

Council Document ISRP 2000-7

Independent Scientific Review Panel for the Northwest Power Planning Council

Review of the

**MASTER PLAN FOR FEASIBILITY ASSESSMENT OF A WHITE
STURGEON 'PUT AND TAKE' CONSUMPTIVE FISHERIES IN OXBOW AND
HELLS CANYON RESERVOIRS, SNAKE RIVER**

Partial Step One of the Northwest Power Planning Council's Three-Step Review Process

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ISRP Partial Step One Review of the Master Plan for Feasibility Assessment of a White Sturgeon ‘Put and Take’ Consumptive Fisheries in Oxbow and Hells Canyon Reservoirs, Snake River

Review Process

On June 30, 2000, the Northwest Power Planning Council requested that the ISRP review the master plan for the “Consumptive Sturgeon Fishery - Hells Canyon and Oxbow Reservoirs” project. The goal of the project is to provide fishery opportunities for white sturgeon in Oxbow and Hells Canyon reservoirs to mitigate for loss of white sturgeon fisheries in Columbia and Snake River basins due to hydropower development and operations. This review is a partial Step One review under the Council’s Three-Step Review Process. The ISRP’s review is provided below in two sections: 1) Recommendations and Findings, 2) Specific ISRP Reviewer Comments. The Specific Reviewer Comments are incorporated in the three-step review template submitted by the Nez Perce Tribe.

Section 1. ISRP Recommendations and Findings

Overall Recommendation

The submittal is not adequate to pass this Partial Step One Review. The plan does not provide a logical research design that is likely to answer uncertainties about the project’s feasibility (Questions 1.1 – 1.3, 1.14, 1.20, and 3.1-3.3). The project sponsors need to reevaluate their basic plan and develop a more disciplined approach that first identifies and then designs a plan to measure the critical elements necessary to determine feasibility of the proposed put-and-take sturgeon fishery. The plan needs to be bolstered particularly in terms of assessment of carrying capacity, emigration, survival, and growth rates (Questions 1.3, 1.7 1.14, 1.19, 1.20, and 3.1-3.3).

General Findings

The concept described in this plan is a “put, grow and take” procedure such as those that often have been used with good result in trout and other fisheries. The proposal described in the Management Plan is identified as a feasibility study. In brief, the project proposes the following, as described on pages 34-39:

Phase 1 covers two years. In 2000-2001, 50 sturgeon will be released that are equipped with sonic tags and PIT tags and marked by removal of a scute. A procedure is described for following sonic tagged fish at intervals during the expected lifetime of the tag. There is no description of how the PIT tags would be recovered or how the information would be used. In 2001-2002, 500 sturgeon will be released, again with 50 marked with sonic tags. There is no mention of PIT tags or of scute removal in the second year releases. Assessment of feasibility of the proposed sturgeon fishery would occur in 2002-2003 (page 38). The emphasis in the assessment process is upon a proposed Monte-Carlo

simulation modeling exercise. The project would then move to Phase 2, which would include full initiation (planting of sturgeon) and monitoring.

A key element that is missing in the Partial Step One Plan is specification of criteria that will be used for deciding whether or not the concept is feasible and thus determining whether it is appropriate to proceed on to Phase 2 in the overall Plan (Questions 1.20 and 2.1). Specification of these criteria will identify the elements that need close monitoring during Phase 1. This logically will lead to specification of an evaluation procedure that will be used before moving to Phase 2. Similarly, criteria specified for moving from Phase 2 to Phase 3 should be defined. In other words, there is a need to more sharply define a plan for monitoring and evaluation throughout all steps of the proposed project (Question 2.1). This is a comment previously made by the ISRP during the review process in FY2000. While the modeling exercise employed crucial factors that will determine feasibility, i.e. rate of survival of planted sturgeon, rate of emigration, and fishing rate, there is a need to explain how the Phase 1 studies would produce useful estimates of these parameters. By useful, we mean estimates made with a degree of precision that will satisfy the managers during the assessment process in 2002-2003. The proposers might seek additional outside expertise in development, parameterization, and evaluation of the models they intend to use.

