

## **Accord Project Sponsors ISRP Response Report**

Date: 1/29/10

<b>Project Number</b>	200850800
<b>Proposer</b>	CRITFC
<b>Project Title &amp; Brief Description</b>	Determine catch sampling protocol and precision of estimates
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### **ISRP Review History:**

**Original Narrative submission date:** 7/30/09

**Date ISRP Review comments were received:** 8/26/09

**ISRP Review results:** *Response requested*

- Meets scientific criteria.
- Meets scientific criteria (qualified).
- Response requested - meets scientific criteria (qualified).
- Response requested – does not meet scientific criteria.

**Response to ISRP Summary:** [*Please check appropriate box and respond below in: Response to ISRP Comments*]

The narrative will be revised and resubmitted by (**insert target date**).

A response to ISRP comments is provided in this document.

[*Your response should include 1) areas of agreement with ISRP comments, i.e., additional information and/or any changes in the project scope of work and, 2) areas of disagreement, i.e., state why you believe there is sufficient data or sound science to proceed, and/or provide additional information which supports your perspective*].

### **Response to ISRP Comments:**

**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 note that this program involves a minimal part-year budget and only 1 person. This proposal is not for the project that actually performs the creel census, nor does it involve biological, genetic, or tag recovery sampling of the catch (hence, the lack of a sampling design). This project, over the next 10 years, will assess the statistical validity of methodologies used to produce treaty catch estimates, and develop written "sampling" protocols and precision estimates for those catch estimates.

This proposal addresses only the first year of this project, which is an assessment of the statistical validity of the "creel census" methodology used to produce the Zone 6 treaty catch estimate and development of precision estimates for those catch estimates. No *survey* of creel census methodologies can be done because there is only one creel census methodology used for the Zone 6 fishery. The "creel census" involves 4 fishery monitors, who each cover a geographical section of the Zone 6 fishery. Each fishery monitor will be observed at least 1 day to provide the biometrician with an understanding of the monitoring in each area. Additional trips will be made to determine error rates for enumeration, species and run identification data collected by the fishery monitors.

Please provide:

1. A summary of the programs that use the escapement estimate data;

This project does not produce escapement data, although the catch estimates are used in run reconstructions that do produce escapement estimates.

If you mean catch estimates, they are provided to TAC for inseason management and are incorporated post-season into run reconstructions for spring, summer and fall run Chinook. The stock specific catch estimates produced by the run reconstructions are then used in US v. Oregon catch accounting, and PST management, and by anyone trying to estimate the productivity or survival of the stocks.

2. The sampling criteria those programs require for robust analysis;

The users of the catch estimates do not require specific sampling criteria, although they would no doubt like to know and maximize the precision of the estimates.

3. A survey design that will be adequate to determine if the creel census meets the program needs.

I interpret this as requesting the survey design for the creel census. This project does not perform the creel census, and therefore the survey design for the creel census is not part of this proposal.

This project proposes to document that survey design and the historical data in order to determine precision of the resulting catch estimates, in order to make it possible to assess whether the creel census meets program needs, as asked.

The in-river managers have not specified a desired level of precision for the catch estimates, although the Chinook Technical Committee is working on a report of desired Data Standards. It is likely that a standard will be based on the estimate having a CV less than some stated percent, on average, over some number of years. Adequacy of the creel census methodology is based on the precision of the resulting catch estimates relative to desired standards. Specifying those standards is beyond the scope of this proposal and involves policy decisions regarding acceptable levels of management risk.

## 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. This project does not collect the data to make the harvest estimates; it is to review the precision and validity of those estimates. The Zone 6 treaty gillnet catch of each of these "coarse" components is prerequisite data entered into all further analyses and run reconstructions, which use additional data (e.g., CWT recoveries and GSI from biological sampling that is not part of this project and has not been part of the creel census in the past) to decompose the catch into stock specific components for the analyses you list above. 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. This project does not involve any of the biological or tag recovery sampling done on the harvests. Sampling of the harvest is performed by the state agencies under an entirely separate program that occurs where fish are sold to commercial buyers, and should not be confused with the "creel census" which merely "samples" the catch per unit effort of the fishers as fish are landed. Future projects may increase the duties of the fishery monitors beyond enumerating catch and effort, and this will have to be taken into consideration in designing future fishery monitoring protocols, but all of the above sampling concerns are currently beyond the scope of the project proposal.

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 narrative was revised twice to better elaborate the current estimation methodology, but the reviewer may not have had the latest more comprehensive narrative. As described in the latest narrative, the total treaty Zone 6 harvest is estimated by "creel census", using estimates of total effort (based on aerial net

counts) and estimates of catch per unit effort (from interviews by fishery monitors). This is the total catch landed, before being sold either commercially or over the bank, before being kept, regardless of being damaged or unmarketable. The method is used to avoid double counting of fish that were intended for OTB sales but then sold commercially, and makes the issue of unreported catch moot, since the above summation is not used and catch is not “reported”. It is the precision of the CPUE, total effort, and accuracy in identifying the “coarse” catch components that determines the precision of the final catch estimates. 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. Yes, the total harvest is a sum of the non-treaty harvest (based on fish tickets) and the Zone 6 treaty harvest (based on creel survey and net counts). This project, however, only involves the Zone 6 treaty catch estimates. 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 (Total TREATY harvests) 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...”). I agree, which is why we are proposing to do the documentation and evaluation.

