United States Department of the Interior

Fish and Wildlife Service

Idaho Fish and Wildlife Office

Northern Idaho Field Office

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Spokane Valley, Washington 99206

Duane Mitchell
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201 North Third Avenue
Walla Walla, WA 99362-1876

Subject: Regional General Permit 27 – Lake Pend Oreille and Pend Oreille River—Bonner County, Idaho—Biological Opinion
In Reply Refer to: 01EIFW00-2015-F-0126

Dear Mr. Mitchell:

Enclosed are the U.S. Fish and Wildlife Service's (Service) Biological Opinion (Opinion) on 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 in Bonner County, Idaho. In a letter dated October 28, 2014, and received by the Service on the same date, the Corps requested formal consultation on the determination under section 7 of the Act that the proposed project may affect, is likely to adversely affect bull trout (*Salvelinus confluentus*) and designated bull trout critical habitat. The Corps also determined that the proposed project will have no effect on the Canada lynx (*Lynx canadensis*) and grizzly bear (*Ursus horribilis*). The Service acknowledges these determinations.

The enclosed Opinion is based primarily on our review of the proposed action, as described in your October 28, 2014, Biological Assessment (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, and will not result in the destruction or adverse modification of designated critical habitat for bull trout. A complete record of this consultation is on file at this office.

Clean Water Act:

This Opinion is also intended to address section 7 consultation requirements for the issuance of any project-related permits required under section 404 of the Clean Water Act. 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 404 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 404 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 Chris Reighn at (208) 378-5264 or Jason Flory at (509) 893-8003 if you have questions concerning this Opinion.

Sincerely,

Ben Conard
Field Supervisor

Enclosure

cc: IDFG, CdA (C.Corsi)

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

Project Number: 01EIFW00-2015-0126

U.S. FISH AND WILDLIFE SERVICE
NORTHERN IDAHO FIELD OFFICE
SPOKANE VALLEY, WA

Biologist ______________________

Date 2/25/15

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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 a letter dated October 28, 2014, and received on the same date, the U.S. Army Corps of Engineers (Corps) requested formal consultation with the Service under section 7 of the Endangered Species Act (Act) of 1973, as amended, for its proposal to permit the action. The Corps determined that the proposed action may affect, is likely to adversely affect bull trout. As described in this Opinion, and based on the Biological Assessment (BA, Corps 2014), developed by the Corps and other information, the Service has concluded that the action, as proposed, is not likely to jeopardize the continued existence of bull trout or result in the destruction or adverse modification of designated critical habitat for bull trout.

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 renewal of RGP-27 on June 28, 2002, which extended ESA coverage for activities conducted under the permit 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. During this time ESA coverage was extended. In October 2009, the Service issued a Biological Opinion providing ESA coverage through 2014.

August 1, 2007: Per memo on this date, the Service requested that the Corps add Scenic Bay to the exclusion areas for RGP-27 due to importance for kokanee spawning and kokanee's relationship to bull trout as forage in Lake Pend Oreille. Per e-mail on August 3, 2007, between the Service and the Corps, the Walla Walla District of the Corps agreed to the addition of Scenic Bay as an exclusion area and proposed to reissue RGP-27 with minor revisions for an interim period of one year, through August 30, 2008. Minor revisions included expanded exclusion areas and modifications to conservation measures.

August 17, 2007: The Service agreed to extend the existing June 28, 2002, section 7 informal consultation for RGP-27 for one year based on the Corps expanded exclusion areas and modified conservation measures in Lake Pend Oreille and the Pend Oreille River.

April 29, 2008: Per letter on this date, the Service responded to the Corps' March 3, 2008, public notice concerning reissuance and modification of RGP-27. The Service offered comments and recommendations based on review of aerial photography, GIS spatial date, and other pertinent information, pursuant to the Fish and Wildlife Coordination Act, ESA, Bald and Golden Eagle Protection Act, the Migratory Bird Treaty Act, and the National Environmental Policy Act.

July 10, 2008: The Walla Walla District of the Corps requested formal consultation with the Service for bull trout pursuant to section 7 of the ESA for reissuance of RGP-27. Since that time the Service and the Corps have been working to address new information and additional conservation measures to minimize effects of activities implemented under RGP-27 to bull trout.

September 5, 2008: By e-mail on this date, the Service received a request from Mike Doherty of the Corps requesting another extension on the previous revised-interim RGP-27 (which expired on August 30, 2008) to April 30, 2009. The extension request included several additional conservation measures to avoid or minimize the effect of activities implemented under the extended RGP-27 on bull trout. One of the conservation measures added this time was an additional exclusion area around the mouth of Priest River for activities authorized under RGP-27, in a further effort to avoid adversely affecting bull trout. The extension was requested due to pending resolution of numerous issues regarding effects to bull trout from RGP-27 activities.

September 11, 2008: By letter on this date, the Service requested additional information necessary to initiate formal consultation requested by the Corps on July 10, 2008. Discussions ensued regarding this request that included the use of light penetrative decking for RGP-27 activities.

October 24, 2008: The Service agreed with the request to extend RGP-27, as modified by the aforementioned conservation measures, to April 30, 2009.

March 24, 2009: By e-mail between the Service and the Corps, and with input from Idaho Fish and Game (IDFG), decisions were made regarding the use of light penetrative decking under certain circumstances, and in specific locations for RGP-27.

April 15, 2009: By letter on this date, the Service acknowledged the receipt of all information required from the Corps to initiate formal consultation on RGP-27. In that letter, the Service stated that the final Opinion would be completed no later than August 5, 2009. The Service and the Corps agreed to extend the existing informal consultation (originally completed on June 28, 2002) to August 5, 2009, for section 7 ESA coverage until the completion of the final biological opinion.

May 2009: Service biologists and state wildlife biologists determined that the Strong Creek tributary to Lake Pend Oreille currently has spawning and rearing habitat for bull trout and would need to be added as an exclusion area for RGP-27 activities.

June 17, 2009: By e-mail between the Service and the Corps, it was agreed upon to add Strong Creek as an exclusion area for RGP-27.

August 4, 2009: The Service and the Corps agreed to extend the existing June 28, 2002, informal consultation for RGP-27 to October 5, 2009. The final Opinion will be completed on, or before, this date.

September 3, 2009: By letter on this date, the Service submitted the draft Opinion to the Corps for review and comments. No comments were received by the Service from the Corps.

October 6, 2009: Final Opinion submitted to the Corps.

October 28, 2014: Corps submitted BA to Service.

November 7, 2014: Service provided questions and comments regarding BA.

November 10, 2014: Corps provided responses to Service questions and comments.

December 1, 2014: Further discussion between Service and Corps regarding the BA and potential effects.

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 BA 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 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.

- 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) is not allowed under any circumstance nor is the reuse of industrial drums.
- 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.

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 will be anchored to the surface of the bed of the waterway or on low profile concrete plank ties, untreated 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 will be installed on the existing ramp surface.
- Marine launching rail systems will not extend more than 120 feet waterward of the elevation 2,062.5 NGVD.
- 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 multi-piled dolphin.
- Mooring piles shall not be installed more than 55 feet waterward of the ordinary high water mark or to length of the permitted dock, whichever is less.
- 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.

Portable Boat Lift Stations

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

- Portable boat-lift stations will be for noncommercial use.
- Portable boat-lift stations shall not be installed more than 55 feet waterward of the ordinary high water mark or the length of the permitted dock, whichever is less.

- 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.
- 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, whichever is less.

The renewal of RGP-27 will last for five years, and it is estimated that approximately 200 to 250 facilities will be authorized during the five-year term of the renewed permit. 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.

