 2025 or until reinitiation of consultation is required (see Reinitiation Notice of this Opinion), whichever occurs first.

2.2 Analytical Framework for the Jeopardy and Adverse Modification Determinations

2.2.1 Jeopardy Determination

Section 7(a)(2) of the Act requires that Federal agencies insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any listed species. Regulations implementing section 7 define "jeopardize the continued existence" as "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). In accordance with policy and regulation, the jeopardy analysis in this Opinion relies on four components:

1. The Status of the Species, which evaluates the species' rangewide condition, the factors responsible for that condition, and its survival and recovery needs;
2. The Environmental Baseline, which evaluates the condition of the species in the action area, 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, which determines the consequences of the proposed Federal action; and
4. The Cumulative Effects, which evaluates the effects of future, non-Federal activities reasonably certain to occur in the action area on the species.

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

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 2015a, 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.

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

2.3 Status of the Species

This section presents information about the regulatory, biological and ecological status of bull trout at a rangewide scale that provides context for evaluating the significance of probable effects caused by the proposed action.

2.3.1 Bull Trout

The status of bull trout is provided in Appendix B of this document.

2.4 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 and private actions which are contemporaneous with the consultation in process. The consequences to the 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).

2.4.1 Bull Trout

2.4.1.1 Status of the Bull Trout in the Action Area

Regulations implementing the ESA (50 CFR 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area which have undergone section 7 consultation and the impacts of State and private actions which are contemporaneous with the consultation in progress.

The number of authorizations granted for actions prior to 1986 under RGP-27 is unknown. From 1986 through September 2019, the Corps had authorized 1,972 final actions under RGP-27. The majority of these actions were for docks and piers. These actions have likely resulted in an estimated 15,570 feet of shoreline alteration, which translates to approximately 1.72 percent of the action area shoreline.

Bull trout from several separate adfluvial populations constituting the Lake Pend Oreille Core Area have been documented throughout the action area. Adfluvial bull trout spawn in tributary waters where juveniles rear from one to four years before migrating to the lake where they grow to maturity (ITD 2006, p. 25). Bull trout most likely use the action area in the course of migrating between spawning habitat, and as foraging, rearing and overwintering habitat in Pend Oreille Lake and River, and Clark Fork River. Adult bull trout generally use the Pend Oreille

River in September and October (and later) post spawn, and May and June pre-spawn. Some adult bull trout are alternate year spawners and use the action area for the entire year. Others spend the entire winter in the Pend Oreille River while some overwinter in Lake Pend Oreille (Scholz et al. 2005, p.3).

Bellgraph (2009, pp. 2, 9-10) reported that four bull trout captured below Albeni Falls Dam in 2008 were genetically assigned to bull trout spawning populations associated with the action area. Most likely genetic assignments included Grouse, Trestle, Rattle, Lightning, Gold, or Morris Creeks. These fish, implanted with radio transmitters, migrated upriver, were detected at monitoring stations located at Dover, Idaho (upstream of Albeni Falls Dam), and were presumed to have migrated to and resided in Lake Pend Oreille until the fall 2008. Two of the radio-tagged fish were later detected in fall 2008 near Grouse and Lightning Creeks. Scholz et al. (2005, pp. 24-25) captured two fish below Albeni Falls Dam in 2004, implanted them with radio tags, and released them above the dam. Both fish moved upstream, were detected at Dover, Idaho, and were presumed to enter Lake Pend Oreille. One fish was later detected in Lightning Creek. Dupont et al. (2007, p. 1269) captured and radio-tagged six bull trout in 2002 in the Middle Fork East River, which is a tributary to the Priest River, which is a tributary to the Pend Oreille River. Four of the six radio-tagged bull trout migrated up the Pend Oreille River and were detected at a monitoring station located at Dover, Idaho. Two of these fish generally remained within 0.6 miles upstream of Long Bridge at the mouth of the Pend Oreille River, throughout the winter from November into May (one fish remained within 0.6 miles upstream of Long Bridge through May), while the other two fish were presumed to enter Pend Oreille Lake (Dupont et al. 2007, pp.1271-1272). According to the IDFG (*in litt*. 2009, p.1), two of the radio-tagged fish in the Dupont et al. (2007) study that remained near the outlet of Pend Oreille Lake throughout the winter were often located under the Burlington Northern Santa Fe (BNSF) railroad bridge. Thus these two fish apparently remained within an area of Pend Oreille Lake near the BNSF trestle throughout the winter from November through May.

In Trestle Creek, a tributary to Lake Pend Oreille, Downs et al. (2006, p. 198) found bull trout juvenile (age 1, and occasionally up to age 3) emigration from Trestle Creek to Lake Pend Oreille (out-migration) occurs in two distinct pulses; spring and fall (Downs et al. 2006, p. 198). Peak bull trout movement occurs between dusk to dawn (Downs et al. 2006, p. 193). The pattern of movement within Trestle Creek suggests that adult bull trout migrate primarily from dusk until dawn within other tributaries to Lake Pend Oreille as well. This may be a mechanism to reduce their vulnerability to predation in smaller stream systems (Downs et al. 2006, p. 195). Smaller bull trout (fry) often use side channels and lateral habitat characterized by low water velocity and structural protection (ITD 2006, p. 29).

Downs and Jakubowski (2007, p. 46) conducted a study in Trestle Creek, a tributary to Lake Pend Oreille, to study bull trout life-history and survival. The first three years of the study (2000-2002) involved the capture and marking of bull trout, and the subsequent four years involved recapture of marked individuals to estimate survival rates and life-history parameters. A total of 29 unique bull trout originally marked as juveniles in 2000, were detected in Trestle Creek as returning adults (10.7 percent). Of the 350 juveniles originally marked outmigrating from Trestle Creek in 2001, 51 unique individuals (14.6 percent) had returned by 2006. Twenty-three unique individuals (7.6 percent) from the 2002 marking group had returned. No previously undetected adult bull trout from the 2000 juvenile marking group returned to Trestle Creek during 2006, although two fish from the marking group that returned in 2004, also returned in 2006 (Downs and Jakubowski 2007, p. 47).

Bull trout, both adults and juveniles, are likely to be present in the action area at all times of the year, particularly during spring and fall months. Data collected by the IDFG from 1980 to 2008 show bull trout abundance in 2008 was nearly the same as in 1999 with 12,134 bull trout documented in Lake Pend Oreille in April 1999 and 12,513 (McGubbins et al 2016, p. 1274-1275). The IDFG annual trap and gill netting program targeting the removal of lake trout in Pend Oreille Lake found approximately 4,000 adult spawning bull trout and 8,000 juvenile bull trout occupying the lake at any given time (McCubbins et al 2016, p. 1274). The status of local adfluvial bull trout populations within the Lake Pend Oreille Core Area may be affected through impacts to individuals from the populations moving through or utilizing habitat within the action area during the life of the permit.

2.4.1.2 Factors Affecting the Bull Trout in the Action Area

Bull trout are vulnerable to human-induced factors that increase water temperature and sediment loads, change flow regimes, block migration routes, and establish non-native trout, particularly brook trout (Behnke 2002, p. 299). As part of the Bull Trout Problem Assessment for the Lake Pend Oreille Key Watershed, threats and limiting factors to bull trout were assessed. Limiting factors for bull trout in the Pend Oreille basin include: lake and stream habitat conditions; outside influences on the species including competition, hybridization, prey availability, and predation (including human predation); and biological constraints inherent to the species (PBTTAT 1998, p. 18).

The construction and operation of dams on the Clark Fork River (Cabinet Gorge) and Pend Oreille River (Albeni Falls) impact bull trout water quality (sediment, temperature, and nutrients), and habitat availability (spawning and rearing) and quantity within the Pend Oreille Core Area. These dams have likely permanently altered bull trout migration routes to tributary streams historically supporting the migratory form of bull trout.

Native fish present in Lake Pend Oreille and the Pend Oreille River include pygmy whitefish (*Prosopium couteri*) and mountain whitefish (*Prosopium williamsoni*), cutthroat trout (*Oncorhynchus clarki lewisi*), and northern pikeminnow (*Ptychocheilus oregonensis*). Non-native fish species present are kokanee salmon (*Oncorhynchus nerka*), lake trout, brook trout, rainbow trout (*Oncorhynchus mykiss*), largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieu*), northern pike (*Esox lucius*), bluegill (*Lepomis macrochirus*), pumpkinseed (*Lepomis gibbosus*), tiger muskie (*Esox lucius x E. masquinogy*), catfish (*Ictalurus punctatus*), walleye (*Stizostedion vitreum*), black crappie (*Pomoxis nigromaculatus*), white crappie (*Pomoxis annularis*), and yellow perch (*Perca flavescens*). All of these fish-eating predators are year-round residents of Lake Pend Oreille and/or the Pend Oreille River. Fish that inhabit the action area and consume salmonids, potentially including bull trout, include: northern pikeminnow, lake trout, largemouth bass, smallmouth bass, northern pike, tiger muskie, and walleye.

Introduction of non-native fish species affects population abundance and potentially distribution of bull trout within the action area. Brook trout and lake trout are present in many of the tributaries within the system and may present the greatest threat to bull trout (Service 2002, p. 107).

2.5 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. 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).

2.5.1 Bull Trout

2.5.1.1 Effects of the Proposed Action

During the five-year term of the RGP-27 permit renewal, the Corps expects the construction of up to 250 facilities and approximately 2,000 feet of shoreline alteration from these structures. The 2,000 feet of shoreline alteration is a liberal estimate assuming all new facilities will be built to the maximum allowable size (100 feet long and 700 square feet area), which is approximately 0.22 percent of the action area shoreline. Renewal of RGP-27 will authorize driving of steel piles up to 10 inches in diameter, and installation, replacement, repair or modification of noncommercial structures consisting of piers and floating docks, marine launching rails, mooring piles, portable boatlift stations, small diameter water line intakes and associated submersible pumps and mooring buoys for a term of five years.

The Service expects there to be effects to bull trout as a result of activities implemented in accordance with the renewal of RGP-27. Those effects are related to: increased turbidity, percussive damage, loss of benthic habitat, loss of riparian habitat, water volume, increased predation, entrainment, reduced littoral productivity, increased boating and poaching, and chemical contamination.

Table 1. Summary of likely effects to bull trout resulting from re-issuance of RGP-27.

