



# FISH PASSAGE CENTER

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## MEMORANDUM

TO: Brad Trumbo, USACE  
Walla Walla District

FROM: Michele DeHart

DATE: March 31, 2015

RE: Review Comments on the PNNL proposal *Implementation plan for a multi-year biological research study at Ice Harbor Dam: Turbine characterization and acoustic telemetry*

At your request, we have reviewed the proposal *Implementation plan for a multi-year biological research study at Ice Harbor Dam: Turbine characterization and acoustic telemetry* provided by PNNL. This is a proposal to test the survival and turbine conditions for smolts at Ice Harbor Dam, and includes both acoustic tagging and balloon tagging.

The management applications of turbine survival estimates generated by this proposal are unclear. If survival estimates at new turbines are low, it is unlikely that they will be uninstalled. If the intention is to apply turbine survival estimates from this study to performance testing requirements, the study design limitations become critical. Past experience with balloon and acoustic tag studies indicate that they cannot represent the effects of turbine passage because they do not include the delayed and latent mortality that is associated with powerhouse passage both downstream (Ferguson et al. 2006) and in smolt-to-adult returns (Tumokowski et al 2010).

If estimates generated through this proposal are high, the shortcomings of this study must be considered before management decisions, such as screen removal and the acceptance of turbine passage as an acceptable route of passage, can be discussed. The management application of the data generated from this proposal should be clearly articulated prior to the conduct of the test. We look forward to participating in the ongoing discussion and development regarding these studies. Below are further comments:

- Acoustic tagging does not represent the run-at-large. For this study, yearling and subyearling Chinook smolts will be collected at Lower Monumental Dam. In 2012, the rejection rate for acoustic tagging at Lower Monumental Dam was 4.8% for yearling Chinook and 6.3% for subyearling Chinook. In 2013, the rejection rate for subyearling Chinook was 18%.
  - These rejection rates include smolts rejected for either size limitations or poor condition. Smolts smaller than the tagging limits, or in poor condition, may have different survival estimates through the turbines.
  - Without sampling the run-at-large, the acoustic portion of this study will not provide an accurate assessment of survival through the new turbines at Ice Harbor Dam. The potential impacts of acoustic tagging rejection rates have been summarized in FPC Memos from June 24, 2009; March 24, 2011; February 15, 2012; March 23, 2012; January 4, 2013; February 11, 2013; March 19, 2013; March 22, 2013; December 3, 2013; January 14, 2014; May 2, 2014; and February 3, 2015.
  
- Balloon tags impose a large tag burden on smolts, affect swimming ability, and the results may not be applicable to untagged fish. For a detailed review of balloon tag studies, please see FPC Memos from January 30, 2004, and July 30, 2012, and the Joint Technical Staff memo from May 29, 2003.
  - The tagging requirements for balloon-tagged fish are not included in this report, but in past studies only large smolts have met the size limitations of balloon tags. The characterization of the turbine environment created by this study will not be representative for much of the run-at-large.
  - Balloon-tagged fish are removed from the system immediately after dam passage, and therefore only the short-term effects are included. Any other factors associated with turbine passage (such as increased predation vulnerability, disease intolerance, or latent mortality) are not included.
  - Only hatchery yearling Chinook are included in this study. The effects of turbine passage on other migrating fish, including subyearling Chinook, steelhead, and sockeye, are not included. This will limit the applicability of results to a small portion of migrating smolts.
  - Balloon tags substantially increase drag in experimental fish when compared to untagged fish. This, when combined with rapid pressure changes and potential tagging-related stress, may significantly affect the swimming ability and, therefore, the likelihood of a turbine-related injury.

In conclusion, we do not believe that the proposed study will adequately characterize turbine passage at Ice Harbor Dam. Steelhead and sockeye are not included in the proposal. Chinook smolts will be highly selected by size due to tagging restrictions, and so will not be adequately represented either. Data that are collected using these methodologies may be misleading due to the extreme limitations, and is unclear that the study will provide useful information to regional managers.

## References

Ferguson JW, RF Absolon, TJ Carlson, BP Sandford. 2006. Evidence of delayed mortality on juvenile pacific Salmon passing through turbines at Columbia River Dams. *Transactions of the American Fisheries Society* 135:139–150.

Tuomikoski J, J McCann, T Berggren, H Schaller, P Wilson, S Haeseker, J Fryer, C Petrosky, E Tinus, T Dalton, R Elke. 2010. Comparative Survival Study (CSS) of PIT-tagged spring/summer Chinook and summer steelhead, 2010 Annual Report. Fish Passage Center, Project no. 199602000.