

## **Research proposal**

Submitted to the U.S. Army Corps of Engineers for support under the  
Anadromous Fish Evaluation Program

**Evaluate bull trout migration between the Tucannon River and  
mainstem Snake River using streamwidth Passive Integrated  
Transponder tag interrogation systems.**

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2005-2008

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## Project Summary

Project goals are to (1) determine the temporal and spatial distribution of bull trout migration between the Tucannon River and mainstem Snake River and (2) determine the effect of the hydropower system on migration behaviors. To achieve these goals the following objectives must be met:

1. Determine if bull trout migrate between the Tucannon River and the mainstem Snake River.  
H<sub>0</sub>: Freely migrating bull trout from the Tucannon River are found in the mainstem Snake River  
H<sub>A</sub>: Freely migrating bull trout from the Tucannon River are not found in the mainstem Snake River.
2. Determine the migration timing of bull trout traveling between the Tucannon River and the mainstem Snake River.  
H<sub>0</sub>: Bull trout are utilizing the mainstem Snake River as overwintering habitat.  
H<sub>A</sub>: Bull trout are not utilizing the mainstem Snake River as overwintering habitat.
3. Determine relative proportion of the Tucannon River bull trout population that travels into the mainstem Snake River.
4. Determine the usage of lower Snake River dam fishways by bull trout originating from the Tucannon River.
5. Assemble a comprehensive report on bull trout movements within the Tucannon River and the lower Snake River.

We propose to monitor and collect data at a streamwidth PIT tag antenna near the hydropower system reservoir influence zone upstream of the confluence of the Tucannon and Snake Rivers. It is assumed that fish passing through the reservoir influence zone will continue into the mainstem Snake River. Bull trout captured at the Tucannon River Hatchery weir, by hook-and-line sampling and by electrofishing conducted within the Tucannon River will be PIT-tagged and released on-site. Data collected at the PIT tag interrogation site and Snake River dams will be downloaded, analyzed and reported to the U.S. Army Corps of Engineers and cooperating agencies. Interrogation data from PIT tagged bull trout that may pass any of the lower Snake River dams will also be integrated and analyzed with the information gathered for this study.

This study will address Reasonable and Prudent Measure 10.A.3.1 of the Federal Columbia River Power System Biological Opinion (FCRPS BiOp): "The action agencies shall determine the presence of, and use by, bull trout in the mainstem Snake river, and shall implement monitoring and studies to provide critical information on bull trout distribution, timing, and usage of the Lower Snake River dams and reservoir system." Also addressed will be Term and

Condition 11.A.3.d: "The Corps shall immediately investigate the presence in, and use of, the mainstem by bull trout migrating from the Tucannon River" (USFWS 2000).

## **Project Description**

### **Background**

The Tucannon River supports migratory bull trout that are believed to utilize the mainstem Snake River for adult rearing. An ongoing radio telemetry project has verified that the movement of bull trout from the Tucannon River into the hydropower reservoir influence zone of the mainstem Snake does occur, but has not produced adequate results to address issues set forth in the FCRPS BiOp (Faler 2004).

Little is known about the effects of hydropower systems on the migratory behavior of bull trout. Incidental observations of bull trout at lower Snake River dams have been documented (Fish Passage Center 2005; USFWS Bull Trout Recovery Plan; Battelle 2004); however, these observations are insufficient to determine the efficacy of bull trout passage through the fishways.

Zydlewski et al (2002) demonstrated the effectiveness of remote streamwidth PIT tag interrogation systems for generating movement, migration, survival and smolt production estimates for salmonids. PIT tags provide for less labor intensive and intrusive methods for evaluating fish life histories, yet results are equivocal to traditional methods of research. This study will be the first to incorporate a passive method of monitoring bull trout movement within the Tucannon River, but is similar to bull trout PIT tag monitoring in the Walla Walla Basin.