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. The data are “identified” and are currently being collected, via clipboard and pencil. An improved monitoring scheme will not eliminate the need to collect any of the current data, which is essential for estimating catches. It may, however, require some additional data be collected, e.g., to estimate variances of the catch estimates. I do not see that as a reason to avoid improving data collection methods for the essential data already being collected. As fishery monitors are asked to collect more and more data, they will need more efficient methods of recording it. 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 current sampling method is based on common creel census methods, and was carefully selected to overcome the unique challenges of estimating catch in this fishery. It may very well be statistically valid. However, it needs to be

documented and validated as such, which is what is proposed.) 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. Biological sampling of gillnet catches for parameters such as age and sex composition that are dependent on size and therefore size selectivity of the gear does have statistical problems. However, this project does not involve any of the biological sampling of the gillnet catch for scales or tags, sampling which occurs when the fish are sold at the commercial buying stations (another Accord project may propose collection of some tissue samples to facilitate a separate project, but they would be the ones to address whether the size selectivity would compromise the intended use of the genetic samples). I don't think the selectivity of the gear has any effect on how accurately the fishery monitors count and identify fish as they are moved from boat to tote. 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? The states use the sum of fish sold as reported on commercial fish tickets. What is the adequacy and precision of the estimates of the number of gillnets counted by aerial flights? The precision of the gillnet counts will be addressed in determining the precision of the catch estimates based on them, as proposed. Should sampling methods be standardized? No. Fish ticket enumeration is not an adequate method of estimating catch in the Zone 6 fishery, because of heavy subsistence use and OTB sales.

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. I think documentation of current methods and estimating precision of current estimates is a logical place to start.

## *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. It is difficult to estimate accuracy without an independent estimate. Please suggest any specific methods you can think of to derive independent estimates of the catch. 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. I disagree. As stated in the

proposal, “Since 1998, the current creel census methods have been used to estimate total landed catch.” If “the current work” is referring to the creel survey and not this project, which has yet to start, the creel survey has been consistently performed by four loyal monitors who have all been hand trained by the single project supervisor who has been consistently carrying out the project for the last 11 years. Some of the monitors have also been conducting the creel survey since it began. One of the strengths of the method is that it so effectively uses the experience of the monitors knowledge of landing sites and the individual behavior of each fisherman to efficiently “capture” samples of CPUE as the fishers land their catch (they can pretty much tell you who has how many nets in the water based on what vehicles are at the landing site). There are data sheets and spreadsheets from the creel survey for the last 11 years “documenting” exactly how the estimates were calculated. There are also spreadsheets for earlier years when OTB sales were estimated. All data sheets for each net flight are collated in annual spreadsheets. There is no formal written documentation of the current protocol because the people doing it know exactly what they are doing, and that does not compromise this project. It might, however, compromise the future creel survey program if key people with the institutional memory of this program did leave before these materials and a formal survey design have been documented, and it makes it very difficult for independent scientific advisors to evaluate the adequacy of the program unless it is documented. That is why this project proposes to go through the legacy materials and work with the project supervisor and the originators of the survey design to document the historical methods and estimates, and document the current creel sampling method that has been performed faithfully every year for the last 11 years.

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. I disagree. Although there are historical catch estimates, there are no historical estimates of precision for those catch estimates. Any decision theoretic management approach using uncertainty of the catch estimates will certainly need precision estimates for multiple years, not just the precision of the new estimates. If at all possible, precision estimates for the historic data need to be developed. 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 creel survey design/protocol will be written up and posted as a work element product. 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. I agree, which is why the proposal first proposes to document the sampling protocol: “1) observe current sampling methods, 2) document current and historical sampling and estimation methods, 3) improve the sampling scheme, if possible, to maximize precision of estimates under existing funding, and 4) document a formal sampling protocol for future years.” Also, these are not the detailed objectives as listed in Section F, but rather a very brief overview in the abstract. 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. None of these changes matter to the catch estimate based on effort and CPUE, because both these parameters are estimated across a time stratum with consistent regulations. The net flights measuring effort are made each week the fishery is open and the CPUE (for whatever gear type is allowed) is monitored via the creel survey when the fishery is open. Regulations are consistent throughout each opener. It will be necessary to state monitoring levels in terms of rates rather than absolutes, but the Zone 6 fishery is no more *ad hoc* than the Zone 1-5 fishery.

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. Figuring out how to estimate the variance given the available data and developing the appropriate distributions to construct likelihood profiles is part of the proposed work.

### 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? If the data required by the protocol is collected, then the protocol is being successfully implemented. How will improvements in accuracy and precision be measured and evaluated? Precision of catch estimates will be monitored through time. How will the methods used to determine optimal sampling strategy be evaluated? Based on how much precision could be improved by rearranging survey effort without increasing sampling resources. How will the quality and clarity of the revised sampling manual be evaluated? If the monitor's feedback is that they understand it and it makes sense, it will be judged completed and posted as a work product. How will the quality and clarity of the user's manual for the handheld PDA application and uploading data be evaluated? If the monitors understand it and are able to follow it, it will be judged clear and uploaded as a work product. How will improvements in accuracy and efficiency due to using the handheld application be evaluated? It would require a staged repeatable experiment with multiple monitors (clipboard vs. PDA), which is beyond the scope of this proposal. As proposed, it is a pilot project which will depend on the monitor's response as to whether it is more efficient for them.

### 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. As the reviewer points out, it is impossible to detail how the sampling will be improved until the existing methodology has actually been documented and reviewed, in something besides institutional memory, experience, and spreadsheets. Regardless of how surprising it is, this has not occurred, which is why it is being proposed. Evaluating whether the survey protocol is developed for future years is quite easy to evaluate. The protocol will be written and posted as a work product. The protocol was not touted as the mechanism for achieving more accurate, precise and timely harvest data in the future, which is listed as one of the long term overall objectives of the project, although it will provide for the consistency that was requested.