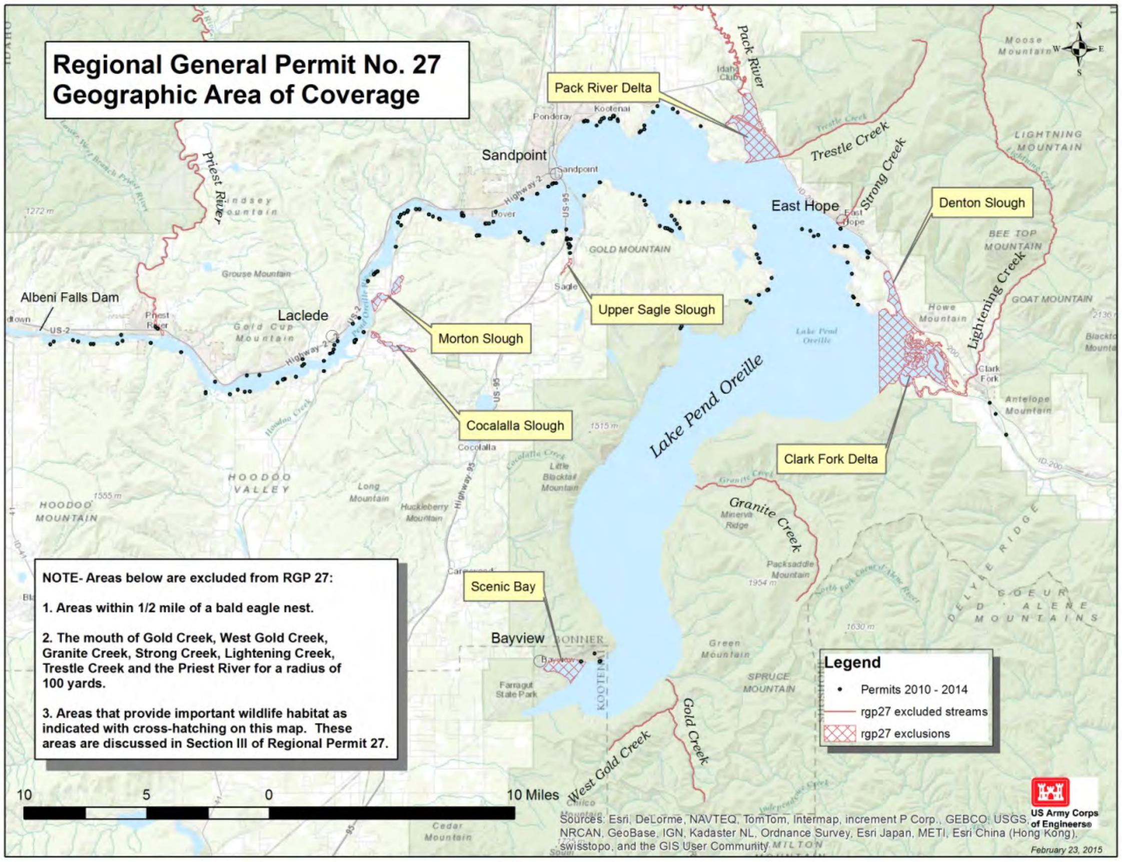
Conservation Measures

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. 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. Additionally, 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 potential 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).

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,
    - Sagle Slough, south of the north section line of Section 11, T.56 N., R.2W.,
    - Morton Slough, including the left bank (east shoreline) of the Pend Oreille River from the half section line of Section 16, T.56N., 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.

Figure 1. RGP-27 geographic area of coverage, exclusion areas and locations of authorized actions from 2010 to 2014.



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 protected by appropriate soil erosion control practices 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 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 (see Appendix A).

2.2 Analytical Framework for the Jeopardy and Adverse Modification Determinations

2.2.1 Jeopardy Determination

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

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

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

As discussed below under the *Status of the Species*, interim recovery units have been designated for the bull trout for purposes of recovery planning and application of the jeopardy standard. Per Service national policy (USFWS 2006, entire), it is important to recognize that the establishment of recovery units does not create a new listed entity. Jeopardy analyses must always consider the impacts of a proposed action on the survival and recovery of the species that is listed. While a proposed Federal action may have significant adverse consequences to one or more recovery units, this would only result in a jeopardy determination if these adverse consequences reduce appreciably the likelihood of both the survival and recovery of the listed entity; in this case, the coterminous U.S. population of the bull trout.

The joint Service and National Marine Fisheries Service (NMFS) *Endangered Species Consultation Handbook* (USFWS and NMFS 1998, p. 4-38), which represents national policy of both agencies, further clarifies the use of recovery units in the jeopardy analysis:

> When an action appreciably impairs or precludes the capacity of a recovery unit 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, include in the biological opinion a description of how the action affects not only the recovery unit's capability, but the relationship of the recovery unit to both the survival and recovery of the listed species as a whole.

The jeopardy analysis in this Opinion conforms to the above analytical framework.

2.2.2 Adverse Modification Determination

This Opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the Act to complete the following analysis with respect to critical habitat.

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

1. The *Status of Critical Habitat*, which evaluates the rangewide condition of designated critical habitat for the bull trout in terms of primary constituent elements (PCEs), the factors responsible for that condition, and the intended recovery function of the critical habitat overall.
2. The *Environmental Baseline,* which evaluates the condition of the critical habitat in the action area, the factors responsible for that condition, and the recovery role of the critical habitat in the action area.
3. The *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the PCEs and how that will influence the recovery role of affected critical habitat units.
4. *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the PCEs and how that will influence the recovery role of affected critical habitat units.

For purposes of the adverse modification determination, the effects of the proposed Federal action on bull trout critical habitat are evaluated in the context of the rangewide condition of the critical habitat, taking into account any cumulative effects, to determine if the critical habitat rangewide would remain functional (or would retain the current ability for the PCEs to be functionally established in areas of currently unsuitable but capable habitat) to serve its intended recovery role for the bull trout.

The analysis in this Opinion places an emphasis on using the intended rangewide recovery function of bull trout critical habitat and the role of the action area relative to that intended function 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 adverse modification determination.

2.3 Status of the Species and Critical Habitat

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

2.3.1 Bull Trout

2.3.1.1 Listing Status

The coterminous United States population of the bull trout was listed as threatened on November 1, 1999 (64 FR 58910). The threatened bull trout occurs in the Klamath River Basin of south-central Oregon, the Jarbidge River in Nevada, north to various coastal rivers of Washington to the Puget Sound, east throughout major rivers within the Columbia River Basin to the St. Mary-Belly River, and east of the Continental Divide in northwestern Montana (Cavender 1978, pp. 165-166; Bond 1992, p. 4; Brewin and Brewin 1997, pp. 209-216; Leary and Allendorf 1997, pp. 715-720). The Service completed a 5-year Review in 2008 and concluded that the bull trout should remain listed as threatened (USFWS 2008, p. 53).

The bull trout was initially listed as three separate Distinct Population Segments (DPSs) (63 FR 31647, 64 FR 17110). The preamble to the final listing rule for the U.S. coterminous population of the bull trout discusses the consolidation of these DPSs, plus two other population segments, into one listed taxon and the application of the jeopardy standard under Section 7 of the Act relative to this species (64 FR 58930):

> Although this rule consolidates the five bull trout DPSs into one listed taxon, based on conformance with the DPS policy for purposes of consultation under Section 7 of the Act, we intend to retain recognition of each DPS in light of available scientific information relating to their uniqueness and significance. Under this approach, these DPSs will be treated as interim recovery units with respect to application of the jeopardy standard until an approved recovery plan is developed. Formal establishment of bull trout recovery units will occur during the recovery planning process.

2.3.1.1.1 Reasons for Listing

Though wide ranging in parts of Oregon, Washington, Idaho, and Montana, bull trout in the interior Columbia River basin presently occur in only about 45 percent of the historical range (Quigley and Arbelbide 1997, p. 1177; Rieman et al. 1997, p. 1119). Declining trends due to the combined effects of habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, angler harvest and poaching, entrainment into diversion channels and dams, and introduced nonnative species (e.g., brook trout, *Salvelinus fontinalis*) have resulted in declines in range-wide bull trout distribution and abundance (Bond 1992, p. 4; Schill 1992, p. 40; Thomas 1992, pp. 9-12; Ziller 1992, p. 28; Rieman and McIntyre 1993, pp. 1-18; Newton and Pribyl 1994, pp. 2, 4, 8-9; Idaho Department of Fish and Game in litt. 1995, pp. 1-3). Several local extirpations have been reported, beginning in the 1950s (Rode 1990, p. 1; Ratliff and Howell 1992, pp. 12-14; Donald and Alger 1993, p. 245; Goetz 1994, p. 1; Newton and Pribyl

1994, p. 2; Berg and Priest 1995, pp. 1-45; Light et al. 1996, pp. 20-38; Buchanan and Gregory 1997, p. 120).

Land and water management activities such as dams and other diversion structures, forest management practices, livestock grazing, agriculture, road construction and maintenance, mining, and urban and rural development continue to degrade bull trout habitat and depress bull trout populations (USFWS 2002a, p. 13).

2.3.1.2 Species Description

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

2.3.1.3 Life History

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

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

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

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

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

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

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

Bull trout are opportunistic feeders with food habits primarily a function of size and life history strategy. Resident and juvenile migratory bull trout prey on terrestrial and aquatic insects, macro zooplankton and small fish (Boag 1987, p. 58; Goetz 1989, pp. 33-34; Donald and Alger 1993, pp. 239-243). Adult migratory bull trout are primarily piscivores, known to feed on various fish species (Fraley and Shepard 1989, p. 135; Donald and Alger 1993, p. 242).

2.3.1.3.1 Population Dynamics

The draft bull trout Recovery Plan (USFWS 2002a, pp. 47-48) defined core areas as groups of partially isolated local populations of bull trout with some degree of gene flow occurring between them. Based on this definition, core areas can be considered metapopulations. A metapopulation is an interacting network of local populations with varying frequencies of migration and gene flow among them (Meefe and Carroll 1994, p. 188). In theory, bull trout metapopulations (core areas) can be composed of two or more local populations, but Rieman and Allendorf (2001, p. 763) suggest that for a bull trout metapopulation to function effectively, a minimum of 10 local populations are required. Bull trout core areas with fewer than five local populations are at increased risk of local extirpation, core areas with between five and ten local populations are at intermediate risk, and core areas with more than 10 interconnected local populations are at diminished risk (USFWS 2002a, pp. 50-51).

The presence of a sufficient number of adult spawners is necessary to ensure persistence of bull trout populations. In order to avoid inbreeding depression, it is estimated that a minimum of 100 spawners are required. Inbreeding can result in increased homozygosity of deleterious recessive alleles which can in turn reduce individual fitness and population viability (Whitesel et al. 2004, p. 36). For persistence in the longer term, adult spawning fish are required in sufficient numbers to reduce the deleterious effects of genetic drift and maintain genetic variation. For bull trout, Rieman and Allendorf (2001, p. 762) estimate that approximately 1,000 spawning adults within any bull trout population are necessary for maintaining genetic variation indefinitely. Many local bull trout populations individually do not support 1,000 spawners, but this threshold may be met by the presence of smaller interconnected local populations within a core area.