This project will validate and expand upon radio telemetry results and anecdotal evidence by using Passive Integrated Transponder (PIT) tags to document the spatial and temporal distribution of bull trout migrating between the Tucannon River and the mainstem Snake River.

### **Objectives/Tasks/Methodology**

The objectives of this study and the subsequent tasks associated with individual objectives are as follows:

- (1) Determine if bull trout migrate between the Tucannon River and the mainstem Snake River.

Task 1.1 Monitor the movement of PIT-tagged bull trout at an established stream-width PIT tag interrogation facility near the confluence of the Tucannon and Snake Rivers.

Task 1.2 Capture and PIT tag bull trout within the Tucannon River using electrofishing, hook-and-line sampling, and incidental catch at the Tucannon Hatchery weir, downstream steelhead weir and screwtrap.

We will focus much of our sampling efforts on the rearing grounds located in the Tucannon River headwaters. This work will be done in conjunction with existing genetic sampling in 2005. Out-year genetic sampling will require additional funding. Juvenile and sub-adult bull trout collected by electrofishing and hook-and-line will be PIT-tagged with a 12-mm PIT tag on the dorsal surface near the dorsal fin or in the abdominal region depending upon size. Data recorded will include fork length, weight, general health observations, date of capture, location of capture and any recapture information. A tissue sample from the caudal fin will be preserved for DNA analysis at a later date. Bull trout will be placed in a recovery tank and upon recovery will be released on-site.

Weir operation is year-round with intermittent closure depending upon weather conditions. Bull trout collected in the weir will be removed from the trap, anesthetized, if needed, PIT-tagged and measured. Upon recovery, the bull trout will be released onsite.

The operation of a seasonal steelhead weir and screw trap by the WDFW Snake River Laboratory results in bull trout as by-catch. Bull trout caught by either method will also be sampled following the above-listed protocols.

Hook-and-line sampling will be conducted throughout the field season. Captured bull trout will be placed into a live tube until processed. Bull trout will be processed following the same protocol as those sampled at the weir and released on-site.

- (2) Determine the migration timing of bull trout traveling between the Tucannon River and the mainstem Snake for overwintering.

The tasks related to objective 2 will be completed by analyzing the numbers, dates and intervals of PIT tag interrogations.

Task 2.1 Calculate the length of time between the first outmigration interrogation and the last outmigration interrogation to determine the length of the outmigration.

Task 2.2 Determine if bull trout utilize the Snake River as overwintering habitat by calculating the amount of time spent in the mainstem Snake River by individual bull trout using the difference between the outmigration interrogation date and the return migration date. Coordinate with fish bypass operators to ensure interrogation of sampled bull trout in collection facilities.

Task 2.3 Calculate the length of time between the first return interrogation and the last return interrogation to determine the length of the return migration.

- (3) Determine relative proportion of the Tucannon River bull trout population that travels into the mainstem Snake River.

The tasks related to objective 3 will require further consideration to determine the desired protocol. A potential protocol is to establish a size requirement for PIT tagging to reduce tag loss resulting from mortality and use only interrogations from this size class for data analysis.

Task 3.1 Compare the number of unique PIT tags detected at the interrogation site to the total number of PIT tags administered.

- (4) Collect incidental data on the usage of lower Snake River dam fishways by bull trout originating from the Tucannon River.

Task 4.1 Collect PIT tag interrogation data from lower Snake River dam facilities and analyze for the presence of bull trout PIT-tagged at the Tucannon River.

Task 4.2 Coordinate with the USACOE and the Fish Passage Center to modify bull trout sampling protocols at Little Goose dam to ensure adequate PIT tagging of bull trout and collection of PIT tag data, DNA and scale samples.

- (5) Assemble a comprehensive report on bull trout movements within the Tucannon River and the lower Snake River.

Task 5.1 Complete quarterly and annual progress reports to be submitted to the U.S. Army Corp of Engineers and cooperating agencies.