Type of Effect	*Cause of Effect*	*Significance*
Increased Turbidity	Construction activities within and near water.	Discountable
Percussive Damage	Pile driving.	Minimized and discountable
Loss of Benthic Habitat	Pile placement for pier/dock installation, moorings and boat lifts.	Discountable
Loss of Riparian Habitat	Pier/dock installation.	Minimized and insignificant
Reduced Water Volume	Withdrawal of water via authorized water intake lines.	Discountable

Type of Effect	*Cause of Effect*	*Significance*
Increased Predation	Increased prey habitat created by installation of pier/docks, mooring piles, boat lifts and mooring buoys.	Minimized, but likely for juvenile bull trout.
Entrainment	Water intake lines	Minimized and discountable
Reduced Littoral Productivity	Increased shade created by installation of pier/docks, mooring piles, boat lifts and mooring buoys.	Minimized and insignificant
Increased Boating and Poaching	Increased boating activity facilitated by improved infrastructure.	Insignificant
Chemical Contamination	Use of machinery near water.	Minimized and discountable

A. Increased Turbidity

The proposed action includes permitting construction in and near the water. Most covered activities have little potential to cause increases in turbidity. Installation of marine launching rails would be performed in the dry and similarly, the vast majority of floating dock and pier construction would be performed in the dry. However, pile driving is almost always done during high water using a barge-mounted rig, and thus is typically done in the wet. Overall, in-water work will be required for an estimated ten percent of authorized structures.

Such construction can mobilize sediments and temporarily increase local turbidity levels in the action area. In the immediate vicinity of construction (several feet), the level of turbidity would likely exceed natural background levels and affect fish. The proposed action includes measures to decrease the likelihood and extent of any such effect on bull trout. These measures are identified in the proposed action and include Best Management Practices (BMPs) addressing construction-related activities.

Quantifying turbidity levels and their effect on fish species is complicated by several factors. First, turbidity from an activity will typically decrease as distance from the activity increases. How quickly turbidity levels attenuate is dependent upon the quantity of materials in suspension (e.g., mass or volume), the particle size of suspended sediments, the amount and velocity of ambient water (dilution factor), and the physical/chemical properties of the sediments. Second, the impact of turbidity on fish is not only related to the turbidity levels, but also the particle size of the suspended sediments.

For salmonids, turbidity has been linked to a number of behavioral and physiological responses (i.e., gill flaring, coughing, avoidance, 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). Although turbidity may cause stress, Gregory and Northcote (1993, p. 239) have shown that moderate levels of turbidity (35-150 Nephelometric Turbidity Units [NTUs]) accelerate foraging rates among juvenile chinook salmon, likely because of reduced vulnerability to predators (camouflaging effect).

It is expected that turbidity arising from the implementation of activities under RGP-27 will be short-lived and will cause only minor, short-term increases in turbidity. The proposed renewal of RGP-27 includes measures to reduce or avoid turbidity impacts. Those fish that are present in the construction area(s) during work activity are expected to be able to avoid the area until the effects dissipate. These areas will be limited in extent (tens of square yards, less than 100 square yards maximum) and duration (minutes or not more than 10 hours). Consequently, the duration, magnitude, and extent of turbidity and fine sediment mobilization from the proposed action is expected to result in transient and discountable effects to bull trout behavioral patterns.

B. Percussive Damage (Pile Driving)

The proposed action includes driving steel piles up to ten inches in diameter. Vibratory pile-driving equipment will be used for the majority of steel pile driving into the lake/riverbed during in-water work. In some instances it may also be necessary to proof[1] vibratory driven pilings with an impact hammer pile driver. Pile driving with an impact hammer will be limited in duration (less than an hour at any one site over a single day). No more than 16 ten-inch diameter piles will be vibratory driven in a day with typically three to five strikes per pile, and a maximum of 15 strikes per pile, with an impact hammer for proofing. Concrete piles will not be driven.

Driving steel piles with an impact hammer can produce intense, sharp spikes of sound reaching levels that harm or even kill fishes (NMFS 2002, p. 34; J. Stadler, NMFS, pers. comm. 2002). 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 depend on a variety of factors, including, but not limited to, pile type and size, the firmness of the substrate into which the pile is being driven, water depth, and the type and size of the pile-driving hammer. Research and field observations show that effects associated with pile driving can range from disruption of schooling behavior to fish death.

Fishes may respond to the first few strikes of an impact hammer with a “startle” response. After these initial strikes, the startle response wanes and the fishes may remain within the field of a potentially harmful sound (NMFS 2002, p. 32). To elicit an avoidance response, a sound must be in the infrasound range (less than 20 Hertz) and the fish must be exposed to the sound for several seconds (Sand et al. 2000, p. 331). Impact hammers produce short spikes of sound with little energy in the infrasound range such that avoidance may not be elicited (Carlson et al. 2001, p. 25). 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 fishes, leading to exposure for longer periods to those harmful pressures.

[1] Piles installed with a vibratory hammer must often be proofed, which involves striking the pile with an impact hammer to determine its load-bearing capacity, possibly with multiple impacts.

Noise from impact pile driving has been implicated in fish mortality and injury (Hastings and Popper 2005, pp. 34, 40). Fishes with swimbladders are more susceptible to barotraumas from impulsive sounds (sounds of very short duration with a rapid rise in pressure) because of swimbladder resonance (vibration at a frequency determined by the physical parameters of the vibrating object). When a sound pressure wave strikes a gas-filled space, such as the swimbladder, it causes that space to vibrate (expand and contract) at its resonant frequency. The amplitude of this vibration increases as the energy of the pressure wave, and the pressure gradient within the wave, increases. When the amplitude of this vibration is sufficiently high, the pulsing swimbladder can press against and strain adjacent organs, such as the liver and kidney. This pneumatic compression can cause ruptured capillaries, internal bleeding, and damage of highly vascular organs. Hastings and Popper (2005, pp. 34-35) also noted that sound waves can cause different types of tissue to vibrate at different frequencies and result in tearing of mesenteries and other sensitive connective tissues. Exposure to high noise levels can also lead to injury through "rectified diffusion," which is the formation and growth of bubbles in tissues. These bubbles can cause inflammation, cellular damage, and blockage or rupture of capillaries, arteries, and veins (Hubbs and Rechnitzer 1952, p. 362; Crum and Mao 1996, p. 2906; Hastings and Popper 2005, p. 35). These effects can lead to overt injury or even mortality. Death from barotrauma and rectified diffusion injuries can be instantaneous, or delayed for minutes, hours or even days after exposure.

Even in the absence of mortality, elevated noise levels can cause sublethal injuries affecting survival and fitness. Fish suffering damage to hearing organs may suffer equilibrium problems and may have a reduced ability to detect predators and prey (Turnpenny et al. 1994, p.9). Other types of sub-lethal injuries can place the fish at increased risk of predation and disease. Adverse effects on survival and fitness can occur even in the absence of overt injury. Exposure to elevated noise levels can cause a temporary shift in hearing sensitivity (referred to as a temporary threshold shift, or TTS), decreasing sensory capability for periods lasting from hours to days (Popper 2003, p. 28; Hastings and Popper 2005, pp. 29-30).

The severity of effects from high noise levels produced by impact-driving of steel piles depends on several factors, including the size and species of fish exposed. For example, National Marine Fisheries Service (NMFS) biologists observed that approximately 100 surf perch from three different species (*Cymatogaster aggregata*, *Brachyistius frenatus*, and *Embiotoca lateralis*) were killed during impact pile driving of 30-inch diameter steel pilings at Bremerton, Washington (Stadler, NMFS, pers. comm. 2002). Dissections revealed complete swimbladder destruction across all species in the smallest fish (80 mm fork length (FL)), while swimbladders in the largest fish (170 mm FL) were nearly intact. However, swimbladder damage was typically more extensive in *C. aggregata* when compared to *B. frenatus* of similar size.

The scientific literature does not correlate peak pressure with injury to non-auditory tissues in fishes with swimbladders (e.g., Yelverton et al. 1975, pp. 22-23; Teleki and Chamberlain 1978, p. 1197; Govoni et al. 2003, p. 117). Instead, current data suggests that the applicable metric for injury to these tissues is an energy index that is indicative of mechanical work done on the tissues and can be estimated using cumulative sound exposure level (SEL).

Cumulative SEL is intended as a measure of the risk of injury from exposure to multiple pile strikes and is calculated using the following equation:

Cumulative SEL = Single-strike SEL + 10*log (number of pile strikes)

The number of pile strikes is estimated per continuous work period. This approach assumes that there will be a break of at least 12 hours between work periods, which is believed to be sufficient time for fish to recover from exposure to high noise levels (Teachout, pers. comm. 2009). Several studies have investigated the cumulative SEL threshold levels at which physical and physiological effects are observed in fish.

Popper et al. (2005, p. 3963-3964) investigated the effects of exposure to seismic airgun arrays on the auditory sensitivity of three species of freshwater fishes. Although the study did not conduct standard necropsy or histopathology on test animals, a general external examination post-exposure and dissections to collect tissues for later analysis did not find any obvious signs of external or internal injury typical of barotrauma in any of the three species after exposure to cumulative SELs as high as 193 decibels (dB). However, the authors found TTS in hearing sensitivity that varied between species, with broad whitefish (*Coregonus nasus*) showing no effect after cumulative SEL exposures as high as 187 dB (Popper et al. 2005, p. 3964). Northern pike and lake chub (*Couesius plumbeus*) showed TTS after exposure to cumulative SELs as low as 185 dB and 183 dB, respectively (Popper et al. 2005, p. 3964). Song et al. (2008, p. 1364) reported no evidence of damage to the auditory tissues of hearing generalists (those species without specializations to enhance hearing, and include salmonids) exposed to the sounds of seismic airguns at peak pressures ranging from 205 to 209 dB and cumulative SELs ranging from183 to 193 dB. Carlson et al. (2007, p. 4-5) suggested that because effects to hearing and auditory tissues do not follow the Equal Energy Hypothesis (a hypothesis stating that equal amounts of sound energy will produce equal level of effect, regardless of how the sound energy is distributed in time), it is imperative to include criteria that address both peak pressure and cumulative SEL. Although TTS is not considered to be injury but rather a short-term fatiguing of the auditory system, it can potentially reduce the survival, growth and reproduction of the affected fish by increasing the risk of predation and reducing foraging or spawning success. Therefore, for the purposes of this consultation, TTS will be considered to be synonymous with injury.

A multi-agency working group of Federal and State transportation and resource agencies, including underwater acoustics experts, fish biologists, and transportation specialists, released agreed-upon “interim criteria” for evaluating the potential for physical effects (i.e., injury) from underwater noise levels caused by pile driving (FHWG 2008, p. 1). These criteria are based on the information reported above and represent threshold values of the two sound metrics (peak pressure and accumulated SEL) proposed by the Carlson et al. (2007, p. 2) for assessing the risk of direct injury, including TTS, and account for the repeated strikes required to drive a pile. Injury is expected if either: 1) the peak pressure of any strike exceeds 206 dB (re: 1 micropascal squared seconds (μPa^2-sec)); or 2) SEL, accumulated over all pile strikes, exceeds 187 dB (re: 1 μPa^2-sec) for fishes 2 grams or larger and 183 dB (re: 1 μPa^2-sec) for fishes smaller than 2 grams (FHWG 2008, p. 1).