For bull trout populations to remain viable (and recover), natural productivity should be sufficient for the populations to replace themselves from generation to generation. A population that consistently fails to replace itself is at an increased risk of extinction. Since estimates of population size are rarely available, the productivity or population growth rate is usually estimated from temporal trends in indices of abundance at a particular life stage. For example, redd counts are often used as an indicator of a spawning adult population. The direction and magnitude of a trend in an index can be used as a surrogate for growth rate.

Survival of bull trout populations is also dependent upon connectivity among local populations. 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. 7). Increased habitat fragmentation reduces the amount of available habitat and increases isolation from other populations of the same species (Saunders et al. 1991, p. 22). Burkey (1989, p. 76) 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 of local populations may be low and probability of extinction high. Migrations also facilitate gene flow among local populations because individuals from different local populations interbreed when some stray and return to nonnatal streams. Local populations that are extirpated by catastrophic events may also become reestablished in this manner.

In summary, based on the works of Rieman and McIntyre (1993, pp. 9-15) and Rieman and Allendorf (2001, pp 756-763), the draft bull trout Recovery Plan identified four elements to consider when assessing long-term viability (extinction risk) of bull trout populations: (1) number of local populations, (2) adult abundance (defined as the number of spawning fish present in a core area in a given year), (3) productivity, or the reproductive rate of the population, and (4) connectivity (as represented by the migratory life history form).

2.3.1.4 Status and Distribution

As noted above, in recognition of available scientific information relating to their uniqueness and significance, five population segments of the coterminous United States population of the bull trout are considered essential to the survival and recovery of this species and are identified as: (1) Jarbidge River, (2) Klamath River, (3) Coastal-Puget Sound, (4) St. Mary-Belly River, and (5) Columbia River. Each of these segments is necessary to maintain the bull trout's distribution, as well as its genetic and phenotypic diversity, all of which are important to ensure the species' resilience to changing environmental conditions.

A summary of the current status and conservation needs of the bull trout within these units is provided below. A comprehensive discussion of these topics is found in the draft bull trout Recovery Plan (USFWS 2002a, entire; 2004a, b; entire).

Central to the survival and recovery of the bull trout is the maintenance of viable core areas (USFWS 2002a, p. 54). A core area is defined as a geographic area occupied by one or more local bull trout populations that overlap in their use of rearing, foraging, migratory, and overwintering habitat, and, in some cases, their use of spawning habitat. Each of the population segments listed below consists of one or more core areas. One hundred and twenty one core areas are recognized across the United States range of the bull trout (USFWS 2005, p. 9).

A core area assessment conducted by the Service for the five year bull trout status review determined that of the 121 core areas comprising the coterminous listing, 43 are at high risk of extirpation, 44 are at risk, 28 are at potential risk, four are at low risk and two are of unknown status (USFWS 2008, p. 29).

2.3.1.4.1 Columbia River

The Columbia River population segment includes bull trout residing in portions of Oregon, Washington, Idaho, and Montana. Bull trout are estimated to have occupied about 60 percent of the Columbia River Basin, and presently occur in 45 percent of the estimated historical range (Quigley and Arbelbide 1997, p. 1177). This population segment currently contains 97 core areas and 527 local populations. About 65 percent of these core areas and local populations occur in Idaho and northwestern Montana.

The condition of the bull trout populations within these core areas varies from poor to good, but generally all have been subject to the combined effects of habitat degradation, fragmentation and alterations associated with one or more of the following activities: dewatering, road construction and maintenance, mining and grazing, blockage of migratory corridors by dams or other diversion structures, poor water quality, incidental angler harvest, entrainment into diversion channels, and introduced nonnative species.

The Service has determined that of the total 97 core areas in this population segment, 38 are at high risk of extirpation, 35 are at risk, 20 are at potential risk, two are at low risk, and two are at unknown risk (USFWS 2005, pp. 1-94).

The draft bull trout Recovery Plan (USFWS 2002a, p. v) identifies the following conservation needs for this population segment: (1) maintain or expand the current distribution of the bull trout within core areas, (2) maintain stable or increasing trends in bull trout abundance, (3) maintain and restore suitable habitat conditions for all bull trout life history stages and strategies, and (4) conserve genetic diversity and provide opportunities for genetic exchange.

2.3.1.4.1.1 Clark Fork Recovery/Management Units

Achieving recovery goals within each management unit is critical to recovering the Columbia River population segment. Recovering bull trout in each management unit would maintain the overall distribution of bull trout in their native range. Individual core areas are the foundation of management units and conserving core areas and their habitats within management units preserves the genotypic and phenotypic diversity that will allow bull trout access to diverse habitats and reduce the risk of extinction from stochastic events. The continued survival and recovery of each individual core area is critical to the persistence of management units and their role in the recovery of a population segment (USFWS 2002a, p. 54).

The draft bull trout Recovery Plan (USFWS 2002a, p. 2) identified 22 recovery units within the Columbia River population segment. These units are now referred to as management units. Management units are groupings of bull trout with historical or current gene flow within them and were designated to place the scope of bull trout recovery on smaller spatial scales than the larger population segments. The action area is encompassed by the Lake Pend Oreille Core Area of the Clark Fork Management Unit.

2.3.1.4.1.1.1 Lake Pend Oreille Core Area

The Lake Pend Oreille Core Area includes Lake Pend Oreille and its tributaries (Clark Fork River upstream to Cabinet Gorge Dam, Priest River, Pack River, and Trestle, Strong, Lightning, Johnson, Twin, Granite, North Gold, and Gold Creeks), and Pend Oreille River downstream to Albeni Falls Dam. During the development of the draft recovery plan, 17 local populations were identified in the Lake Pend Oreille Core Area (Service 2002, pp. 124-128). However, based on recent survey data, there appears to be at least 20 local populations as redds and multiple age classes of juvenile bull trout have been identified in several additional streams (Idaho Department of Fish and Game (IDFG) in litt. 2009, p.1) (Table 1 and 2).

At the time of bull trout listing, the Lake Pend Oreille Subpopulation (now referred to as the Lake Pend Oreille Core Area) was considered to be in a declining trend (Service 1998, pp. 24-25, 53). The Bull Trout Core Area Conservation Status Assessment (Service 2005, p. 68) determined the Lake Pend Oreille Core Area to be stable. Bull trout redd counts have been conducted annually since 1983 on six index streams, which are also streams identified as supporting local populations (Trestle, East Fork Lightning, Gold, North Gold, Johnson and Grouse Creeks). In 2006, the combined total bull trout redd counts for the index streams were considerably higher than the long-term average for these streams (Downs and Jakubowski 2007, p. 1). There is variability between these index streams with some approaching restoration objectives and others, particularly those in the Lightning Creek drainage, persisting at low levels (Downs and Jakubowski 2007, p. 1).

Table 1. Lake Pend Oreille Core Area bull trout redd counts from 1983 to 1995.

River/Stream	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Clark Fork River	--	--	--	--	--	--	--	--	--	2	8	17	18
Lightning Creek	28	9	46	14	4	--	--	--	--	11	2	5	0
E.F. Fork Lightning Creek	110	24	132	8	59	79	100	29	--	32	27	28	3
Savage Creek	36	12	29	--	0	--	--	--	--	1	6	6	0
Char Creek	18	9	11	0	2	--	--	--	--	9	37	13	2
Porcupine Creek	37	52	32	1	9	--	--	--	--	4	6	1	2
Wellington Creek	21	18	15	7	2	--	--	--	--	9	4	9	1
Rattle Creek	51	32	21	10	35	--	--	--	--	10	8	0	1
Johnson Creek	13	33	23	36	10	4	17	33	25	16	23	3	4
Twin Creek	7	25	5	28	0	--	--	--	--	3	4	0	5
Morris Creek	--	--	--	--	--	--	--	--	--	--	--	--	--
Strong Creek	--	--	--	--	--	--	--	--	--	--	--	--	--
Trestle Creek	298	272	298	147	230	236	217	274	220	134	304	276	140
Pack River	34	37	49	25	14	--	--	--	--	65	21	22	0
Grouse Creek	2	108	55	13	56	24	50	48	33	17	23	18	0
Granite Creek	3	81	37	37	30	--	--	--	--	0	7	11	9
Sullivan Springs	9	8	14	--	6	--	--	--	--	0	24	31	9
N. Gold Creek	16	37	52	8	36	24	37	35	41	41	32	27	31
Gold Creek	131	124	111	78	62	111	122	84	104	93	120	164	95
W. Gold Creek	--	--	--	--	--	--	--	--	--	--	--	--	--
Uleda Creek	--	--	--	--	--	--	--	--	--	--	--	--	--
M.F. East River	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2. Lake Pend Oreille Core Area bull trout redd counts from 1996 to 2008.[2]