In order to account for behavior variations due to environmental conditions, we anticipate the need for a minimum of three field seasons worth of data for the replication needed for statistical analysis. Analysis will include spatial distribution, temporal distribution, ratio of population outmigrating, ratio of population using fishways (contingent upon placement of antenna arrays in fishways at dams) and periods of migration.

## **Facilities and Equipment**

The principal investigators and personnel will be stationed at the Idaho Fishery Resource Office in Ahsahka, Idaho. The Tucannon River Hatchery will serve as a satellite facility for equipment storage due to its proximity to the weir on the Tucannon River.

Required equipment will include: a remote streamwidth PIT tag interrogation system established within the reservoir influence zone of the Tucannon River, 1000 12-mm PIT tags annually, surgical equipment, backpack electrofisher, sampling equipment and live tubes. Backpack electrofisher and live tubes are currently available.

## **Impacts**

This study will complement a current cooperative study between the US Fish and Wildlife Service and the Washington Department of Fish and Wildlife to track bull trout movements using radio telemetry and PIT tag methods (Faler et al 2002). Data from the three research efforts will be analyzed collectively, but reported separately to establish a more complete data set of bull trout movement in the Tucannon River basin and the mainstem Snake River.

Negative impacts to the Tucannon River bull trout population resulting from the capture, handling and tagging are considered negligible. Bull trout are regularly found in the adult trap at the Tucannon Hatchery weir and upon removal are in good health. Fishing with barbless hooks minimizes physical damage caused by hook-and-line sampling.

Other species potentially affected by the research include steelhead and spring Chinook that migrate up the Tucannon River. Effects would be minimal, resulting from by-catch. Data collected regarding research on these non-target species (i.e. PIT tag interrogations) would be disseminated to the administering officials, co-managers and other interested parties.

This research requires no modification to daily operations conducted by the FCRPS.

### **Key personnel**

Michael Faler-US Fish and Wildlife Service  
Carrie Bretz-Lead Biologist; US Fish and Wildlife Service

### **Literature Cited**

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- Faler, Michael. 2004. Evaluate bull trout movements in the Tucannon River and lower Snake River. 2nd quarter report to Bonneville Power Administration. Project No. 2002-006-00
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- Fish Passage Center. 2005. Bull trout at Smolt Monitoring Projects. World Wide Web Publication [http://www.fpc.org/bulltrout/query\\_smp\\_bulltrout\\_submit.htm](http://www.fpc.org/bulltrout/query_smp_bulltrout_submit.htm)
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USFWS. 2000. Biological Opinion on the effects to listed species from operations of the Federal Columbia River Power System. US Fish and Wildlife Service, Region 1 and 6, Portland, OR.

USFWS. 2002. Draft Bull Trout Recovery Plan. Region 1 US Fish and Wildlife Service. Portland, OR.

## Schedule

| <b>FY05</b> | 1.1<br>Monitor<br>antenna,<br>Data<br>download | 1.2<br>Active<br>sampling | 2.1 , 2.2,<br>2.3, 3.1<br>Data<br>analysis | 4.1<br>Collect<br>incidental<br>data from<br>LGS | 4.2<br>Sampling at<br>LGS agency<br>coordination | 5.1<br>Report<br>completion |
|-------------|--|---------------------------|--|--|--|-----------------------------|
| Jan         |  |                           |  |  |  |                             |
| Feb         |  |                           |  |  |  |                             |
| Mar         |  |                           |  |  |  |                             |
| Apr         |  |                           |  |  |  |                             |
| May         |  | X                         |  |  |  |                             |
| Jun         |  | X                         |  | X  | X  |                             |
| Jul         |  |                           |  | X  | X  |                             |
| Aug         | X  |                           |  |  | X  |                             |
| Sep         | X  | X                         | X  | X  | X  |                             |
| Oct         |  |                           |  |  |  |                             |
| Nov         |  |                           |  |  |  |                             |
| Dec         |  |                           |  |  |  |                             |

