

Lower Snake River Compensation Plan Project Proposal:

Assess impacts to Bull Trout from Operation of the New Imnaha River Weir for Imnaha River Spring/Summer Chinook Salmon Program

Project Goal – To provide information that reduces the incidental take of ESA-listed Bull Trout in the Imnaha River during operation and management of the Imnaha River weir and acclimation site for brood collection of spring/summer Spring Chinook salmon.

Project Objective(s)

1. Assess passage rate of Bull Trout during 2017-2020 operation of the Imnaha River weir during the Spring/Summer Chinook salmon return. Target passage criteria will be an average of at least 92.9% (four year running average) of PIT-tagged adults passing with no less than 76.5% in any given year (point estimates).
2. Assess migration delay of Bull Trout during 2017-2020 operation of the Imnaha River weir during the Spring/Summer Chinook salmon return. Target delay criteria will be median passage (between lower and upper antenna arrays) of no longer than 8 days for May, 6 days for June, 4 days for July and 2 days for August and September with no individual taking longer than 8 days.
3. Minimize and standardize impacts to Bull Trout during operation of the Imnaha River weir through adaptive management during planned monitoring activities of passage and delay. This will be done through ongoing and continued discussions and coordination between USFWS, NOAA-Fisheries, co-managers, and cooperators and may involve revising criteria, implementing operational changes or modification of structures.

Justification and Management Implication - This study addresses specific terms and conditions 2.1 and 3.1 within the USFWS Biological Opinion (2015) on the Imnaha River Satellite Facility Weir modification. Specifically:

(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.

(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.

Results from this effort could also inform hatchery or weir operations where similar impacts to Bull Trout are a permitting or incidental take concern.

Project Study Area and Background

The Imnaha River Satellite Facility is located on the Imnaha River approximately 48 km south of the town of Imnaha, Oregon, near river kilometer (rkm) 73. The facility is located on U.S. Forest Service (USFS) property. The Imnaha River Satellite Facility serves as the adult collection and juvenile acclimation and release facility for the Imnaha River Spring/Summer Chinook hatchery program within the USFWS-Lower Snake River Compensation Plan Program. The existing facility was constructed in 1988 and is operated by Oregon Department of Fish and Wildlife (ODFW) with assistance from the Nez Perce Tribe (NPT) through co-operative agreements with the LSRCPO Office. Spawning, incubation and early rearing for this program occurs at Lookingglass Fish Hatchery, operated by ODFW. Lead management entities identified in the current 2008 – 2017 U.S. v. Oregon Management Agreement include the Nez Perce Tribe, Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and ODFW, and the target release goal identified is 490,000 smolts annually.

Historically, a picket weir was installed for brood stock collection at the site with a target installation period in early to mid-May. The picket barriers required manual installation accomplished by workers wading into water that may be high and fast flowing, which has led to precarious situations. Installation of the picket weir occurred anytime from late-May to late-July when river flows subsided following the spring runoff. This often resulted in a significant portion of the spring Chinook salmon run passing the weir site before installation occurred and compromised co-manager management objectives and introduced concerns identified by NOAA-Fisheries for this ESA-listed population and corresponding hatchery program.

A new bridge-style weir and structure have been completed as of Fall 2015 (Figure 1). Picket panels can be installed manually onto the bridge structure from the bridge. The new weir can be operated under a wider range of river flows, and the need for workers to enter the river during potentially unsafe flows should be eliminated. This modification assists in meeting management objectives identified by co-managers and addresses NOAA-Fisheries permitting and incidental take concerns regarding the Imnaha River Spring/Summer Chinook program.

