Independent Scientific Review Panel
for the Northwest Power & Conservation Council
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Memorandum (ISRP 2009-37) **August 26, 2009**

To: Tony Grover, Fish and Wildlife Division Director, Northwest Power and Conservation Council

From: Eric Loudenslager, ISRP Chair

Subject: Review of Accord Proposal, Produce Statistically Valid Harvest Estimates (2008-508-00) - Response Requested

Background

At the Council's July 31 request, the ISRP reviewed the Columbia River Inter-Tribal Fish Commission's Accord proposal titled Produce Statistically Valid Harvest Estimates (2008-508-00). As stated in the proposal abstract, "this project has four long term objectives: 1) ensure that the sample design and estimation methods for producing tribal catch estimates are statistically valid, 2) make accurate harvest data readily available for decision making, 3) improve the transparency and dissemination of catch estimates, with associated variances, and 4) account for the uncertainty of estimates in management." Ultimately, this project intends to determine and formalize statistically valid sampling protocols for tribal harvest estimates throughout the Columbia River Basin.

ISRP Recommendation

Response Requested

The overarching goal of the project is to be applauded; however, the description of specifically what is to be accomplished in the first year is not sufficiently detailed. A response is requested that demonstrates that the survey of the creel census methodologies in the first year will be adequate to address whether this program meets the intended design requirements.

Please provide:

1. A summary of the programs that use the escapement estimate data;
2. The sampling criteria those programs require for robust analysis;
3. A survey design that will be adequate to determine if the creel census meets the program needs.

Review Summary

The proposal's long term goals are important and have been identified by the ISRP in reviews of coded wire tagging (CWT) proposals since 1997 as uncertainties in the management of salmon in the Columbia River Basin, by the CSMEP report, and by the PSC Coded Wire Tag expert panel and follow-up, and in the ISAB Harvest Report. The ISRP believes this project is long overdue; however, the proposal needs to have additional detail as to how the objectives will be met and quantified.

The proposal stipulates that the current program is aimed at estimating harvest for bright and tule fall Chinook, A and B-run steelhead, and coho, and that the first step will be to observe and assess the current methodologies. It is not clear from the proposal that this "coarse" assignment of fish to stocks actually reflects the management needs under the PST, U.S. v. Oregon, PFMC harvest management, and ESA, to provide data on harvest so exploitation rates can be estimated and cohorts can be reconstructed. The proposal should link the data needs of managers to methods used to collect the initial information to derive those statistics, and indicate how the observations in the first year will collect fishery information from the essential field operations. Data and analyses from the first year should be reported and reviewed (by the ISRP) before undertaking the development of new sampling designs.

There is no mention in the proposal of the various tag data that are actually collected from the fish, how these relate to tagging effort, and how new methods under consideration (for example, parental genotyping of steelhead in Idaho, and escapement estimates at Bonneville using genetic data) will be integrated into future fishery sampling designs.

For example, from the description provided, tribal-harvested fish go to (a) commercial outlets, (b) over-the-bank sales, and (c) subsistence (and sport?) uses. There is presumably other unreported catch from non-targeted by-catch, unmarketable or damaged catch, and so on. Thus, there is a mathematical model that can be proposed to estimate total tribal harvest (TTH) such as "TTH = Commercial + OTB sales + Subsistence + Other." The accuracy/precision of the each of the parameters carries a potential measurement bias. Essentially, the proposed work would be improved if these biases were identified and concrete ways of addressing these biases (either to eliminate, reduce, or at least compensate them) likewise identified. The use of the PDAs addresses a source of data-entry error (although no information is presented to convey how significant this error is). The goal of improving accuracy and precision of tribal catch estimates is important enough to justify involvement of additional qualified statistical experts to provide support for project staff when necessary.

ISRP Comments

1. Technical Justification, Program Significance and Consistency, and Project Relationships (sections B-D)

The current method for estimating total harvest is based on a combination of methods, including commercial sales ticket accounting, creel census/survey sampling, aerial net counts, and perhaps other methods. The sponsor recognizes some potential problems with the current methodology in that the estimates may not be completely accurate or precise. The goal of proposed project is to examine current harvest tracking approaches and to develop a more rigorous and robust

estimation of total harvest for each species or fishery. It is alarming that no formal documentation of existing procedures or analysis of accuracy and precision has been conducted to date. A complete evaluation of existing creel procedures is a very useful first step in efforts to improve harvest estimates. These estimates, and resulting fishing mortality rate, are of fundamental importance to scientific fishery management ("that which we can measure accurately, we can manage…").