River/Stream	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Clark Fork River	3	7	8	5	5	6	7	8	1	0	3	2	0
Lightning Creek	6	0	3	16	4	7	8	8	9	22	9	3	10
E.F. Fork Lightning Creek	49	22	64	44	54	36	58	38	77	50	51	34	38
Savage Creek	0	0	0	4	2	4	15	7	15	7	25	0	8
Char Creek	14	1	16	17	11	2	8	7	14	15	20	1	5
Porcupine Creek	0	0	0	4	4	0	0	5	10	14	8	8	8
Wellington Creek	5	2	1	22	8	7	7	8	7	6	29	9	10
Rattle Creek	10	2	15	13	12	67	33	37	34	34	21	2	24
Johnson Creek	5	27	17	31	4	34	31	0	32	45	28	32	40
Twin Creek	16	6	10	19	10	1	8	3	6	7	11	0	4
Morris Creek	--	--	--	1	1	0	7	1	1	3	16	0	6
Strong Creek	2	--	--	--	--	--	0	--	0	--	--	--	7
Trestle Creek	243	221	330	253	301	335	333	361	102	174	395	145	183
Pack River	6	4	17	0	8	28	22	24	31	53	44	16	11
Grouse Creek	50	8	44	50	77	18	42	45	28	77	55	38	31
Granite Creek	47	90	49	41	25	7	57	101	149	132	166	104	52
Sullivan Springs	15	42	10	22	19	8	15	12	14	15	28	17	7
N. Gold Creek	39	19	22	16	19	16	24	21	56	34	30	28	17
Gold Creek	100	76	120	147	168	127	203	126	167	200	235	179	73
W. Gold Creek	--	--	--	--	--	--	--	--	--	--	4	0	7
Uleda Creek	--	--	--	--	--	3	4	3	7	4	7	2	7
M.F. East River	--	--	--	--	--	4	8	21	20	48	71	34	36

[2] Redd count data for 22 streams/rivers are contained in the table. However, according to Scott Deeds (Service, pers. comm. 2008), 2 spawning areas (Clark Fork River, West Gold Creek) and are not considered to support separate local bull trout populations. In the case of the Clark Fork River, it is thought that bull trout from local populations above Cabinet Gorge Dam have and are spawning in an artificially constructed side channel below the dam, due to the dam blocking their upstream spawning migration. In recent years, the number of bull trout redds located in the side channel of the Clark Fork River below the dam has decreased, presumably because a trap and haul program has been initiated by the Idaho Department of Fish and Game wherein adult bull trout returning upriver on their spawning migrations are relocated above the dam. In the case of West Gold Creek, it is considered to be included in Gold Creek bull trout local population, as Gold Creek subs out at the confluence immediately above West Gold Creek. Therefore, the Lake Pend Oreille Core Area is currently considered to be comprised of 20 local bull trout spawning populations.

Within the Lake Pend Oreille Core Area adult bull trout exhibit typical migration and spawning behavior (with some minor seasonal variation to coincide with specific individual stream flows), in that they generally begin migrating to spawning streams in early or late summer, spawn and return to the lake for overwintering in the fall. Similarly, bull trout juveniles exhibit typical outmigration behavior, except for the East Fork River local population. The East Fork River is a tributary to the Priest River. Except for the East Fork River, juvenile bull trout begin outmigrating from their spawning/rearing habitat/streams with the spring freshets. However, because East Fork River bull trout migrate upriver in the Pend Oreille River to reach Lake Pend Oreille, most juveniles outmigrate in the fall, reaching the lake by early to mid-winter. It is thought that this rather unique juvenile outmigration pattern has evolved to avoid migrating upriver against the spring freshets.

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.

Lake Pend Oreille is the largest and deepest natural lake in Idaho (Panhandle Bull Trout Technical Advisory Team 1998). It covered about 33,696 hectares (83,200 acres) under natural conditions, and it now (post-impoundment by Albeni Falls Dam) has a surface area of about 38,362 hectares (94,720 acres) (PBTTAT 1998a). The lake has more than 282 kilometers (175 miles) of shoreline, with mean and maximum depths of 164 meters (538 feet) and 351 meters (1,152 feet), respectively.

Historic forestry practices impact virtually all of the major drainages in the Pend Oreille system. The historic effects of forestry practices include increased sediment to streams (primary contributor is roads), loss of instream woody debris, channel instability, changes in water temperature, and alterations of stream hydrographs including increased peak and decreased base flows. Many of these changed conditions continue to impact bull trout spawning, rearing, and migratory habitat. Current forestry practices are more cognizant of their effect upon bull trout habitat and, thus, are more proactive. However, bull trout are still at risk from the high density of roads within watersheds, and the legacy effects of historic forestry practices. Within the Pend Oreille Core Area, a number of stream segments including Trestle, Gold, and Lightning Creeks, and the Pack River are listed as water quality limited for various pollutants of concern, which include sediment, flow, habitat alteration, thermal modification, and metals, among others (PBTTAT 1998, p. 6).

Historic mining has impacted bull trout habitat within Pend Oreille Core Area. Past mining operations from several mines on both Gold Creek (Conjecture and Weber Mines) and Chloride Gulch (Lakeview Mine), which is a tributary to Gold Creek, have resulted in the leaching of extremely high concentrations of heavy metals (primarily zinc, arsenic, cadmium) from mine waste deposits left adjacent to or in the streams. Impacts to the bull trout populations in these streams from these heavy metal concentrations are currently unknown. Gold Creek exhibits channel instability and intermittency as a result of excess bedload stemming from past mining operations, which causes it to go dry for most of the summer season in areas where width/depth ratios, channel confinement, and channel sinuosity are outside normal ranges (PBTTAT 1998, p. 44).

The introduction of non-native fish species affects the population abundance and potentially the distribution of bull trout within the action area. Brook trout and lake trout (*Salvelinus namaycush*) are present in many of the tributaries within the system, and may present the greatest threat to bull trout (Service 2002, p. 107). Brook trout hybridize with bull trout. Lake trout prey on juvenile bull trout, compete for forage with, and may eventually replace bull trout in systems where they have been introduced. The impact of lake trout upon the bull trout population in Lake Pend Oreille is not fully understood, however there is concern over the apparently rapidly expanding population abundance and distribution of lake trout within the Pend Oreille system.

Since 1996, in an effort to reduce the potential impact upon bull trout (and cutthroat trout), the IDFG has implemented an annual trap and gill netting program in Pend Oreille Lake targeting the removal of lake trout. The trap and gill netting efforts have been very successful at removing lake trout and potentially reducing the lake trout population in Pend Oreille Lake. However, while targeting lake trout, many bull trout have been caught in the nets as well. In 2006, 2007, and 2008, 301, 432, and 1,052 bull trout were caught in the nets, respectively (Fredericks, pers. comm. 2009). While every effort is made to release bull trout unharmed, some mortality does occur. In 2006 of the 301 bull trout caught, there were 116 known mortalities, in 2007, 142 of the 432 bull trout were known to have died, and in 2008, 200 of the 1,052 bull trout were known to have died (Fredericks, pers. comm. 2009). There is likely some additional delayed bull trout mortality that occurs after release, but the amount is unknown. Annually, IDFG has implemented refinements to their capture and release protocols to reduce the capture mortality of bull trout. The known mortality of bull trout has decreased from 38 percent in 2006 to 19 percent in 2008.

Urbanization, including: channel constrictions at crossings; diking to prevent flooding; and development within riparian areas and floodplains impacts bull trout populations and habitat within the Lake Pend Oreille Core Area (PBTTAT 1998, pp. 19-24; Service 2002, pp. 64, 66, 77). Channel constrictions can present migration impediments to bull trout seasonally, and in some cases year-round, reducing the availability of habitat to support bull trout spawning and rearing life stages. Dikes have impaired floodplain function, which has affected stream channel stability. Similarly, the removal of trees, which often times accompanies riparian area and floodplain development, has reduced channel stability. Removal of large woody debris (LWD) from streams and riparian areas, which often occurs to protect development within riparian areas and floodplains, has resulted in reduced stream complexity (i.e., pool frequency and volume has been reduced) (PBTTAT 1998, p. 24).

Illegal harvest of bull trout (i.e., poaching) is recognized as a problem in the Lake Pend Oreille Core Area. Bull trout in Lake Pend Oreille are particularly vulnerable to poaching because they often enter small tributary streams several months prior to spawning and congregate in pools (Service 2002, p. 94).

The Service's Five Year Status Review (USFWS 2008, p. 33) concluded that the Lake Pend Oreille core area population is stable but at potential risk of extirpation. We determined that threats to the viability of this core area are moderate and non-imminent (USFWS 2008, p. 33). As described above, threats to bull trout in the core area include non-native lake trout and brook trout, historic forestry practices including legacy road networks, urbanization including construction and operations of dams, and poaching.

2.3.1.5 Conservation Needs

The recovery planning process for the bull trout (USFWS 2002a, p. 49) has identified the following conservation needs (goals) for bull trout recovery: (1) maintain the current distribution of bull trout within core areas as described in recovery unit chapters, (2) maintain stable or increasing trends in abundance of bull trout as defined for individual recovery units, (3) restore and maintain suitable habitat conditions for all bull trout life history stages and strategies, and (4) conserve genetic diversity and provide opportunity for genetic exchange.

The draft bull trout Recovery Plan (USFWS 2002a, p. 62) identifies the following tasks needed for achieving recovery: (1) protect, restore, and maintain suitable habitat conditions for bull trout, (2) prevent and reduce negative effects of nonnative fishes, such as brook trout, and other nonnative taxa on bull trout, (3) establish fisheries management goals and objectives compatible with bull trout recovery, (4) characterize, conserve, and monitor genetic diversity and gene flow among local populations of bull trout, (5) 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, (6) use all available conservation programs and regulations to protect and conserve bull trout and bull trout habitats, (7) assess the implementation of bull trout recovery by management units, and (8) revise management unit plans based on evaluations.

