

Rocky Reach and Rock Island Hydroelectric Projects
DRAFT STUDY PLAN OUTLINE
2018 Bull Trout Project Interactions and Genetics Analysis Study Plan
License Management Plans Year 10 Monitoring Study

Steve Hemstrom and Scott Hopkins
Chelan PUD
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1.0 INTRODUCTION AND REGULATORY CONTEXT

In 2018, Chelan PUD (District) will conduct a PIT-tag monitoring study for bull trout to analyze interactions with Rocky Reach and Rock Island Dams including upstream and downstream passage. The District's Rocky Reach FERC License Bull Trout Management Plan (2009) and Rock Island Project's Bull Trout Management Plan (2005) require the District to implement Terms and Conditions of U.S. Fish and Wildlife Service (Service) Biological Opinions (Service 2004, 2008) and conduct a monitoring study every 10 years using methods chosen by the District and Rocky Reach Fish Forum (RRFF).

2.0 BACKGROUND

The District began studying bull trout passage at the Rocky Reach and Rock Island Projects in 2001. Multiple-year radio telemetry studies were conducted by the District from 2001 to 2003 and 2005 to 2007. Significant numbers of fish (165) were tagged and extensive passage data were compiled for the Projects. During these studies, hundreds of upstream and downstream passage interactions occurred, but no fish injury of any kind was observed or verified during passage through the fishways, turbines, spillways, or bypass system at Rocky Reach or Rock Island.

However, some negative trapping and tagging-related effects on bull trout were observed. A numbers of fish died unexpectedly within tributaries within one year of tagging, and a number of fish appeared to have lost their tags in tributaries shortly after tagging. Tags were recovered in log jams. Douglas PUD (2017) observed similar results during its recent radio-tag study on bull trout in 2016 (Andrew Gingrich, Douglas PUD, Personal Communication). Effects on otherwise perfectly healthy bull trout from trapping and handling in the Rocky Reach fishway and marking them with large tags (having long external antennas) may affect fish behavior and survival during studies. Spawning success and survival of radio-tagged fish during tributary residence may also have been affected.

Radio tags for larger fish provide between 12 to 18 months of information before battery function in the tag ceases; at this point the large tag and external antenna remain in the fish un-operational with continued health effects, but provide no information. PIT tags however, are completely internal and remain operational in the fish during its entire life span. Because trapping and tagging effects are highly undesirable for a listed species, Chelan PUD and the Service have agreed to utilize full-duplex PIT tags and existing tag data for this study to monitor bull trout passage, migration, and interaction rates with Project facilities for the 2018 study.

3.0 STUDY AREA

The geographic scope for this bull trout study will include Rock Island Dam and reservoir, Rocky Reach Dam and reservoir, and all mid-Columbia dams and tributaries inclusive of the Yakama River upstream to the Okanogan River.

4.0 STUDY OBJECTIVES

The objectives of this study are to: **1)** Comply with the Bull Trout Management Plans contained in the Rocky Reach and Rock Island FERC Licenses and the Terms and Conditions in the Service's Biological Opinions; **2)** develop a database of bull trout movements and interactions with Project facilities over a long time duration exceeding that available with radio-tags; **3)** determine and describe the interaction types, frequency, and locations of bull trout passage interactions with the District's Projects to the extent possible; **4)** PIT tag a target number of bull trout at Dryden and Tumwater dams in 2018 and collect tissue samples for genetic analyses; ensure any remaining tissue samples from previous studies are analyzed, and reports are prepared by the analyzing agency; **5)** ensure funding is provided by the District for costs associated with previous genetic sample analysis and study reports; **6)** prepare and provide a draft report of initial PIT-tag data findings to the Service and RRF by July of 2019, and a final report of results by July of 2021.

5.0 METHODS

In 2018, the District will use full-duplex (FDX) PIT tags and existing PIT data from previously tagged fish to monitor and analyze success rates of upstream and downstream dam passage events for fluvial and adfluvial bull trout. New and existing PIT tag data will be used to estimate fishway passage success and passage times, downstream passage rates and timing, tributary choice and residency times, migration extent and geographic range of bull trout within the mid-Columbia River. More than 1,000 individual PIT detection records are available from Mid-Columbia dams and tributaries for bull that have interacted (passage) specifically with Rocky Reach and/or Rock Island since 2008 (more than 100 individual fish).

