**STUDY CODE: JPL-XX-21-DET**

**TITLE: *Detroit Interim Downstream Fish Passage Operation: Interim Measure #5***

**FISH PROGRAM FEATURE:** CRFM -Willamette Valley Project Interim Measures Implementation Plan.

Evaluation of Downstream Passage (resulting from Interim measure #5)

**REFERENCE:** Beginning in fall 2020, the Corps will modify Detroit Dam operations during the drawdown when fish passage rates are high, as follows: Once the reservoir elevation is less than 100 feet over the turbine intakes (elevation 1500 feet to 1450 feet), typically around November 1 through February 1, turbines will not be operated at Detroit Dam between 6:00 AM - 10:00 AM and 6:00 PM - 10:00 PM except for station service power. The Corps will manage discharge from Detroit Dam to reduce total dissolved gas (TDG) levels downstream of Big Cliff dam.

**BIOLOGICAL OPINION ACTION:** RPA 4.8, 4.11, 5.1.1.

**MANAGEMENT PURPOSE:** To develop information for optimizing operational downstream passage alternatives at Detroit Dam and reduce TDG levels downstream of Big Cliff dam. Inform downstream fish passage strategies to improve survival of juvenile Chinook and steelhead produced above DET reservoir.Address management questions about the potential effects of modified dam operations on passage timing, route of passage, and survival of downstream-migrating juvenile Chinook and steelhead.

**BACKGROUND:** The Willamette BiOp requires improvements to operations and structures to reduce impacts on Upper Willamette River (UWR) spring Chinook and UWR winter steelhead. As a part of ESA coordination, NMFS and USFWS have required that USACE develop interim operations. An understanding of when fish are available to pass, the relative efficiency of existing routes at passing fish, passage survival, the vertical and horizontal distribution of fish in the near forebay of dams, and the size distribution and abundance of fish that are passing will be important components for developing operations and structures that pass fish safely and efficiently.

The monitoring of Willamette Valley Project (WVP) dam passage with direct capture methodologies has been occurring consistently below select WVP dams since 1996. This effort provided the majority of information on fish passage timing, a rough indication of abundance, species, and fish morphometrics. It also indicated severe passage issues with dead and injured fish commonly occurring in the catch. Studies using more direct measures of survival, such as acoustic telemetry, have been employed at some dams to understand survival and injury rates. However, there still is a need to directly capture fish in WVP dam tailraces. In many cases the trap downstream of the dam will be an important way of capturing unmarked fish or recapturing marked fish following dam passage, and provide an index of juvenile passage timing, species composition, and size class distribution relative to operations and environmental conditions.

The program should monitor juvenile outmigration and TDG during modified operations and other key periods as appropriate (possibly throughout the year) in response to objectives and potential methods. This study has three principal areas of interest; 1) effects of modified operations during fall and winter months for fish passage, and 2) provide sufficient data on fish passage and survival so biological benefits/risk of modified operations can be assessed, 3) effects of TDG levels downstream of Big Cliff dam.

**OBJECTIVES:**

Specific Objectives 2020 - The *Willamette Valley Project Interim Measures Implementation Plan, Revised June 2020* states – “A rotary screwtrap will be installed and operated below Big Cliff Dam to provide information on the migration timing and size of naturally-produced juvenile salmonids exiting downstream of Detroit and Big Cliff dams. Results will be compared to rotary screwtrap results previously collected under normal operating conditions.”

1. Screw trap(s) will be deployed below Big Cliff Dam and results will be compared to rotary screw trap results previously collected under normal operating conditions.
2. If feasible, compare RO and turbine passage screw trap data with traps below Detroit Dam.
3. Estimate the number of fish passing downstream through the dam.
4. Monitor seasonal (monthly, weekly, etc…) passage timing and rates of steelhead and Chinook juveniles during the study period.
5. Monitor and summarize TDG levels downstream of Big Cliff dam and compare to existing data as appropriate.

**SCHEDULE**: 2020, 2021

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**ODFW Comments:**

Will marked surrogates be released as part of evaluation? If so, suggest reviewing earlier Detroit paired release studies to determine adequate release numbers for meaningful results.

Please clarify in Obj. 4 that TDG monitoring and comparative summaries are necessitated by a change in operations at Detroit.

The Background information states “This study has three principal areas of interest; 1) effects of modified operations during fall and winter months for fish passage, and 2) provide sufficient data on fish passage and survival so biological benefits/risk of modified operations can be assessed, 3) effects of TDG levels downstream of Big Cliff dam.” Please explain how the proposed operation of a screw trap in the tail race will specifically inform item 2, which is a critical information need.

For this and all situations where the Corps seeks sufficient data on fish passage and survival to assess biological benefits/risk of modified operations, ODFW advocates the installation and maintenance of PIT tag infrastructure in the tributaries and mainstem to allow for improved monitoring of tagged fish downstream survival and migration. Given the Corps’ on-going and long-term interest in the Willamette basin to assess the biological benefits and risks of modified dam operations, it is advantageous be strategic in the development of infrastructure necessary to support the associated long-term data collection effort. Pending a discussion with regional partners through the WATER process, early infrastructure investments might include PIT tag detection arrays at Willamette Falls and Minto to address near-term data needs.

Over time, strategic investment in PIT tag infrastructure in the Willamette basin will allow the Corps to use tagged fish to:

1. Evaluate success of Interim Measures and the adaptive management of those measures over multiple years;
2. Evaluate passage survival during unplanned flow and operational conditions that otherwise would be difficult to mobilize to monitor; and
3. Evaluate permanent or other long-term fish passage solutions.

As suggested in this concept paper, screw trap data collected in the tail race is useful to evaluate migration timing and size. However, having PIT tag data is also important for providing meaningful biological benefit as part of passage evaluations. Ultimately biological benefit of improved passage will be determined by returning adults. Short of waiting a generation or more to evaluate passage success, PIT tag detections recorded from various points in the tributaries and mainstem can be used to inform Corps decisions for adaptive management of fish passage operations.

In addition to the Corps, regional partners and other researchers could use the PIT tag infrastructure to conduct other studies to further the state of knowledge in the basin. Given the broad applications for PIT tag infrastructure in the basin beyond those benefiting Corps evaluations, there may be opportunities to cost-share the infrastructure investment with regional partners.

**NMFS Comments:**

Will have rotary screw trap operate during fall/winter when reservoir at/near the minimum conservation pool (no lower than 1450 ft). Consider how adding means of detecting any PIT tagged fish that go through turbines, others likely pass through RO (with no detector). Alternatively, when fish handled to measure length, tag and gain information about how many successfully make it to Bennett Dam area (bypass has antenna). If this operation will continue until other passage is provided, the data will be helpful regarding timing.