This potential earlier operational period also can amplify existing impacts for two other ESA-listed populations in the Imnaha River, Bull Trout and Steelhead Trout. In recent years, Bull Trout mortalities during operation of the weir are known to be at least 31 in 2014 and 13 in 2015. A singular factor, or even multiple factors, for the cause of mortalities are not readily apparent. However, initial operation of the electronarcosis protocol appeared to be correlated with much of the mortality, and PIT-tagging did not appear to be related to the mortality. Operational changes from 2014 to 2015, as well as in-season operational adjustments, were implemented in an attempt to address the mortalities. Loss of Bull Trout was a concern voiced by co-managers in the Imnaha Basin during summer 2015 and is shared by the U.S. Fish and Wildlife Service heading into 2016 and subsequent operation years. In 2015, downstream management of Steelhead kelts was identified as a pending issue that also needed to be addressed (Jim Harbeck NPT, personal communication). Incidental take of Steelhead is accounted for in draft permitting for the weir and overlaps with Bull Trout upstream migration in May and early June. Impacts to both species and the issues with operation of the new bridge-style weir have been discussed amongst the co-managers and the LSRCPO during Annual Operations Plan meetings and also with the USFWS and NOAA-Fisheries in discussions regarding Section 7 and 10 permitting, respectively. This



Figure 1. Pictures of the new bridge-style weir installed at the Imnaha River Acclimation Facility and Brood collection ponds during October 2015. Weir panels are in the “down” position and pivot from the lower portion of the bridge to operate. Photos by USFWS – Lower Snake River Compensation Plan Office.

proposal attempts to address the specific Bull Trout impacts and incidental take concern. Unresolved or future issues related to operation of the new Imnaha River weir will be addressed through regular coordination and agency interaction during regularly occurring Imnaha Weir Operational and Permitting meetings.

Methods

Objective 1. Assess passage rate of Bull Trout during 2017-2020 operation of the Imnaha River weir during the Spring/Summer Chinook salmon return.

To address Objective 1, we will use PIT-tagged Bull Trout that move through the Imnaha River subbasin, specifically between the lower and upper PIT antennas near the weir (Figure 2). Per the USFWS Biological Opinion, Bull Trout that are PIT-tagged as part of ongoing investigations by co-managers and cooperating agencies will be used to address this objective. At a minimum, Bull Trout within the Imnaha River population will be PIT tagged by the Idaho Power Company (IPC) and the Nez Perce Tribe (NPT). The IPC will PIT tag Bull Trout captured in the Snake River and Oregon Department Fish & Wildlife (ODFW) will PIT tag those captured moving upstream at the weir during Chinook Salmon operations. The NPT will PIT tag Bull Trout that are captured in screw traps being operated downstream of the town of Imnaha. Overall, each effort will attempt to put tagged Bull Trout that may be observed for multiple years in the Imnaha River subbasin. These fish will be used to assess Bull Trout passage success at the weir. The development of the target passage criteria (92.9% average over four years) is outlined in Appendix A.

The LSRCP will be responsible for installing arrays to detect PIT-tagged fish above and below the weir and has contracted with Biomark after discussions with the LSRCP cooperators. A schematic developed by the contractor of the PIT tag arrays to be installed at the site is in Appendix B. At a minimum, these antennas will be operated and maintained during the entire time the weir is functioning to capture Chinook Salmon adults moving upstream. Ideally, these antennas will be operated and maintained during the entire year to address other questions regarding bull trout and other species. During the period when panels are installed in the weir and attempts are being made to collect Chinook Salmon, the USFWS and NPT/ODFW will coordinate downloading data for upload into PTAGIS at least weekly. During other times of the year, the NPT, ODFW, USFWS or IPC will coordinate to ensure that data will be downloaded and put into PTAGIS at least once every three months. Eventually, these systems will automatically record and upload the information to data servers that is error checked and automatically updated to PTAGIS for public use.

After the Chinook Salmon spawning season is over, the USFWS will summarize and analyze the data on Bull Trout passage for dissemination to the subject panel experts from coordinating agencies. Relative to Objective 1, the proportion of Bull Trout that pass the weir will be calculated as:

$$a) (D_{56} + A_{56}) / D_{12}$$

Where D_{12} = the number of uniquely PIT-tagged Bull Trout determined through detection histories to have passed upstream of antenna 1 (the downstream-most of two antennas below the weir); D_{56} = the number of PIT-tagged Bull Trout trapped and released downstream from antennas 5 and 6 and determined through detection histories to have passed upstream of antenna 6 and remained there until August 21st ; and A_{56} = the number of PIT-tagged Bull Trout captured in the trap and either transported and released above antennas 5 and 6 and not detected at antennas 5 or 6 for at least 14 days after release. This analysis will be distributed to the NPT, ODFW, CTUIR, Service and IPC and be used to inform operations during subsequent years.