Growing evidence of the behavioral effects of pile driving has been gathered in the Pacific Northwest. Behavioral effects are observed at far lower noise levels than those associated with injury. Root mean square (rms) sound pressure levels (SPLs) are commonly used in behavioral studies. The preponderance of available data indicates that rms SPLs in excess of 150 dB (re:

1µPa)[2] are likely to elicit temporary behavioral changes, including a startle response or other behaviors indicative of stress. While rms SPLs of this magnitude are unlikely to lead to permanent injury, depending on a variety of factors (e.g., duration of exposure), they can still indirectly result in potentially lethal effects. For example, TTS or altered behavior may increase the vulnerability of individual fish to predation. Feist et al. (1992, pg. 28) found that pile installation operations affected the distribution and behavior of juvenile pink (*Oncorhynchus gorbuscha*) and chum salmon (*Oncorhynchus keta*) around the site. For example, the abundance of fish during non-pile driving days was two-fold greater than on days when pile driving occurred. Additionally, salmonids were less responsive to the activity of observers on the shore during pile driving than during periods without pile driving. This reduced responsiveness may put them at greater risk of predation.

Feist et al. (1992, p. 24) also noted that juvenile pink and chum salmon exposed to pile driving noise were less likely to startle and flee when approached by an observer. Popper (2003, p. 27) suggests that behavioral response of fishes to loud sounds may include swimming away from the sound source, thereby decreasing potential exposure to the sound, or “freezing” (staying in place), thereby becoming vulnerable to possible injury. Alternatively, fish could effectively abandon favorable habitats, as found by Engas et al. (1996, p. 2246) when evaluating the response of gaddids to the impulsive sounds from seismic surveys, affecting long-term behavior and subsequent survival and reproduction. Collectively, behavioral responses can vary broadly, from insignificant to a range of short- and long-term responses limiting to survival, growth, and fitness.

Based on the above information, the Service uses an SPL of 150 dB_{rms} as a guideline for when behavioral effects can be expected. Whether these effects result in actual injury is dependent on a variety of specific factors. Other factors such as the duration of the exposure and the species life history and habitat use are then factored in to determine whether or not significant behavioral effects are likely. The proposed action includes measures to decrease the likelihood and extent of any such effect on bull trout. These measures include timing restrictions, pile driver limitations, and sound attenuation strategies.

The effect upon aquatic environments from noise levels produced by driving piles with impact hammers can be reduced by deploying noise attenuation systems (e.g., air bubble curtains and/or wooden blocks). Implementation of activities under the proposed renewal of RGP-27 will require the use of an air bubble curtain and cushion to attenuate the underwater noise levels generated when using an impact hammer pile driver. Air bubble curtains are most effective at moderate to high frequencies but are also useful for low frequency sounds and have been known to reduce SPLs at some frequencies by as much as 30 dB (Gisiner et al. 1998, p. 112). In recent years, bubble curtains have been required and used on an increasing number of pile installations, primarily on the west coast of the United States. Designs have varied and are largely experimental. Effectiveness has also varied widely and is likely to be influenced by factors such as design, site conditions, and the ability for construction contractors to correctly implement the system. Improper installation and operation can decrease effectiveness. Problems with

[2] Throughout this document, reference value for rms dB is 1 µPa.

implementation have been observed on a number of projects (Laughlin 2005, p. 10; Pommerenck 2006, p. 9, 11).

Under the proposed renewal of RGP-27, if an impact pile driver is used, sound attenuation devices (bubble curtain and cushion) must be included. No more than 16 ten-inch diameter piles will be driven in a day with typically three to five impact strikes per pile, and a maximum of 15 strikes per pile. In limiting pile size to 10-inch diameter or less and using both sound attenuation devices, peak sound levels for individual strikes are anticipated to reach a maximum165 dB which would not exceed the peak threshold of 206 dB for injury. As described previously, 16 piles may be driven in a single day, with up to a maximum of 15 strikes per pile, including proofing, resulting in a total of 240 strikes over a single day and an accumulated SEL of 187 dB. The accumulated SEL threshold, without attenuation devices and worse case conditions (16 piles driven in a day), would only be exceeded out to 6.6 feet for fish 0.04 ounces or heavier, as would be expected to occur in the action area. Due to increased activity occurring in the immediate area with RGP-27 activities, most bull trout and other fish would be expected to move away prior to the initiation of pile driving.

In-water work from September 1 through June 30 will utilize appropriate measures to avoid or minimize effects to bull trout from pile driving. In particular, piles no greater than ten inches in diameter will be used for construction of residential piers and docks. The majority of pile driving will be conducted with vibratory hammers, with the chance an impact hammer could be used but only with a sound attenuation device. Effects to bull trout from pile driving are anticipated to be insignificant or discountable.

C. Loss of Benthic Habitat

The footprint of the proposed action will result in the loss of benthic habitat in Lake Pend Oreille and the Pend Oreille River. The loss of habitat will result where project activities permanently impact the lake bottom. Specific impacts to the lake bottom include: ten inch diameter circles where piles are installed, areas covered by concrete to provide footings for piles and to stabilize water withdrawal lines or to allow attachment of a mooring, trenching for waterlines, and areas covered by structures to allow anchoring of marine launching rails. Removal of benthic habitat can reduce invertebrate species and their habitat. Aquatic invertebrates are an important food item of juvenile salmonids. Therefore, removal of benthic habitat could reduce aquatic invertebrates, thus reducing a food source for juvenile and adult bull trout.

Benthic habitats provide forage, cover and breeding opportunities for riverine fishes (Stanford et al. 1996, p. 402). Juvenile salmonids are opportunistic predators that eat a wide variety of invertebrate species. They generally feed on drifting invertebrates in streams although they are also known to forage on prey living on or just above the stream bottom. Aquatic invertebrates can recolonize disturbed locations quickly and adapt to new features in their environment. Given the small footprint of the project where benthic habitat will be lost relative to the total benthic habitat available to bull trout and the fast invertebrate recolonization rate for areas disturbed but not permanently lost, the effect to benthic habitat is discountable.

D. Loss of Riparian Habitat (shoreline)

Various levels of shoreline development in the form of docks, bulkheads, marinas, residences, roads and riprap occur along the shorelines of Lake Pend Oreille and the Pend Oreille River. The majority of the shorelines within the action area are rural to undeveloped, a consequence of 65 percent of the lakeshore being administered by U.S. Forest Service. However, near the population centers along the north and west portions of the lake and along the Pend Oreille River, shoreline development has altered long reaches of shoreline environment. Shoreline development has reduced riparian vegetation and subsequently large woody debris (LWD) recruitment, displaced willow habitat with fill materials and altered wave and scour patterns adjacent to new shoreline structures.

Pier and floating dock construction and marine launching rail installation will likely result in removal of riparian vegetation. Riparian vegetation can provide shading that moderates nearshore water temperature during summer months. In-water vegetation provides refuge for small fish, such as juvenile bull trout or forage fish for bull trout. Plant roots provide bank stabilization while riparian trees can generate coarse woody debris inputs that increase in-water habitat complexity while providing organic matter that increases primary and secondary productivity in the aquatic food chain (Carrasquero 2001).

The removal of shoreline vegetation decreases water shading and has been linked to increased water temperatures. Low water temperature (less than 15°C) is required to support bull trout (Carrasquero 2001). However, Lake Pend Oreille is a large, open, regulated reservoir and overall water temperature within the reservoir is not significantly affected by shoreline vegetation. Water temperature in nearshore areas of the lake may receive some measurable effect from shoreline vegetation, primarily along north facing shorelines. Water temperatures in nearshore areas along south facing shoreline areas are not expected to be measurably affected by shoreline vegetation.

Removal of riparian trees would reduce the potential for LWD recruitment, which reduces habitat components for salmonids. LWD is an important in-water component contributing to the production of invertebrate prey for salmonids. LWD also traps sediments and stabilizes and protects shorelines from wave scour and erosion. Removal of riparian trees and shrubs reduces the supply of terrestrial insects to the adjoining water body, reducing a forage source for young bull trout and for small fish that bull trout prey on.

The potential magnitude of the aforementioned effects depends greatly upon the existing condition of riparian habitats. A reconnaissance of existing waterfront properties on Lake Pend Oreille performed in May 2008 indicated that the great majority (more than 90 percent) of such properties, whether or not they had docks or marine launching rails, had only ornamental vegetation (primarily lawn) apart from some scattered remnant native trees. It is thus unlikely that performance of activities covered by RGP-27 would significantly alter the extent or condition of existing riparian vegetation.

Moreover, RGP-27 limits the extent of shoreline or riparian vegetation that can be impacted by the covered activities to no more than eight linear feet of shoreline vegetation per activity. Most existing recreational properties have 100 feet or more of shoreline, so activities performed under RGP-27 can at most produce only localized alteration of riparian habitat. Removal of vegetation on adjacent upland property is primarily regulated by county or city ordinances outside of the jurisdiction of the Corps.

Removal of riparian vegetation may also expose bare soil that can be eroded, contributing sediment to the adjacent waters. Such sediment delivery can cause a variety of effects in addition to those previously mentioned in the discussion of turbidity, including alteration of substrate composition and impairment of benthic productivity.

In consideration of permit requirements and the existing condition of riparian areas in the affected area, it is unlikely that implementation of RGP-27 would result in measurable impairment of riparian conditions in the action area or in measurable effects to bull trout.

E. Reduced Water Volume

The proposed action provides for installation and operation of water in-take lines. Lines may be no greater than two inches in diameter. Between 2007 and 2012, a total of 52 waterline intakes were authorized in Lake Pend Oreille and most of these were associated with docks or piers. There are roughly 2,500 docks or piers on the lake. It is probable that most of these docks or piers also have associated water intake lines (Corps 2014). Active storage of the lake is approximately 1.2 million acre-feet of water. If the estimated withdrawal of water through the pump is 92 gallons per minute, 2,500 intakes actively pump water for six hours every day during a 90-day use season, approximately 22,860 acre-feet of water would be withdrawn from the lake annually. This would amount to 0.02 percent of the volume of water in the lake being removed over the course of a season. Due to the relatively small amount of water being removed from the lake, effects to bull trout as a result of water withdrawal by these intakes would likely be insignificant.

