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To: Joe Krakker, US Fish and Wildlife Service, Lower Snake River Compensation Plan Office, Boise, Idaho

From: Field Supervisor, La Grande Field Office
La Grande, Oregon

Gary S. Miller

Subject: Imnaha River Satellite Facility Weir Modification – Formal Section 7 Consultation (*FWS reference* 01EOFW00-2013-F-0174)

This document transmits the Fish and Wildlife Service's (Service) Biological Opinion based on our review of the proposed Imnaha River Satellite Facility Weir Modification in Wallowa County, Oregon, in accordance with the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq*.). At issue are project activities that may adversely affect federally threatened bull trout (*Salvelinus confluentus*) and their designated critical habitat.

Your original request for formal consultation, dated March 27, 2013, and accompanying Biological Assessment (Assessment) were received in this office on April 2, 2013. However, in November 2013, you notified our office that the project was being put on hold because the weir, as designed, did not meet the National Marine Fisheries Service's (NMFS) fish passage criteria. Based on that notification, we stopped work on this consultation. In October 2014, you notified us that the design had been modified and an agreement with NMFS had been reached, so the project was moving forward again.

The Service's Lower Snake River Compensation Plan (LSRCP) Office is proposing this action and serves as the lead Federal action agency for this consultation. Based on information provided in the Assessment, the LSRCP Office is requesting formal consultation on project effects to bull trout and their critical habitat. A complete administrative record of this consultation is on file at the La Grande Field Office, La Grande, Oregon.

If you have questions regarding this consultation, please contact John Stephenson at 541-312-6429 or me at 541-962-8584.

cc:
Jeff Yanke, Oregon Department of Fish and Wildlife, Enterprise, Oregon
Brett Farman, NOAA Fisheries, Portland, Oregon

BIOLOGICAL OPINION
Regarding the
Effects to Bull Trout and Bull Trout Critical Habitat
From the Installation and Operation of the
Imnaha River Satellite Facility Weir Modification Project
Wallowa County, Oregon

Lead Action Agency: U.S. Fish and Wildlife Service
Lower Snake River Compensation Plan Office

Consultation
Conducted by: U.S. Fish and Wildlife Service
La Grande Field Office
La Grande, Oregon

Date Issued: MAR 1 1 2015

Issued by: Gary S. Miller
Gary S. Miller
Field Supervisor

File No.: 01EOFW00-2013-F-0174

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INTRODUCTION

This document contains the U.S. Fish and Wildlife Service's (Service) Biological Opinion (Opinion), based on our review of the Service's Lower Snake River Compensation Plan (LSRCP) Office's proposed action to modify an existing cross-channel weir at the Imnaha River Satellite Facility, and its effects on bull trout (*Salvelinus confluentus*) and their critical habitat in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq*.). The LSRCP is a Service Program authorized by the Water Resources Development Act of 1976, (Public Law 94-587) to mitigate losses caused by the construction and operation of the four lower Snake River dams and navigation lock projects.

The original request for formal consultation and associated Biological Assessment (Assessment), dated March 27, 2013, was received by this office on April 2, 2013. However, on November 26, 2013, Joe Krakker of the LSRCP Office notified our office that the project was being put on hold because the weir, as designed, did not meet the National Marine Fisheries Service's (NMFS) fish passage criteria. Based on that notification, we stopped work on this consultation. On October 17, 2014, Mr. Krakker notified us that the design had been modified and an agreement with NMFS had been reached, so the project was moving forward again, and we resumed work on this consultation.

The Imnaha Satellite Facility is an adult collection and juvenile acclimation and release facility for the Imnaha River Spring/Summer Chinook Salmon Program. It was constructed under the LSRCP Program to meet established compensation goals in the Imnaha River. The purpose of the weir modification project is to provide the ability to safely operate the weir for adult collection during the late spring/early summer period when streamflows are high.

This Opinion is based on the following information: (1) the Assessment titled "Biological Assessment for Modification of the Imnaha River Satellite Facility Weir, dated March 26, 2013 (LSRCP 2013), and addendums to that Assessment dated September 25, 2013, October 15, 2014, and January 27, 2015; (2) various written and oral communications, including emails, meetings, and telephone conversations; (3) spatial data on species occurrences and land uses; and (4) various reports and publications, as indicated by the citations herein. A complete administrative record of this consultation is on file at the La Grande Field Office.

CONSULTATION HISTORY

There have been past consultations and correspondence on LSRCP-funded activities at the Imnaha Satellite Facility:

- On April 8, 1999, the Service's Snake River Basin Office issued a biological opinion to the LSRCP Office that addressed effects to bull trout from operation of the LSRCP's existing fish production program in Washington, Oregon, and Idaho (USFWS 1999). This opinion covered the operation of existing salmon and steelhead production facilities in the Grande Ronde and Imnaha river basins, including the Imnaha Satellite Facility.

- On November 23, 2004, the Service's La Grande Field Office issued a biological opinion to the Bonneville Power Administration (BPA) and the LSRCP Office that addressed effects to bull trout from the Northeast Oregon Hatchery Program, Grande Ronde –

Imnaha Spring Chinook Hatchery Project (1-17-04-F-0385). This opinion covered several upgrades to the Imnaha Satellite Facility, including installation of a new hydraulically-operated weir. However, the proposed weir was never installed.

- On June 7, 2006, the Service's La Grande Field Office issued a letter to the BPA and LSRCP Office addressing changes to the Northeast Oregon Hatchery Program, Grande Ronde – Imnaha Spring Chinook Hatchery Project (1-17-04-F-0385) that had been proposed in a Supplemental Biological Assessment dated March 2006. The changes included some modifications to the proposed weir at the Imnaha Facility. We concluded that the proposed changes were consistent with the effects analysis included in the November 2004 Biological Opinion. Again, the proposed actions identified in this letter were never implemented.

On March 27, 2013, the Service received an email request for formal consultation from the LSRCP Office, along with a Biological Assessment (BA) for the proposed project. On September 10, 2013, an on-site meeting was held at the Imnaha Facility to discuss issues associated with installation and operation of the proposed new weir. In particular, the discussion focused on problems with meeting the National Marine Fisheries Service's (NMFS) criteria for fish passage at the site. On September 25, 2013, we received an addendum to the proposed action, dated September 19, 2013 and titled "Imnaha Construction Sequencing" in an email from Chris Starr of the LSRCP Office.

On November 26, 2013, Joe Krakker of the LSRCP Office called John Stephenson of the Service's La Grande Field Office and informed him that the weir replacement project at the Imnaha Satellite Facility had been put on hold because NMFS was not providing the necessary approvals, due to problems meeting their fish passage criteria.

On October 17, 2014, Joe Krakker of the LSRCP Office called John Stephenson of the Service's La Grande Field Office and informed him that they had resolved the fish passage problem with NMFS and had received approval from them to move forward with the weir project. On that same day, Joe Krakker emailed a list of technical modifications to the proposed weir, dated October 15, 2014, that had been made to secure approval from NMFS.

On November 5, 2014, a meeting was held in La Grande between representatives of the Oregon Department of Fish and Wildlife (ODFW), the Service's La Grande Field Office, the Service's LSRCP Office, and Idaho Power Company (IPC) to discuss the results of an investigation to determine the cause of 31 adult bull trout mortalities that occurred in 2014 in and around the Imnaha Satellite Facility.

On January 27, 2015, we received an addendum to the Biological Assessment from the LSRCP Office that included additional proposed actions to address fish passage conditions, trap box designs, and fish handling procedures at the Imnaha Satellite Facility.

On March 3, 2015, a draft of the Incidental Take Statement was shared with the LSRCP Office. A call between La Grande Field Office staff and LSRCP staff took place on March, 5, 2015 to discuss the draft terms and conditions and a revised draft of the terms and conditions was provided to the LSRCP Office on March 10, 2015.

BIOLOGICAL OPINION

1. Description of the Proposed Action

The LSRCP Office is proposing to replace the existing Imnaha River picket weir (Figure 1) with an earth-tone colored bridge-mounted bar rack weir spanning above the Imnaha River. The existing picket weir currently consists of removable picket barriers, which are installed seasonally, on the existing concrete apron which spans the Imnaha River at the site. The picket barriers require manual installation, accomplished by workers wading into the water, which can only be achieved when river flows subside following the spring runoff. Installation of the picket weir can occur anytime from late-May to late-July. Timing of the weir installation (based on annual runoff levels) often results in a significant portion of the spring Chinook run passing the weir before installation and compromises meeting management objectives identified for the ESA listed program.

The existing Imnaha River weir abutments would be modified to provide bearing plates for the bridge structure (Figure 2) similar to a recent modification completed at a facility on the South Fork Salmon River, Idaho. Modifications to the existing abutments would be minimal and would occur above the water surface. The existing concrete apron would be modified by bolting a 3 to 6 inch high steel sill (curb) onto the existing concrete apron on the upstream side of the apron. The picket panels when deployed would seal up against this sill. No physical modifications to the concrete apron itself would be required.

Installation of the bridge style weir would be initiated during low flow conditions (after broodstock collections at the site were completed in mid to late-September) with minimal work occurring in the active river channel. During low flow conditions, sand bags would be placed along the upstream edge of the existing concrete apron to divert water to either the right or left side of the apron while installing the steel sill (curb) across the apron. The modifications to the existing concrete abutments could be completed in the dry outside of the river. A few crossings by heavy equipment at the weir site may be required during construction for transportation of materials.

The steel bridge would be fabricated off-site, transported to the site and bolted together, and would be lifted and placed onto the concrete abutments with a crane. Once the bridge is placed, picket panels can be installed manually onto the bridge structure from the bridge. All modifications at the weir site would require approximately 6 to 8 weeks with approximately 1-2 weeks of work in river for placement of the steel sill. Access to the bridge structure will be controlled with a chain-link security fence and locking gates on each end.

Modification to a bridge style weir will assist in meeting management objectives identified by co-managers for the ESA-listed Imnaha Spring Chinook Program, does not require any power or mechanical equipment to operate, can be operated under a wider range of river flows, and eliminates the need for workers to enter the river during potentially unsafe flows to install a picket weir and addresses major safety concerns associated with the existing Imnaha River picket weir.

The preferred in-water work period for the Imnaha River above Big Sheep Creek is July 15 – August 15 (Oregon Guidelines for Timing of In-Water Work to Protect Fish and Wildlife

Resources, June, 2008), but the LSRCP Office has requested a variance so that the work can be done after spring Chinook broodstock collections have been completed at the site (i.e., mid to late-September). So, the proposed construction period is late-September through November.

This Opinion also addresses operation of the Imnaha Satellite Facility's adult collection trap with the new weir in place for a period of 10 years after the date of issuance.

Figure 1. Current Imnaha Weir during installation.

Figure 2. Bridge style weir like the one proposed for the Imnaha Facility.

1.1 Modifications to Meet Anadromous Salmonid Passage Facility Design Criteria

The following modifications to the weir and facility were outlined in an October 15, 2014 letter from McMillen, LLC. These modifications were made to address issues raised by the National Marine Fisheries Service (NMFS) regarding fish passage conditions at the site.

1. The 50 percent picket panels were designed with ¾ inch round tube/bar at 1 inch clear spacing. Upon review with National Oceanic and Atmospheric Administration (NOAA) the bars will be reduced to ½ inch round bar/tube at 1 inch clear spacing. This provides reduced head loss conditions through the picket panels. It does not affect the overall construction, operation, or installation of the weir.
2. The last stop log baffle in the fish ladder will be removed and replaced with an orifice and weir baffle. The orifice will be adjustable in size to allow for the optimal entrance condition and water velocities to improve fish attraction. This will not require any modification to the existing ladder as the existing stop log guides will be utilized to slide the new baffle into place.
3. A request to provide roughening components to the downstream side of the existing concrete sill was made by the reviewing agencies. McMillen proposes to utilize stainless steel plates with 4 inch baffles welded to the plates to provide the roughening component. The roughening components will be installed with epoxy anchors embedded into the existing sill similar to the stainless steel sill. These modifications will be accomplished in the wet at low flows. This modification will add 0.35 cubic yards of material that is permanently anchored to the existing slab.
4. Solid plates that are 2 foot tall by the width of the picket panel will be added to the picket panel design. The solid panels will slide up and down on the picket panel. The solid panel will be slid into place at low flows to divert the river to the left bank side (ladder side) to provide attraction flow and depth over the sill.

1.2 Facility Modifications and Updated Operations Protocols for Fish Handling

The following modifications to the Imnaha Satellite Facility and updated operations protocols were outlined in a memo from the LSRCP Office to John Stephenson of the La Grande Field Office, received on January 28, 2015. These modifications were made to address issues at the facility.

<u>Proposed facility modifications to meet co-manager and agency concerns at the facility:</u>

1. Settling of the concrete sidewalk on the adult ladder side and question as to whether the stability and structure of the retaining wall there were compromised – if there was good drainage, etc.