The method outlined calculates the proportion of tags passing the weir assumes a high detection probability of PIT tags at the lower array, at the ladder array, during processing (hand scanning), and at the upper array. While the detection probability is likely to be very high it is possible to miss PIT tags due to tag collisions (two tags passing at the same time), operational downtime (eg. power loss), or due to missing or lost data. Depending on efficiency, it may be necessary to estimate the number of PIT tags passing (with the associated uncertainty) using a simple mark re-capture estimator where the PIT tags observed on the lower array are defined as the “marks”, the PIT tags observed above the lower array are defined as the “captures”, and the PIT tags observed at both observation sites defined as the recaptures. Using this methodology the number of PIT tags can be estimated at each observation point, lower array, ladder array, handed/released, and upper array, and the subsequent loss rate (if any) calculated between observation points. If estimation of PIT tags is needed for analyses of passage to occur, a separate methodology will be developed and added to this proposal in future years.

Objective 2. Assess migration delay of Bull Trout during 2017-2020 operation of the Imnaha River Weir during the Spring/Summer Chinook Salmon return.

To address Objective 2, we will use PIT-tagged Bull Trout that move through the Imnaha River subbasin, specifically between the lower and upper PIT antennas near the weir when it is in operation. Development of the target delay criteria is outlined in Appendix A. After the Chinook Salmon spawning season is over, the USFWS will summarize and analyze the data on Bull Trout delay and distribute to the NPT, ODFW, CTUIR, Service and IPC. Relative to Objective 2, the time (in days) determined through detection histories for an individual Bull Trout to pass the weir sites will be calculated as:

$$\text{b) } date_{56} - date_{12} \text{ (or)}$$

$$\text{c) } date_{trans} - date_{12}$$

Where $date_{12}$ = the Julian day a PIT-tagged Bull Trout was detected at antenna 2 after passing antenna 1; $date_{56}$ = the Julian day a PIT-tagged Bull Trout was detected at antenna 6 after passing antenna 5, when the capture history shows the last detection moving upstream at antenna 6 occurred during that Julian day; $date_{trans}$ = the Julian day a PIT-tagged Bull Trout that had been captured at the weir facility was transported and released into the Imnaha River above antenna 6. If Bull Trout that had been captured at the weir facility, transported and released into the Imnaha River above antenna 6 are not detected at antenna 5 or 6 for 14 days after release, passage time will be calculated using $date_{trans}$. If Bull Trout that had been captured at the weir facility, transported and released into the Imnaha River above antenna 6 are detected at antenna 5 or 6 within 14 days after release, passage time will be calculated using $date_{56}$. Median passage time (in days) for each month will be calculated from individual passage times from equations b and c. This analysis will be distributed to the NPT, ODFW, CTUIR, Service and IPC and be used to inform operations during subsequent years.

Similar to calculating the proportion of PIT tags passing the weir, calculating passage time or travel time for individuals will depend upon the detection probability of each observation site. If detection probabilities are low at one or multiple observation points, there will be fewer tags with observations. However, if the detection probabilities are very high then the travel time can be calculated at the detection sites.

Objective 3. Minimize and standardize impacts to Bull Trout during operation of the Imnaha Weir through adaptive management during planned monitoring activities of passage and delay.

To address Objective 3, the LSRCPO will organize and facilitate continued meetings of Bull Trout subject experts, co-managers and permitting agencies to plan, review or refine results of planned monitoring and evaluation of Bull Trout through 2019 (Table 1). Currently those agencies are the ODFW, NPT, CTUIR, USFWS, and IPC and past meetings have included USFS and NOAA-Fisheries. These meetings and attendees will also attempt to identify improvements and work to develop solutions to current and future operational, permitting, and staffing issues as they arise. Part of this objective will be met with development and annual updating of a Standard Operating Procedure (SOP) document. At least one meeting will occur after annual operations are completed and additional, follow-up or pre-season meetings will be scheduled as needed.