Subjects of Special Interest

Need for Baseline Data: There is no question that more data are needed on sturgeon in the reservoirs, but as presented this is not the project that will collect those data (Question 1.8 and 3.3). Project sponsors need a more general perspective and reasonable analytical model. Perhaps they should solicit advice from CRITFC or others on the NPT staff who have recently developed monitoring and evaluation plans.

It is not clear what kind of interactions proposed releases under this project would have with those through Idaho Power and IDFG efforts. Moreover, it is not clear what results other sturgeon projects in the reservoir have generated to date, e.g. have the Idaho Power efforts produced information that might apply here?

Alternative Approaches: An alternative approach, such as seining fish from the large populations above or below the reservoirs should be considered. Removal of the numbers of fish intended for planting into the study area reservoirs (50 the first year and 550 the second) is unlikely to adversely effect the populations in the Hells Canyon and the Bliss-C.J. Strike areas, which each have population estimates of 2500 or more sturgeon. Introducing wild naturally spawned sturgeon will also make the genetic concerns expressed in the proposal nearly moot. This alternative approach deserves more consideration and discussion within the proposal itself (Question 1.5).

Genetic: Considering the normal life history of Columbia River white sturgeon, one would expect river-wide homogeneity with respect to their genetic composition. Adults

are anadromous, but no evidence has been found that individuals seek out specific spawning locations within the river, and such behavior would be unexpected. Even if it occurs, the effect on genetic integrity would be minimal, due to the nature of their spawning habits. Sturgeon are broadcast spawners. Eggs are deposited in areas of high flow, where they are rapidly carried downstream and widely distributed on the way. Thus, a mechanism, such as occurs with salmon where they hatch in a particular place upon which they may imprint, is lacking in sturgeon. At the same time it is to be recognized that in situations where sturgeon populations have been isolated by natural barriers, such as in the Kootenai River, the fish have been shown to have developed unique genetic characteristics. Whether these are of selective advantage or merely a result of genetic drift might be debatable, but it is clear that sturgeon populations that are isolated can develop such characteristics.

The Management Plan refers to studies being conducted by the University of Idaho genetics lab to assess the genetic variation among Columbia Basin white sturgeon populations. Considering the extent to which the river has been fragmented by dams, it will not be surprising if these studies show differences among isolated stocks. It is questionable whether detection of such differences should be interpreted to mean it might be important to maintain isolation. Perhaps a more important question relating to the proposed put, grow, and take project, is whether sturgeon arising from a fish culture program that depends for its brood stock upon fish taken from the Snake River might adversely affect the genetic composition of the original group if planted individuals that emigrate happen to spawn naturally with the parent stock. Both questions, however, seem rather academic, perhaps with little practical application to the situation described in this management plan. Even if the stocked white sturgeon survive and spawn with wild fish below Hells Canyon, they would not necessarily pose a risk to Hells Canyon populations. In this context, the planned experiment that would attempt to measure survival of entrained sturgeon is probably unnecessary. What if a portion of the emigration occurs over the spillway? How would this be taken into account in estimating the total number of survivors?

Finally, the few fish involved in these initial tests are unlikely to pose a genetic risk to a large natural population. As the authors note (section 5.2.5), the essential issue in minimizing genetic risk is maintaining a large genetically effective population size (N_c). But the ability to do this may have been compromised early in the culture history of these fish. The investigation and monitoring of N_c should be developed as an ongoing priority. (Questions 1.19, 1.20, 3.3, 3.4)

Feasibility of Supporting a Fishery Using the Production Assessments and Model.

The Management Plan provides a population model to estimate potential fishery benefits and to evaluate potential genetic risks. However, the authors start with little to no information about the dynamics of sturgeon in these reservoirs and develop a model (Excel spreadsheet) that seems to indicate the potential for the successful development of a small fishery (consistent with their goal of about 500 animals per year).