   The engineers have determined that there are no structural issues with the retaining wall and fish ladder. The sidewalk will be repaired as part of the proposed weir modification.

2. Trap work-area needs to be modified. The trap area was not designed to accommodate current needs.

A. The current fish holding tank is too small, it needs to be repositioned, and needs a supplemental oxygen supply.

The fish holding tank was repositioned and outfitted with supplemental oxygen and met staff needs in 2014.

B. The ability to anesthetize fish needs to be incorporated into the fish handling process. Procuring and using an electro-anesthesia unit was suggested.

The original electro-anesthesia unit failed in 2014 and an MS222 was used for the remainder of 2014. A new unit was purchased and will be installed in 2015. The LSRCP office is purchasing a backup unit for use in 2015.

C. A system to return Chinook to the river after processing needs to be developed. The current method of hand carrying fish back to the river is not appropriate. The original fish return tube does not work.

In the past, the fish return pipe to the river was extended to the river past the “in ground recovery tank”. The system did not work well with the use of MS-222 and when the return pipe was below the river water surface. MS-222 is no longer used (slower recovery time) and fish recovery from electro-anesthesia is rapid. The existing return system worked well with the use of electro-anesthesia in 2014, with fish swimming quickly out of the “in ground recovery tank” and return pipe.

D. A passive integrated transponder (PIT) tag reader board needs to be purchased and incorporated into fish processing.

There are currently two PIT Tag arrays in the fish ladder and a cheese block style PIT Tag reader in the holding area to scan fish as they are worked up. Staff reported that the PIT Tag reader worked as needed in 2014. The LSRCP is evaluating the need for purchasing a backup PIT Tag reader for the trap.

E. Holding fish overhead to load onto trucks is difficult.

A set of portable steps were brought to the site in 2014 to reduce lifting distance of fish.

F. An additional laptop with satellite internet access will be necessary to enter trap data into FINS.

A new laptop computer and satellite internet access were installed at the site in 2014.

G. Installation of a phone line to the trap would be nice.

There is no landline phone service to the site, a radio phone is available at the site and will be maintained.

H. The mechanical crowder needs maintenance. Due to its age, installation of a new crowder is preferred.

A newly designed fish crowder system will be installed prior to the 2015 trapping season.

I. No backup parts to operate the 30-year-old hoist system exist, and they are needed.

   A newly designed fish hoist system will be installed prior to the 2015 trapping season.

J. Issues with the new finger weir (aluminum) that was installed in the trap entrance in 2014.

   Hatchery staff has designed and will install a new V-box trap in 2015. The v-box design is larger and will disperse water velocity and prevent smaller fish from being pulled in and impinged, The new V-box will be constructed with steel for greater support and prevent spreading of the bar as occurred with the aluminum finger weir in 2014.

The proposed modifications to the facility do not affect the overall footprint of the facility within the ordinary high water mark of the Imnaha River or within bull trout critical habitat. These proposed weir/facility design changes are not expected to change the Effects Determinations made in the Assessment and are expected to further reduce potential impacts to freshwater migration for bull trout passage at the facility.

1.3 Proposed operations (protocols) at the facility in 2015

Based on the draft 2015 Annual Operating Plan (AOP) for the Imnaha weir, ODFW and Nez Perce Tribe (NPT) staff will implement the following operational protocols;

1. The trap will be installed as soon as river conditions allow and operated until September 11, or until the last scheduled spawning ground survey.

2. ODFW will provide three staff people stationed at the Imnaha satellite facility Monday-Thursday and one Friday-Sunday, 24/7.

3. NPT will provide one technician Monday through Friday and a transportation vehicle.

4. LSRCP will fund two 3 month seasonal technicians for ODFW to assist with weir and facility operations and culture activities at Lookingglass Hatchery.

5. ODFW will collect all the relevant data from fish worked at the Imnaha weir, and provide this information daily (upon request) and in weekly summaries of trap operations.

6. Prior to Chinook trapping operations commencing at the Imnaha weir, ODFW and NPT staff will hold a preseason meeting at the facility and walk through logistics, fish handling, holding, pass:keep, recycling, transportation, communication operations, etc.

7. Trapping facilities will be checked daily and fish removed and worked up Monday-Friday.

8. If 200 or more fish are in the trap on Friday, the trap will be worked on Saturday. Likewise, if 200 or more fish are in the trap on Saturday, the trap will be worked on Sunday.

<u>Non-LSRCP Program</u>

Bull trout **-** Bull trout captured at the Imnaha weir may be incorporated into an ongoing Idaho Power Company (IPC) research project to evaluate abundance and life history of fluvial bull trout in the Snake and Imnaha Rivers.

Protocol for Disposition of Trapped Fish:

- Upon capture, bull trout will be enumerated and scanned for existing PIT tags.
- When conditions allow, unmarked bull trout will be anesthetized and implanted with a PIT tag using standard procedures.
- When water temperatures exceed 61°F (16°C), PIT tags will not be applied and expedited handling procedures will be followed.
- Expedited handling procedures will include enumeration, scan for existing tags, and estimating length (within 2-inch size class).
- PIT tags and tagging procedures will be provided by IPC (Wilkison).
- Bull trout mortalities will be stored frozen for further analysis.
- Data, tag codes, and reports will be sent to ODFW (Yanke), LSRCP (Krakker), and IPC (Wilkison)
- All bull trout handled will be reported under LSRCP Section 7 Consultation; PIT-tagged bull trout will be reported under ODFW Section 6 permit.

Proposed operational protocols at the facility were developed by LSRCP cooperators based on the previous years of experiences in operating the facility. Protocols are designed and modified as needed to meet program needs and to reduce and minimize potential impacts on listed salmon, steelhead, bull trout and other native fish species. The LSRCP and cooperators meet on an annual basis (AOP planning) to review and assess operational protocols at the facility and to make operational (protocol) changes as needed. In addition, ODFW and NPT staff will meet prior to Chinook trapping operations commencing at the Imnaha weir, to hold a preseason meeting at the facility and walk through logistics, fish handling, holding, pass:keep, recycling, transportation, communication operations, etc. All staff at the weir are aware of issues that occurred in 2014 and will be monitoring protocols carefully during 2015.

Current operational protocols call for ODFW and NPT staff to work fish up at the Imnaha Facility trap daily, Monday through Friday, and to work up fish on Saturday and Sunday if fish trap numbers are expected to reach 200 fish on any day during the weekend. In addition, staff stationed at the facility will check the trap daily and request assistance (ODFW and NPT) to work up fish on the weekend if needed.

The proposed modifications to the facility operations (protocols) do not affect the overall footprint of the facility within the ordinary high water mark of the Imnaha River or within bull trout critical habitat. These proposed weir/facility design changes are not expected to change the effects determinations made in the Assessment and are expected to further reduce potential impacts to freshwater migration for bull trout passage at the facility.

1.4 Responsibilities of LSRCP and co-managers

All cooperative agreements between the Service, LSRCP Office and co-managers that receive Service funding contain stipulations that require the Service's LSRCP Office to participate in co-manager Annual Operations Plan meetings to discuss and determine how LSRCP hatchery plans will meet program needs. Co-managers are required to: 1) Operate all facilities to satisfy any and all federal or state regulations and laws (i.e. NPDES, water rights, fuel contamination prevention, Endangered Species Act); 2) Develop an annual hatchery operation plan (AOP) to describe how the recipient will meet LSRCP program needs; and 3) Notify the Service of any unusual occurrences immediately (i.e. fish losses etc.). These stipulations have been in the LSRCP cooperative agreements for the last seven years for the Oregon hatchery programs (ODFW, CTUIR, NPT).

The LSRCP Program is funded through a Memorandum of Agreement between the Service and Bonneville Power Administration (BPA). Funding is negotiated and developed through BPA's rate case process on a two-year funding cycle. The LSRCP Office negotiates and develops annual operating budgets (Operations & Maintenance and Monitoring & Evaluation) with LSRCP cooperators for implementation of the hatchery programs.

1.5 Impact Minimization Measures

Measures (Best Management Practices) to be identified in the contract scope of work include the following actions to minimize impacts to the site, Essential Fish Habitat, and listed species.

A. Work Site and Staging Area:

1. The work site is located in a relatively open flat area along the Imnaha River.
2. The area where the crane will set up near the weir is an existing gravel road.
3. Equipment, vehicles, and materials shall only be staged and operated on existing gravel roadways; unless explicitly approved / delineated otherwise by the hatchery manager.
4. The area will be administratively closed to the public during construction.

B. Vegetation: Minimize disturbance to brush and other vegetation.

C. River

1. The purity of the river water is critical to the environment and fish rearing operations. Contractor shall utilize equipment and methods that safeguards the water supply.
2. Absorbent Booms: Provide and deploy two floating oil-containment booms downstream of the work site. Each 140 lineal feet long consisting principally of a white poly sock filled with petroleum-absorbent polypropylene.
3. Wattles: Provide temporary weed-free straw wattles (held in place by stakes) along the down-slope perimeter of the staging and similar areas.
4. Spill Kits: Petroleum spill kits shall be readily available at the work site and the workers shall be proficiently knowledgeable of the kit.

5. All vehicles and equipment shall be cleaned off-site and shall be free of weed seeds, soil, grease, and oil prior to mobilizing to the work site.
6. All vehicles and equipment shall be in sound mechanical condition; minor leaks and drips that can be effectively contained using absorbent mats are allowed.
7. Land-based vehicles and equipment may contain ordinary hydraulic fluid.
8. Vehicles and motorized equipment may cross the stream or be operated in-stream.
    a. Provide a spill containment impoundment around (and under) any fossil-fuel engines (such as generator, pump, welder) located within 50 feet of the stream; such as those on a floating work platform. Gas powered equipment may remain on the floating barge or moved to the island during the work period. Capacity of the spill containment will be125 percent of the volume of fuel.
    b. Up to 5 crossings may be necessary to complete the project. All crossings will be made within a 10 ft. area immediately upstream of the existing concrete sill. Prior to Chinook spawning, mesh will be secured to the river bed in the crossing area (concrete sill upstream 10 ft.) to prevent Chinook from spawning in the river crossing area.
9. Heavy equipment shall be fueled no closer than 100 feet from the edge of water.
10. In-stream temporary scaffolding and planks may be erected at the weir abutments. Any temporary sand bags (or similar) shall be masons sand that is free of clay, silt, and similar fine material.
11. Dewatering the river channel is not allowed.
12. Contractor may erect temporary scaffolding to drill holes from the river side.

D. Land Ownership: The bridge site is on U. S. Forest Service land; used via special use permit by the Service. There are no known land ownership encumbrances.

E. Environmental Permits: The Service is responsible to secure environmental permits and/or exemptions for the work.

F. This project site does not entail any known hazardous materials. However, if any suspect materials are encountered, then test those materials for hazardous material content, and shall handle and dispose of any hazardous materials in a legal manner.

1.6 Action Area

A project's action area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR Part 402). The area affected directly by installation of the new Imnaha weir is limited to the immediate vicinity of the adult collection facility and some short distance downstream that will experience short-term increases in turbidity during and after construction. However, operation of the modified weir affects the entire fluvial bull trout population in the upper Imnaha River, since bull trout spawning grounds are entirely upstream of the weir location. The project has the potential to affect all adult fluvial bull trout that return to the upper Imnaha River to spawn, since the upgraded weir can be installed in the river prior to the date that bull trout start moving past the site. Therefore, the action area for this consultation is identified as the entire Upper Imnaha River Basin.

The Imnaha River Basin encompasses an area of about 885 square miles in northeastern Oregon. The Imnaha River flows north out of the Eagle Cap Wilderness Area on the east side of the Wallowa Mountains and runs about 63 miles through a mostly narrow, deeply-incised valley before entering the Snake River approximately 48 miles upriver from Lewiston, Idaho (NWPPC 2001). The Imnaha River Basin is remote; there are no large towns and few residents in the basin, and a large amount of relatively undisturbed land. Approximately 75 percent of the Imnaha River Basin is public land.

2. Analytical Framework for the Jeopardy and Adverse Modification Determinations

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; and (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 (Director's March 6, 2006, memorandum), 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 NMFS *Endangered Species Consultation Handbook* (USFWS and NMFS 1998), 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 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 ESA 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 range-wide 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; and (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 range-wide condition of the critical habitat, taking into account any cumulative effects, to determine if the critical habitat range-wide 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 range-wide recovery function of designated bull trout critical habitat, especially in terms of maintaining and/or restoring viable core areas, 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.

3. Status of the Species/Critical Habitat (Rangewide)

3.1 Listing Status

The coterminous United States population of the bull trout (*Salvelinus confluentus*) was listed as threatened on November 1, 1999 (64 FR 58910). The threatened bull trout occurs in the Klamath River Basin of south-central Oregon and in the Jarbidge River in Nevada, north to various coastal rivers of Washington to the Puget Sound, and east throughout major rivers within the Columbia River Basin to the St. Mary-Belly River, east of the Continental Divide in northwestern Montana (Bond 1992, Brewin and Brewin 1997, Cavender 1978, Leary and Allendorf 1997).