Another threat now facing bull trout is warming temperature regimes associated with global climate change. Because air temperature affects water temperature, species at the southern margin of their range that are associated with cold water patches, such as bull trout, may become restricted to smaller, more disjunct patches or become extirpated as the climate warms (Rieman et al. 2007, p. 1560). Rieman et al. (2007, pp. 1558, 1562) concluded that climate is a primary determining factor in bull trout distribution. Some populations already at high risk, such as the Jarbidge, may require "aggressive measures in habitat conservation or restoration" to persist (Rieman et al. 2007, p. 1560). Conservation and restoration measures that would benefit bull trout include protecting high quality habitat, reconnecting watersheds, restoring flood plains, and increasing site-specific habitat features important for bull trout, such as deep pools or large woody debris (Kinsella 2005, entire).

2.3.2 Bull Trout Critical Habitat

2.3.2.1 Legal Status

Ongoing litigation resulted in the U.S. District Court for the District of Oregon granting the Service a voluntary remand of the 2005 critical habitat designation. Subsequently the Service published a proposed critical habitat rule on January 14, 2010 (75 FR 2260) and a final rule on October 18, 2010 (75 FR 63898). The rule became effective on November 17, 2010. A justification document was also developed to support the rule and is available on our website (http://www.fws.gov/pacific/bulltrout). The scope of the designation involved the species' coterminous range, which includes the Jarbidge River, Klamath River, Coastal-Puget Sound, St. Mary-Belly River, and Columbia River population segments (also considered as interim recovery units)[1].

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

Table 3. Stream/shoreline distance and reservoir/lake area designated as bull trout critical habitat by state.

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

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

This rule also identifies and designates as critical habitat approximately 1,323.7 km (822.5 miles) of streams/shorelines and 6,758.8 ha (16,701.3 acres) of lakes/reservoirs of unoccupied habitat to

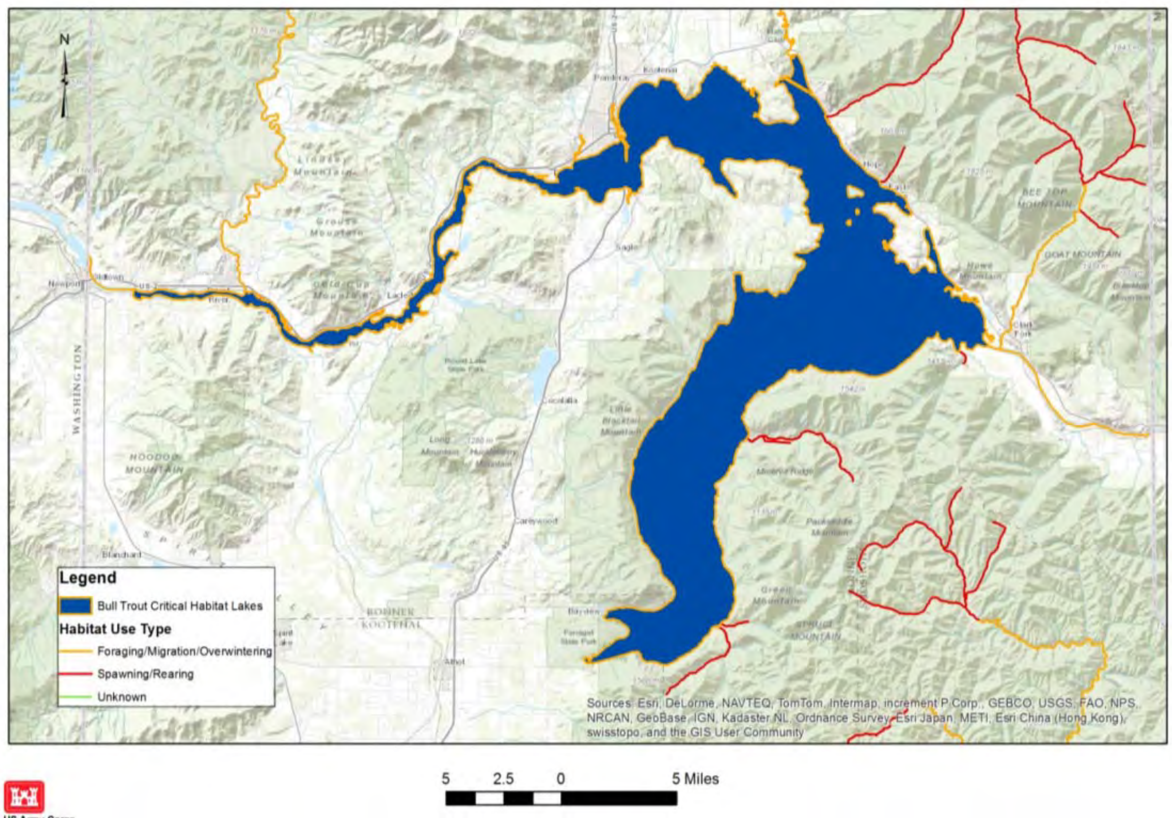
[1] The Service's five year review (USFWS 2008, p. 9) identifies six draft recovery units. Until the bull trout draft recovery plan is finalized, the current five interim recovery units are in affect for purposes of section 7 jeopardy analysis and recovery. The adverse modification analysis does not rely on recovery units.

address bull trout conservation needs in specific geographic areas in several areas not occupied at the time of listing. No unoccupied habitat was included in the 2005 designation. These unoccupied areas were determined by the Service to be essential for restoring functioning migratory bull trout populations based on currently available scientific information. These unoccupied areas often include lower mainstem river environments that can provide seasonally important migration habitat for bull trout. This type of habitat is essential in areas where bull trout habitat and population loss over time necessitates reestablishing bull trout in currently unoccupied habitat areas to achieve recovery.

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

Critical habitat designated within the action area is identified in Figure 2 below.

Figure 2. Designated bull trout critical habitat within the action area of RGP-27. In this figure, all areas where bull trout are known to occur are designated critical habitat.



US Army Corps of Engineers

2.3.2.2 Conservation Role and Description of Critical Habitat

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

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

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

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

In determining which areas to propose as critical habitat, the Service considered the physical and biological features that are essential to the conservation of bull trout and that may require special management considerations or protection. These features are the PCEs laid out in the appropriate quantity and spatial arrangement for conservation of the species. The PCEs of designated critical habitat are:

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

8. Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.
9. Sufficiently low levels of occurrence of nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.

2.3.2.3 Current Rangewide Condition of Bull Trout Critical Habitat

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

The primary land and water management activities impacting the physical and biological features essential to the conservation of bull trout include timber harvest and road building, agriculture and agricultural diversions, livestock grazing, dams, mining, urbanization and residential development, and nonnative species presence or introduction (75 FR 2282).

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

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

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

2.4 Environmental Baseline of the Action Area

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

2.4.1 Bull Trout

2.4.1.1 Status of the Bull Trout in the Action Area

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.

In 1981, the Seattle District of the Corps issued a regional permit authorizing installation, replacement, repair or modification of 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 occurs every five years, following a public interest review, including opportunity for public comment. During discussions in 2002, the Service and the Corps agreed to include exclusion areas for RGP-27 for activities located near and potentially affecting known bald eagle nesting sites and at the outlet of streams where bull trout were known to spawn. On June 28, 2002, the Service issued a concurrence letter (FWS Ref. #1-9-02-0287) for permitted activities covered under RGP-27 within Pend Oreille Lake and Pend Oreille River.

The number of authorizations granted for actions prior to 1986 under RGP-27 is unknown. From 1986 through June 2014, the Corps had authorized 1,696 final actions under RGP-27. The majority of these actions were for docks and piers. These actions have likely resulted in estimated 13,570 feet of shoreline alteration, which translates to approximately 1.47% 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 genetically assigned to bull trout spawning populations that utilize habitat within 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 one kilometer (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 1 kilometer 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 within close proximity to 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 older) 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 sunset and sunrise (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 (2006, p. 46) have been conducting bull trout studies on Trestle Creek with 2006 marking the seventh year of what is anticipated to be an eight-year study into the life-history and survival of bull trout inhabiting Lake Pend Oreille tributaries. The first three years of the study (2000-2002) involved the capture and marking of bull trout, and the subsequent five years will involve recapture of marked individuals to estimate the desired survival rates and life-history parameters. To date, a total of 29 unique bull trout originally marked as juveniles in 2000, have been detected in Trestle Creek as returning adults (10.7%). Of the 350 juveniles originally marked outmigrating from Trestle Creek in 2001, 51 unique individuals (14.6%) have returned to date. Twenty-three unique individuals (7.6%) from the 2002 marking group have returned to date. No previously undetected adult bull trout from the 2000 juvenile marking group returned to Trestle Creek during 2006, although two fish from that marking group that had returned in 2004, also returned in 2006.

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 documented in May 2008 (Hansen 2008, power point slide titled "Lake Pend Oreille Bull Trout"). 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. 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*) and smallmouth bass (*Micropterus dolomieu*), northern pike (*Esox lucius*), plus 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 piscine predators are year-round residents of Lake Pend Oreille and the Pend Oreille River and some are known to consume salmonids, including bull trout.