Demonstrating potential is about as far as this assessment should go. The proponents simply must collect some data, particularly on growth rate, before any credible dynamics

model should be developed further. In our opinion, certain assumptions clearly dictate the outcomes in Tables 2 through 5. For example, the assumption of constant growth accounts for increasing biomass with stocking numbers (weight harvested to weight stocks constant in Table 4) and the conclusions about stocking densities (page 24). Is the resulting implication that there is no limit to carrying capacity in these systems? We find this result to be highly doubtful given the turnover rates stated on page 9. Also, the assumption of constant natural mortality is a very optimistic scenario to rely on. Alternative survival models might have been examined, such as survival being inversely proportional to weight. It is far more reasonable to assume larger natural mortality at small size than to assume equal mortality rates over all ages. For these reasons, it seems unlikely that a defensible determination of feasibility can be made prior to planting larger numbers of sturgeon and following their progress with more intensive sampling over a longer time period than the two years proposed. (Questions 1.12-1.18, 4.2).

Environmental Assessment: The Management Plan postpones consideration of this issue. It might at least recognize that the ecosystem will adjust for the presence of larger numbers of sturgeon. Since salmon are not present above Hells Canyon Dam they will not be affected. With use of information from food habit studies of sturgeon elsewhere, it should be possible to predict effects on certain aquatic components of the food web.

Summary of Previous Sturgeon Studies in mid-Snake River. The NPT proposal refers to a white sturgeon conservation plan being developed by the Idaho Power Company and notes in their response to Question 3f that Idaho Power Company has collected extensive information on the status and life history of white sturgeon throughout the Snake River. The proposal also noted that IDFG had planted more than 5000 juvenile sturgeon in the mid and upper Snake River in the early 1990s (pp. 20-21, Partial Step One Plan). The ISRP wondered what information is available from IDFG and Idaho Power Company from their past and present efforts, and how might this be used in the proposed NPT feasibility study. We feel that the lack of summary and discussion of work by Idaho Power Company and Idaho Department of Fish and Game constitute a serious omission from the proposal. (Questions 1.9, 3.2).

General Recommendations

The submittal is not adequate to pass this Partial Step One Review due to deficiencies in project organization and design. The Partial Step One Plan does not adequately address concerns expressed in earlier ISRP reviews (FY2000 and the subsequent "Fix-It Loop"). It does not provide a logical research design that is likely to answer uncertainties about the project's feasibility. (Questions 1.1 – 1.3, 1.14, 1.20, and 3.1-3.3).

In those reviews, the project sponsors disagreed with the ISRP about whether the project was an implementation or research project. Regardless of whether the project is labeled as research, implementation, or mitigation, the questions raised by the feasibility study and the data needed to answer them, constitute research. Feasibility studies, by their very nature, ask questions and attempt to answer them through the collection of appropriate data.

The project sponsors need to reevaluate their basic plan and develop a more disciplined approach that first identifies and then designs a plan to measure the critical elements necessary to determine feasibility of the proposed put-and-take sturgeon fishery. The sponsors need to provide a structured approach that considers the potential outcome of their efforts and the potential utility of the information gathered.

The plan lacks any kind of a decision tree into which anticipated results would be used to define the project's feasibility toward future actions. As part of subsequent submittals, the project sponsors should present, in point form or flow chart, an outline of what the feasibility study really has to demonstrate so they can have a successful fishery. The ISRP requested a similar decision tree from the NPT for its Clearwater Hatchery Monitoring and Evaluation Plan. Project sponsors for this plan might gain valuable input from other NPT or CRITC staff familiar with the Clearwater plan as this Step One Plan is revised for resubmission.

The monitoring and evaluation plan needs to be revised to conform to the project's overall goals and objectives. Whether or not this is called a research proposal, it must generate research-type data in order to provide information useful at the assessment Phase. This requires that there be a scientifically acceptable monitoring and evaluation design. The usefulness of data to test hypotheses depends on having hypotheses, or questions, specified in advance so that the appropriate data set is defined before collection. Further, often, pre-treatment (i.e. before fish stocking), initial (i.e., time of first fish stocking), and continuing data (e.g., data on food availability) are needed to understand the outcome of work such as this; the design and sampling need to be planned before the work is begun. The plan needs to be bolstered particularly in terms of assessment of carrying capacity, emigration, survival, and growth rates. The plan does not describe enough about the intended fishery, such as length of time needed for the sturgeon to reach a harvestable size, anticipated angler response, expected regulation of the fishery, and fishing pressure, etc. (Questions 3.1-3.4).