| <b>FY06</b> | 1.1<br>Monitor<br>antenna,<br>Data<br>download | 1.2<br>Active<br>sampling | 2.1 , 2.2,<br>2.3, 3.1<br>Data<br>analysis | 4.1<br>Collect<br>incidental<br>data from<br>LGS | 4.2<br>Sampling at<br>LGS agency<br>coordination | 5.1<br>Report<br>completion |
|-------------|--|---------------------------|--|--|--|-----------------------------|
| Oct         | X  | X                         | X  | X  | X  | X                           |
| Nov         | X  | X                         | X  | X  | X  | X                           |
| Dec         | X  | X                         |  | X  | X  |                             |
| Jan         | X  | X                         |  | X  | X  |                             |
| Feb         | X  | X                         |  | X  | X  |                             |
| Mar         | X  | X                         |  | X  | X  |                             |
| Apr         | X  | X                         |  | X  | X  |                             |
| May         | X  | X                         |  | X  | X  |                             |
| Jun         | X  | X                         |  | X  | X  |                             |
| July        | X  |                           | X  | X  | X  |                             |
| Aug         | X  |                           | X  |  | X  |                             |
| Sep         | X  | x                         | X  | X  | X  |                             |

| <b>FY07</b> | 1.1 Monitor antenna, Data download | 1.2 Active sampling | 2.1 , 2.2, 2.3, 3.1 Data analysis | 4.1 Collect incidental data from LGS | 4.2 Sampling at LGS agency coordination | 5.1 Report completion |
|-------------|------------------------------------|---------------------|-----------------------------------|--------------------------------------|---|-----------------------|
| Oct         | X                                  | X                   | X                                 | X                                    | X                                       | X                     |
| Nov         | X                                  | X                   | X                                 | X                                    | X                                       | X                     |
| Dec         | X                                  | X                   |                                   | X                                    | X                                       |                       |
| Jan         | X                                  | X                   |                                   | X                                    | X                                       |                       |
| Feb         | X                                  | X                   |                                   | X                                    | X                                       |                       |
| Mar         | X                                  | X                   |                                   | X                                    | X                                       |                       |
| Apr         | X                                  | X                   |                                   | X                                    | X                                       |                       |
| May         | X                                  | X                   |                                   | X                                    | X                                       |                       |
| Jun         | X                                  | X                   |                                   | X                                    | X                                       |                       |
| July        | X                                  |                     | X                                 | X                                    | X                                       |                       |
| Aug         | X                                  |                     | X                                 |                                      | X                                       |                       |
| Sep         | X                                  | x                   | X                                 | X                                    | X                                       |                       |

| <b>FY08</b> | 1.1 Monitor antenna, Data download | 1.2 Active sampling | 2.1 , 2.2, 2.3, 3.1 Data analysis | 4.1 Collect incidental data from LGS | 4.2 Sampling at LGS agency coordination | 5.1 Report completion |
|-------------|------------------------------------|---------------------|-----------------------------------|--------------------------------------|---|-----------------------|
| Oct         | X                                  | X                   | X                                 | X                                    | X                                       | X                     |
| Nov         | X                                  | X                   | X                                 | X                                    | X                                       | X                     |
| Dec         | X                                  | X                   |                                   | X                                    | X                                       |                       |
| Jan         | X                                  | X                   |                                   | X                                    | X                                       |                       |
| Feb         | X                                  | X                   |                                   | X                                    | X                                       |                       |
| Mar         | X                                  | X                   |                                   | X                                    | X                                       |                       |
| Apr         | X                                  | X                   |                                   | X                                    | X                                       |                       |
| May         | X                                  | X                   |                                   | X                                    | X                                       |                       |
| Jun         | X                                  | X                   |                                   | X                                    | X                                       |                       |
| July        | X                                  |                     | X                                 | X                                    | X                                       |                       |
| Aug         | X                                  |                     | X                                 |                                      | X                                       |                       |
| Sep         | X                                  | x                   | X                                 | X                                    | X                                       |                       |

The Final report will be completed and submitted in December FY '09.