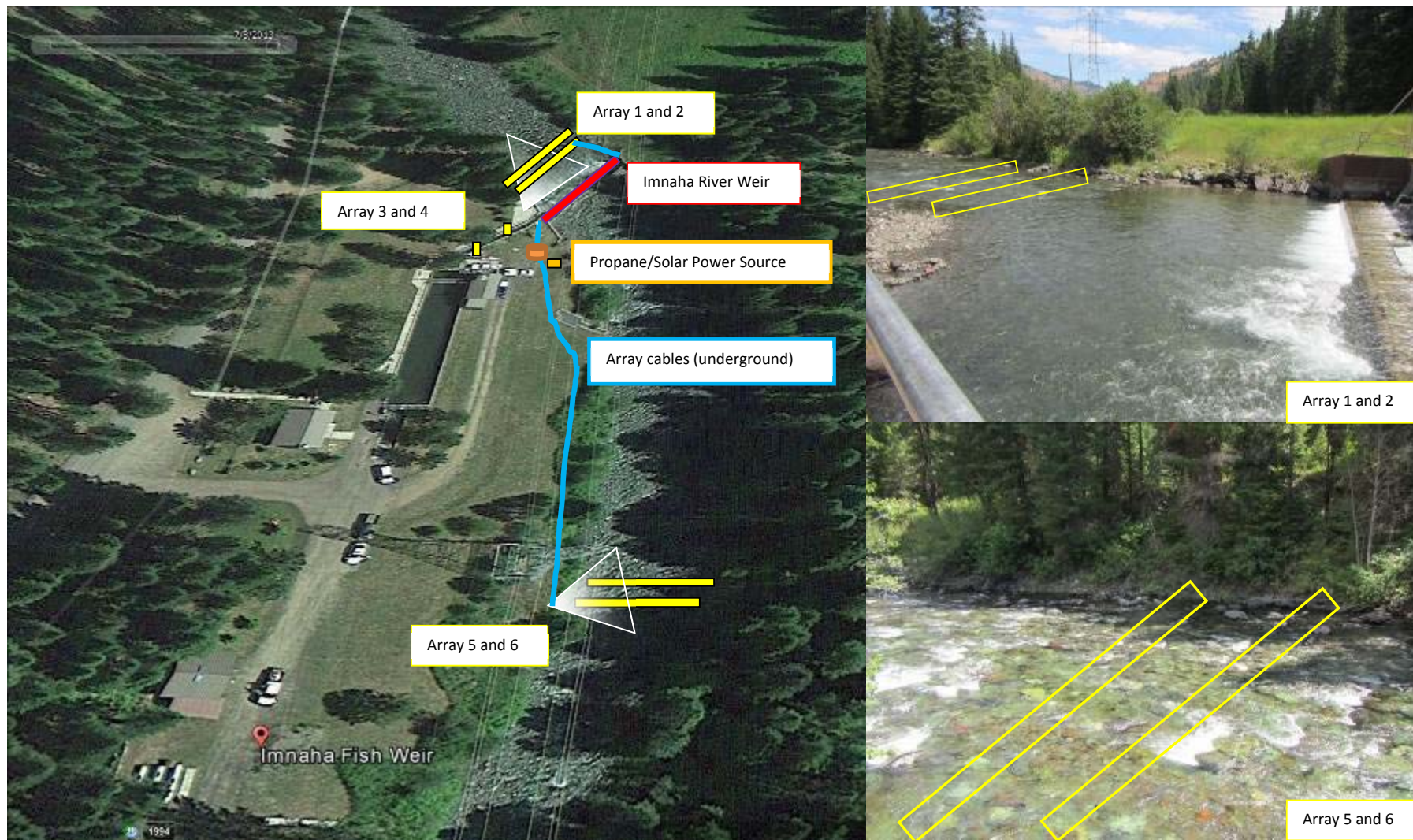


Figure 3 Location map for the proposed installation the 6 passive integrated transponder (PIT) tag detection arrays at the Imnaha River weir site. Arrays 1, 2, 5 and 6 are within the bankfull area of the Imnaha River. Array 3/4 is located within the adult ladder leading to the adult collection trap. Photos on the right show where arrays 1 and 2 (top right) and 5 and 6 (bottom right) will be positioned and correspond to shaded triangles showing a perspective from the bank. The orange block is the location of the metal transceiver box with the propane tank and the thermoelectric generator. The array cables (blue) run from the metal transceiver box to the arrays with cables for Arrays 1 and 2 crossing the river on the weir bridge. All locations are approximations.