Section 2. Specific ISRP Reviewer Comments

This section is adapted from the Nez Perce Tribe's Three-Step submittal: Appendices 7-9. Each Three-Step question (red text) is followed by the Tribe's response to the question, or reference to a section of the master plan or other supporting documents where the question is addressed (black text). This response is followed by the ISRP's review comments on whether the master plan and supporting documents adequately address the Three-Step question (blue text).

Program Language Regarding Master Planning Requirements

7.4B.1 Master Planning

Because of the need to address potential conflicts among increased production, mixed-stock harvest, gene conservation, consistency with other plans and other objectives, the Council calls for detailed master plans where there is not a National Environmental Policy Act document that provides enough information to evaluate new artificial production projects. Below, the Council provides a suggested list of master plan elements. This list is intended to offer guidance, not to impose requirements. Not all of these elements may be relevant in all projects, and some unlisted elements may be important. In general, however, the elements listed below should be considered in the course of master planning.

Question 1.1: Project goals

NPT Response: Determine the feasibility of a 'put, grow, and take' white sturgeon fishery in Oxbow and Hells Canyon reservoirs.

ISRP Reviewer Comments: The primary factors that will determine feasibility are rate of emigration, rate of survival of planted sturgeon, and the fishing rate that is applied. At the present time information on these factors is not available. The feasibility study is intended to develop estimates of the first two factors, but there is no discussion of any fishery that might be encouraged or permitted on the planted sturgeon. The plan should include NPT's estimate of the number of sturgeon desired; this places some scale to the practicality of the program.

Question 1.2: Measurable and time-limited objectives

NPT Response: See chapter 5, page 18.

ISRP Reviewer Comments: Phase 1 is to take place between 2000 and 2002 (page 32). Phase 2 would extend for 6-8 years thereafter to "build up the sturgeon population" and allow them to reach catchable size (page 17), and Phase 3 would continue from that time using stocking densities determined in Phase 2. Prior to initiation of Phase 2 there would be an "assessment of feasibility" in 2002-2003, using a mathematical model. The proposal does not make it clear that sufficient information can be gathered up to that time to make an appropriate assessment. For example, there is not adequate time allowed in

Stage 1 to evaluate sustainable growth rates and carrying capacity. Some thought should be given to this.

The NPT Plan indicates that sturgeon would be stocked at the age of 2 (page 20). We note that white sturgeon in the lower Columbia River reach the legal minimum size limit of 36 inches when they are 8 or 9 years old. Of course, the same size limit would not necessarily apply here, but it would be useful to consider what size limit, if any might apply and to relate that to the number of years during which estimates of rates of emigration, of survival in the reservoir, and of fishing might be obtained by the monitoring efforts that are proposed. Consideration of the expected precision of those estimates arising from observations on 50 fish in each of two years would also be a useful exercise in designing the monitoring program. In other words, we wonder whether the stated time limited objectives are realistic. Can enough observations of sonic tagged sturgeon be made during the expected lifetime of the sonic tags to provide useful estimates of rate of emigration or other characteristics? How do the PIT tags fit into the picture? Where and how would recoveries be made?

Question 1.3: Factors limiting production of the target species

NPT Response: See chapter 2, pages 6-9.

ISRP Reviewer Comments: This reference is actually to the Status section but the impact of dams and the lack of recruitment are included. The Management Plan ought to have recognized that production of sturgeon will be limited by the basic productivity of that portion of the system upon which the plan is focused. There are interactions among the fish species that are present, and these will be adjusted in response to stocking of sturgeon. While the Plan mentions other species that are present, it makes no acknowledgement of these interactions.

Question 1.4: Expected project benefits (e.g., gene conservation, preservation of biological diversity, fishery enhancement and/or new information).