Bull trout will not be trapped or tagged at Rocky Reach or Rock Island dams in 2018. The District will utilize the existing PIT-tag data available for fish tagged from 2008 to 2017, and new any PIT tag detections from 2018 fish tagged at Tumwater and Dryden dams. Detection data will be used to establish passage and interaction histories for each bull trout that made contact with Rocky Reach or Rock Island from 2008 to 2020. The PITAGIS database will be queried for tagged fish that have been detected moving upstream or downstream of Rocky Reach and Rock Island in this 13-year period.

For one year (2018) at Tumwater and Dryden dams, up to 30 adult bull trout and 40 subadult bull trout will be PIT-tagged (12 mm Biomark PIT tags) if incidentally captured by Washington Department of Fish and Wildlife (WDFW) during salmon and steelhead trapping. This will provide an additional source of tagged fish to track for a period of three years, 2018-2020. The District, through WDFW's fishway trap operation, will collect a new tissue sample from each bull trout that is tagged in 2018 at Dryden in 2018, if desired by the Service and RRF. The District will submit the samples and fund genetic analyses and report preparation for these samples.

Complete tag and interaction histories for each bull trout that interacts with Rocky Reach or Rock Island will be created to determine the number and timing of upstream and downstream passage events at both Projects, and the route of passage (i.e. spill, turbine, bypass) when possible. Tributary entrance and detection histories will also be provided for these fish in all tributaries, at other Mid-Columbia River dams, and any other location they may be detected.

The District will estimate the type and number project interactions made by PIT tagged fish over multiple years, 2008-2020. Project operations (turbines, spill, bypass operations and time periods) will be analyzed to determine downstream passage routes based on timing of PIT detection upstream or downstream. Successful upstream and downstream dam passage events will be determined by the number of events and later detections upstream or downstream after each individual passage event.

Complete tag histories will be compiled using initial mark and release location, and time, and all subsequent detections in time and place after detection at Rocky Reach and Rock Island facilities.

Definition of Passage Success and In-Progress Detection History

- 1) "Upstream Project passage" (fishway) is defined and confirmed by a PIT detection in the Project's fishway, then by a subsequent detection anywhere upstream of that fishway (in a tributary or next dam).
- 2) "Downstream Project passage" (turbine, spill, or bypass if operating) is defined and confirmed by a release event or PIT detection upstream of the Project (in a tributary or dam upstream), then subsequently anywhere downstream of the Project, or again later in the Project's *upstream adult fishway*.
- 3) "In-Progress PIT Detection History" is the PIT detection timeline for any tagged bull trout that may still be alive and at large; so its tag history is still "in-progress". For the study, we believe a three-year tracking period is necessary to account for at-large, alternate-year spawning bull trout (large fluvial or adfluvial fish) that may not interact with any fishways on the Columbia River or access any tributary to spawn annually, and hence may not be detected by any PIT antenna system for long periods. Bull trout with alternate year spawning are common in the Mid-Columbia. At study completion, the number of fish with in-progress timelines will be reported as in-progress or unknown.

Photo Identification of Tagged Bull Trout in Fishways

The District has recorded and cataloged photographs of all bull trout passing through fishways at Rocky Reach and Rock Island Dams since 2003. Still photographs are taken as the fish pass by the count window at each fishway. Photograph date, time, and specific fishway (Rock Island has three separate fishways) are recorded for each fish.

PIT detection times from PITAGIS are recorded by the uppermost set of fishway PIT antennas, located immediately downstream of count windows. Detection times will be used to identify and match passage photographs of each individual PIT tagged bull trout. We will attempt to estimate total length of each tagged fish to within 25 to 50 mm. Photo data will also be used to visually assess the physical condition of bull trout after they have traversed the fishway and are about to exist upstream.

5.0 RESULTS

Study results will be provided in report form, using text, tables and figures to summarize data for each individual fish having a Project interaction. Data will include tag code, first release (mark) and tag detection history at all antenna system locations, Project interaction frequency, interaction type, and success (upstream or downstream), tributary entry and residence, and any other detections outside of the study area.

6.0 Discussion

This section will summarize the overall number of successful interactions at each location (Project and passage route) over the period of detections for each fish that interact with Rocky Reach or Rock Island, and when possible, fates of each fish during the study period.