Project Tasks, Timelines and Outcomes

Table 1. Identification of Tasks associated with completion of this project. The outcome or result of each task is provided as well as the coordinating partners/groups for its completion.

Tasks	Objective(s) Addressed	Frequency or Time	Purpose or Outcome	Lead Agencies/Forums for Coordination
Develop criteria for weir installation.	Objectives 1-3.	Annually during coordination meetings.	Sets weir operational guidelines for the weir for staff and initiates associated preparation of equipment, work schedules and needed coordination. Should also reduce unnecessary operational timeframes when non-target ESA-listed species are present.	Co-managers, LSRCP and USFWS at Bull Trout coordination meetings. Finalize installation date along with NE Oregon AOP if possible.
Installation of the PIT tag arrays	Objectives 1 and 2.	Late July and/or early August 2016	Detects PIT tagged Bull Trout and other fish for determining the passage and delay to navigate the Imnaha River Weir.	Biomark, LSRCP, NPT, ODFW, IPC, USFWS through Bull Trout coordination meetings.
Development and revision of Standard Operating Procedures (SOP) for fish handling at the site with Bull Trout emphasis.	Objective 3	May 2016 and then updated annually.	Standardizes handling procedures and should reduce the potential causes for mortality, should they occur. Should include electronarcosis/MS-222 protocol, number of EN/holding tanks, etc. Operational protocols for the facility and other species encountered during operations are also be part of the document.	Leads ODFW and NPT.
Reporting of Bull Trout Impacts for Biological Opinion (to La Grande USFWS)	Objectives 1-3.	Annually March 1 st for formal report, verbal summaries during coordination meetings.	Address reporting requirements in Section 7 BiOp. Final report and verbal updates summarize direct handling and observed mortalities at the Imnaha facility and any modifications or improvements that have been implemented to avoid or minimize impacts to Bull Trout.	ODFW and NPT with involvement of LSRCP. Verbal report during Bull Trout coordination meetings or Snake Basin coordination calls.
Reporting of Monitoring and Evaluation Results for Biological Opinion (to La Grande USFWS)	Objectives 1-2	Annually-March 1 st for formal report.	Summarizes the detection of PIT-tagged Bull Trout and calculates the percentage of adults that pass the weir site against the goal of 92.9%. Identifies the rate of migration of PIT-tagged Bull Trout through the Imnaha River and median delay, by month, at Imnaha River weir. Summarizes information and presents recommendations	USFWS in-season and initial summary analyses related to passage and delay. Co-managers, LSRCP, IPC, review and contribute analyses and develop joint report via Bull Trout coordination meetings.

Tasks	Objective(s) Addressed	Frequency or Time	Purpose or Outcome	Lead Agencies/Forums for Coordination
Operations and maintenance of the PIT tag arrays	Objectives 1 and 2	May through September	<p>for improved operations.</p> <p>Maintain data collection during operational period of the weir for Spring/Summer Chinook brood collections and LSRCPD funded portion of the program.</p> <p>ODFW will coordinate data uploading/sharing from ladder detectors and fish handling for 2016 operations until issues associated with automatic uploading and internet can be addressed. This coordination of data collected and uploading will likely change in 2017 with changes in internet/DSL availability.</p>	Biomark (contractor) with operational checks by ODFW, USFWS, NPT.
		October through April	<p>Maintains data collection of PIT tagged salmon, steelhead and Bull Trout outside of weir operational period.</p> <p>Specific data sharing, uploading abilities, summary of information need to be discussed and confirmed again after installation of the PIT tag arrays (early August 2016). This is a task for further development.</p>	Biomark (contractor) NPT, ODFW, USFWS and/or IPC.
In-Season Coordination related to operation or passage concerns	Objectives 1-3	As needed or requested	<p>In –season analysis of Bull Trout passage/delay will be occurring through coordination and analysis of PIT tag detections. For 2016, data will only be related to in-ladder detections until the arrays are installed (early August).</p> <p>If an issue arises with either weir operations and/or with Bull Trout, Chinook, or Steelhead impacts, a notice will be provided on the weekly Snake Basin Coordination call and a subsequent follow-up meeting will occur specific to the issue. Discussions regarding in-season changes in weir operations/handling/etc. may occur if merited.</p>	USFWS, IPC, co-managers, others.