E. Increased Predation

Numerous predators of fish are year-round residents of Lake Pend Oreille and the Pend Oreille River. Some are known to consume salmonids, including bull trout. Residential boat docks will add both in- and overwater structure which can create structure and additional habitat for fish species that prey on juvenile salmonids. Therefore, predation on bull trout could increase as a result of new construction of residential docks. However, in some areas RGP-27 requires installation of light penetrative decking (including grating and reflective dock components) to decrease the likelihood and extent of predation effects to bull trout by reducing the shade cover and subsequent attractiveness of docks to prey. Installation of light penetrative decking is required for all docks constructed and installed between 100 yards and one-quarter mile on either side of the mouths of all known bull trout spawning tributaries.

While the Service is not aware of any studies that have been done to specifically determine impacts of in- and overwater structures on bull trout, numerous analogous predation studies have been done to determine impacts of these structures on listed salmonids, as discussed below. Studies suggest that serious predation impacts could occur as a result of pier or dock construction. Increased predation impacts are a function of increased predation rates on listed salmonids, as well as increased predator populations resulting from introduced artificial habitat that provides rearing and ambush habitat for native and non-native predator species.

Piscivorous (fish-eating) fish utilize various predatory strategies, including prey pursuit, prey ambush or prey stalking. Ambush predation is probably the most commonly employed predation strategy. Predators use sheltered areas that provide shade to lie-in-wait and then dart out in an explosive rush to capture prey. Predators waiting to ambush juvenile or subadult bull trout are likely to use shaded areas created by overwater structures (Hobson 1979, pp. 231-242).

In- and overwater structures create light/dark interface conditions (i.e., shadows) that allow ambush predators to remain in darkened areas (barely visible to prey) and watch for prey to swim by against a bright background (high visibility). Helfman, (1981, p. 395) suggests that depth of shade and/or the position of a fish under a shade-producing object may have a significant influence on the advantage of hovering under shade producing structures. Prey species moving around structure(s) are unable to see predators in dark areas under or beside structure(s) and are more susceptible to predation.

Fish, particularly largemouth bass, seem to be attracted to the shade produced by experimental floats (Carrasquero 2001, p. 32). Largemouth bass are commonly found under docks in early spring and are thought to be present there until late summer (Carrasquero 2001, p. 7). Smallmouth bass appear to be attracted to the physical structure provided by in-water objects such as docks and piers. Smallmouth bass have been observed to preferentially locate nest sites near artificial structures (Hoff 1991, p. 39-43). Shade was apparently not a critical attraction feature of piers for spawning smallmouth bass; instead, the attraction was to physical structure provided by piers, further evidenced by the location of nests adjacent to non-shading structures such as isolated piles (Kahler et al. 2000, p. 33). Both the structure and shade provided by piers and docks attract and provide habitat for potential predators of bull trout (e.g., bass).

Light plays an important role in both predation success and prey defense mechanisms. Prey species are better able to see predators under high light intensity, thus providing the prey species with a relative advantage (Hobson 1979, p. 231-242). Walters et al. (1991, p. 320) indicate that high light intensities may result in increased use of shade-producing structures by predators. To minimize the light/dark interface on bull trout the Corps requires applicants to use conservative dock design criteria, including surfacing with light penetrative decking or opaque materials. However, using conservative dock design criteria, such as light penetrative decking, opaque materials, and size limitations, does not eliminate the light/dark interfaces; it only reduces the area impacted or shaded by dock structures in an attempt to maintain more natural light conditions.

Bull trout may be present at all times of the year in Lake Pend Oreille Lake and Pend Oreille River. Although we do not know the abundance and distribution of bull trout predators in the area, we do know that they seek out docks for refuge, reproduction and predation. Nearshore water temperatures generally exceed 59^{o} F during the summer; however, water temperatures above 59^{o}F may not preclude bull trout use in an area on a short-term basis. For example, outmigrating juveniles or spawning adults can tolerate warmer water when migrating between spawning and rearing habitats, and overwintering and foraging habitats. In addition, spring run-off increases lake levels and shoreline temperatures could stay cold enough for bull trout throughout the spring and possibly into August. Carline (1987, p. 229) states that largemouth bass thermoregulate behaviorally and probably seek out cooler temperatures in the summer. Parente and Smith (1981, p. 5) found that juvenile salmonids, especially ocean type chinook (among others), may utilize backwater areas during their outmigration. With these studies in mind, there may be a chance for habitat overlap between bull trout and native and non-native piscivorous predators in these areas, and bull trout could be present in these nearshore areas where activities will occur (Delavergne, pers. comm. 2009).

Based on the presence of bull trout and predators in the action area, and the additional shading and vertical structure created by the installation of new docks, it appears likely that the proposed action will contribute to increased predation rates on bull trout. Further, the pilings will create spawning and rearing habitats that could increase predator populations by the addition of in- and overwater structures. Advantageous predator habitat created by the proposed action will likely increase predation rates on bull trout. All life stages of bull trout could be present in the action area; however, only juvenile or subadult bull trout are susceptible to increased predation. Adult bull trout would either seek out deeper, colder water habitats or if foraging within shallower water habitats, would not be expected to be vulnerable to predation from predators due to their size. As such, the effects of predation on adult bull trout are discountable. Juvenile or subadult bull trout are expected to be consumed at a higher rate normal due to the proposed action. The Project may affect, and is likely to adversely affect juvenile bull trout.

To minimize the effects to bull trout from predation, the Corps requires applicants to use conservative dock design criteria (e.g., restricted dock size, light penetrative decking, and keeping in-water and shoreline habitat features in place).

F. Entrainment

The installation and use of small diameter (two inches or less) water lines and associated pumps may be authorized in certain areas of Lake Pend Oreille and Pend Oreille River where they would have a discountable chance of entraining (siphoning along with the water into pipe) bull trout. Those areas where intakes may be authorized without further assessment are identified in Figure 2. In areas outside of those identified in Figure 2, authorization of intakes will require further assessment, using Appendix C in this Opinion, because they have greater potential to entrain bull trout.

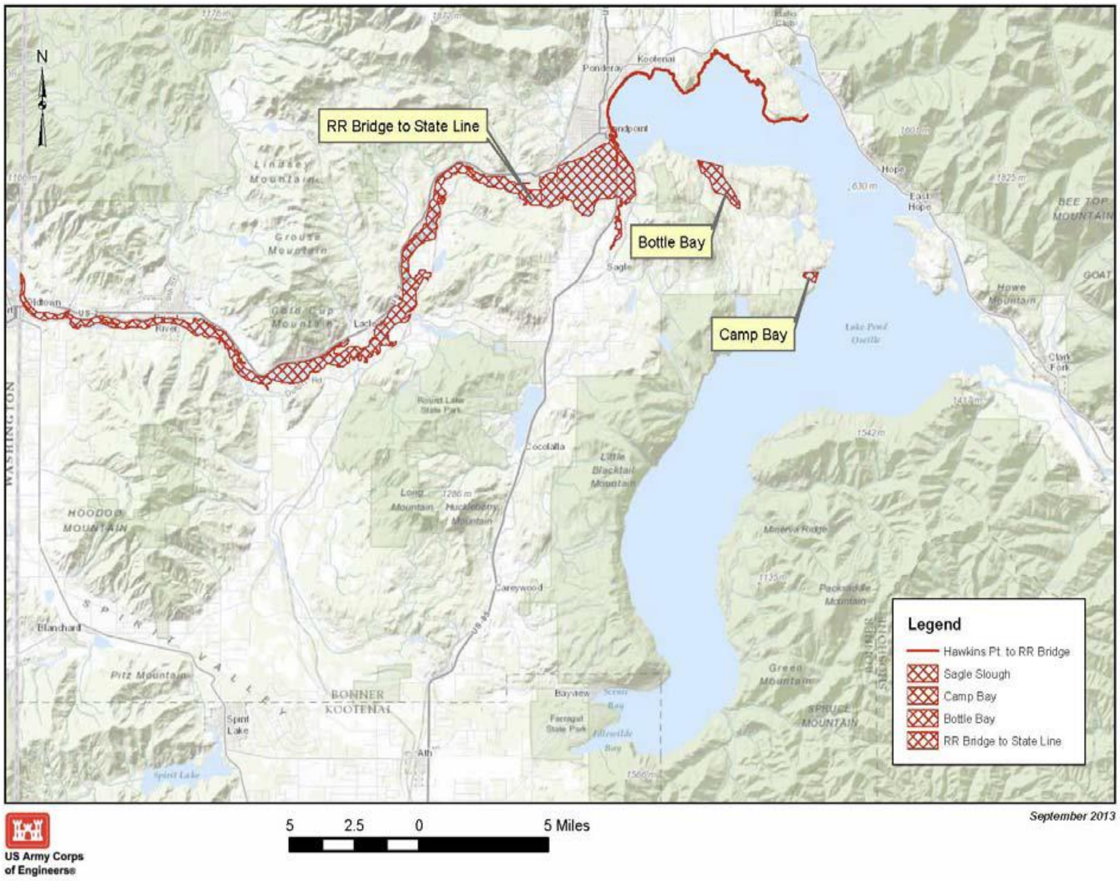

Figure 2. Areas (in red) where installation of small diameter water intake lines and associated pumps may be authorized through RGP-27 without further assessment.

Adult bull trout are not likely susceptible to entrainment into two inch water intakes due to their body size (greater than two inches dorsal-ventrally) and burst swimming ability. However, juvenile or subadult bull trout, if present, would be likely much more susceptible to entrainment due to their body size (less than two inches dorsal-ventrally) and potential lack of ability to swim faster than the velocity of water entering the intake. If a bull trout were to be entrained it is likely to die due to physical injury and/or desiccation.

Portions of the action area authorized for water intakes through this consultation were identified based on the likelihood of juvenile bull trout presence. Juvenile bull trout may be present throughout the action area; however, there is greater potential for their presence near spawning and early rearing habitats which are primarily tributaries entering Pend Oreille Lake from the east and south (see Figure 1). Water intakes in these areas will not be authorized under RGP-27 (see Appendix C). In areas where water intakes may be authorized through RGP-27, juvenile bull trout being present and subsequently entrained is not reasonably certain to occur.

G. Reduced Littoral Productivity

Piers, docks and boat lifts can negatively affect littoral (related to the shoreline) productivity. The shade these features create can inhibit the growth of aquatic macrophytes and other plant life (e.g., epibenthic algae and pelagic phytoplankton) which affects the abundance of salmonid prey organisms. The residential docks will add in- and overwater structure. However, activities covered under the renewal of RGP-27 include measures (i.e., grating and reflective dock components, and size limitations) to decrease the magnitude of this effect which is insignificant to bull trout.

