FISH PASSAGE CENTER

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MEMORANDUM

TO: FPAC
Tom Lorz, CRITFC

FROM: Michele DeHart

DATE: June 24, 2009

RE: Review of; "Statistical Design for the Lower Columbia River Acoustic-Tag Investigations of Dam Passage Survival and Associated Metrics"

In response to an FPAC request the Fish Passage Center staff has reviewed the document and offers the following comments for the committees' consideration.

The document proposes a study design for the lower Columbia River, including John Day, The Dalles and Bonneville, using acoustic tags, to estimate performance standards included in the 2008 Biological Opinion. In accord with the 2008 Biological Opinion, the study is designed to provide estimates of dam passage survival, spill passage efficiency, forebay residence time, tailrace egress time and boat restricted zone to boat restricted zone survival. The study proposes to use acoustic tags and to include spring migrating yearling Chinook and steelhead and summer migrating sub-yearling Chinook.

The study is proposed independently of a Decision Framework
Because the study is proposed without an identified Decision Framework it is difficult to assess the degree to which assumptions inherent in the subject study design will affect the applicability of the proposed study results to the run-at-large. Tagging studies are used to make inferences about a population. In this proposed study the measured juvenile survival through the hydrosystem projects would be applied to the run-at-large. The proposed study will generate estimates as identified in the study objectives but whether or not the estimates reflect the experience of the run-at-large depends upon the whether or not the study assumptions are met.

The study is ambitious and complicated; it includes marking at dams of actively migrating smolts, extensive handling and transportation, and the use of acoustic tags. All of these have the potential to affect the resulting estimates and raise the question of applicability to the run-at-large. There is no discussion in the proposal of reconciling study results with long reach survival estimates and adult returns. In addition the study results have limited applicability to fish mitigation management decisions because the long term documented effects of route specific passage on adult returns is not incorporated into this proposal. Including this study in a Decision Framework would weight the study results appropriately relative to the significant study assumptions inherent in this design, and would require the study results to be considered within the context of other research and monitoring information. Including this study within a Decision Framework would reduce the potential for erroneous management decisions.

Proposed study assumptions

Several assumptions are inherent in the study design, which have potential for affecting the applicability of the results to the run-at-large. Some study assumptions of the proposed design are mentioned in passing but details regarding how violations of assumptions inherent in the design would affect study results and applicability of study results to the run-at-large are not included. Including detailed discussion of how violation of study assumptions could affect study results and application of results to the run–at- large would be helpful.

Tag size limitations

Tag size limitations of acoustic tags should be clearly identified. In any tagging study, in order to make valid inferences applicable to the run- at- large, tagging must be representative of the entire population in terms of their size. If the tagged population does not represent the population of interest, this can bias the outcome of the study and the applicability of the results to the run-at-large. When tagging fish to represent a population of small sized fish, the lower size limit of effective tagging is a primary concern. The assumption that the tagged fish are representative of the run- at- large is the first assumption in this proposed study. To test for a bias in this assumption the author suggests, “Length, weight and condition factor distributions of the tagged fish will be compared to distributions for fish routinely monitored at the John Day juvenile collection facility”. Fish size, limitations with acoustic tags, and variable affects of acoustic tags on behavior and survival relative to fish size may be unavoidable and therefore could bias study results.

Acoustic tag effects on survival and behavior

Recent studies (Rub et al.2009) have indicated that JSATS tags proposed for use in this study have impact on the survival and behavior of tagged fish. The author of the proposed study recognizes this but minimizes the serious implications to study results and applications of the results to the run-at-large. The author states, “Research on the effects of JASATS tags on fish have identified the possibility of decreased smolt survival as fish pass through several successive hydroprojects.” If true, it may be prudent to limit the fish used in the virtual release groups to fish released in river pools closer to the dam of interest, but this need can be evaluated *a-posteriori* and adjusted as required.” The research has shown that the longer the tags are in the fish the greater the impact of the tag. This is inconsistent with the authors proposed study design where fish are used and reused. This is a serious issue. The impact of acoustic tags on juvenile fish survival and behavior should be clearly understood before the study goes forward.

Marking, handling, transporting effects

The study is ambitious, proposing extensive and complicated holding, marking and transporting of groups of fish. Analysis of past studies has shown that marking at dams biases study results (Petrosky presentation ISAB/ISRP 5/8/2008;FPC memorandum 2.18/2009 www.fpc.org). Similar impacts have been documented in truck transporting and release of marked fish in many studies. These impacts on fish are variable and impossible to control. This will affect the application of study results to the run-at-large.