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

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 United States 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 58910):

> 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.

Thus, as discussed above under the *Analytical Framework for the Jeopardy and Adverse Modification Determinations*, the Service's jeopardy analysis for the proposed project will involve consideration of how the project is likely to affect the Columbia River interim recovery unit for the bull trout based on its uniqueness and significance as described in the DPS final listing rule cited above, which is herein incorporated by reference. However, in accordance with Service national policy, the jeopardy determination is made at the scale of the listed species. In this case, that is the coterminous U.S. population of the bull trout.

3.1.1 Current Status and Conservation Needs

In recognition of available scientific information relating to their uniqueness and significance, five 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 interim recovery units: 1) Jarbidge River, 2) Klamath River, 3) Columbia River, 4) Coastal-Puget Sound, and 5) St. Mary-Belly River (USFWS 2002a, pp. iv, 2, 7, 98; 2004a, Vol. 1 & 2, p. 1; 2004b, p. 1). Each of these interim recovery units 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 interim recovery units is provided below and a comprehensive discussion is found in the Service's draft recovery plans for the bull trout (USFWS 2002a, pp. vi-viii; 2004a, Vol. 2 p. iii-x; 2004b, pp. iii-xii).

The conservation needs of bull trout are often generally expressed as the four "Cs": cold, clean, complex, and connected habitat. Cold stream temperatures, clean water quality that is relatively free of sediment and contaminants, complex channel characteristics (including abundant large wood and undercut banks), and large patches of such habitat that are well connected by unobstructed migratory pathways are all needed to promote conservation of bull trout at multiple scales ranging from the coterminous to local populations (a local population is a group of bull trout that spawn within a particular stream or portion of a stream system). The recovery planning process for bull trout (USFWS 2002a, pp. 49-50; 2004a, Vol 1 & 2 pp. 12-18; 2004b, pp. 60-86) has also identified the following conservation needs: 1) maintenance and restoration of multiple, interconnected populations in diverse habitats across the range of each interim recovery unit, 2) preservation of the diversity of life-history strategies, 3) maintenance of genetic and phenotypic diversity across the range of each interim recovery unit, and 4) establishment of a positive population trend. Recently, it has also been recognized that bull trout populations need to be protected from catastrophic fires across the range of each interim recovery unit (Rieman *et al.* 2003).

Central to the survival and recovery of bull trout is the maintenance of viable core areas (USFWS 2002a, pp. 53-54; 2004a, Vol. 1 pp. 210-218, Vol 2. pp. 61-62; 2004b, pp. 15-30, 64-67). 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. Each of the interim recovery units listed above consists of one or more core areas. There are 121 core areas recognized across the coterminous range of the bull trout (USFWS 2002a, pp. 6, 48, 98; 2004a, Vol. 1 p. vi, Vol. 2 pp. 14, 134; 2004b, pp. iv, 2; 2005, p. ii).

<u>Jarbidge River Interim Recovery Unit</u>

This interim recovery unit currently contains a single core area with six local populations. Less than 500 resident and migratory adult bull trout, representing about 50 to 125 spawning adults, are estimated to occur in the core area. The current condition of the bull trout in this interim recovery unit is attributed to the effects of livestock grazing, roads, incidental mortalities of released bull trout from recreational angling, historic angler harvest, timber harvest, and the introduction of non-native fishes (USFWS 2004b). The draft bull trout recovery plan (USFWS 2004b) identifies the following conservation needs for this interim recovery unit: 1) maintain the current distribution of the bull trout within the core area, 2) maintain stable or increasing trends in abundance of both resident and migratory bull trout in the core area, 3) restore and maintain suitable habitat conditions for all life history stages and forms, and 4) conserve genetic diversity and increase natural opportunities for genetic exchange between resident and migratory forms of the bull trout. An estimated 270 to 1,000 spawning bull trout per year are needed to provide for the persistence and viability of the core area and to support both resident and migratory adult bull trout (USFWS 2004b).

<u>Klamath River Interim Recovery Unit</u>

This interim recovery unit currently contains three core areas and seven local populations. The current abundance, distribution, and range of the bull trout in the Klamath River Basin are greatly reduced from historical levels due to habitat loss and degradation caused by reduced water quality, timber harvest, livestock grazing, water diversions, roads, and the introduction of non-native fishes (USFWS 2002a). Bull trout populations in this interim recovery unit face a high risk of extirpation (USFWS 2002a). The draft Klamath River bull trout recovery plan (USFWS 2002a) identifies the following conservation needs for this interim recovery unit: 1) maintain the current distribution of bull trout and restore distribution in previously occupied areas, 2) maintain stable or increasing trends in bull trout abundance, 3) restore and maintain suitable habitat conditions for all life history stages and strategies, 4) conserve genetic diversity and provide the opportunity for genetic exchange among appropriate core area populations. Eight to 15 new local populations and an increase in population size from about 2,400 adults currently to 8,250 adults are needed to provide for the persistence and viability of the three core areas (USFWS 2002a).

Columbia River Interim Recovery Unit

The Columbia River interim recovery unit 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 interim recovery unit currently contains 97 core areas and 527 local populations. About 65 percent of these core areas and local populations occur in central Idaho and northwestern Montana. The Columbia River interim recovery unit has declined in overall range and numbers of fish (63 FR 31647). Although some strongholds still exist with migratory fish present, bull trout generally occur as isolated local populations in headwater lakes or tributaries where the migratory life history form has been lost. Though still widespread, there have been numerous local extirpations reported throughout the Columbia River basin. In Idaho, for example, bull trout have been extirpated from 119 reaches in 28 streams (IDFG, in litt. 1995). The draft Columbia River bull trout recovery plan (USFWS 2002c) identifies the following conservation needs for this interim recovery unit: 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) restore and maintain suitable habitat conditions for all bull trout life history stages and strategies, and 4) conserve genetic diversity and provide opportunities for genetic exchange.

This interim recovery unit 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 within these core areas varies from poor to good. All core areas have been subject to the combined effects of habitat degradation and fragmentation caused by the following activities: dewatering; road construction and maintenance; mining; grazing; the blockage of migratory corridors by dams or other diversion structures; poor water quality; incidental angler harvest; entrainment into diversion channels; and introduced non-native species. The Service completed a core area conservation assessment for the 5-year status review and determined that, of the 97 core areas in this interim recovery unit, 38 are at high risk of extirpation, 35 are at risk, 20 are at potential risk, 2 are at low risk, and 2 are at unknown risk (USFWS 2005, pp. 2, Map A, pp. 73-83).
The overall status of the Columbia River interim recovery unit has not changed appreciably since its listing on June 10, 1998. Populations of bull trout and their habitat in this area have been affected by a number of actions addressed under section 7 of the Act. Most of these actions resulted in degradation of the environmental baseline of bull trout habitat, and all permitted or analyzed the potential for incidental take of bull trout. The Plum Creek Cascades HCP, Plum Creek Native Fish HCP, Storedahl Daybreak Mine HCP, and WSDNR Forest Practices HCP addressed portions of the Columbia River population segment of bull trout.

Coastal-Puget Sound Interim Recovery Unit

Bull trout in the Coastal-Puget Sound interim recovery unit exhibit anadromous, adfluvial, fluvial, and resident life history patterns. The anadromous life history form is unique to this interim recovery unit. This interim recovery unit currently contains 14 core areas and 67 local populations (USFWS 2004a). Bull trout are distributed throughout most of the large rivers and associated tributary systems within this interim recovery unit. Bull trout continue to be present in nearly all major watersheds where they likely occurred historically, although local extirpations have occurred throughout this interim recovery unit. Many remaining populations are isolated or fragmented and abundance has declined, especially in the southeastern portion of the interim recovery unit. The current condition of the bull trout in this interim recovery unit is attributed to the adverse effects of dams, forest management practices (e.g., timber harvest and associated road building activities), agricultural practices (e.g., diking, water control structures, draining of wetlands, channelization, and the removal of riparian vegetation), livestock grazing, roads, mining, urbanization, poaching, incidental mortality from other targeted fisheries, and the introduction of non-native species. The draft Coastal-Puget Sound bull trout recovery plan (USFWS 2004a) identifies the following conservation needs for this interim recovery unit: 1) maintain or expand the current distribution of bull trout within existing core areas, 2) increase bull trout abundance to about 16,500 adults across all core areas, and 3) maintain or increase connectivity between local populations within each core area.

<u>St. Mary-Belly River Interim Recovery Unit</u>

This interim recovery unit currently contains six core areas and nine local populations (USFWS 2002b). Currently, bull trout are widely distributed in the St. Mary-Belly River drainage and occur in nearly all of the waters that it inhabited historically. Bull trout are found only in a 1.2-mile reach of the North Fork Belly River within the United States. Redd count surveys of the North Fork Belly River documented an increase from 27 redds in 1995 to 119 redds in 1999. This increase was attributed primarily to protection from angler harvest (USFWS 2002b). The current condition of the bull trout in this interim recovery unit is primarily attributed to the effects of dams, water diversions, roads, mining, and the introduction of non-native fishes (USFWS 2002b). The draft St. Mary-Belly River bull trout recovery plan (USFWS 2002b) identifies the following conservation needs for this interim recovery unit: 1) maintain the current distribution of the bull trout and restore distribution in previously occupied areas, 2) maintain stable or increasing trends in bull trout abundance, 3) restore and maintain suitable habitat conditions for all life history stages and forms, 4) conserve genetic diversity and provide the opportunity for genetic exchange, and 5) establish good working relations with Canadian interests because local bull trout populations in this interim recovery unit are comprised mostly of migratory fish, whose habitat is mostly in Canada.

3.1.2 Life History

Bull trout exhibit both resident and migratory life history strategies. Both resident and migratory forms may be found together, and either form may produce offspring exhibiting either resident or migratory behavior (Rieman and McIntyre 1993, pp. 1-18) . Resident bull trout complete their entire life cycle in the tributary (or nearby) streams in which they spawn and rear. The resident form tends to be smaller than the migratory form at maturity and also produces fewer eggs (Fraley and Shepard 1989, p. 1; Goetz 1989, pp. 15-16). Migratory bull trout spawn in tributary streams where juvenile fish rear 1 to 4 years before migrating to either a lake (adfluvial form), river (fluvial form) (Fraley and Shepard 1989, pp. 135-137; Goetz 1989, pp. 22-25), or saltwater (anadromous form) to rear as subadults and to live as adults (Cavender 1978, pp. 139, 165-68; McPhail and Baxter 1996, p. 14; WDFW *et al.* 1997, pp. 17-18, 22-26). Bull trout normally reach sexual maturity in 4 to 7 years and may live longer than 12 years. They are iteroparous (they spawn more than once in a lifetime). Repeat- and alternate-year spawning has been reported, although repeat-spawning frequency and post-spawning mortality are not well documented (Fraley and Shepard 1989, pp. 135-137; Leathe and Graham 1982, p. 95; Pratt 1992, p. 6; Rieman and McIntyre 1996, p. 133).

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

Growth varies depending upon life-history strategy. Resident adults range from 6 to 12 inches total length, and migratory adults commonly reach 24 inches or more (Goetz 1989, pp. 29-32; Pratt 1984, p. 13) The largest verified bull trout is a 32-pound specimen caught in Lake Pend Oreille, Idaho, in 1949 (Simpson and Wallace 1982).

3.1.3 Habitat Characteristics

Bull trout have more specific habitat requirements than most other salmonids (Rieman and McIntyre 1993, p. 7). Habitat components that influence bull trout distribution and abundance include water temperature, cover, channel form and stability, valley form, spawning and rearing substrate, and migratory corridors (Fraley and Shepard 1989, pp. 137, 141; Goetz 1989, pp. 19-26; Bond in Hoelscher and Bjornn 1989, p. 57; Howell and Buchanan 1992, p. 1; Pratt 1992, p. 6; Rich 1996, pp. 35-38; Rieman and McIntyre 1993, pp. 4-7; Rieman and McIntyre 1995, pp. 293-294; Sedell and Everest 1991, p. 1; Watson and Hillman 1997, pp. 246-250). Watson and Hillman (1997, pp. 247-249) concluded that watersheds must have specific physical characteristics to provide the habitat requirements necessary for bull trout to successfully spawn and rear and that these specific characteristics are not necessarily present throughout these watersheds. Because bull trout exhibit a patchy distribution, even in pristine habitats (Rieman and McIntyre 1993, p. 7), bull trout should not be expected to simultaneously occupy all available habitats (Rieman *et al.* 1997, p. 1560).