Aquatic plant life is the foundation for most aquatic food webs and their presence or absence affects many higher trophic levels (e.g., invertebrates and fishes). Autochthonous pathways (pathways derived from within a system, such as organic matter in a stream resulting from photosynthesis by aquatic plants) are extremely important in the trophic support of juvenile salmonids (Murphy and Meehan 1991, p. 46). Consequently, the shade from docks can affect local plant/animal community structure or species diversity. At a minimum, shade from docks can affect the overall productivity of littoral environments (Kahler et al. 2000, p. 40).

The proposed action includes measures to reduce the likelihood and extent of effects from the implementation of activities under RGP-27 by incorporating conservative dock design criteria and size limitations. For some docks, surfacing is required and is expected to result in more natural light conditions beneath the proposed structures than would result from using traditional materials. Size limitations include limiting the total deck area of a single-use pier or floating dock, including the access ramp, to 700 square feet, with no more than eight feet of shoreline vegetation disturbed at the access point to the pier or dock, and no pier or dock will extend more than 100 feet waterward of the ordinary high water mark. Each riparian property owner will be limited to one pier or floating dock. In addition, the Corps will require the applicants to revegetate the disturbed shoreline areas with native plant species to minimize effects to trophic productivity. Furthermore, given the small footprint of the docks (0.22 percent of the shoreline) relative to the total surface area of littoral habitat in the action area, it is unlikely that primary productivity will be affected to an extent that significantly affects bull trout.

H. Boating Activity

The addition of new docks and related infrastructure will likely increase levels of boating activity in the reservoir, especially near the docks. Although the type and extent of boating activity that might be enhanced by the proposed action are outside of the discretionary action under consultation here, boating activity might cause several impacts on listed salmonids and aquatic habitat. Engine noise, prop movement, and the physical presence of boat hulls may disturb or displace nearby fishes (Graham and Cooke 2008, p. 6). In addition, more anglers would likely fish more often and in more places where bull trout may be present, so the potential for catching and illegally or accidentally killing a bull trout is increased.

Boat traffic could increase turbidity and uproot aquatic macrophytes in shallow waters, introduce aquatic pollution (through exhaust, fuel spills, or release of petroleum lubricants), and cause shoreline erosion. These boating impacts indirectly affect listed fish in a number of ways. Turbidity may injure or stress affected fishes, as discussed previously in the effects of Increased Turbidity section. The loss of aquatic macrophytes can reduce hiding cover from predators and may increase bull trout exposure to predation, as well as, decrease littoral productivity, or alter local species assemblages and trophic interactions. Studies of impacts to water quality from boats have shown minimal toxic effects on aquatic organisms because the amount of pollution is small compared to the size of the water body and most hydrocarbons are volatile and quickly disperse (Asplund 2000, p. 6).

New docks and associated infrastructure could result in increased boating activity and increased poaching within the action area. The Service recognizes that illegal harvest of bull trout occurs and works with partners to reduce this threat, but we do not analyze illegal activities in section 7 consultations and do not discuss the topic further in this opinion.

Any increase in boating activity due to RGP-27 will likely be a result of permits being issued for new infrastructure versus permits issued for maintenance or improvements to existing structures. We assume permits issued for maintenance or improvements are already part of the baseline for boating activity. The amount of increase in boating activity is not known, but is not believed to be significant compared to baseline conditions. The amount of increased boat traffic due to the RGP-27 will likely be so small that it cannot be meaningfully differentiated from current use. Permits issued for structure repair and maintenance are likely to result in an even smaller increase in boating activity. Therefore, the amount of increase in boat traffic and subsequent effects due to RGP-27 are likely insignificant.

I. Chemical Contamination

Construction machinery will at times operate below the ordinary high water mark, which could result in chemical contaminants entering the water. No machinery will enter the water, except for a backhoe or excavator bucket, or operate directly within waters other than to place or remove materials via excavator arm extension or other similar device. Although only barge mounted machinery will operate directly within waters, there is a risk that construction materials or equipment fluids (e.g., fuel, oil, hydraulic fluid, antifreeze, and paint) may leak or spill into the water. The risk to aquatic life depends on the type of contaminant that may be accidentally spilled or leaked, the time of the year, amount of material spilled or leaked, and the effectiveness of containment efforts.

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 and minimization measures contained within the permit.

To ensure spills are addressed quickly, all contractors operating under RGP-27 are required to have a spill response kit onsite. Additionally, 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.

To completely avoid localized increases in pH levels resulting from wet concrete, all concrete footings are required to be installed in the dry. RGP-27 prohibits the direct installation of wet concrete into the water column or the direct contact between wet concrete and the water column.

Water quality can also be affected through the leaching of chemical preservatives from treated wood used for construction. To minimize this risk, creosote, pentachlorophenol, chromated copper arsenate, or comparably toxic compounds not approved for the appropriate environment (i.e., freshwater) cannot be used for any portion of the activities covered under RGP-27. Any project using copper zinc arsenate-treated wood must use wood treated by the manufacturer and installed per the post-treatment best management practices developed by the Western Wood Preservers Institute (https://wwpinstitute.org/Resources/PreservedWoodorg.aspx - last accessed February 26, 2020). These best management practices will reduce the potential for leaching of any harmful chemicals into water. The suspension of contaminated sediments during performance of the RGP-27 covered activities is expected to be minimal because very little soil disturbance would occur. Although the covered activities may result in short-term and localized effects on water quality, effects to bull trout will likely be immeasurable. Activities covered by RGP-27 would be relatively small in scale. Additionally, conservation measures identified as part of the action will be employed to protect water quality and further reduce potential impacts to water quality.

There remains a reasonable likelihood, given the number of permits expected to be issued under RGP-27 (approximately 50 in a typical year), that one or more spills could occur during the five-year term of the permit. The spill volume would likely be small as spills from equipment of this type rarely exceed ten gallons, and due to easy access to the spill site, containment efforts can be implemented quickly and effectively. Therefore, effects to bull trout from chemical contamination are expected to be insignificant.

J. Effects Summary

The proposed action is likely to result in direct adverse effects to bull trout through increased predation resulting from activities implemented in accordance with the renewal of RGP-27. Due to the permanency of the permitted structures as a result of the renewal of RGP-27, these effects will occur in perpetuity. However, the maximum area of all overwater structures permitted under RGP-27 is very small compared to the total area of Lake Pend Oreille and the Pend Oreille River (2,000 ft out of a total of 924,000 ft of shoreline). Relatively few bull trout are likely to be affected, hence, RGP-27 renewal activities are unlikely to significantly affect subpopulation indicators at the watershed or Recovery Unit scales. Other effects not related to predation are expected to be discountable or insignificant to bull trout.

Effects to designated critical habitat are insignificant or not reasonably certain to occur.

2.5.1.2 Effects of Interrelated or Interdependent Actions

No interdependent or interrelated actions would be associated with the activities authorized by RGP-27. The covered activities would be single and complete actions; therefore no effects from interdependent or interrelated actions would occur.

2.6 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.

2.6.1 Bull Trout

2.6.1.1 Cumulative Effects

As the human population in Idaho continues to grow, residential growth and demand for increased dispersed and developed recreation is likely to occur. This trend is likely to result in increasing habitat degradation from road construction in riparian areas, levee building, bank armoring, and campsite development on private lands. These activities tend to remove riparian vegetation, disconnect rivers from their floodplains, interrupt groundwater-surface water interactions, reduce stream shade (and increase stream temperature), reduce off-channel rearing habitat, and reduce the opportunity for large woody debris recruitment. Each subsequent action by itself may have only a small incremental effect, but taken together they may have a substantive effect that would further degrade the watershed's environmental baseline and undermine the improvements in habitat conditions necessary for bull trout to survive and recover. Watershed assessments and other education programs may reduce these adverse effects by continuing to raise public awareness about the potentially detrimental effects of residential development and recreation on salmonid habitats and by presenting ways in which a growing human population and healthy fish populations can co-exist.

The Service is not aware of any other future actions that are reasonably certain to occur within the action area that are likely to contribute to cumulative adverse effects to bull trout or designated critical habitat.

2.7 Conclusion

2.7.1 Bull Trout

2.7.1.1 Conclusion

The Service has reviewed the current status of the bull trout, the environmental baseline in the action area, effects of the proposed action, and cumulative effects, and it is our conclusion that the proposed action is not likely to jeopardize the species continued existence.

The action area is small and the effects to bull trout are negligible a the Distinct Population Segment scale.

2.8 Incidental Take Statement

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened fish and wildlife species, respectively, without specific exemption. Take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct". Harm 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.

2.8.1 Form and Amount or Extent of Take Anticipated

Based on survey data from the Service and Idaho Department of Fish and Game, bull trout are expected to be present in the action area. Therefore, incidental take of these listed fish is reasonably certain to occur. The proposed action includes measures to reduce the likelihood and amount of incidental take of bull trout.

The Service expects that the implementation of RGP-27 may result in incidental take of bull trout in the form of harm or harassment. Harassment is likely to result from habitat modifications that will impair or disrupt normal behavior patterns of bull trout. Harm is likely to result from increased predation on juvenile bull trout from non-native predators that may be in the vicinity because of the creation of new in- and overwater structures.

Incidental take of bull trout is likely to occur as bull trout habitat and predator habitat are likely to overlap during certain times of the year. This additive mortality of bull trout is likely to occur due to increased predation from the increase in predator foraging and nesting habitat resulting from the renewal of RGP-27.

Incidental take of bull trout will be difficult to estimate and detect because of the uncertainty of bull trout presence in the areas where the activities authorized by the renewal of RGP-27 will occur. The Service cannot reject the possibility that lethal take may occur. In 2008, data collected by the IDFG showed approximately 4,000 adult spawning bull trout and 8,000 juvenile bull trout occupying the lake at any given time.

The total amount of shoreline in the action area, not including exclusion areas, is 905,250 ft, and Marine launching rails will not extend more than 200 ft waterward. Thus, the total amount of near-shore (within 200 ft of the shore) aquatic habitat within the action area is 905,250 ft of shoreline multiplied by 200 ft (maximum waterward extension of marine rails) which equates to 108,105,000 sq ft. To calculate the amount of near-shore aquatic habitat within the action area potentially affected by permitted structures, the Service multiplied 250 permits (maximum number of permits allowed during the 5 year renewal period for RGP-27) by the maximum allowance per pier or dock of 1,100 sq ft plus 2,000 sq ft for the maximum area covered by marine launching rails (10 ft maximum width by 200 ft maximum length). This equals 775,000 sq ft of aquatic habitat potentially affected by permit activities which is 0.72 percent of all nearshore habitat within the action area potentially affected.