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). Brook trout hybridize with bull trout. Lake trout prey on juvenile bull trout, compete for forage with, and may eventually replace bull trout in systems where they have been introduced. Implementation of IDFG's annual trap and gill netting program in Pend Oreille Lake, targeting the removal of lake trout, shows the known human-caused mortality of bull trout in Pend Oreille Lake has decreased from 38 percent in 2006 to 19 percent in 2008 (Fredericks, pers. comm. 2009). The impact of lake trout upon the bull trout population in Lake Pend Oreille is not fully understood.

2.4.2 Bull Trout Critical Habitat

2.4.2.1 Factors Affecting Bull Trout Critical Habitat in the Action Area

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

Flow and water quality in the lake and its tributary streams have, to varying degrees, been altered by land use (primarily forestry, grazing, dry-land agriculture, mining and sub/exurban development). Stream hydrology and morphology have been altered near the lake as a result of the seasonal fluctuations in lake level produced by manipulation of Albeni Falls Dam discharges. The precise nature of the fluctuations is rather complex. The water level of Lake Pend Oreille fluctuates between a summer elevation of 2,062.5 feet, and winter elevations of 2,051 to 2,055 feet (thus, a change of 7.5 to 11.5 feet). Lake levels are controlled at Albeni Falls Dam, and are targeted at an elevation of either 2,051 feet or 2,055 feet in winter, depending on the outcome of a consultative process that considers the seasonal precipitation forecast, number of female kokanee spawners, the success of lower Columbia chum salmon spawning, and recent history of Lake Pend Oreille winter elevations. Lake level management is conducted to provide for kokanee spawning in fall and for protection of incubating kokanee eggs in winter and spring. These criteria are reviewed by September of each year by an interagency team consisting of representatives from numerous agencies, including the Service. The team recommends a lake elevation for the coming winter. Based on the recommendation, the Service submits an operation request to the Corps for consideration by the interagency Technical Management Team, which oversees the week-to-week operation of the Federal Columbia River Power System. The Corps makes its decision on the recommendation in consideration of the Technical Management Team's evaluation (Corps 2008, p. 4-2).

The action area is entirely within the Albeni Falls Dam impoundment to elevation 2,062.5, and thus includes areas within both Lake Pend Oreille, the impounded portions of the Pend Oreille River and its tributaries, including the lower part of Priest River, Pack River Delta, and the Clark Fork River Delta. Prior to dam construction, Pend Oreille River and Lake both displayed a highly variable seasonal hydrograph with measured river flows varying from about 5,000 to

150,000 cubic feet per second, and lake levels varying between 2,046 to 2,069 feet. Dam construction greatly diminished both river and lake flow variation. Under the current management regime, the lake maintains an elevation of 2,052, 2,056, or 2,062 feet for most of the year, with transitions between those states lasting a period of weeks. At high lake levels, appreciable flow velocities (commonly five to six miles per hour) may occur in the impounded portion of the Pend Oreille River. Such events happen roughly every other year during the period of peak spring runoff (Corps 2008, p. 4-5).

Altered seasonal water level fluctuations have caused the shoreline environment to deteriorate by reducing riparian vegetation, eroding beaches and shorelines, and decreasing the productivity of littoral habitats. Summer water temperatures in the Pend Oreille River and many Lake Pend Oreille tributaries rise above 15^{o}C, which makes for unsuitable habitat for coldwater-dependent fish such as bull trout. Current habitat conditions favor warmer-water fish such as brown and lake trout, large and smallmouth bass, and northern pike, which prey on foraging and migrating juvenile salmonids, including bull trout (Corps 2008, p. 4-5).

2.5 Effects of the Proposed Action

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

2.5.1 Bull Trout and Bull Trout Critical Habitat

2.5.1.1 Direct and Indirect 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 conservative estimate assuming all new facilities will be built to the maximum allowable size (100 feet long and 700 square feet area), which translates to approximately 0.22% 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: turbidity, percussive damage, benthic habitat, riparian habitat, water volume, predation, entrainment, littoral productivity, boating activity and poaching, and chemical contamination.

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

Type of Effect	*Cause of Effect*	*Significance*
Turbidity	Construction activities within and near water.	Discountable
Percussive Damage	Pile driving.	Minimized and discountable
Benthic Habitat	Pile placement for pier/dock installation, moorings and boat lifts.	Discountable
Riparian Habitat	Pier/dock installation.	Minimized and insignificant
Water Volume	Withdrawal of water via authorized water intake lines.	Discountable
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
Littoral Productivity	Increased shade created by installation of pier/docks, mooring piles, boat lifts and mooring buoys.	Minimized and insignificant
Boating activity and poaching	Increased boating activity facilitated by improved infrastructure.	Insignificant
Chemical contamination	Use of machinery near water.	Minimized and discountable

A. 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 at Lake Pend Oreille 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 meters), 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 include timing restrictions and 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 lake 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 meters) and duration (minutes or hours). Consequently, the duration, magnitude, and extent of turbidity and fine sediment mobilization from the proposed action is expected to result in transient and insignificant effects to bull trout and their critical habitat.

B. Percussive Damage (Pile Driving)

The proposed action includes driving steel piles up to ten inches in diameter. Impact hammer and vibratory pile-driving equipment will be used to drive piles into the lakebed during in-water work. In some instances it may also be necessary to proof vibratory driven piling with an impact hammer pile driver. Pile driving 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.

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 Hz) 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.

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 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:

$$\text{Cumulative SEL} = \text{Single-strike SEL} + 10 \cdot \log(\text{number of pile strikes})$$

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, Service, 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, pp.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 dB. However, the authors found temporary threshold shifts 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 (*Esox lucius*) and lake chub (*Couesius plumbeus*) showed temporary threshold shifts 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, pp.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.

Recently, 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: 1µPa); 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, temporary threshold shifts 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 fish 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

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

require the use of an air bubble curtain and/or a wood block 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. 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 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/or a six-inch minimum thick wood cushion block) must be included. Pile driving with a vibratory hammer will be limited in duration and the possibility that a bull trout will be in the vicinity at the same time is low. No more than 16 ten-inch diameter piles will be driven in a day with typically three to five strikes per pile, and a maximum of 15 strikes per pile. In limiting pile size to 10-inch diameter or less and using one or both of the 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 two-meters for fish two grams 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, 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 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. Pile driving will be conducted with impact and vibratory hammers. A sound attenuation device will be employed when an impact hammer is used to drive piles. For these reasons, effects to bull trout from pile driving are anticipated to be insignificant or discountable.

C. 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, to stabilize water withdrawal lines, or to allow attachment of a mooring, 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 epibenthic prey on 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 effects to benthic habitat are expected to be discountable.

D. 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 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, in-turn, 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. However, because LWD is popularly perceived as unsightly and impedes uses such a swimming and boating, it is unlikely that LWD along recreational shoreline properties on Lake Pend Oreille would remain in place long enough to provide substantial habitat value. 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 provide bull trout prey.

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%) of such properties, whether or not they have docks or marine launching rails, currently have 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.

RGP-27 includes several requirements and special conditions intended to minimize the potential effects of riparian vegetation removal. They include:

- No more than 8 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 protected by appropriate soil erosion control practices to minimize sediment delivery into the water.
- Disturbed soils will be revegetated with native plant species.

In consideration of these measures and the existing condition of riparian areas in the affected area, the effects to riparian conditions in the action area are expected to be insignificant.

E. 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% 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 are expected to be insignificant.

E. Predation

Residential boat docks will add both in- and overwater structure. Adding in-water structures and decking can create beneficial structure, as well as additional habitat, for fish species that prey on juvenile salmonids. Therefore, predation on bull trout could increase as a result of the residential docks. However, RGP-27 renewal includes measures requiring installation of light penetrative decking (including grating and reflective dock components) to decrease the likelihood and extent of predation effects to bull trout. 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. These suggest that serious predation impacts from these emplacements could occur. Increased predation impacts are a function of increased predation rates on listed salmonids, as well as increased predator populations from introduced artificial habitat that imparts rearing and ambush habitat for native and non-native predator species. Numerous piscine predators are year-round residents of Lake Pend Oreille and the Pend Oreille River and some are known to consume salmonids, including bull trout.

Piscivorous 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 will likely use shaded areas created by overwater structures (Hobson 1979, pp. 231-242).

Docks, piers, and floats are expected to affect predation on bull trout by providing foraging habitat for structurally-oriented predators, specifically bass (Kahler et al. 2000, p. 29). Smallmouth bass and largemouth bass are two of the piscivorine predator fish in the action area, and have a strong affinity to habitat structures including piers, docks and associated pilings.

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. Bevelhimer (1996, p. 274), in studies on smallmouth bass, indicates that ambush cover and low light intensities create a predation advantage for predators and can also increase their foraging efficiency.

It is suggested that the attraction of fish, including largemouth bass, to floating or overhanging objects is linked to the shade produced by the object rather than to the tactile stimulus. Fish, particularly largemouth bass, seem to be attracted to the shade produced by experimental floats (Carrasquero 2001, p. 32). The larger the floating object, the greater the shaded area, and thus the greater the number of fish attracted to such objects, potentially altering fish distribution and aggregation. Largemouth bass are commonly found under docks in early spring and are thought to be present there until late summer (Carrasquero 2001, p. 7). With the possibility that water temperatures during the spring and into the summer months may be cold enough for bull trout, there may be a chance for habitat overlap between bull trout and largemouth bass in these areas.