Migratory corridors link seasonal habitats for all bull trout life histories. The ability to migrate is important to the persistence of bull trout (Gilpin, in litt. 1997, pp. 4-5; Rieman and McIntyre 1993, p. 7; Rieman *et al.* 1997, p. 1114). Migrations facilitate gene flow among local populations when individuals from different local populations interbreed or stray to nonnatal streams. Local populations that are extirpated by catastrophic events may also become reestablished by bull trout migrants. However, it is important to note that the genetic structuring of bull trout indicates there is limited gene flow among bull trout populations, which may encourage local adaptation within individual populations, and that reestablishment of extirpated populations may take a long time (Rieman and McIntyre 1993, p. 7; Spruell *et al.* 1999, pp. 118-120). Migration also allows bull trout to access more abundant or larger prey, which facilitates growth and reproduction. Additional benefits of migration and its relationship to foraging are discussed below under “Diet.”

Cold water temperatures play an important role in determining bull trout habitat quality, as these fish are primarily found in colder streams (below 15 °C or 59 °F), and spawning habitats are generally characterized by temperatures that drop below 9 °C (48 °F) in the fall (Fraley and Shepard 1989, p. 133; Pratt 1992, p. 6; Rieman and McIntyre 1993, p. 7).

Thermal requirements for bull trout appear to differ at different life stages. Spawning areas are often associated with cold-water springs, groundwater infiltration, and the coldest streams in a given watershed (Baxter *et al.* 1997, pp. 426-427; Pratt 1992, p. 6; Rieman and McIntyre 1993, p. 7; Rieman *et al.* 1997, p. 1117). Optimum incubation temperatures for bull trout eggs range from 2 °C to 6 °C (35 °F to 39 °F) whereas optimum water temperatures for rearing range from about 6 °C to 10 °C (46 °F to 50 °F) (Buchanan and Gregory 1997, pp. 121-122; Goetz 1989, pp. 22-24; McPhail and Murray 1979, pp. 41, 50, 53, 55). In Granite Creek, Idaho, Bonneau and Scarnecchia (1996) observed that juvenile bull trout selected the coldest water available in a plunge pool, 8 °C to 9 °C (46 °F to 48 °F), within a temperature gradient of 8 °C to 15 °C (4 °F to 60 °F). In a landscape study relating bull trout distribution to maximum water temperatures, Dunham *et al.* (2003) found that the probability of juvenile bull trout occurrence does not become high (i.e., greater than 0.75) until maximum temperatures decline to 11 °C to 12 °C (52 °F to 54 °F).

Although bull trout are found primarily in cold streams, occasionally these fish are found in larger, warmer river systems throughout the Columbia River basin (Buchanan and Gregory 1997, pp. 121-122; Fraley and Shepard 1989, pp. 135-137; Rieman and McIntyre 1993, p. 2; Rieman and McIntyre 1995, p. 288; Rieman *et al.* 1997, p. 1114). Availability and proximity of cold water patches and food productivity can influence bull trout ability to survive in warmer rivers (Myrick et al. 2002). For example, in a study in the Little Lost River of Idaho where bull trout were found at temperatures ranging from 8 °C to 20 °C (46 °F to 68 °F), most sites that had high densities of bull trout were in areas where primary productivity in streams had increased following a fire (Gamett, pers. comm. 2002).

All life history stages of bull trout are associated with complex forms of cover, including large woody debris, undercut banks, boulders, and pools (Fraley and Shepard 1989, pp. 135-137; Goetz 1989, pp. 22-25; Hoelscher and Bjornn 1989, p. 54; Pratt 1992, p. 6; Rich 1996, pp. 35-38; Sedell and Everest 1991, p. 1; Sexauer and James 1997, pp. 367-369; Thomas 1992, pp. 4-5; Watson and Hillman 1997, pp. 247-249). Maintaining bull trout habitat requires stability of stream channels and maintenance of natural flow patterns (Rieman and McIntyre 1993, p. 7). Juvenile and adult bull trout frequently inhabit side channels, stream margins, and pools with suitable cover (Sexauer and James 1997, pp. 367-369). These areas are sensitive to activities that directly or indirectly affect stream channel stability and alter natural flow patterns. For example, altered stream flow in the fall may disrupt bull trout during the spawning period, and channel instability may decrease survival of eggs and young juveniles in the gravel from winter through spring (Fraley and Shepard 1989, pp. 135-137; Pratt 1992, p. 6; Pratt and Huston 1993, pp. 70-72). Pratt (1992, p. 6) indicated that increases in fine sediment reduce egg survival and emergence.

Bull trout typically spawn from August through November during periods of increasing flows and decreasing water temperatures. Preferred spawning habitat consists of low-gradient stream reaches with loose, clean gravel (Fraley and Shepard 1989, p. 135). Redds are often constructed in stream reaches fed by springs or near other sources of cold groundwater (Goetz 1989, p. 15; Pratt 1992, p. 8; Rieman and McIntyre 1996, p. 133). Depending on water temperature, incubation is normally 100 to 145 days (Pratt 1992, p. 8). After hatching, fry remain in the substrate, and time from egg deposition to emergence may surpass 200 days. Fry normally emerge from early April through May, depending on water temperatures and increasing stream flows (Ratliff and Howell 1992 in Howell and Buchanan 1992, pp. 10, 15; Pratt 1992, pp. 5-6).

Early life stages of fish, specifically the developing embryo, require the highest inter-gravel dissolved oxygen (IGDO) levels, and are the most sensitive life stage to reduced oxygen levels. The oxygen demand of embryos depends on temperature and on stage of development, with the greatest IGDO required just prior to hatching.

A literature review conducted by the Washington Department of Ecology (WDOE 2002) indicates that adverse effects of lower oxygen concentrations on embryo survival are magnified as temperatures increase above optimal (for incubation). In a laboratory study conducted in Canada, researchers found that low oxygen levels retarded embryonic development in bull trout (Giles and Van der Zweep 1996, pp. 54-55). Normal oxygen levels seen in rivers used by bull trout during spawning ranged from 8 to 12 mg/L (in the gravel), with corresponding instream levels of 10 to 11.5 mg/L (Stewart et al. 2007). In addition, IGDO concentrations, water velocities in the water column, and especially the intergravel flow rate, are interrelated variables that affect the survival of incubating embryos (ODEQ 1995). Due to a long incubation period of 220+ days, bull trout are particularly sensitive to adequate IGDO levels. An IGDO level below 8 mg/L is likely to result in mortality of eggs, embryos, and fry.

Migratory forms of bull trout may develop when habitat conditions allow movement between spawning and rearing streams and larger rivers, lakes or nearshore marine habitat where foraging opportunities may be enhanced (Brenkman and Corbett 2005, pp. 1073, 1079-1080; Frissell 1993, p. 350; Goetz *et al.* 2004, pp. 45, 55, 60, 68, 77, 113-114, 123, 125-126). For example, multiple life history forms (e.g., resident and fluvial) and multiple migration patterns have been noted in the Grande Ronde River (Baxter 2002). Parts of this river system have retained habitat conditions that allow free movement between spawning and rearing areas and the mainstem Snake River. Such multiple life history strategies help to maintain the stability and persistence of bull trout populations to environmental changes. Benefits to migratory bull trout include greater growth in the more productive waters of larger streams, lakes, and marine waters; greater fecundity resulting in increased reproductive potential; and dispersing the population across space and time so that spawning streams may be recolonized should local populations suffer a catastrophic loss (Frissell 1999, pp. 15-16; MBTSG 1998, pp. iv, 48-50; Rieman and McIntyre 1993, pp. 18-19; USFWS 2004a, Vol. 2, p. 63). In the absence of the migratory bull trout life form, isolated populations cannot be replenished when disturbances make local habitats temporarily unsuitable. Therefore, the range of the species is diminished, and the potential for a greater reproductive contribution from larger fish with higher fecundity is lost (Rieman and McIntyre 1993, pp. 1-18).

3.1.4 Diet

Bull trout are opportunistic feeders, with food habits primarily a function of size and life-history strategy. A single optimal foraging strategy is not necessarily a consistent feature in the life of a fish, because this strategy can change as the fish progresses from one life stage to another (i.e., juvenile to subadult). Fish growth depends on the quantity and quality of food that is eaten (Gerking 1994), and as fish grow, their foraging strategy changes as their food changes, in quantity, size, or other characteristics. Resident and juvenile migratory bull trout prey on terrestrial and aquatic insects, macrozooplankton, and small fish (Boag 1987, p. 58; Donald and Alger 1993, pp. 239-243; Goetz 1989, pp. 33-34). Subadult and adult migratory bull trout feed on various fish species (Brown 1994, p. 21; Donald and Alger 1993, p. 242; Fraley and Shepard 1989, p. 135; Leathe and Graham 1982, p. 95). Bull trout of all sizes other than fry have been found to eat fish up to half their length (Beauchamp and VanTassell 2001). In nearshore marine areas of western Washington, bull trout feed on Pacific herring (*Clupea pallasi*), Pacific sand lance (*Ammodytes hexapterus*), and surf smelt (*Hypomesus pretiosus*) (Goetz *et al.* 2004, p. 114; WDFW *et al.* 1997, p. 23).

Bull trout migration and life history strategies are closely related to their feeding and foraging strategies. Migration allows bull trout to access optimal foraging areas and exploit a wider variety of prey resources. Optimal foraging theory can be used to describe strategies fish use to choose between alternative sources of food by weighing the benefits and costs of capturing one source of food over another. For example, prey often occur in concentrated patches of abundance ("patch model") (Gerking 1994). As the predator feeds in one patch, the prey population is reduced, and it becomes more profitable for the predator to seek a new patch rather than continue feeding on the original one. This can be explained in terms of balancing energy acquired versus energy expended. For example, in the Skagit River system, anadromous bull trout make migrations as long as 121 miles between marine foraging areas in Puget Sound and headwater spawning grounds, foraging on salmon eggs and juvenile salmon along their migration route (WDFW *et al.* 1997). Anadromous bull trout also use marine waters as migration corridors to reach seasonal habitats in non-natal watersheds to forage and possibly overwinter (Brenkman and Corbett 2005, p. 1079; Goetz *et al.* 2004, pp. 36, 60).

3.2 Status of Bull Trout Critical Habitat (Rangewide)

3.2.1 Legal Status

The Service published a final critical habitat designation for the coterminous United States population of the bull trout on October 18, 2010 (70 FR 63898); the rule becomes 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, Columbia River, Coastal-Puget Sound, and Saint Mary-Belly River population segments (also considered as interim recovery units)[1]. Rangewide, the Service designated reservoirs/lakes and stream/shoreline miles as bull trout critical habitat (Table 1). Designated bull trout critical habitat is of two primary use types: 1) spawning and rearing, and 2) foraging, migration, and overwintering (FMO).

[1] The Service's 5 year review (USFWS 2008, pg. 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.

Table 1. 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

The 2010 revision 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 compared to the 2005 designation.

This rule also identifies and designates as critical habitat approximately 1,323.7 km (822.5 miles) of streams/shorelines and 6,758.8 ha (16,701.3 acres) of lakes/reservoirs of unoccupied habitat to address bull trout conservation needs in specific geographic areas in several areas not occupied at the time of listing. No unoccupied habitat was included in the 2005 designation. These unoccupied areas were determined by the Service to be essential for restoring functioning migratory bull trout populations based on currently available scientific information. These unoccupied areas often include lower main stem 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.

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 63898:63943 [October 18, 2010]). 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.

Thirty-two CHUs within the geographical area occupied by the species at the time of listing are designated under the revised 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 biological features associated with Primary Constituent Elements (PCEs) 5 and 6, which relate to breeding habitat.

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 (Hard 1995, pp. 314-315; Healey and Prince 1995, p. 182; 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 (Hard 1995, pp. 321-322; MBTSG 1998, pp. 13-16; Rieman and Allendorf 2001, p. 763; Rieman and McIntyre 1993, p. 23).

3.2.3 Primary Constituent Elements for Bull Trout

Within the designated critical habitat areas, the PCEs for bull trout are those habitat components that are essential for the primary biological needs of foraging, reproducing, rearing of young, dispersal, genetic exchange, or sheltering. Based on our current knowledge of the life history, biology, and ecology of this species and the characteristics of the habitat necessary to sustain its essential life-history functions, we have determined that the following PCEs are essential for the conservation of bull trout.

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 °C to 15 °C (36 °F 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 departure 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 non-native 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.

Throughout the remainder of this Opinion, the PCEs will be referred to by the corresponding number, as listed above. The revised PCE's are similar to those previously in effect under the 2005 designation. The most significant modification is the addition of a ninth PCE to address the presence of nonnative predatory or competitive fish species. Although this PCE applies to both the freshwater and marine environments, currently no non-native fish species are of concern in the marine environment, though this could change in the future.
Note that only PCEs 2, 3, 4, 5, and 8 apply to marine nearshore waters identified as critical habitat. Also, lakes and reservoirs within the CHUs also contain most of the physical or biological features necessary to support bull trout, with the exception of those associated with PCEs 1 and 6. Additionally, all except PCE 6 apply to FMO habitat designated as critical habitat.