To derive an estimated level of lethal take of juvenile bull trout, the Service multiplied the percent of nearshore habitat potentially affected by RGP facility construction by the number of juvenile bull trout potentially in the area. Therefore, the Service multiplied 0.72 percent of affected nearshore habitat by 8,000 juvenile bull trout to derive an estimated lethal take of 58 juvenile bull trout for activities conducted under the renewal of RGP-27 over the next five years. The Service used the same formula as described above for juvenile bull trout to derive an estimated level of take of adult bull trout in the form of harassment. Thus, the Service multiplied

0.72 percent of nearshore habitat affected by 4,000 adult bull trout to derive an estimated sublethal take of 29 adult bull trout in the form of harassment for activities conducted under the renewal of RGP-27 over the next five years. Therefore, it is the Service's opinion that should the limit of 250 permits be exceeded, this will exceed the level of take analyzed in this Opinion and reinitiation of consultation will be necessary.

2.8.2 Effect of the Take

In the accompanying Opinion, the Service determined that this level of anticipated take is not likely to jeopardize the continued existence of the bull trout across its range.

The action area primarily serves as feeding, migrating, rearing, and overwintering habitat for bull trout. This function will continue, but the likely increase of bull trout predator habitat due to construction of permit-related infrastructure is likely to affect individual juvenile bull trout. Population level effects are not expected. Consequently, effects of activities implemented under RGP-27 are unlikely to change subpopulation indicators of bull trout at the watershed or Recovery Unit scales.

2.8.3 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 impacts of the take of bull trout that is reasonably certain to be caused by the proposed action.

1. Minimize incidental take from general construction.
2. Minimize incidental take from in- and overwater structures

2.8.4 Terms and Conditions

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.

To implement RPM #1, the Corps shall:

A. Confine construction impacts to the minimum area necessary to complete each activity.
B. Contact the Service immediately in the event of a catastrophic spill associated with fuel-carrying vehicle accidents to initiate a site-specific consultation under the provisions for emergency consultation.

C. Ensure construction methods do not cause changes in turbidity beyond the limits established by Idaho Water Quality Standards (https://www.deq.idaho.gov/water-quality/surface-water/standards.aspx - last accessed February 26, 2020).

To implement RPM #2, the Corps shall:

D. Reinitiate formal consultation when 250 permits have been authorized under RGP-27 during the five years of permit coverage, starting on April 1, 2020 and ending on March 31, 2025.

2.8.5 Reporting and Monitoring Requirement

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).

As documented in the Assessment and proposed action within this Opinion, the Corps will submit regular tracking and monitoring reports (Appendix A) to the Service on the use of RGP-27. Monitoring reports will be submitted three and six months after completion of consultation, and then annually for a period of five years. The monitoring report will include a map indicating the locations of activities authorized under RGP-27, activity type (dock, pier, or launch rail, mooring pile, portable lift station, water intake, or mooring buoy), general footprint size of the facility, and general construction type. The monitoring report will also include a discussion of any compliance or enforcement issues associated with the RGP and how these issues were resolved and proposals for any revisions to the consultation. Revisions may include, but are not limited to, changes in general conservation measures, changes in approved work windows, changes in specific activity parameters, and/or additional activities. These revisions may require initiation of section 7 consultation by the Corps to authorize the individual applicant.

2.9 Conservation Recommendations

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

1. Evaluate the effectiveness of conservation measures to reduce impacts to bull trout.
2. Assist the Service in assessing the cumulative effects of in- and overwater structures on predator/prey interactions in the action area.
3. 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.

Note: the following best management practices supplement any applicable laws and regulations for invasive species control, including state watercraft inspection requirements.

2.9.1 Invasive Species

2.9.1.1 Use local, low-risk sources of materials

- Locally-sourced materials typically do not present invasive species risks that are not already found within the project 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.
- 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.
- 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.
- 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.

2.9.1.2 Reduce Exposure

- 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.
- Activity should be timed when feasible to avoid exposure to reproductive stages of invasive species (e.g., seasons when seed production is prevalent).
- 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.

2.9.1.3 Inspect and Decontaminate Vehicles, Gear, Materials and Equipment

- 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.

- Upon arrival at a new field site, all vehicles, equipment, gear, and materials should be staged initially in a dedicated containment area, and thoroughly inspected for hitchhiking organisms such as seeds, plant fragments, snails, etc. Concealed recesses and other inconspicuous locations where water or organisms can escape initial observation require heightened scrutiny; a mirror and flashlight can help inspection in these hard-to-reach areas. Where inspection at the field site reveals that prior off-site cleaning procedures have failed to remove unwanted material, the associated item should be cleaned on land and within containment prior to deployment.
- Prior to entering a new water body, equipment should be thoroughly dry (ideally for a minimum of 5 days), and any standing water (including inside internal compartments, tubing, bilges and bladders) should be drained completely on land.

2.9.1.4 Monitor site and respond quickly to invasive species introductions

- The site should be monitored regularly (with particular attention to vehicle and equipment staging and storage areas) for incipient populations of non-native plant and animals likely to establish if prevention measures are not fully effective. Eradication measures should be implemented quickly for any detected invasions by executing standard control treatments for the species and/or soliciting assistance from local invasive species managers.

2.9.1.5 Additional References

1. Technical Memorandum No. 86-68220-07-05: Inspection and Cleaning Manual for Equipment and Vehicles to Prevent the Spread of Invasive Species (USBR - 2012 Edition) – last accessed March 4, 2020.

2. https://invasivemusselcollaborative.net/wp-content/uploads/2018/11/NOAA-Decon-Watercraft.pdf, NOAA – last accessed March 4, 2020.

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4. Invasive Species of Idaho, Idaho State Department of Agriculture – last accessed March 4, 2020.

2.10 Reinitiation Notice

This concludes formal consultation on reissuance of the RGP-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; or
4. A new species is listed or critical habitat designated that may be affected by the action.

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4. APPENDICES

4.1 Appendix A– Monitoring and Tracking Reports

Project Completion Form

Permit No.: NWW-_______-______________
Applicant:____
Date:___________________________________
Name of Project:____
Date Project Completed:____
Location of Project:____
Objective of Project:____
Was project completed as designed (including reclamation of work areas)? (Yes/No): _____
If No, please explain:
____
____
____
Were the objectives of the project met (i.e., how was *success* defined?) – explain:
____
____
____
Attach photos which document compliance with project implementation measures.
If project included turbidity monitoring, report results:
____
____
____

Regional General Permit 27 Tracking Report					
Permit No.	Project Name	Date Completed	Action Type	Location	Completed as designed
NWW-2014-XXXXXXX	John Doe’s dock	3/12/2014	Pier or floating dock	Lake Pend Oreille	yes

4.2 Appendix B - Status of the Species – 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 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, November 1, 1999). Additional information can be found at https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=E065.

B.1.1 Listing Status and Current Range

The coterminous United States population of the bull trout (*Salvelinus confluentus*) 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; the Jarbidge River in Nevada; the Willamette River Basin in Oregon; Pacific Coast drainages of Washington, including Puget Sound; major rivers in Idaho, Oregon, Washington, and Montana, within the Columbia River Basin; and the Saint Mary-Belly River, east of the Continental Divide in northwestern Montana (63 FR 31647; 64 FR 58910; 75 FR 2269, January 14, 2010; Bond 1992, p. 2; Brewin and Brewin 1997, p. 215; Cavender 1978, pp. 165-166; Leary and Allendorf 1997, pp. 716-719; USFWS 2015a, p. 1).

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 Endangered Species Act of 1973, as amended (Act; 16 U.S.C. 1531 et seq.), relative to this species, and established five interim recovery units for each of these DPSs for the purposes of Consultation and Recovery (64 FR 58930).

Six draft recovery units were identified based on new information (75 FR 63898, October 18, 2010) that confirmed they were needed to ensure a resilient, redundant, and representative distribution of bull trout populations throughout the range of the listed entity. The final Recovery Plan for the Coterminous Bull Trout Population (bull trout recovery plan) formalized these six recovery units (USFWS 2015a, pp. 36-43) (see Figure B.1). 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 proceedures.

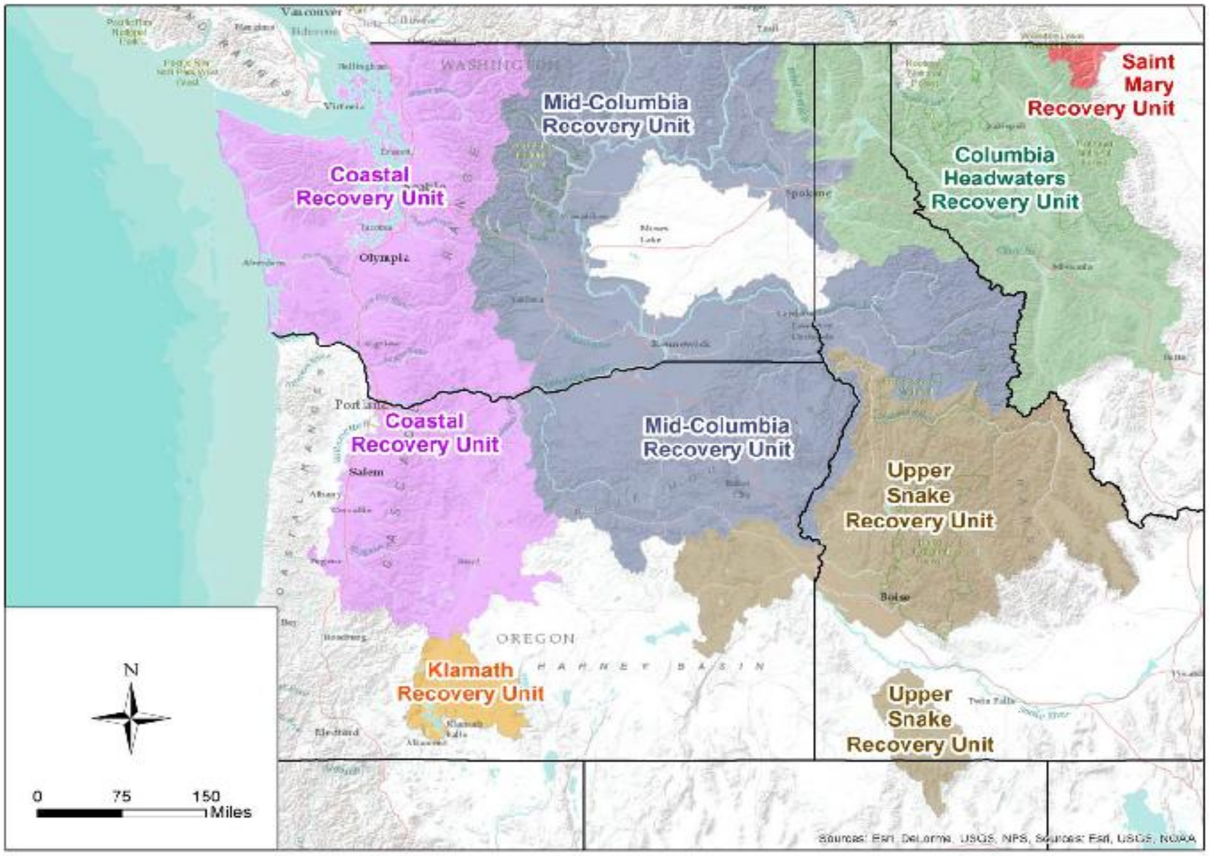

Figure B.1. Locations of the six bull trout recovery units in the coterminous United States.