In contrast, smallmouth bass do not seem to be attracted to the shade produced by objects oriented over the water. Rather, they appear to be attracted to the physical structure provided in the water by structures such as docks and piers. Smallmouth bass have been observed to preferentially locate nest sites near artificial structures (Hoff 1991, p. 39-43). Hoff documents increases of successful smallmouth bass nests of 183% to 443% and increases in catch/effort for fingerlings of 60% to 3,840% in Wisconsin lakes after the installation of half-log structures, concluding that increasing nesting cover in lakes with low nest densities, poor quality and/or quantity of nesting cover, and low first-year recruitment rates can significantly increase recruitment. 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)

Shade-producing structures can introduce changes to fish assemblages and distributions, which in turn may affect the local communities, and therefore the systems they inhabit (Carrasquero 2001, p. 39). Shading affects habitat function by creating visual barriers to migrating fish (Carrasquero 2001, p. 42). In addition, the presence of predators may force smaller prey fish species into less desirable habitats, disrupting foraging behavior, and depressing growth (Dunsmoor et al. 1991, p. 14-23).

In addition, 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). Petersen and Gadomski (1994, p. 229) found that predator success was higher at lower light intensities. Prey fish lose their ability to school at low light intensities, making them vulnerable to predation (Petersen and Gadomski 1994, p. 227). Howick and O'Brien (1983, p. 515) found that under high light intensities, prey species such as bluegill, can locate largemouth bass before they are seen by the bass. However, under low light intensities, bass can locate the prey before they are seen. 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 will require the applicants to utilize conservative dock design criteria, including surfacing, at a minimum 60% of the float and 100% of the pier and ramp 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.

Literature and anecdotal evidence substantiate the use of docks and other structures by juvenile predators for rearing purposes. Juvenile predators may derive a survival advantage from use of these structures by avoiding predation by their larger conspecifics (Hoff 1991, p. 39-43); Carrasquero 2001, p. 37). Poe et al. 1991 found that walleye and smallmouth bass in the John Day Reservoir, Oregon, ate more salmonids in August—probably because the subyearling chinook salmon, which composed almost 100% of the juvenile salmonid out-migration at that time of year, were rearing in the littoral areas of the John Day Reservoir where the distribution overlapped that of these predators (Poe et al. 1991, p. 417). Many of the piscivorous predators present in the action area, including northern squawfish, walleye, smallmouth bass and channel catfish, are large, abundant and opportunistic predators that feed on a variety of prey and switch their feeding patterns when spatially or temporally segregated from a commonly consumed prey (Gray and Rondorf, p. 181).

Smallmouth bass are a major predator of juvenile salmonids, likely due to the overlap in rearing habitat (Carrasquero 2001, p.6, Poe et al. 1991, p. 417). Tabor et al. (1993, p. 831), studied smallmouth bass predation in the Columbia River, and found that juvenile salmonids are the dominant prey item of smallmouth bass. He also found a habitat overlap between salmonids and smallmouth bass and suggested this is the factor that, when combined with the small size and high abundance of prey, may have contributed to the high salmonid predation rate observed.

Adult bull trout migrations have been thought to occur over discrete time periods that vary across basins (Swanberg 1997, p. 743). Homel and Budy (2008, p. 875) studied migration patterns of juvenile and subadult bull trout in the South Fork Walla Walla River in northeastern Oregon. They found that juvenile and subadult bull trout movement patterns and the variables providing cues for migration revealed that movement and migration occur continuously. They detected upstream and downstream diel and seasonal movements, as well as downstream migration, with downstream migration occurring almost exclusively at night. The seasonal timing of migration was significantly and differentially associated with minimum temperature (every season), discharge (fall only), and the presence of upstream-migrating adults (summer only), but those associations explained only a portion of the variation in migration timing. As such, it appears that the timing of juvenile and subadult migrations is more flexible and continuous than the discrete migrations of adults.

Homel and Budy (2008, p. 876) also found that fish did not migrate to a common destination and inhabited areas of the stream that were previously considered to be only migratory corridors. Regardless of Homel and Budy's definitions for the observed behavioral patterns, the outcome is the same: throughout the year, fish are using (and moving through) the entire South Fork Walla Walla River, including areas once considered migratory corridors. Results from this study may also be applicable to the portions of action area for the RGP-27 renewal. Since we do not know the abundance and distribution of bull trout in the action area, it is possible that bull trout may utilize all habitats within the action area at any given time.

Migration patterns vary temporally and spatially and also differ between daytime and nighttime. Homel and Budy (2008, p. 873) found that most migrations occurred at night, particularly in the hours after sunset and just before sunrise. They found that most (94%) of the downstream migration detections for all size-classes of bull trout throughout the year were almost exclusively at night. Nighttime movements are important in allowing smaller bull trout to escape the predation risk from larger bull trout and other predators. Along with commencing migrations at night, bull trout also display a distinct diel habitat shift into shallower water, a strategy that may allow them to prey on smaller conspecifics. The combination of diel movements and habitat shifts reflects an evolutionary adaptation that allows bull trout to maximize foraging opportunity while minimizing mortality risk and probably contributes to increased overall fitness (Homel and Budy 2008, p. 876).

Bonneau and Scarnecchia (1997, p. 783) studied juvenile bull trout in Trestle Creek, a Lake Pend Oreille bull trout spawning tributary in northern Idaho. The study section was three km long and its lower end was located six km upstream of Pend Oreille Lake. Water temperatures ranged from zero to two degrees Celsius in January to nine to 11 degrees Celcius in July. The only fish species present in the section were bull trout and cutthroat trout. Bull trout were adfluvial, rearing for two to three years in the stream before migrating into the lake to grow and mature as four, five, and six-year-old fish (Pratt 1985, as cited in Bonneau and Scarnecchia, 1997, p. 784). Within Trestle Creek, during summer, bull trout occupied shallower water at night (mean 28 cm deep) than during the day (mean 36 cm deep, $P < 0.01$), but there was no significant difference during winter (mean 28 cm deep during the day and 26 cm at night; $P > 0.5$). At night, bull trout occupied water of similar depths in summer and winter ($P > 0.5$), but during the day occupied deeper water during summer than winter ($P < 0.01$) (Bonneau and Scarnecchia 1997, p. 786). Except for the absence of bull trout and cutthroat trout in shallow water (<15 cm) during the day, both species occupied a wide range of depths day and night, summer and winter (Bonneau and Scarnecchia 1997, p. 788). Spring run-off in Pend Oreille Lake and the Pend Oreille River could potentially create colder shoreline temperatures in early spring and through late summer; therefore, bull trout may utilize this shoreline habitat during this time. The addition of overwater structures permitted under the renewal of RGP-27 in this nearshore habitat will have the potential to increase predation on bull trout.

While previous discussions of migration patterns have suggested that fish use migratory corridors during discrete time intervals and move in association with various cues in the environment, Homel and Budy (2008, p. 877) found that fish (1) move and migrate throughout the year, (2) can respond unpredictably to specific cues or combinations of cues when commencing migration, and (3) utilize supposed migratory corridors as year-round habitat in some cases. In the same way that their understanding of trout commencing migration evolved from the restricted movement paradigm to a broader understanding of variable movement patterns, their results indicate that a reevaluation of bull trout movement pattern descriptions is warranted (Homel and Budy 2008, p. 877).

The proposed action will add new in- and overwater structures that will likely benefit predators of bull trout by providing increased cover. In addition, the pilings themselves could provide nesting and spawning locations for predator species. By increasing the number of predators, there is the potential to increase the predation pressure on bull trout in the action area. To minimize the effects to bull trout, the Corps will require the applicants to use conservative dock design criteria (e.g. grating and reflective materials). However, the proposed action is still likely to increase rearing and spawning habitat for predators, which may improve spawning success and lead to an overall predator population increase in the action area.

