**334588 Ice Harbor Turbine Replacement – Biological Testing**

CRFM Work Plan

June 2017

**1. Project Information.** Purpose/Objective. This project has two major objectives, to develop and test a process to integrate considerations of fish survival into the turbine design, and to determine how safe a turbine can be for downstream juvenile salmon passage.

**Description**. Ice Harbor Unit 2 was taken out of service due to oil leaks. Analyses at the time, determined that replacement of the turbine could not be economically justified based on power production given powerhouse hydraulic capacity and voluntary fish spill. The Northwestern Division’s Turbine Survival Program (TSP) had been exploring turbine mechanics and hydraulics, and fish injury and survival since 1995. The TSP identified many hypotheses to benefit fish passing through turbines, through scale model and laboratory studies. A full scale turbine was needed to fully test the TSP hypotheses.

The Corps and Bonneville Power Administration (BPA) agreed to partner on replacing Unit 2 as a test turbine, with the goals as stated above. BPA Large Capital Program would fund the traditional design and installation cost. The Corps would fund biologist participation on the design team, observational modeling, and post constructions evaluations, with CRFM funds. The Large Cap Sub agreement stated post construction evaluations would include balloon tag testing for direct injury and direct survival and telemetry survival estimate to include indirect mortality.

Through the process, Units 1 and 3 were added to the project. Unit 2 installation is expected to be complete in spring or summer of 2018, with a fixed blade runner. Units 1 and 3 will have an adjustable blade turbine that allow a greater range of operation. Unit 3 will be complete about 18 months after Unit 2, and Unit 1, 18 months after that.

**2. Major Activities/Tasks**.

 FY18 – Characterize the pressure, sheer, and strike environment; and estimate direct injury rates and direct survival rates of juvenile salmon through the new fixed blade turbine in Unit 2 using balloon tagged salmon and sensor fish.

FY19-FY20 – Characterize the pressure, sheer, and strike environment; and estimate direct injury rates and direct survival rates of juvenile salmon through the adjustable blade turbine in Unit 3 using the same methods as unit 2.

**3. Cost Estimate**.

FY17 Final Obligations - $1,771,057

FY18 Budget - $350,000

**4. Information and Issues**.

Funds for the telemetry based survival estimate, to include indirect mortality, are not being programed for CRFM. However, BPA and Corps fish program policy mangers expressed support for such a test once all three new turbines are installed.