B.1.2 Reasons for Listing, Rangewide Trends 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 non-native species (63 FR 31647; 64 FR 58910). Poaching and incidental mortality of bull trout during other targeted fisheries are identified described in the bull trout recovery plan (see Threat Factors B and D) as additional threats (USFWS 2015a, p. 150). Since the time of coterminous listing 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 2005b, entire; USFWS 2009, entire), Conservation Status Assessment (USFWS 2005a), and 5-year Reviews (USFWS 2008, entire; USFWS 2015h, 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 2015a, p. 3). As well, 2015 5-year review maintained the listing status as threatened based on the information compiled in the final bull trout recovery plan (USFWS 2015h, p.3) and the recovery unit implementation plans (RUIPs) (USFWS 2015b-g).

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 2002, entire; USFWS 2004a, entire; USFWS 2004b, entire) included detailed information on threats at the recovery unit scale (i.e., similar to subbasin or regional watersheds), thus incorporating the metapopulation concept with core areas and local populations. In the 2008, 5-year review, the U.S. Fish and Wildlife Service (Service or USFWS) established threats categories (i.e., dams, forest management, grazing, agricultural practices, transportation networks, mining, development and urbanization, fisheries management, small populations, limited habitat, and wild fire.) (USFWS 2008, entire). In the final recovery plan, threats and recovery actions are described for 109 core areas, forage/migration and overwintering areas, historical core areas, and research needs areas in each of the six recovery units (USFWS 2015a, pp. 10-11). Primary threats are described in three broad categories—Habitat, Demographic, and Nonnative Fish—for all recovery areas described in the listed range of the species. The 2015 5-year status review (USFWS 2015h, entire) references the final recovery plan and the recovery unit implementation plans and incorporates by reference the threats described therein. Although significant recovery actions have been implemented since the time of listing, the 5-year review concluded that bull trout still meets the definition of a "threatened" species (USFWS 2015h, entire).

New or Emerging Threats

The final Recovery Plan for the Coterminous Bull Trout Population describes new or emerging threats, climate change, and other threats (USFWS 2015a, pg. 17). Climate change was not addressed as a known threat when bull trout was listed. The 2015 bull trout recovery plan and RUIPs (USFWS 2015b-g) 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 (UJSFWS 2015a, 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 2015a, p. vii and pp. 17-20). Mote et al. (2014) summarized climate change effects to include rising air temperature, changes in the timing of streamflow related to changing snowmelt, increases in extreme precipitation events, lower summer stream flows, and other changes. A warming trend in the mountains of western North America is expected to decrease snowpack, hasten spring runoff, reduce summer stream flows, and increase summer water temperatures (Poff et al. 2002, entire; Koopman et al. 2009, entire; 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) and could adversely affect watershed function by resulting in faster runoff, lower base flows during the summer and fall, and increased sedimentation rates. Lower flows also may result in increased groundwater withdrawal for agricultural purposes and resultant reduced water availability in certain stream reaches occupied by bull trout (USFWS 2015c, p. B-10). Although all salmonids are likely to be affected by climate change, bull trout are especially vulnerable given that spawning and rearing are constrained by their location in upper watersheds and the requirement for cold water temperatures (Battin et al. 2007, pp. 6672-6673; Rieman et al. 2007, p. 1552). Climate change is expected to reduce the extent of cold water habitat (Isaak et al. 2015), 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 (Wenger et al. 2011, Isaak et al. 2010, 2014; Peterson et al. 2013; Dunham 2015).

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 (Cavender 1978, pp. 165-166; Bond 1992, p. 2). 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 (Cavender 1978, pp. 165-166; Brewin and Brewin 1997, entire).

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 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 safe 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 6 to 12 inches total length, and migratory adults commonly reach 24 inches or more (Goetz 1989, p. 30; Pratt 1985, pp. 28-34). The largest verified bull trout is a 32-pound 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 (WDOE 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 (ODEQ 1995, Ch. 2 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 1 to 4 years before migrating to either a lake (adfluvial form), river (fluvial form) (Fraley and Shepard 1989, p. 138; Goetz 1989, p. 24), or saltwater (anadromous form) to rear as subadults and to live as adults (Brenkman and Corbett 2005, entire; McPhail and Baxter 1996, p. i; WDFW et al. 1997, p. 16). Bull trout normally reach sexual maturity in 4 to 7 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; Service 2016, p. 170). 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; Nelson and Nelle 2008). Such multiple life history strategies help to maintain the stability and persistence of bull trout populations to environmental changes. Benefits of connected habitat for migratory bull trout include greater growth in the more productive waters of larger streams, lakes, and marine waters; greater fecundity resulting in increased reproductive potential; and dispersing the population across space and time so that spawning streams may be recolonized should local populations suffer a catastrophic loss (Frissell 1999, pp. 861-863; MBTSG 1998, p. 13; Rieman and McIntyre 1993, pp. 2-3). In the absence of the migratory bull trout life form, isolated populations cannot be replenished when disturbances make local habitats temporarily unsuitable. Therefore, the range of the species is diminished, and the potential for a greater reproductive contribution from larger size fish with higher fecundity is lost (Rieman and McIntyre 1993, p. 2).

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

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

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

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

Spruell et al. (2003, p. 17) noted that within the major assemblages, populations were further subdivided, primarily at the level of major river basins. Taylor et al. (1999, entire) surveyed bull trout populations, primarily from Canada, and found a major divergence between inland and coastal populations. Costello et al. (2003, p. 328) suggested the patterns reflected the existence of two glacial refugia, consistent with the conclusions of Taylor and Costello (2006, pg. 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 recovery units identified in the 2002 draft bull trout recovery plan (Service 2002, 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 Distinct Population Segment (DPS) policy (61 FR 4722, February 7, 1996) and subsequently identified six draft recovery units that contain assemblages of core areas that retain genetic and ecological integrity across the range of bull trout in the coterminous United States. These six draft recovery units were used to inform designation of critical habitat for bull trout by providing a context for deciding what habitats are essential for recovery (75 FR 63898). These six recovery units, adopted in the final bull trout recovery plan (USFWS 2015a) and described further in the RUIPs (USFWS 2015b-g) include: Coastal, Klamath, Mid-Columbia, Columbia Headwaters, Saint Mary, and Upper Snake. A number of additional genetic analyses within core areas have been completed to understand uniqueness of local populations (Hawkins and Van Barren 2006, 2007; Small et al. 2009; DeHann and Neibauer 2012).

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; Burkey 1995, 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 (Rieman and McIntyre 1993, p. 15; Dunham and Rieman 1999, entire; 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 (Rieman and Clayton 1997, pp. 10-12; Dunham and Rieman 1999, p. 645; Spruell et al. 1999, pp. 118-120; Rieman and Dunham 2000, p. 55).

Human-induced factors as well as natural factors affecting bull trout distribution have likely limited the expression of the metapopulation concept for bull trout to patches of habitat within the overall distribution of the species (Dunham and Rieman 1999, entire). However, despite the theoretical fit, the relatively recent and brief time period during which bull trout investigations have taken place does not provide certainty as to whether a metapopulation dynamic is occurring (e.g., a balance between local extirpations and recolonizations) across the range of the bull trout or whether the persistence of bull trout in large or closely interconnected habitat patches (Dunham and Rieman 1999, entire) is simply reflective of a general deterministic trend towards extinction of the species where the larger or interconnected patches are relics of historically wider distribution (Rieman and Dunham 2000, pp. 56-57). Research does, however, provide genetic evidence for the presence of a metapopulation process for bull trout, at least in the Boise River Basin of Idaho (Whiteley et al. 2003, entire), while Whitesel et al. (2004, pp. 18-21) identifies that bull trout fit the metapopulation theory in several ways.

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; Howell and Buchanan 1992, pp. 30, 32; Pratt 1992, entire; Rich 1996, p. 17; Rieman and McIntyre 1993, pp. 4-6; Rieman and McIntyre 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 nonnatal 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; Rieman and McIntyre 1995, p. 287). Availability and proximity of cold water patches and food productivity can influence bull trout ability to survive in warmer rivers (Myrick 2002, pp. 6 and 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 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

(Quinn 2005, pp. 195-200). Resident and juvenile migratory bull trout prey on terrestrial and aquatic insects, macrozooplankton, and small fish (Boag 1987, p. 58; 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. 13, 50-56). Bull trout of all sizes other than fry have been found to eat fish half their length (Beauchamp and VanTassell 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; WDFW 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 et al 2016, entire; Schaller et al 2014, entire; Service 2016, entire). For example, a data report documented a juvenile bull trout from the Entiat made over a 200-mile migration between spawning grounds in the Entiat River to foraging and overwintering areas in Columbia and Yakima River near Prosser Dam (PTAGIS 2015, Tag Code 3D9.1C2CCD42DD). As well, in the Skagit River system, anadromous bull trout make migrations as long as 121 miles between marine foraging areas in Puget Sound and headwater spawning grounds, foraging on salmon eggs and juvenile salmon along their migration route (WDFW 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 in six recovery units; (2) effectively manage and ameliorate the primary threats in each of six recovery units at the core area scale such that bull trout are not likely to become endangered in the foreseeable future; (3) build upon the numerous and ongoing conservation actions implemented on behalf of bull trout since their listing in 1999, and improve our understanding of how various threat factors potentially affect the species; (4) use that information to work cooperatively with our partners to design, fund, prioritize, and implement effective conservation actions in those areas that offer the greatest long-term benefit to sustain bull trout and where recovery can be achieved; and (5) apply adaptive management principles to implementing the bull trout recovery program to account for new information (USFWS 2015a, p. 24.) .

Information presented in prior draft recovery plans published in 2002 and 2004 (USFWS 2002, 2004a, 2004b) 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 2015a, entire) integrates new information collected since the 1999 listing regarding bull trout life history, distribution, demographics, conservation successes, etc., and integrates and updates previous bull trout recovery planning efforts across the 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 2015a, p. 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 six recovery units (USFWS 2015a, p. 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 2015a, p. 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 biological-based recovery units: (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 2015a, p. 23). A viable recovery unit should demonstrate that the three primary principles of biodiversity have been met: representation (conserving the genetic makeup of the species); resiliency (ensuring that each population is sufficiently large to withstand stochastic events); and redundancy (ensuring a sufficient number of populations to withstand catastrophic events) (USFWS 2015a, p. 33).