Critical habitat includes the stream channels within the designated stream reaches and has a lateral extent as defined by the bankfull elevation on one bank to the bankfull elevation on the opposite bank. Bankfull elevation is the level at which water begins to leave the channel and move into the floodplain and is reached at a discharge that generally has a recurrence interval of 1 to 2 years on the annual flood series. If bankfull elevation is not evident on either bank, the ordinary high-water line must be used to determine the lateral extent of critical habitat. The lateral extent of designated lakes is defined by the perimeter of the waterbody as mapped on standard 1:24,000 scale topographic maps. The Service assumes in many cases this is the full-pool level of the waterbody. In areas where only one side of the waterbody is designated (where only one side is excluded), the mid-line of the waterbody represents the lateral extent of critical habitat.

In marine nearshore areas, the inshore extent of critical habitat is the mean higher high-water (MHHW) line, including the uppermost reach of the saltwater wedge within tidally influenced freshwater heads of estuaries. The MHHW line refers to the average of all the higher high-water heights of the two daily tidal levels. Marine critical habitat extends offshore to the depth of 10 meters (m) (33 ft) relative to the mean low low-water (MLLW) line (zero tidal level or average of all the lower low-water heights of the two daily tidal levels). This area between the MHHW line and minus 10 m MLLW line (the average extent of the photic zone) is considered the habitat most consistently used by bull trout in marine waters based on known use, forage fish availability, and ongoing migration studies and captures geological and ecological processes important to maintaining these habitats. This area contains essential foraging habitat and migration corridors such as estuaries, bays, inlets, shallow subtidal areas, and intertidal flats.

Adjacent shoreline riparian areas, bluffs, and uplands are not designated as critical habitat. However, it should be recognized that the quality of marine and freshwater habitat along streams, lakes, and shorelines is intrinsically related to the character of these adjacent features, and that human activities that occur outside of the designated critical habitat can have major effects on physical and biological features of the aquatic environment.

Activities that cause adverse effects to critical habitat are evaluated to determine if they are likely to “destroy or adversely modify” critical habitat by no longer serving the intended conservation role for the species or retaining those PCEs that relate to the ability of the area to at least periodically support the species. Activities that may destroy or adversely modify critical habitat are those that alter the PCEs to such an extent that the conservation value of critical habitat is appreciably reduced (75 FR 63898:63943; USFWS 2004, Vol. 1. pp. 140-193, Vol. 2. pp. 69-114). The Service’s evaluation must be conducted at the scale of the entire critical habitat area designated, unless otherwise stated in the final critical habitat rule (USFWS and NMFS 1998, pp. 4-39). Thus, adverse modification of bull trout critical habitat is evaluated at the scale of the final designation, which includes the critical habitat designated for the Klamath River, Jarbidge River, Columbia River, Coastal-Puget Sound, and Saint Mary-Belly River population segments. However, we consider all 32 CHUs to contain features or areas essential to the conservation of the bull trout (75 FR 63898:63901, 63944). Therefore, if a proposed action would alter the physical or biological features of critical habitat to an extent that appreciably reduces the conservation function of one or more critical habitat units for bull trout, a finding of adverse modification of the entire designated critical habitat area may be warranted (75 FR 63898:63943).

3.2.4 Current Critical Habitat Condition (Rangewide)

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 decline of bull trout is primarily due to habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, past fisheries management practices, impoundments, dams, water diversions, and the introduction of nonnative species (63 FR 31647, June 10 1998; 64 FR 17112, April 8, 1999).

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; and 5) degradation of FMO habitat resulting from reduced prey base, roads, agriculture, development, and dams.

3.2.5 Effects of Climate Change on Bull Trout Critical Habitat

One objective of the final rule was 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 non-native fishes).

3.2.6 Consulted on Effects for Critical Habitat

The Service has formally consulted on the effects to bull trout critical habitat throughout its range. Section 7 consultations include actions that continue to degrade the environmental baseline in many cases. However, long-term restoration efforts have also been implemented that provide some improvement in the existing functions within some of the critical habitat units.

4. Environmental Baseline

The preamble to the implementing regulations for section 7 (51 FR 19932; third paragraph, left column) contemplates that the evaluation of "…the present environment in which the species or critical habitat exists, as well as the environment that will exist when the action is completed, in terms of the totality of factors affecting the species or critical habitat…will serve as the baseline for determining the effects of the action on the species or critical habitat." The regulations at 50 CFR 402.02 define the environmental baseline to include "the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process." The analyses presented in this section supplement the above *Status of the Species* and *Status of Critical Habitat* evaluations by focusing on the current condition of the bull trout and its critical habitat in the action area, the factors responsible for that condition (inclusive of the factors cited above in the regulatory definition of environmental baseline), and the role the action area plays in the survival and recovery of the bull trout and in the recovery support function of designated critical habitat. Relevant factors on lands surrounding the action area that are influencing the condition of the bull trout and its critical habitat were also considered in completing the status and baseline evaluations herein.

4.1 Status of the Species and Critical Habitat in the Action Area

Bull trout spawn in the Imnaha River in high-elevation headwater areas that are largely within the Eagle Cap Wilderness. The relatively extensive, high-elevation aquatic habitat in the upper

Imnaha Basin provides a coldwater refugia that increases the potential resiliency of this population to future climate change effects, thereby elevating the importance of this population for bull trout recovery. The excellent habitat conditions, presence of an anadromous prey base, and good connectivity with the Snake River are other reasons why it is considered to be a key, stronghold population.

Depending on the season, bull trout can be found throughout the Imnaha River (Buchanan *et al*. 1997). Summer distribution in the Imnaha River extends from at least RM 39.8 to the confluence of the North and South Forks of the Imnaha River at RM 73.3, and some bull trout occur year-round in this area. Fluvial bull trout utilize the lower Imnaha River and the Snake River in winter, and spring for feeding, migration, and overwintering (Chandler et al. 2001, Idaho Power Company, 2015).

In the upper watershed, bull trout use the South, Middle, and North forks of the Imnaha River. In the Middle Fork, upstream distribution appears to be limited by a waterfall 1.2 river miles from the mouth. Bull trout have also been observed in Cliff, Bear, Blue, and Soldier creeks, all tributaries to the South Fork of the Imnaha River. Over a ten year period from 2001 through 2010, an average of 193 bull trout redds per year were observed during annual counts in the Upper Imnaha River and tributaries. Total redds numbers over 17.5 miles of stream ranged from a low of 101 to a high of 262 during that time period (Sausen 2011).

Most known summer rearing and holding areas in the Imnaha River are on National Forest lands above Summit Creek (RM 45). Data from radio and PIT-tagged bull trout indicate that fish found in the river below Summit Creek are mainly moving between headwater spawning habitat and foraging/overwintering habitat in the lower Imnaha and Snake Rivers (Chandler et al. 2001, Idaho Power Company 2015).

Bull trout that were radio-tagged in the Snake River began moving into the lower Imnaha River in late-April, and continued upstream through May, June, and July, with all reaching the upper river by August (Idaho Power Company 2015), as they escaped increasing water temperatures in the lower river. By late-July/early-August, almost all fluvial bull trout have moved upstream of the Imnaha Satellite Facility (ODFW, unpubl. capture data). Spawning occurs in the headwaters from late August through early October (Sausen 2011).

After spawning, adult bull trout soon move back downstream (Ringel et al. 2014). In the Imnaha River, downstream outmigration begins in September and continues through November (Idaho Power Company 2015). Juveniles likely rear in the headwaters in which they were spawned. Subadults, approximately 2-3 years of age, migrate out of the headwater areas in late fall and move to overwintering sites down river.

A sizeable number of Imnaha River bull trout are currently being PIT-tagged each year as part of an ongoing IPC research project to evaluate abundance and life history of fluvial bull trout in the Snake and Imnaha Rivers (Table 2). Since 2006, IPC fisheries biologists have been annually catching (by angling) and tagging bull trout in winter in the mainstem Snake River. Most of these tagged fish move up the Imnaha River in spring (Idaho Power Company 2015). Since 2011, NPT personnel also have been tagging bull trout caught in a screw trap they operate in the lower Imnaha River, and they record bull trout moving past their detection arrays in the lower River. And, starting in 2013, ODFW staff now PIT-tag bull trout caught at the Imnaha Satellite

Facility. IPC biologists compile and analyze the data on bull trout detections and movements. These efforts are expected to continue for at least the next five years, so more will continue to be learned about this migratory population.

Limited information is available on the abundance of bull trout in the Imnaha River. Peterson mark-recapture population estimates of migratory bull trout using data from the PIT-tagged fish moving past detection arrays in the lower river produced a population estimate of about 1,000 to 1,500 fish during the period from 2012 through 2014 (Idaho Power Company 2015). However, the 95 percent confidence interval ranged from 785 to 2,193 bull trout, so there is a high amount of uncertainty associated with the estimate.

Table 2. The number of Imnaha River bull trout PIT-tagged each year since 2006. In 2011, NPT staff started tagging bull trout caught in their screw trap, and in 2013 ODFW started tagging them at the Imnaha Satellite Facility (Idaho Power Company 2015).

Year	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Bull Trout Tagged	17	24	41	40	32	139	130	188	217

Operation of the Imnaha Weir and Collection Facility

The Imnaha Satellite Facility at RM 46 has been in operation since 1988 and has been operated by ODFW with assistance from the NPT (LSRCP 2013). The facility has typically operated from March through September, with Chinook smolt acclimation and release occurring in March and April and adult collection occurring from the time that the weir can be safely put in place until mid-September. The channel-spanning weir that blocks upstream fish passage for adult Chinook collection has typically been placed in the river in late-June, although the installation date has varied widely (from May 25 to July 18 since 2000) due to safety constraints (LSRCP 2013). Up to 9 cfs of streamflow is diverted from the Imnaha River to operate the facility.

The inability to install the weir earlier in the season, during high flows, has long been identified as a problem for Chinook salmon management (MWH 2001), but this situation has provided an opportunity for a substantial number of upstream-moving bull trout to swim past the facility prior to weir installation. This ability for volitional passage has multiple benefits. It eliminates the potential for migration delays should fish fail to enter the trap box, and it eliminates any potential for injury while entering and holding in the trap box, or with subsequent human handling for placement upstream. These are all known sources of bull trout injury and mortality.

From 2000 to 2014, there were 1,025 recorded bull trout captures at the Imnaha Satellite Facility (ODFW unpubl. data, 2014). Yearly totals vary from lows of 2 fish in both 2010 and 2011, to a high of 208 fish in 2001. Less than 25 captures were recorded in all 5 years that the weir was installed later than July 5th, while over 120 were captured in 5 of the 7 years when the weir was in place by June 22nd. The high of 208 bull trout in 2001 corresponds with the earliest install date, May 25th. 2014 saw the 2nd highest number of bull trout captured (190) over the last 15 years; the weir was installed on June 18th in 2014 (ODFW unpubl. data, 2014).

Prior to 2014, there had been few reported bull trout mortalities at the facility. It is unclear if this accurately represents past mortality rates, or reflects less comprehensive recordkeeping on bull trout, since Chinook salmon are the focus of the adult collection program. Bull trout are referred to as bycatch, and while their captures have been tallied since at least 2000 and size classes recorded since 2005, it is unclear how closely their outcomes were monitored in past years.

Since 2013, Imnaha Satellite Facility personnel have assisted in the IPC-led bull trout research project by PIT-tagging fish that are captured. They also now record fork length measurements, weights, and comments on body condition for captured bull trout. In 2014, 31 bull trout mortalities were documented at the facility. At least 9 of these were directly attributable to the trapping operation, but others were collected on the upstream face of the weir and may have died from other causes. The documentation and investigation of these mortalities appears to reflect greater attention to bull trout outcomes at the facility.

Prior to 2012, fish trapped in the Imnaha facility were processed and transferred only 1 to 2 days per week, so a trapped fish could potentially be delayed up to seven days in the trap box (ODFW 2015). Current operational protocols call for ODFW to process and transfer trapped fish daily, Monday through Friday. Fish are not processed on Saturday or Sunday unless fish numbers are expected to reach 200 fish on any day during the weekend (ODFW 2015). Staff stationed at the facility will check the trap daily and request assistance to work up fish on the weekend if needed.

4.2 Factors Affecting Species Environment with the Action Area

This section describes factors affecting the species' environment and/or critical habitat in the action area. The environmental baseline includes all Federal, State, tribal, local, and private actions already affecting the species and/or critical habitat or that will occur contemporaneously with the proposed action. Unrelated Federal actions affecting the same species or critical habitat that have completed formal or informal consultation are also part of the environmental baseline, as are other beneficial actions.

Water quality in the upper Imnaha River is generally considered to be excellent, although the river from the North/South Fork confluence down to Summit Creek is on Oregon's 303d list for water temperature (ODEQ 2002). Aquatic habitats in the Imnaha River Basin have been affected primarily by timber harvest, livestock grazing, and road construction.