Under U.S. V. Oregon, there are specific requirements for collecting and providing accurate, precise, timely data (including real-time data) for in-season management decisions. Timeliness of data is an important issue; however, it is not necessarily true that a lack of improved data loggers is a significant obstacle to effective stock assessment. Developing the ability to record catch data is premature when the data to be collected have not been completely identified nor evaluated for how difficult they will be to collect. A more appropriate approach would be to match the technological needs with a carefully selected, well-thought-out sampling regime. Once a statistically valid sampling design has been developed, the adoption of electronic methods for recording catch data is a worthwhile goal, as long as sufficient training is provided for accurate data input and the data fields are designed for effective use.

In 2009 the project proponents are going to focus on methods for estimating gillnet catches in Zone 6, but do provide information on other harvest methods and issues such as over-the-bank sales. A map showing the location of Zone 6 would be useful. The proposal would also be improved by provision of more details on gillnet sampling and associated statistical problems if development of this method is indeed their primary goal. Comparisons with methods used for "standard" harvest methods in other fisheries agencies on the Columbia River would be helpful. For example, what methods do State agencies use to monitor gillnet catches in the lower river? What is the adequacy and precision of the estimates of the number of gillnets counted by aerial flights? Should sampling methods be standardized?

Although it is pointed out in the proposal that this project is not a sampling project but rather an analysis project, it is difficult to evaluate how the 2009 objectives will contribute toward the desired endpoint of statistically valid sampling designs and harvest estimates.

2. Objectives, Work Elements, and Methods (section F)

The methods and benchmarks for each of the objectives are rather weakly stated and do not appear to be in a format that is sufficiently complete. For example, work elements associated with an analysis of accuracy are not adequate. A much better evaluation of accuracy than simply determining if catch estimates exceed fish ticket sales is needed. A strategy for estimating the amount of bias in estimating harvest is needed. Similarly, plans to re-sample a subset of samples for determining error rates should be explained in sufficient detail for scientific evaluation. Incentives to increase fisher participation should be considered.

The second objective seems especially weak: "document current and historical sampling and estimation methods" (p. 1). Evidently there is little or no written documentation of current methods, that is, what are being used today? There must be some protocol outlined for whatever sampling will be conducted. If not, it is possible that the current work will not be technically effective, cost effective, or conducted in a consistent manner.

Without a clear sampling protocol, it is difficult to see the benefit of trying to reconstruct historical methods. The main value of this retrospective approach might be to assess the validity and compatibility of past data with current and future harvest data. It is unlikely, however, that much will be resolved using that approach. Perhaps emphasis on the current approach and how to improve it for the future are most important.

Objective 4, "documenting a formal protocol for future years" is a very worthwhile objective. At least two main issues would need to be addressed, however, for this objective to be met. First, without some indication of the details of the actual or envisioned sampling program, it is very difficult to know how anyone would be able to verify that objective 4 has been met. The success of objectives 3 and 4 depends on a defensible and clearly documented sampling design/protocol. This is not in place at present, as indicated on p. 2 of the proposal. Secondly, the ability of the project proponents to develop a clearly documented sampling design/protocol will be difficult due to the open nature of the Zone 6 fishery. In U.S. v. Oregon, language clearly states that the fisheries will remain open all year, and that, for fall Chinook for example, "the actual fishing dates, gear restrictions, and other shaping measures with respect to this fishery shall be defined by the tribes inseason as the fishery progresses" (U.S. v. Oregon p 52). Any protocol identified under Objective 4 should therefore address these sorts of inherent in-season gear or other modifications designed to optimize harvest. It would seem that contingency plans should be developed for how to validly sample these *ad hoc* fishery activities that potentially involve changes in effort as well as changes in gear.

More details should be provided on the methodology for estimating variance. Work element #162 has the objective "Calculate likelihood profiles of in season catch estimates." The proposal would be improved by an explanation of how this will be done.

3. M&E (section G, and F)

Monitoring and evaluation plans in the proposal are not adequately detailed. How will acceptance and proper use of revised sampling protocols be monitored in the field? How will improvements in accuracy and precision be measured and evaluated? How will the methods used to determine optimal sampling strategy be evaluated? How will the quality and clarity of the revised sampling manual be evaluated? How will the quality and clarity of the user's manual for the handheld PDA application and uploading data be evaluated? How will improvements in accuracy and efficiency due to using the handheld application be evaluated?

4. Overall Comments - Benefit to F&W (all proposal)

Improvement in the rigor and robustness of total harvest estimation will benefit the basin's fish populations as a result of having more accurate data to support resource decision-making process. The proponents should be commended for their efforts to systematize data collection for tribal fisheries, and the proposal is a first step in that direction.

The four long-term objectives are of course important and laudable, but the four short-term objectives of this study lack sufficient detail. It is surprising that the first two have not already been done. It would seem that the first two objectives would have been thoroughly outlined and documented in writing before initiating sampling. In addition, there is a need for a clear outline describing meaningful criteria for evaluating whether objectives 3 and 4 have been successfully

met, that is, how the sampling scheme has been improved, and how the formal protocol will result in more accurate, precise, and timely harvest data in the future.