**TURBINE SURVIVAL PROGRAM MULTI YEAR ACTION PLAN**

**Project Information**

The Turbine Survival Program (TSP) is focused on improving juvenile salmon survival passing through Kaplan turbines operated by the Corps of Engineers throughout the Columbia and Snake Rivers in support of 2008 Biological Opinion (BiOp). We are currently in phase II of the TSP program which is focused on improving and understanding the operational relationships between turbine, powerhouse and site operations and effects on juvenile fish (Phase I was completed in February, 2004). The TSP is focused on establishing an evaluation process for both existing and replacement turbine designs to improve the turbine environment for fish passage.

**1. Purpose for TSP:**

The purpose of the program is to evaluate and develop operational and design guidelines to improve fish passage through turbines. The approach is two-fold; a) identify potential powerhouse operational changes to existing plants that can potentially improve fish passage, and;

b) participate in the design process of fish friendly turbines.

Phase II Main Report; Turbine Optimization for Passage of Juveniles Salmon at Hydropower Projects on the Columbia and Lower Snake Rivers was completed. The report was drafted as a “working document’ in that it includes results from studies conducted to date and provides place holders for future project-specific research and analysis and recommends further study and analysis to better define Target Operating Ranges for various powerhouses. Potential modification and improvement to powerhouse operations entail:

o Identify best operating point which is based on:

 Open Geometry

 Observational Model – shear, strike and water passage

 Nadir pressures – sensor fish and CFD

 Biological Test

o Identify powerhouse priorities (incorporate egress).

o Identify project constraints: such as spinning reserves.

TSP continues to support the Ice Harbor Fish Friendly Turbine Design program and recognizes the need for continued, ongoing support for future designs, given age of our infrastructure and the need for next generation turbine replacement. Through the Design Process develop fish friendly turbines. Towards that end;

* TSP Team Members are active PDT members on the Ice Harbor Test
	+ - Turbine Team.
	+ NWW, HDC and ERDC (includes observational model work)
* Review CFD data being developed and presented by the Turbine
	+ - Manufacturer.
* Develop Biological Study Design
	+ Develop (if necessary) any tools necessary to perform the biological studies.

**2. FY 16 Scope of Work:**

* Completion of the B2 Model investigation with correct cam curves: Given the survival rate of fish passing through the B2 turbine units, there is and has been a desire to better understand the relationship between turbine environment, powerhouse operations and operating at the upper 1% efficiency.
* Support Ice Harbor biologic testing: TSP will provide support in some pre-installation testing to establish baseline conditions for existing turbines
* Support The Dalles Model construction: Construction of The Dalles model is being funded through BPA’s Large Cap Program. TSP will provide support in helping to determine intake and tailrace conditions for the project.
* Support NOAA, DOE and others efforts regionally

**3. FY 17 Scope of Work**

* Continue to support IHR turbine rehab
* Expanded support for developing long term strategy for next generation turbines
* Continued BIT investigation and study with a focus on the Willamette River projects

**4. FY 17-18** – ongoing support for turbine rehab, repair, and new turbine design

**13.0 FY15-18 Budget ($1000s)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Resource** | **FY16** | **FY17** | **FY18** |  |  |
| NWP admin and PDT labor | 120 | 60 | 60 |  |  |
| NWW PDT Labor | 80 | 40 | 40 |  |  |
| ERDC Labor and Materials |  |  |  |  |  |
| **Total** | **200** | **100** | **100** |  |  |