The release of hatchery-produced Chinook salmon each spring at the Imnaha Satellite Facility could affect bull trout through increased competition for limited food and habitat resources, increased predation on juvenile fish, and/or disease transfer. Direct competition for food and space between hatchery fish and native bull trout could occur in rearing areas and downstream overwintering areas. At the currently proposed stocking densities, neither food nor space is expected to be limited because the numbers of salmon smolts to be produced, and the adult return levels, in the Imnaha River are believed to be within the historical abundance of salmon in the basin and within the current carrying capacity of the system. Chinook smolts are released at the time of increasing water temperatures and flows in the spring and quickly migrate out of the tributary habitat and through the mainstem migration corridors. This behavior reduces interactions with the naturally occurring fish. Because of these factors, competition effects on bull trout from hatchery-produced salmon are not expected to be significant.

Salmonids typically take prey that is less than one-third their body length (NOAA Fisheries 1999). At the time that yearling hatchery Chinook smolts are released (March-early April), we do not expect prey-size bull trout to be present in significant numbers in the areas where these smolts occur.

The risk of disease transmission between hatchery fish and naturally occurring salmonids has been reduced in recent years by disease management measures applied at fish hatcheries. Fish disease management guidelines recommended by the Interagency Hatchery Oversight Team (IHOT 1995) and the Pacific Northwest Fish Health Protection Committee (PNFHPC 1989) are followed to minimize the opportunity for disease transmission.

4.3 Role of the Action Area in the Conservation of the Bull Trout

The conservation of the coterminous U.S. population of the bull trout is dependent upon the persistence of bull trout within six recovery units. Persistence of bull trout is dependent upon maintaining viable core areas. Viable core areas are dependent on the persistence of local bull trout populations, which are in turn dependent upon reliable habitat connectivity for migratory bull trout that provides for genetic and demographic resiliency, especially in response to stochastic events. Therefore, recovery units should provide for the long-term persistence of self-sustaining, complex, interacting local populations of bull trout in core areas distributed throughout the species range.

The entire occupied area of the Imnaha River Core Area is essential to the recovery unit because it is a bull trout stronghold within the Columbia basin and within the state of Oregon. The Imnaha River Core Area contains eight populations that are generally healthy; these populations are spread over a large geographical area with multiple age classes, containing both resident and fluvial fish. This bull trout stronghold also has an anadromous prey base; connectivity with the Snake River; wide distribution throughout the habitat; and overall, excellent habitat conditions. Primary spawning activity on the Imnaha River has been documented to occur in the headwaters, which lie within wilderness, and contain higher elevation, coldwater habitat that should help ameliorate future climate change effects on bull trout in the Columbia River Basin.

Major barriers to bull trout movement (seasonally) within this FMO habitat include water quality problems associated with high stream temperatures and low stream flows in the late summer and early fall.

The conservation role of the action area is to provide foraging, migration, and over-wintering habitats for bull trout throughout most of the Imnaha River. The action area also provides significant conservation value to spawning and rearing areas in the Imnaha River.

5. Effects of the Proposed Action

Effects of the action are defined as the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with the action, that will be added to the environmental baseline (50 CFR 402.02). The Service's effects analysis is based on information provided in the Assessment (LSRCP 2013) and addendums to that Assessment dated September 25, 2013; October 15, 2014; and January 27, 2015, as well as the Service's assessment of baseline conditions and expected changes from the proposed action.

The effects determinations in this Opinion for both the species and critical habitat were made using methods for evaluating current aquatic conditions, the environmental baseline, and predicting the effects of the proposed actions on bull trout and bull trout critical habitat. The effects of proposed projects are expressed in terms of the expected effect on aquatic habitat, including the PCEs, in the project area.

The components of the proposed action that are most likely to affect bull trout and bull trout critical habitat are: (1) instream and riparian ground disturbance associated with installing the new weir; and (2) annual operations of the weir and adult collection trap.

5.1 Effects of Instream and Riparian Ground Disturbance

Removing the existing Imnaha River picket weir and replacing it with a bridge-mounted bar rack weir will result in some in-stream and riparian ground-disturbance. The existing weir abutments will be modified to provide bearing plates for the bridge structure, and a 3 to 6 inch tall steel sill (curb) will be bolted onto the upstream side of the existing concrete apron that spans the river channel. This will require diverting water around the work area while the steel sill is installed. Heavy equipment will need to cross the river channel at the weir site several times during construction to transport materials, including sections of the pre-fabricated steel bridge that will span the channel.

The planned approach for in-channel work area isolation is to divert water to the west side of the channel while the sill is installed on the east side of the apron, then flip flows to the east side to install the sill on the west side of the apron. This in-channel work is expected to take one to two weeks. The entire project is expected to take 6 to 8 weeks to complete, with much of the bridge assembly and installation work occurring outside of the active river channel.

Activities involving in-stream or near-stream construction will cause short-term adverse habitat effects and potentially result in harassment or harm of bull trout. The proposed construction activities will require instream operation of heavy machinery and ground disturbance in riparian areas adjacent to the river. This will produce sediment plumes sufficient to harm or harass bull trout in the action area during construction activities and potentially during subsequent high flow events. Possible direct effects include mortality from exposure to suspended sediments (turbidity) and contaminants from construction materials. Potential indirect effects include behavioral changes resulting from elevated turbidity (Sigler *et al*. 1984; Berg and Northcote 1985; Whitman *et al*. 1982; Gregory and Levings 1993) during in-water construction.

Water turbidity, resulting from elevated levels of total suspended solids (TSS), has been reported to cause physiological stress, reduce growth, and adversely affect survival. Of key importance in considering the detrimental effects of TSS on fish are the frequency and the duration of the exposure, not just the TSS concentration. Chronic exposure can cause physiological stress responses that can increase maintenance energy and reduce feeding and growth (Redding *et al*. 1987; Lloyd 1987; Servizi and Martens 1991). The elevated TSS levels resulting from this project should be limited primarily to the period of construction and thus should be short-term in nature.

The proposed timing of instream work from mid-September to mid-October is of concern because data from PIT-tagged and radio-tagged bull trout indicate that this is a period when many fluvial adults are moving downstream through the project area (Chandler *et al.* 2001; Idaho Power Company 2015). From 2012 through 2014, the mean and median dates of PIT tag detections at an array at RM 25.5, 20 miles downstream of the Imnaha Satellite Facility, have been between October 14th and October 22nd (Idaho Power Company 2015). We do not know the specific dates when these fish passed the project area, but it likely was two to three weeks before they arrived at the array 20 miles downstream. So, larger numbers of fish are likely to encounter elevated water turbidity than would be the case if the project were constructed in August or early September when nearly all fluvial bull trout are upstream of the facility.

From a habitat standpoint, some minor sedimentation of substrates in downstream reaches is expected. Operation of heavy machinery near the stream will also disturb riparian vegetation and could lead to decreased shade, increased water temperatures, and decreased streambank stability until riparian vegetation is re-established.

Increased sedimentation can lead to increased embeddedness of spawning substrates. However, all of the bull trout spawning habitat is upstream of the project site, so the proposed work will not adversely affect bull trout spawning habitat. Fine, redeposited sediments also have the potential to adversely affect primary and secondary productivity (Spence *et al*. 1996), and reduce cover for juvenile salmonids (Bjornn and Reiser 1991).

There is the potential for fuel or other contaminant spills associated with use of heavy equipment in or near the stream. Operation of back-hoes, excavators, and other equipment requires the use of fuel, lubricants, and other substances which, if spilled into the channel of a waterbody or into the adjacent riparian zone, can injure or kill aquatic organisms. Petroleum-based contaminants (such as fuel, oil, and some hydraulic fluids) contain polycyclic aromatic hydrocarbons (PAHs), which can be acutely toxic to salmonids at high levels of exposure and can also cause mortailty and have acute and chronic sublethal effects on aquatic organisms (Neff 1985). Instream construction will elevate the risk for chemical contamination of the aquatic environment within the action area. However, given the proposed conservation measures, which should reduce the risk of a contaminant spill, and the localized and short-duration of the activities, the probability of direct mortality from chemical contamination is considered to be low.

Critical Habitat Effects from Construction of the Weir

Of the nine critical habitat PCEs described on pages 22 and 23, the in-stream and riparian ground disturbance associated with proposed construction activities is expected to have a short-term adverse effect on two: PCE 3 (substrate quality) and PCE 7 (food base abundance)(see discussion above). The areas where critical habitat will be affected are in the immediate vicinity of the weir and a short distance downstream. The impact minimization measures described in the proposed action are expected to substantially minimize the extent and duration of these habitat effects, such that it is unlikely that construction of the new weir will result in any long-term adverse effects to the function or conservation role of the critical habitat.

5.2 Effects of Annual Operation of the Weir and Collection Facility

The Imnaha Satellite Facility at RM 46 has been in operation since 1988. The channel-spanning weir that blocks upstream fish passage for adult Chinook collection has typically been placed in the river in late-June, although the installation date has varied widely (from May 25 to July 18 since 2000) due to streamflow-related safety constraints. The weir is typically removed around September 15 of each year (LSRCP 2013).

The new bridge-mounted weir will be capable of being safely installed at higher flow levels, so future install dates will be driven by fish management priorities rather than safety constraints. It is proposed to be installed “as soon as river conditions allow and operated until September 11, or until the last scheduled spawning ground survey” (BA addendum dated 1/28/2015). Other correspondence has suggested that the installation date would likely be around June 1st of each year, with some variation based on run timing and river flow levels. As with the old weir, the plan is to keep the weir in place continuously (24 hours a day, 7 days a week) during the trapping period.

The proposed June 1st weir installation date is 14 to 48 days earlier than it has been installed in the past 15 years, with the exception of 2001 when it was installed in late-May. The median install date over the past 15 years has been June 25th, so, on average, volitional fish passage will be blocked for an additional 25 days in late-spring/early-summer, which is the peak period of bull trout upstream movement (Chandler *et al.* 2001; Idaho Power Company 2015).

When the weir spans the river channel, upstream-moving Chinook salmon and bull trout must enter the collection trap to be either collected for hatchery broodstock (salmon only) or manually placed upstream to continue their migration. Fish enter the collection trap through a fish ladder on the west side of the channel.

Downstream-moving fish that are too large to get through the 1-inch wide gaps between weir picket bars, which includes all adult and many subadult bull trout (fish that are about 200 mm total length [TL] or larger), are also blocked from continuing downstream when the weir is in place. There is no access to the fish ladder and collection trap from upstream of the facility, so downstream-moving fish cannot be manually transported past the facility. Adult bull trout are typically not moving downstream during the months when the weir is in place, except for a few in early September. However, juvenile and subadult movements are more variable and less understood. In a study of juvenile and subadult bull trout (120 mm - 300 mm TL) movement in the South Fork Walla Walla River in northeast Oregon, it was found that these fish frequently moved downstream during summer months with peak movement occurring in August (Homel and Budy 2008). If this is also the pattern in the Imnaha River, larger subadults will be blocked from moving further downstream until the weir is lifted.

Earlier installation of the weir is a priority for Chinook salmon management because an unquantified number of hatchery salmon get upstream during this period and salmon broodstock are not getting collected from this segment of the run (ODFW 2012). However, the limitations of the old weir typically provided three to four more weeks in June and sometimes early July for bull trout migrants to swim past the facility prior to installation of the weir.

Since most of the available data on timing of arrival of bull trout at the facility comes from trap captures, we lack information on fish movement before the weir is installed each year. However, data from radio-tagged and PIT-tagged bull trout indicate that bull trout start arriving in this stretch of river in late-May or early-June (Chandler *et al.* 2001; Idaho Power Company 2015). These data, along with bull trout captures at the weir (Figure 3), suggest that 40 to 50 percent of upstream migrants reach the facility by June 25th in most years. So, the way the old weir was operated often allowed that proportion of the run to move freely past the facility without having to navigate the ladder and collection trap and be manually placed upstream.

Under the proposed new operations schedule, essentially all adult migratory bull trout will have to be trapped at the facility and placed upstream. The potential effects associated with this situation are multiple: (1) passage delays or full impasses due to upstream-moving fish not making it into the trap box; (2) fish stuck in a trap box with other large fish are susceptible to injury or death, (3) human handling and temporary holding facilities for transfer upstream can result in injury or death, and (4) early downstream migrants are prevented from moving further until the weir is pulled in mid-September. These are known sources of bull trout injury and mortality, and for that reason volitional fish passage is preferred where possible. These adverse effects will be addressed in more detail below.