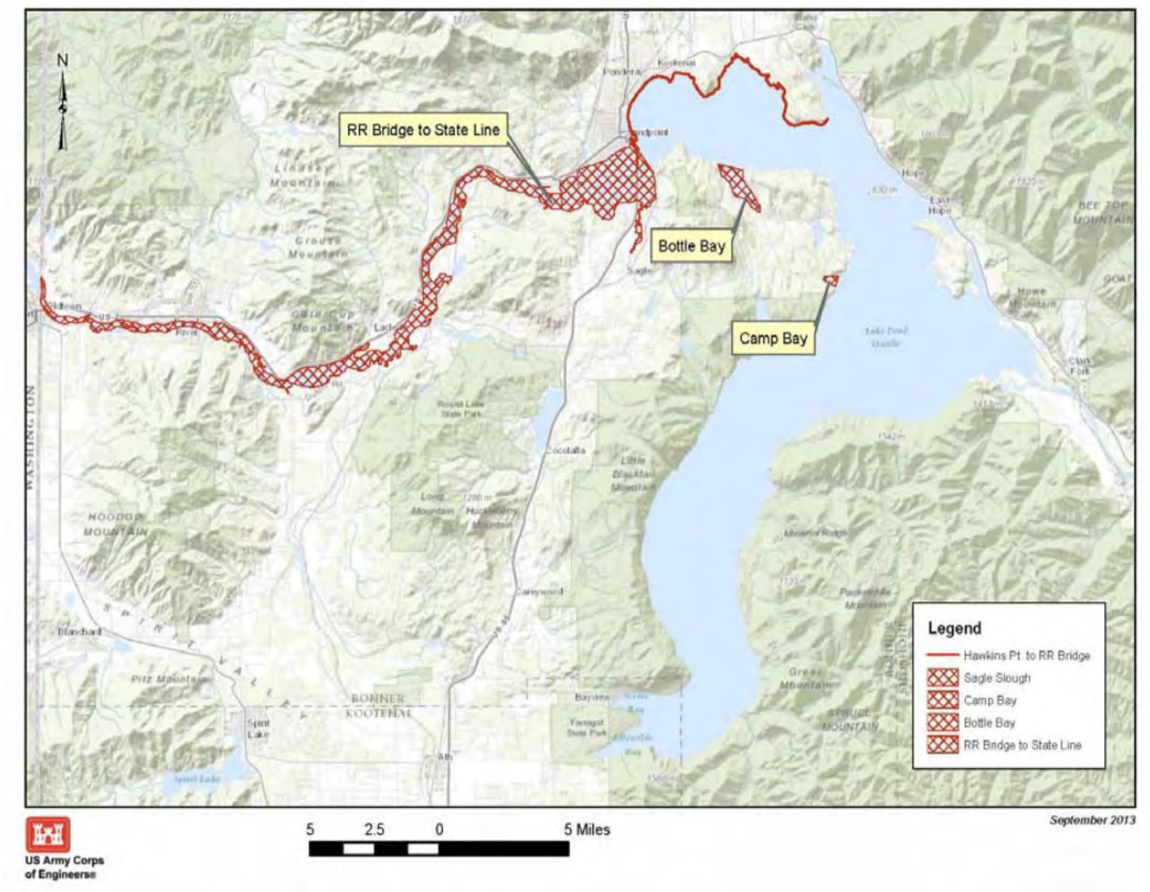
Bull trout may be present at all times of the year in Lake Pend Oreille Lake and Pend Oreille River. Although we do not know the abundance and distribution of bull trout predators in the area, we do know that they seek out docks for refuge, reproduction and predation. Nearshore water temperatures generally exceed 15^{o} C during the summer; however, water temperatures above 15^{o}C 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 native and non-native 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. Using the best available science, it is impractical at this time to quantify the number of bull trout that will be lost to predation as a consequence of the proposed action. Advantageous predator habitat created by the proposed action will likely increase predation rates on bull trout. Bull trout in the action area are migratory fish and use the area for foraging, rearing and overwintering as well. Additionally, 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 expected to be discountable. Juvenile or subadult bull trout are expected to be adversely affected.

F. Entrainment

The installation and use 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 3. In areas outside of those identified in Figure 3, authorization of intakes will require further assessment using Appendix 4 in this Opinion.

Figure 3. 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 2). Water intakes in these areas will not be authorized under RGP-27. In areas where water intakes may be authorized the likelihood of juvenile bull trout being present and subsequently entrained is discountable.

G. Littoral Productivity

Piers, docks and boat lifts can negatively affect littoral 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 of overriding importance 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. Surfacing 60 percent of each float deck and 100 percent of all ramps and piers with grating or translucent material and using reflective materials for in-water components 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% 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 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. 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. Despite a general lack of data specifically for salmonids, pollution from boats may cause short-term injury, physiological stress, decreased reproductive success, cancer, or death for fishes in general. Further, pollution may also impact fishes by impacts to potential prey species or aquatic vegetation.

The new docks associated infrastructure are likely to cause a small increase in boating capacity and potential for poaching within the action area; however, effects to bull trout from these activities are expected to be insignificant.

I. Chemical Contamination

Construction machinery will at times operate below the ordinary high water mark. 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.

Petroleum-based products contain polycyclic aromatic hydrocarbons, which can cause acute toxicity to salmonids at high levels of exposure and can also cause chronic lethal and acute and chronic sublethal effects on a wide range of aquatic organisms. 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.

To ensure spills are addressed quickly, all contractors operating under RGP-27 are required to have onsite a spill response kit. 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. The use of wet concrete in ambient water may result in a short-term, localized increase in pH levels. In order to completely avoid this potential impact, all concrete footings would be required to be installed in the dry. RGP-27 prohibits the direct installation of wet concrete into the water column or the direct contact of wet concrete and the water column. Concrete footings and pilings are customarily installed in the dry, when access to the work area is easy. Any concrete piling installed in-water would be required to use washed, fully cured concrete.

Water quality can also be affected through the leaching of chemical preservatives from treated wood used for construction. In order to minimize this risk, no creosote, pentachlorophenol, chromated copper arsenate, or comparably toxic compounds not approved for the appropriate environment (i.e., freshwater) can 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 (http://www.wwpinstitute.org/aquatics.html). These best management practices will reduce the potential for leaching of any harmful chemicals into the water. The suspension of contaminated sediments during performance of the RGP-27 covered activities is expected to be minimal because no sites designated as contaminated under the Superfund program occur within the coverage area and very little soil disturbance would occur. Although the covered activities may result in short term and localized effects on water quality, effects on federally listed species 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 are usually implemented quickly and are highly effective. Therefore, the 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 structural changes 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 expected to be insignificant or discountable.

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, tribal, local or private actions that are reasonably certain to occur in the action area considered in this Opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

An additional cumulative effect to bull trout is global climate change. Warming of the global climate seems quite certain. Changes have already been observed in many species' ranges consistent with changes in climate (Independent Scientific Advisory Board 2007, p. iii; Hansen et al. 2001, p. 767). Global climate change threatens bull trout throughout its range in the coterminous United States. Downscaled regional climate models for the Columbia River basin predict a general air temperature warming of 1.0 to 2.5 °C (1.8 to 4.5 °F) or more by 2050 (Rieman et al. 2007, p. 1552). This predicted temperature trend may have important effects on the regional distribution and local extent of habitats available to salmonids (Rieman et al. 2007, p. 1552), although the relationship between changes in air temperature and water temperature are not well understood. Bull trout spawning and early rearing areas are currently largely constrained by low fall and winter water temperatures that define the spatial structuring of local populations or habitat patches across larger river basins; habitat patches represent networks of thermally suitable habitat that may lie in adjacent watersheds and are disconnected (or fragmented) by intervening stream segments of seasonally unsuitable habitat or by actual physical barriers (Rieman et al. 2007, p. 1553).

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

2.6.1 Bull Trout

2.6.1.1 Cumulative Effects

Past actions authorized under RGP-27 have resulted in estimated 13,570 feet of shoreline alteration, which translates to approximately 1.47% of the action area shoreline. When combined with the proposed action, as much as 1.7% of the action area shoreline will have been altered within the action as a result of RGP-27.

As the human population in the State continues to grow, residential growth and demand for dispersed and developed recreation is likely to occur. This trend is likely to result in increasing habitat degradation from riparian road construction, 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 listed species 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 in the action area that are likely to contribute to cumulative effects on 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.

2.7.2 Bull Trout Critical Habitat

2.7.2.1 Conclusion

The Service has reviewed the current status of bull trout critical habitat, 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 destroy or adversely modify designated critical habitat for bull trout.

2.8 Incidental Take Statement

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

Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The Corps of Engineers has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require the applicants to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

2.8.1 Form and Amount or Extent of Take Anticipated

Based on survey data from the Service and IDFG, 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.

Take of bull trout is likely to occur as bull trout and predator habitat may 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 feet. Piers or docks will not extend more than 100 feet waterward and will not exceed 700 square feet in size. Thus, the total amount of aquatic habitat within the action area is 905,250 ft. of shoreline multiplied by 100 ft. (maximum waterward extension of docks) which equates to 90,525,000 sq. ft. of aquatic habitat within the action area. To calculate the amount of aquatic habitat potentially affected by dock construction within the action area, the Service multiplied 250 permits (maximum number of authorizations allowed during this five year renewal period for RGP-27) by the maximum allowance per pier or dock of 700 square feet which equals 175,000 sq. ft. of aquatic habitat potentially affected by dock construction within the action area. This equates to 0.19% of nearshore habitat potentially affected by dock construction. To derive an estimated level of lethal take of juvenile bull trout, the Service multiplied the percent of nearshore habitat potentially affected by dock construction by the number of juvenile bull trout potentially in the area. Therefore, the Service multiplied 0.19% of affected nearshore habitat by 8,000 juvenile bull trout to derive an estimated lethal take of 15 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 0.19% of nearshore habitat affected by 4,000 adult bull trout to derive an estimated sublethal take of 8 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 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 to bull trout at the watershed or Recovery Unit scales.

2.8.3 Reasonable and Prudent Measures

The Service concludes that the following reasonable and prudent measures are necessary and appropriate to minimize the take of bull trout 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 implement RPM #1, the Corps shall:

A. Confine construction impacts to the minimum area necessary to complete each activity.
B. In the event of a catastrophic spill associated with fuel-carrying vehicle accidents, the Service shall be contacted immediately 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.

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 in 2015.

2.8.5 Reporting and Monitoring Requirement

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

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.

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.
4. A new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

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3.2 Personal Communications

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4. APPENDICES

4.1 Appendix A

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 – Not 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 BA. The figures in the BA are the same as in this Opinion but are labeled differently. Figure 6 and Figure 3 in the BA are Figure 3 and Figure 1 in this BO, respectively.

4.2 Appendix B

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	Joe Blow's Dock	3/12/2014	Pier or floating dock	Lake Pend Oreille	yes