Tasks	Objective(s) Addressed	Frequency or Time	Purpose or Outcome	Lead Agencies/Forums for Coordination
Conduct annual Imnaha Weir Operational and Permitting Meetings	Objective 3	Annually between late Fall and February 2016-2020, additional coordination as needed.	Discuss, plan, review or refine annual Imnaha Weir operations, monitoring and evaluation based on results presented. Identify improvements and work to develop solutions to current and future operational, permitting, and staffing issues as they arise.	Lead LSRCPO – ODFW, NPT, CTUIR, USFWS, NOAA-Fisheries, and IPC attend and participate.

Project Duration and Cost

This project will occur annually through 2020 per the terms and conditions identified in the USFWS 2015 Biological Opinion with the activities identified in Table 1 occurring throughout that period. Cost of the project is covered in existing Statements of Work (SOW) and cooperative agreements between ODFW, NPT, USFWS-Columbia River Fisheries Program Office and the LSRCP. Additional funding requests will be identified within the Imnaha River Operational and Permitting meetings as well as Annual Operation Plan meetings and submitted SOWs to the LSRCP. Funding decisions will be directly communicated to the requesting cooperator and through coordination meetings. The LSRCP and Idaho Power Company have had, and will continue, discussing shared costs associated with the operation of the PIT array at the Imnaha River Acclimation site. The operation of the PIT tag arrays and existing PIT tagging program for Bull Trout coordinated by IPC provide mutual benefits for both mitigation programs. As other operational expenses are identified, either within or outside mitigation obligations by LSRCP and IPC, they will be discussed during coordination meetings. Consideration for maintaining operation of the arrays beyond the requirements identified in the Biological Opinion (USFWS 2015) will be discussed at annual meetings. The desire for continued data collection and management of the arrays will need to be addressed prior to the 2020 operation period.

Literature Cited

U.S. Fish and Wildlife Service. 2015. Endangered Species Act section 7 consultation biological opinion - Imnaha River satellite facility weir modification, USFWS, Consultation (01EOW-2013-F-0174).

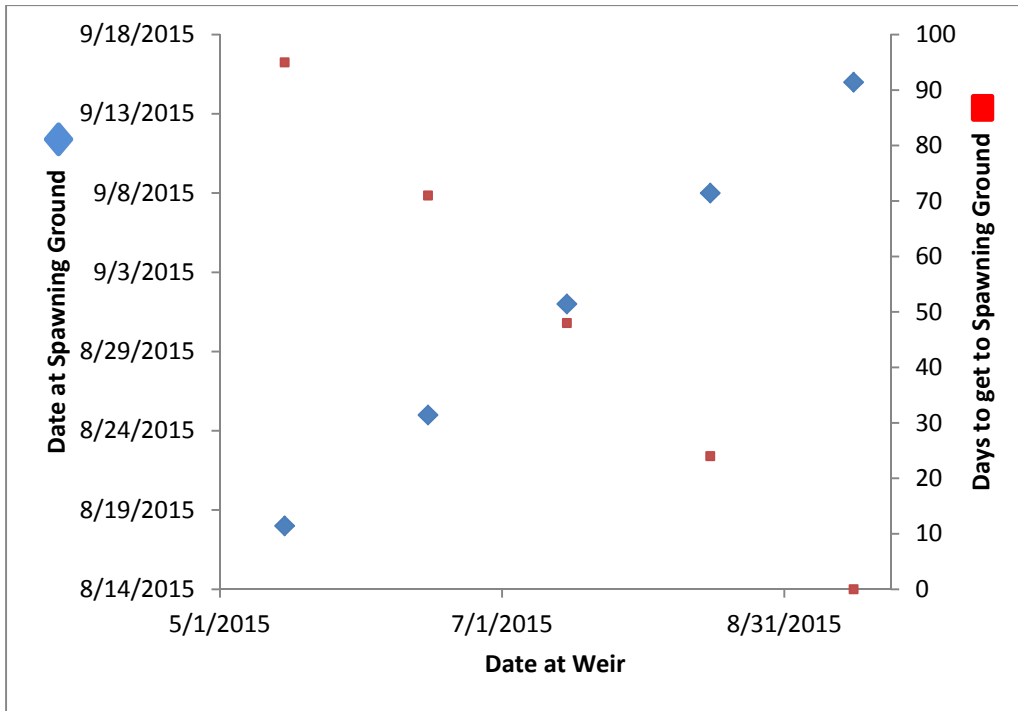
Appendix A. Derivation of acceptable passage rates and migration delays of Bull Trout at the Imnaha River weir.