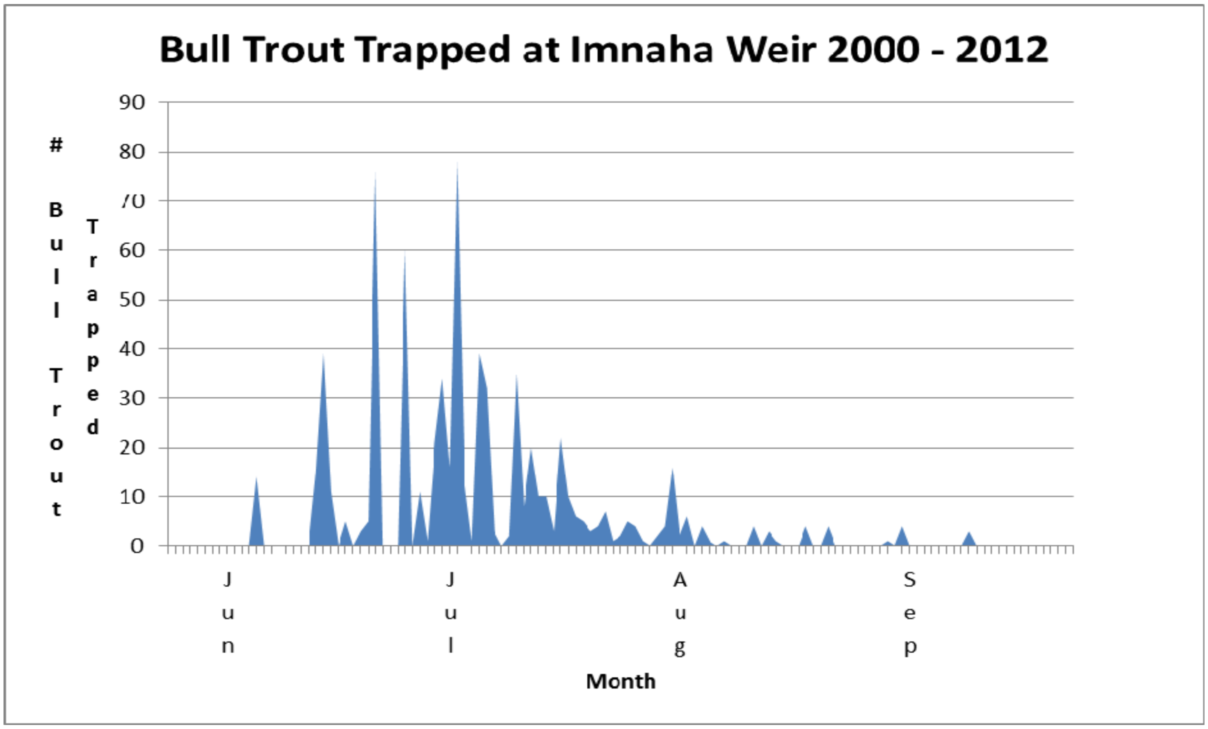

Figure 3. Graph of bull trout trapped by date at the Imnaha Weir over a 13-year period. The weir was often not installed until late-June so these data reflect greater sampling effort in July, August, and early September. On the x-axis, the month name is listed by the first day of that month (ODFW, unpubl. data).

5.2.1 Studies on Fish Trapping Effects

While trapping facilities are regularly used to achieve salmon management goals, there are only a few studies that have looked at how they affect non-target migratory fish, commonly referred to as 'bycatch'. The existing studies do indicate that trapping facilities which block fish passage can have sizeable adverse effects on non-target fish.

On the Wenatchee River in Washington, a Chinook salmon trap operated 7 days a week from 2008 through 2010 on the fish ladder at Tumwater Dam resulted in up to 38 percent of sockeye salmon being inadvertently blocked from reaching spawning tributaries (Murauskas *et al.* 2014). These fish had trouble making it into the trap box for upstream transfer. Others did eventually make it into the trap, but experienced delays in migration that commonly exceeded 8 days. When the trapping operation was reduced to 3 days per week in 2011, less than 1 percent of the run was blocked and median delays were 6 minutes (Murauskas *et al.* 2014).

The trapping operation at Tumwater Dam began in 2004, and passage delays went unnoticed until installation of PIT-tag detection arrays at the facility in 2008. After three years of documenting the fish passage problems associated with operating the trap continuously, the trapping operation was permanently reduced to 3 days per week after 2011. The authors of this study recommend a precautionary approach where trapping of adult migratory fishes is proposed but the effects are unknown, and intensive trapping efforts should be closely evaluated prior to and during implementation (Murauskas *et al.* 2014).

Radio-tagged bull trout also experienced substantial migration delays at a collection trap and weir on the Chiwawa River, a tributary of the Wenatchee River (Ringel *et al.* 2014). Over 25 percent of tagged bull trout were delayed by the weir, most for 3 to 5 days. One was delayed for 18 days. A few bull trout avoided entering the trap and waited downstream until the weir was down before moving upstream. This behavior may reflect an individual or learned behavior, as demonstrated by one tagged bull trout that during both years it was tracked held for 3 to 4 nights before the weir was lowered and then passed (Ringel *et al.* 2014).

A New Zealand study looked at stress responses in wild rainbow trout, by tracking changes in plasma cortisol and lactate levels, as they entered fish traps on their upstream spawning migration, were confined, handled, and then released (Clements *et al.* 2002). Based on the results of this study, the authors concluded that the trapping procedure induces a severe and prolonged stress response in wild rainbow trout and that it is important to minimize the length of disturbance during trapping and processing (Clements *et al.* 2002).

5.2.2 Issues at the Imnaha Satellite Facility

From 2000 to 2014, there were 1,025 recorded bull trout captures at the Imnaha Satellite Facility. Size class information was not recorded for bull trout until 2005, but the data collected since then show that well over 90 percent of the captured bull trout were over 400 mm TL (ODFW unpubl. data, 2014). This contrasts sharply with the size distributions of bull trout caught downstream in the NPT screw trap in the lower Imnaha River (RM 4) and by IPC angling in the Snake River. The majority of those fish were in the 230 mm to 400 mm TL size range (Figure 4) (Idaho Power Company 2015).

Figure 4 illustrates the difference in sizes of fish caught at the weir versus sites downstream. The small adult and sub-adult fish observed downstream would be expected to move upstream as summer water temperatures rise in the lower river. And, as mentioned earlier, fish that are about 200 mm TL or larger are not able to get through the one-inch gaps in the weir pickets, so they are not able to swim through the weir when it is in place. We do not know the reason for the substantial under-representation of smaller fish in captures at the weir, but there would seem to be only three possible explanations: (1) these fish are getting past the facility prior to installation of the weir, (2) they are not making it as far upstream as the weir, or (3) they are not being successfully held in the trap box and are stacking up downstream. Some of these tagged small adults have crossed the PIT-tag detection array located in the Imnaha Satellite Facility fish ladder, but have not been captured and handled at the facility (R. Wilkison, IPC, *pers.comm*

2015), which might mean they are escaping or not reaching the trap box and are returning back down the ladder.

This uncertainty about what is happening to a large proportion of the migratory population needs to be resolved before we can safely say that the weir is not causing major impacts. It is particularly important given that the new weir will go in much earlier and thus eliminate the possibility that these fish can get upstream before the weir is installed. We also lack information on how quickly larger adults are moving into the trap box and whether some do not make it. The studies described above provide evidence that, in some situations, these trapping operations can inadvertently block substantial numbers of fish from reaching spawning tributaries (Murauskas *et al.* 2014). If some fish are not getting past the weir, it is unknown whether there are suitable cold-water refugias in the lower river for them to survive the warm summer months.

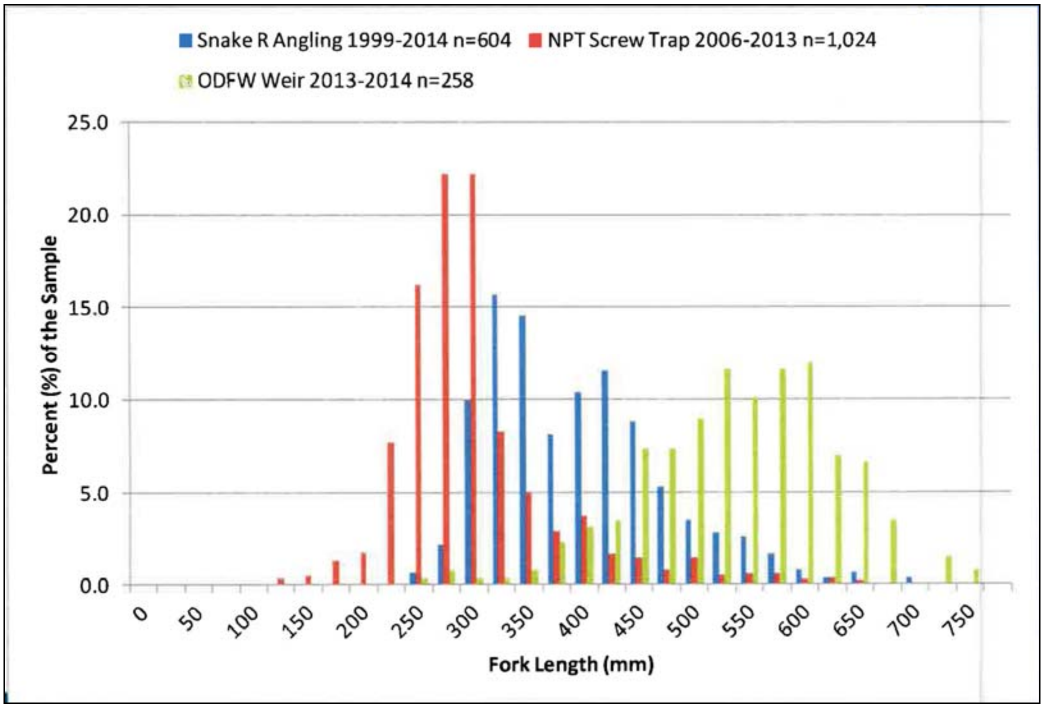

Figure 4. Graph of size distribution of migratory bull trout in the Imnaha River sampled by angling in the Snake River (blue), screw trap captures in the lower Imnaha (red), and captures at the Imnaha weir (green). Smaller fish are prevalent in the lower river, but rarely caught at the weir (Idaho Power 2015).

Prior to 2014, there had been few reports of bull trout mortalities at the Imnaha Satellite Facility. This may not accurately represent past mortality rates, however, given that Chinook salmon are the focus at this facility and beyond tallying the date and size class of bull trout bycatch each year, the record-keeping for bull trout prior to 2012 was quite limited. In 2012, a number of operational improvements were made at the facility, including increasing staffing levels to ensure that fish in the trap are processed a minimum of five days a week rather than the prior schedule of one to two days per week, thereby greatly reducing the amount of time fish spend in the trap and also reducing the number of fish processed per check. The increase in staff may explain why more detailed records are now kept on bull trout captures, including individual length and weight measurements, and more attention is paid to bull trout overall.

In 2014, 31 adult bull trout mortalities were observed at the facility, a sharp increase from the two observed mortalities in 2013 and one in 2012 (ODFW 2015). ODFW reported that 19 of the mortalities were found on the upstream side of the weir, 9 in the trap box, and 3 were found on the river bank. The bank mortalities occurred at a time of heavy fishing pressure (i.e., Fourth of July weekend) and were likely the result of public angling in the area and unrelated to the facility.

The nine mortalities in the trap box all appeared to be directly related to a new aluminum finger weir design that was used in 2014. The aluminum pickets became bent, increasing the gaps between them, and bull trout were found impinged between the pickets. ODFW experienced no additional mortalities in the trap after plywood was installed to block off the finger weir (ODFW 2015). A new steel V-box trap will be installed in 2015 to permanently fix this problem. The V-box design is larger and will disperse water velocity and prevent smaller fish from being pulled in and impinged.

ODFW conducted an investigation of the 19 dead bull trout that were found on the upstream side of the weir between July 4 and Aug 11, but they were not able to identify a specific cause for these mortalities. The first two weir mortalities were fish that had been PIT-tagged in 2014, raising concern about the tagging process and triggering ODFW to suspend further PIT-tagging for the rest of the season. However, of the subsequent mortalities, six were tagged in previous years and six fish did not have PIT tags, so other factors appear to be involved (ODFW 2015). While it is possible that some of these deaths were related to problems that occurred while passing through the facility, it appears that other environmental or physiological factors must have also contributed to this extended incident.

A 2001 report identified a number of deficiencies in the Imnaha Satellite Facility's adult collection system (MWH 2001). While the current project addresses problems with the existing weir, other significant problems identified in this report will not be addressed. The report stated that the fish ladder entrance is poorly designed because the toe of the weir is located upstream of the entrance, so migrating adults must drop back from the barrier to find the entrance. The report also stated that the fish ladder is too small and water flows exiting the ladder are insufficient to provide the desired attraction to the ladder and that the existing adult trap and holding area is too small and can result in fish over-crowding (MWH 2001). An orifice and weir baffle is being installed to improve ladder attraction flow, but the ladder size and entrance problems will remain, as will the existing adult trap.