Each of the six recovery units contain multiple bull trout recovery areas which are non-overlapping watershed-based polygons, and each core area includes one or more local population. Currently there are 109 occupied core areas, which comprise 611 local populations (USFWS 2015a, 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 2015a, p.

3, Appendix F). Core areas can be further described as complex or simple (USFWS 2015a, p. 3-4). Complex core areas contain multiple local bull trout populations, are found in large watersheds, have multiple life history forms, and have migratory connectivity between spawning and rearing habitat and foraging, migration, and overwintering (FMO) habitats. Simple core areas are those that contain one bull trout local population. Simple core areas are small in scope, isolated from other core areas by natural barriers, and may contain unique genetic or life history adaptations.

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

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

B.1.5 Population Units

The final recovery plan (USFWS 2015a) designates six bull trout recovery units as described above. These units replace the five interim recovery units previously identified (USFWS 1999). The Service will address the conservation of these final recovery units in our section 7(a)(2) analysis for proposed Federal actions. The recovery plan (USFWS 2015a), identified threats and factors affecting the bull trout within these units. A detailed description of recovery implementation for each recovery unit is provided in separate recovery unit implementation plans (RUIPs) (USFWS 2015b-g), 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 recovery units (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 2015b, entire). The Coastal RU is located within western Oregon and Washington. The Coastal Recovery Unit is divided into three geographic regions: Puget Sound, Olympic Peninsula, and the Lower Columbia River regions. This recovery unit 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 recovery unit also has four historically occupied core areas that could be re-established (USFWS 2015a, p. 47; USFWS 2015b, p. A-2).

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 2015b, p. A-6). Puget Sound and the Olympic Peninsula currently support the only anadromous local populations of bull trout. This recovery unit also contains 10 shared FMO habitats which allow for the continued natural population dynamics in which the core areas have evolved (USFWS 2015b, p. A-5). There are four core areas within the Coastal Recovery Unit that have been identified as current population strongholds: Lower Skagit, Upper Skagit, Quinault River, and Lower Deschutes River (USFWS 2015a, p.79; USFWS 2015b, p. A-3). These are the most stable and abundant bull trout populations in the recovery unit. 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 2015b, p. A-7). The current condition of the bull trout in this recovery unit is attributed to the adverse effects of climate change, loss of functioning estuarine and nearshore marine habitats, development and related impacts (e.g., flood control, floodplain disconnection, bank armoring, channel straightening, loss of instream habitat complexity), agriculture (e.g., diking, water control structures, draining of wetlands, channelization, and the removal of riparian vegetation, livestock grazing), fish passage (e.g., dams, culverts, instream flows) residential development, urbanization, forest management practices (e.g., timber harvest and associated road building activities), connectivity impairment, mining, and the introduction of non-native species (USFWS 2015b, p. A-1 – A-25). 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 2015b, p. A-33 – A-34).

Klamath Recovery Unit

The Klamath recovery unit implementation plan describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (Service 2015b, entire). The Klamath Recovery Unit is located in southern Oregon and northwestern California. The Klamath Recovery Unit is the most significantly imperiled recovery unit, having experienced considerable extirpation and geographic contraction of local populations and declining demographic condition, and natural re-colonization is constrained by dispersal barriers and presence of nonnative brook trout (USFWS 2015a, p. 39). This recovery unit currently contains three core areas and eight local populations (USFWS 2015a, p. 47; USFWS 2015c, p. B-1). Nine historical local populations of bull trout have become extirpated (USFWS 2015c, p. B-1). All three core areas have been isolated from other bull trout populations for the past 10,000 years (USFWS 2015c, p. B-3). The current condition of the bull trout in this recovery unit 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 (UFWS 2015c, p. B-13 – B-14). Conservation measures or recovery actions implemented or ongoing include removal of nonnative fish (e.g., brook trout, brown trout, and hybrids), acquiring water rights for instream flows, replacing diversion structures, installing fish screens, constructing bypass channels, installing riparian fencing, culver replacement, and habitat restoration (USFWS 2015c, p. B-10 – B-11).

Mid-Columbia Recovery Unit

The Mid-Columbia RUIP describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015d, entire). The Mid-Columbia Recovery Unit is located within eastern Washington, eastern Oregon, and portions of central Idaho. The Mid-Columbia Recovery Unit is divided into four geographic regions: Lower Mid-Columbia, Upper Mid-Columbia, Lower Snake, and Mid-Snake Geographic regions. This recovery unit contains 24 occupied core areas comprising 142 local populations, 2 historically occupied core areas, 1 research needs area, and 7 FMO habitats (USFWS 2015aUSFWS 2015d, pp. C-1 – C-4). The current condition of the bull trout in this recovery unit 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 2015d, pp. C-9 – C-34). Conservation measures or recovery actions implemented or ongoing include road removal, channel restoration, mine reclamation, improved grazing management, removal of fish barriers, and instream flow requirements (USFWS 2015d, pp. C-37 – C-40).

Columbia Headwaters Recovery Unit

The Columbia headwaters RUIP describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015e, entire). The Columbia Headwaters Recovery Unit is located in western Montana, northern Idaho, and the northeastern corner of Washington. The Columbia Headwaters Recovery Unit is divided into five geographic regions: Upper Clark Fork, Lower Clark Fork, Flathead, Kootenai, and Coeur d'Alene geographic regions (USFWS 2015e, pp. D-2 – D-4). This recovery unit contains 35 bull trout core areas; 15 of which are complex core areas as they represent larger interconnected habitats and 20 simple core areas as they are isolated headwater lakes with single local populations. The 20 simple core areas are each represented by a single local population, many of which may have persisted for thousands of years despite small populations and isolated existence (USFWS 2015e, p. D-1). Fish passage improvements within the recovery unit have reconnected some previously fragmented habitats (USFWS 2015e, p. D-42), while others remain fragmented. Unlike other recovery units in Washington, Idaho and Oregon, the Columbia Headwaters Recovery Unit does not have any anadromous fish overlap (USFWS 2015e, p. D-42). Therefore, bull trout within the Columbia Headwaters Recovery Unit do not benefit from the recovery actions for salmon (USFWS 2015e, p. D-42). The current condition of the bull trout in this recovery unit 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 2015e, pp. D-10 – D-25). Conservation measures or recovery actions implemented or ongoing include habitat improvement, fish passage, and removal of nonnative species (USFWS 2015e, pp. D-42 – D-43).

Upper Snake Recovery Unit

The Upper Snake RUIP describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015f, entire). The Upper Snake Recovery Unit is located in central Idaho, northern Nevada, and eastern Oregon. The Upper Snake Recovery Unit is divided into seven geographic regions: Salmon River, Boise River, Payette River, Little Lost River, Malheur River, Jarbidge River, and Weiser River. This recovery unit contains 22 core areas and 207 local populations, with over 70 percent being present in the Salmon River Region (USFWS 2015a, p. 47; USFWS 2015f, pp. E-1 – E-2). The current condition of the bull trout in this recovery unit is attributed to the adverse effects of climate change, dams, mining, forest management practices, nonnative species, and agriculture (e.g., water diversions, grazing) (USFWS 2015f, pp. E-15 – E-18). Conservation measures or recovery actions implemented or ongoing include instream habitat restoration, instream flow requirements, screening of irrigation diversions, and riparian restoration (USFWS 2015f, pp. E-19 – E-20).

St. Mary Recovery Unit

The St. Mary RUIP describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015g, entire). The Saint Mary Recovery Unit 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 flows into is located in Canada. The United States portion includes headwater spawning and rearing habitat and the upper reaches of FMO habitat. This recovery unit contains four core areas and seven local populations (USFWS 2015g, p. F-1) in the U.S. Headwaters. The current condition of the bull trout in this recovery unit 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 2015g, p. F-7 – F-8). The primary issue precluding bull trout recovery in this recovery unit relates to impacts of water diversions, specifically at the Bureau of Reclamations Milk River Project (USFWS 2015g, p. F-5). Conservation measures or recovery actions implemented or ongoing are not identified in the St. Mary RUIP; however, the Service is conducting interagency and tribal coordination to accomplish conservation goals for the bull trout (USFWS 2015g, p. F-9).

B.1.6 Federal, State and Tribal Actions Since Listing

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

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

At sites that are vulnerable to development, protection of land through fee title acquisition or conservation easements is important to prevent adverse impacts or allow conservation actions to be implemented. In several bull trout core areas, 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) (Fredenberg et al. 2007; DeHaan et al. 2010, entire; DeHaan and Godfrey 2009, entire; Fredericks and Dux 2014; Rosenthal and Fredenberg 2017). A more comprehensive overview of conservation successes from 1999-2013, described for each recovery unit, is found in the Summary of Bull Trout Conservation Successes and Actions since 1999 (Available at: https://www.fws.gov/pacific/ecoservices/endangered/recovery/documents/USFWS_2013_summary_of_conservation_successes.pdf – last accessed February 7, 2020).

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 detailed discussion of consulted-on effects in the proposed action area is provided in the environmental baseline section below.

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4.3 Appendix C – Determining Effects from Water Intakes to Bull Trout and Subsequent Requirements

Water Intakes

(for RGP-27 - Lake Pend Oreille and the Pend Oreille River)

Determining Effects to Bull Trout and Subsequent Requirements

No Effect – No further consultation needed.

1. Project is within the "no effect" area in Figure 6* on Lake Pend Oreille or the Pend Oreille River and meets the following:

    a. If the pipe is to be buried, trenching and installation is conducted in the dry during the winter drawdown.

    AND

    b. The intake will only be used between 1-June and 15-September each year.

NLAA - Covered under this Biological Opinion

1. Project is outside of the "no effect" area in Figure 6*.

AND

2. Project location is not within ¼ mile of the mouth of a spawning tributary identified in Figure 3*.

AND

3. The intake will only be used between 1-June and 15-September each year.

LAA – <u>Not</u> covered under this Biological Opinion. Separate consultation suggested.

1. Water intake is outside of the "no effect" area in Figure 6*.

AND

2. Water intake location is within ¼ mile of the mouth of a spawning tributary identified in Figure 3*.

OR

3. The intake will be used between 16-September and 31-May each year.

* Figure 6 and Figure 3 above refer to figures in the Assessment. Figures in the Assessment are the same as in this Opinion but are identified differently. Figure 6 and Figure 3 in the Assessment are Figure 2 and Figure 1 in this BO, respectively.