To derive acceptable passage rates and migration delays of Bull Trout at the Imnaha River weir, we used data from PIT- and radio-tagged Bull Trout that were tagged on the Snake River or at traps in the Imnaha River and were subsequently observed migrating upstream in the Imnaha River below the weir site. Our aim, firstly, was to answer two questions: 1) What proportion of the Bull Trout that migrated to within (at least) 10 km of the weir site (i.e., past the IR3 PIT tag antenna array) subsequently passed the weir site? and 2) What was the travel rate of the upstream migrants?

To address the first question, we were limited to using telemetry data, since only radio-tagged Bull Trout could be observed above the weir site. Of the radio-tagged Bull Trout that migrated past IR3 ($n=14$), 92.9% (95% CI: 68.3 – 99.6%) passed the weir site. In general, these fish likely passed when the weir was operational. Based on this data, the working group determined that, over the four years of evaluation at the Imnaha River weir, the passage rate for Bull Trout from arrays 1 and 2 upstream past arrays 5 and 6 should average 92.9% and be no lower than 76.5% in any given year to be considered acceptable. The 76.5% criterion was based on the lower bound for the 75% CI for the point estimate of 92.9%.

To address the second question, we used the combined telemetry and PIT tag detection data for 484 Bull Trout that were detected in the Imnaha River at IR3, at two PIT tag detection arrays downstream from it (IR1 and IR2), and at the weir. For this combined group, the median travel time was 1.34 km/d. Given this figure and the distance between arrays 1 and 2 and arrays 5 and 6 (approximately 425 m), Bull Trout presumably would migrate through the project area in less than one day (median) in the absence of a trapping operation. To allow for some delay due to the trapping operation and account for differences in the amount of time earlier- and later-arriving Bull Trout have to reach the spawning grounds after being released upstream from the weir, we developed a sliding scale for acceptable delay that exceeded one day.

The sliding scale was based on the median migration rate (1.34 km/d), distance between the weir and the approximate mid-point of the Bull Trout spawning grounds (30 km), time available for reaching the spawning grounds, timing of the beginning of Bull Trout spawning (15 August – 15 September), and a liberal baseline of 2 d to swim from arrays 1 and 2 to arrays 5 and 6. For Bull Trout arriving at the weir in August or September, any delay could potentially have negative effects (Appendix A, Figure 1); thus, we set the acceptable level of delay at a median of 2 d for those months. For July, June, and May, when trapped Bull Trout have two, three, and four times as long to reach the spawning grounds the acceptable level of delay was set at a median of 4, 6, and 8 d, respectively. In addition, the working group agreed that no individual Bull Trout should be delayed for more than 8 d in any month.



Appendix A - Figure 1. Relationships between the date of arrival of Bull Trout at the Imnaha River weir, desired date of arrival at the spawning grounds, and calculated days to get to the spawning grounds.

Appendix B. Schematic from Biomark (contractor) identifying PIT tag arrays to be placed around the Imnaha River weir site (Heiden Bliss - Biomark, personal communication). Arrays 1 and 2 are to the left of the diagram and Arrays 5 and 6 are to the right.