<u>Critical Habitat Effects from Operation of the Weir</u>

Annual operation of the weir and adult collection facility is expected to have a long-term adverse effect on PCE 2 (minimal barriers to migration). The key issue is whether bull trout can readily get passed the facility to migrate upstream and downstream. As has been discussed, studies elsewhere have shown this can be a problem, and there is still much uncertainty about whether some bull trout are being delayed by the weir. While many improvements have been and will continue to be made at this facility, there are previously identified problems that will remain unfixed. It is hoped that the impact minimization measures described in the proposed action will effectively minimize the potential for migration delays. However, additional information is needed on the outcomes of individual bull trout encountering the facility to effectively address this issue.

5.3 Interrelated and Interdependent Actions

Interrelated actions are those actions that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those actions that have independent utility apart from the action under consideration. Interdependent and interrelated activities are identified by applying the “but for” test, which asks whether any activity and its associated impacts will occur “but for” the proposed action.

No interrelated or interdependent actions have been identified for the LSRCP Office’s proposed modification and operation of the Imnaha Satellite Facility Weir.

6. Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 as “those effects of future State or private activities, not involving Federal activities that are reasonably certain to occur within the action area...” 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.

No cumulative effects have been identified for the LSRCP Office’s proposed modification and operation of the Imnaha Satellite Facility Weir.

7. Conclusion

After reviewing the current status of bull trout, the environmental baseline for the action area, the effects of the proposed activities and conservation measures, interrelated and interdependent actions, and anticipated cumulative effects, it is the Service’s biological opinion that the actions as proposed are not likely to jeopardize the continued existence of bull trout in the Columbia River interim recovery unit and is not likely to destroy or adversely modify bull trout critical habitat. The Service reached these conclusions for the following reasons.

1. While the Imnaha River supports a large and important bull trout population, it represents only a small percentage of the overall bull trout population in the Columbia River interim recovery unit.

2. The measures described in the LSRCP proposed action to minimize harm to bull trout when installing the new weir are expected to be effective at limiting construction-related impacts to bull trout and their habitat.

3. While much is still unknown about the efficacy of passage conditions for bull trout at this facility, the proposed measures to improve ladder and trap box technology and improve fish handling procedures are expected to be effective at getting bull trout past this facility annually with acceptable levels of injury and mortality.

4. Monitoring measures in place should ensure that passage problems get identified quickly and are addressed.

5. The adverse effects to critical habitat PCEs resulting from project activities will not permanently alter or destroy the quality or function of that habitat and the PCEs will remain functional to maintain their conservation role in the Imnaha River.

Available information on bull trout abundance, distribution, and movements in the action area is limited; new information on the species status, habitat use, and/or cumulative effects may alter these conclusions.

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 species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species 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, carrying out 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 this project is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the responsible action agency or become binding conditions of any agreement issued to contractors, operators, or permittees, as appropriate, for the exemption in Section 7(o)(2) to apply. LSRCP has a continuing duty to regulate the activity covered by this Incidental Take Statement. If LSRCP (1) fails to assume and implement the terms and conditions or (2) fails to require permittees, operators, or authorized contractors to adhere to the terms and conditions outlined in the Incidental Take Statement through enforceable terms that are added to the permit or contract document, the protective coverage of Section 7(o)(2) may lapse. In order to monitor the impact of incidental take, LSRCP 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 Section 402. 14(i)(3)].

8.1 Amount/Extent of Take Anticipated

Because of the inherent biological characteristics of aquatic species such as bull trout, it is very difficult to estimate or detect fish mortalities that may be directly attributable to the project activities. The small size of some fish, behavioral modifications before death, the camouflaging effect of complex aquatic environments, rapid rates of decomposition, and the presence of stream flows which can rapidly carry carcasses downstream combine to make it unlikely that all or even most incidentally taken fish will be detected. Consequently, the amount of take anticipated here is based on a high level of uncertainty and on injuries or mortalities that can be detected. Under current conditions, it is very difficult to detect migration delays or impasses because there is currently no way to assess: (1) when fish reach the weir, (2) what proportion of fish reaching the weir successfully make it past the facility, and (3) how long the passage process takes.

The Service anticipates the following take as a result of implementing the proposed action:

Because bull trout are expected to be in the vicinity and moving through the project area during the proposed construction period, in-stream and near-water construction activities at the Imnaha Satellite Facility are expected to result in the injury and possibly death of a small number of bull trout. Eight subadults and two adults are expected to be either injured or killed by construction-related activities. The extent of this take is expected to be limited to the areas where ground-disturbance is occurring and downstream to the extent of project-related turbidity plumes, which is anticipated to be a distance of no more than 1,500 feet below the work area.

The most likely outcome is that the temporary increase in sediment and turbidity will cause fish to avoid disturbed areas of the stream, both within and downstream of the project areas, during project construction. Incidental take in the form of harm is likely from riparian and streambank disturbance. Incidental take from ground-disturbing activities is expected to occur primarily during and immediately after the work. Occasional events that result in take may continue to occur up to two years after ground-disturbing activities are completed due to the dislodging of soil and sediments that were exposed during construction.

Over the <u>ten-year period</u> covered by this consultation, operation of the new Imnaha Satellite Facility Weir is expected to result in the harm and harassment of bull trout on a yearly basis. Harm to migrating bull trout will occur at the weir facility in a variety of ways, including: (1) impingement on weir and trap box components, (2) incidents associated with extended periods of confinement with other fish in trap boxes or holding areas, (3) handling-related injuries as fish are transferred from the trap box back to the river upstream of the facility, and (4) migration delays or impasse associated with fish not readily entering the trap box.

Three adult fish per year are expected to be either significantly injured or killed by impingement on the weir or trap box, time spent in the trap box, or problems associated with human handling (e.g., processing, PIT-tagging, transporting). Trap capture data from past years indicate that very few sub-adults are trapped and handled at this facility (ODFW, unpubl. data, 2014), so we do not expect them to be measurably affected by impingement, handling or time spent in the trap box. Based on studies of similar adult collection traps in similar river systems (Murauskas *et al.* 2014, Ringel *et al.* 2014), we also anticipate that 30 adult fish and 20 sub-adult fish per year will experience significant migration delays, with some of those never successfully making it upstream of the facility. Delays or complete impasses to upstream movement can result in bull trout mortality if stream temperatures rise substantially before these fish make it to cooler higher-elevation waters. Delays also can reduce reproductive success. Despite the fact that a substantial number of bull trout in this river are now PIT-tagged, there is great uncertainty about the magnitude of passage problems at the Imnaha Satellite Facility because of the current lack of infrastructure to assess fish movement above and below the facility.

If it is determined that these activities are adversely affecting bull trout beyond the extent identified here, then consultation will need to be reinitiated.

8.2 Effect of Take

Although the Imnaha River supports a large and important bull trout population, it accounts for only a small percentage of the overall population in the Columbia River interim recovery unit.

Therefore, the anticipated incidental take of bull trout from the Imnaha Satellite Facility Weir Modification Project is not likely to jeopardize the survival of bull trout across the Columbia River interim recovery unit. It is unlikely that effects from project construction and subsequent operation of the weir will significantly impair the productivity or population numbers of bull trout across the entire Columbia River interim recovery unit.

8.3 Reasonable and Prudent Measures

The Service believes that the following reasonable and prudent measures are necessary and appropriate to minimize take of bull trout:

1. The LSRCP Office shall avoid or minimize the amount and extent of take resulting from general construction activities, riparian disturbance, and in-water work required to construct the proposed fish production facilities.

2. The LSRCP Office shall minimize the amount and extent of take resulting from adult fish collection operations at the Imnaha Satellite Facility and ensure effective bull trout passage is provided while these operations are occurring.

3. The LSRCP Office shall monitor the effect that adult fish collection operations at this facility are having on bull trout and use an adaptive management approach, as needed, to modify structures and activities to minimize impacts to bull trout.

8.4 Terms and Conditions

To be exempt from the prohibitions of Section 9 of the Act, The LSRCP Office is responsible for compliance with the following terms and conditions, which implement the reasonable and prudent measures described above. These measures are non-discretionary and must be undertaken by the LSRCP Office or made a binding condition of any contract, grant, or permit, as appropriate, in order for the exemption in section 7(o)(2) to apply. The LSRCP Office has a continuing duty to regulate the activities covered by this incidental take statement.

1. To implement reasonable and prudent measure #1, the LSRCP Office shall ensure that the following terms and conditions are implemented in the action area:

   1.1 Work below ordinary high water must be completed during an in-water work period that has been approved by ODFW as appropriate for the project area, unless otherwise approved in writing by the Service. Further, in-water work will not extend beyond October 15th of the calendar year and any temporary construction-related diversions and bypass channels will also be completely removed from the river channel by that date.

   1.2 Passage must be provided for any bull trout present in the project area during project construction, unless otherwise approved in writing by the Service.

   1.3 Fish screens must be installed, operated and maintained according to NOAA Fisheries' fish screen criteria on each water intake used for project construction, including pumps used to isolate an in-water work area.

2. To implement reasonable and prudent measure #2, the LSRCP Office shall ensure that the following terms and conditions are implemented in the action area:

   2.1 Within 6 months of the issuance of this opinion, a small group of subject matter experts will be convened, including representatives from the Service, ODFW, IPC, and the NPT, to develop and recommend a feasible sampling strategy for identifying the potential impacts from operation of the new weir and quantitatively evaluating bull trout movement past the Imnaha Satellite Facility when the weir is blocking the channel. It is expected that this strategy will capitalize on the large number of PIT-tagged bull trout in the river. The agreed-upon approach must be intensive enough to assess the duration of potential migration delays in the immediate vicinity of the weir.

   Within one year of the date of the sampling strategy being finalized, the agreed-to sampling strategy will be implemented for a four year period. Data collected from this sampling effort will be shared with the La Grande Field Office and adaptive management procedures will be used to adjust weir operations, as needed, if serious migration problems are observed.

   2.2 Captured bull trout shall be released as soon as possible and time spent in the trap box or other holding facility shall not exceed 24 hours during the Monday through Friday time period and shall not exceed 48 hours at any time.

3. To implement reasonable and prudent measure #3, the LSRCP Office shall ensure that the following terms and conditions are implemented in the action area:

   3.1 Establish a monitoring program, in coordination with the La Grande Field Office and based on the sampling strategy described in Term and Condition 2.1, to evaluate bull trout passage and help assess incidental take from operation of the new weir. The monitoring program shall be intensive enough to identify any subadult or adult passage problems, should they be occurring. Adaptive management procedures will be used to adjust weir operations, as needed, if serious fish passage problems are identified through this monitoring program.

   3.2 LSRCP shall notify the Service's La Grande Field Office as soon as possible when they find evidence, or are told about evidence, of bull trout mortality or passage difficulties at the Imnaha Satellite Facility.

   3.3 An annual report, due March 1 of each year, shall be provided to the Service's La Grande Field Office that addresses project activities that affect bull trout. The report shall briefly summarize bull trout collections at the Imnaha facility, monitoring results, and any modifications or improvements that have been implemented to avoid or minimize impacts to bull trout.

8.5 Reporting Requirements

The results of all monitoring or research conducted on bull trout or riparian/stream habitat conditions at the Imnaha Satellite Facility by LSRCP, or its contractors should be provided to the Service's La Grande Field Office. As other pertinent reports are received from other researchers, provide copies of these reports to the Service.

Disposition of Sick, Injured, or Dead Individuals: Upon locating dead, injured, or sick bull trout at the Imnaha facility, initial notification must be made to the Service Law Enforcement Office, located at 9025 SW Hillman Court, Suite 3134, Wilsonville, OR 97070, at telephone number (503) 682-6131. Instructions for proper handling and disposition of such specimens will be issued by the Division of Law Enforcement. Care must be taken in handling sick or injured fish to ensure effective treatment and care, and in handling dead specimens to preserve biological material in the best possible state. In conjunction with the care of sick or injured fish, or the preservation of biological materials from a dead animal, LSRCP has the responsibility to ensure that information relative to the date, time, and location of the fish when found, and possible cause of injury or death be recorded and provided to the Service.

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. The term "conservation recommendations" is defined as suggestions from the Service regarding discretionary measures to (1) minimize or avoid adverse effects of a proposed action on listed species or critical habitat, (2) conduct studies and develop information, and (3) promote the recovery of listed species.

To further conserve bull trout, we recommend that the LSRCP Office incorporate the following conservation recommendation:

1. Evaluate how Chinook salmon management objectives at the Imnaha Satellite Facility can be met in a manner that does not require the weir to be in the river 24 hours a day, 7 days a week during the migration season. Other similar Chinook salmon collection facilities in the Pacific Northwest have recognized the negative affect that 24/7 operations have on non-target species and have found ways to shift to reduced weir operation schedules.

10. Reinitiation – Closing Statement

This concludes formal consultation on the actions outlined in the request. 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 retained (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 not considered in this opinion; or (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 of consultation with the Service.

The Service appreciates the LSRCP Office’s efforts in completing consultation on this project. Although some adverse impacts to bull trout may result, LSRCP has made a concerted effort to include design components that will avoid or minimize those adverse effects. We recognize the time and commitment put into this effort by your staff.

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