NPT Response: Information regarding the potential of entrainment of white sturgeon and entrainment survival at Hells Canyon Dam.

ISRP Reviewer Comments: The NPT response should have simply acknowledged that it is a fishery enhancement effort. It is not clear why their response focuses only on entrainment ... the expected Stage 1 benefits are broader including growth, survival, etc.

Question 1.5: Alternatives for resolving the resource problem

NPT Response: Proposed activities are directed toward information collection.

ISRP Reviewer Comments: This reply is inadequate. It is true that their Stage 1 programs address information collection but they are intended to examine the feasibility of outplanting juvenile sturgeon. The alternative sources of sturgeon were noted but only the cultured stock was detailed in the assessment and no comments were made about the

feasibility of juveniles from other Snake River populations. The authors do note that this is not intended as a new production hatchery program. However, what is not commented on is the feasibility of altering flow regimes to provide spawning areas or to provide downstream passage from the larger up-stream natural populations.

Similarly, section 2.3 notes that other sections of the upper Snake River (here referred to as the Mid-Snake) support reasonably robust sturgeon populations (> 3,000 sturgeon in the Lower Granite to Hells Canyon section and ~ 2,500 sturgeon in the C.J. Strike to Bliss area), while the Hells Canyon to Swan Falls area (which includes the study area) appears to support only about 150 sturgeon. Limiting factors that have produced these distributional abundances are not discussed in the plan and may be critically important in the success or failure of the proposed “put-grow-take” fishery. The plan attempts to deal with some of this question by identifying uncertainties associated with growth, survival and potential yield (section 5.2.2).

The activities are built around substituting a sturgeon fishery in this reach for sturgeon fisheries adversely affected by the hydroelectric system. The information collection element is, or ought to be focused on evaluating the effectiveness of this particular activity. The proposed information gathering activities are primarily designed to determine feasibility of the management plan not primarily designed to gather information as the NPT response implies.

Question 1.6: Rationale for the proposed project

NPT Response: See section 1.2, pages 2-3.

ISRP Reviewer Comments: OK. Agreed citation to section, but response also needs to refer to Status section. The stepped progression of research programs is a strong point.

Question 1.7: How the proposed production project will maintain or sustain increases in production

NPT Response: The current proposed activities does not include increasing production.

ISRP Reviewer Comments: Stage 1 may not have this intention, but the purpose for the program is to increase production by outplanting cultured (commercially available, co-operative program) or by transfer of juveniles from other Snake River populations. Over the long haul, it does propose to increase production. Even over the short term, it presumably could add to production if any effort is undertaken to measure the potential catchability of planted sturgeon, which would require some fishing. In fact, this seems to be a key missing element. The questions not addressed in the Plan ought to be: “*Will anyone fish for these sturgeon and can they be successful?*” The way to find out would be to open a fishery.

Question 1.8: The historical and current status of anadromous and resident fish in the sub-basin

NPT Response: See Chapter 2, pages 6-12

ISRP Reviewer Comments: Brief but sufficient.

Question 1.9: The current (and planned) management of anadromous and resident fish in the sub-basin

NPT Response: See Chapter 3, pages 13-15.

ISRP Reviewer Comments: OK. Good/informative chapter but focused on sturgeon. Is there any basis for interactions with other species (did comment on Bull trout).

Concern about Co-managers issue:

Throughout the text, there are references to ongoing programs that should substantially aid in this evaluation. However, there are also notations to past releases of sturgeon and programs by IDFG and ODFW that provide some basis for concern (see Chapter 3 and page 20/21, and Appendix 1). Principally, if IDFG released large numbers of sturgeon, what was learned from that experience? There is no comment at all on these activities. Further, Appendix 1 implies the development of a program similar to that suggested by the NPT; was this program implemented and, if so, what has been learned? Finally, Chapter 3 and Appendix 1 certainly seem to indicate another program involving cultured sturgeon ... and one that could involve greater genetic risks than that proposed by the NPT. Was the standard of care required of the NPT program applied to these State programs and, if not, is there any basis for concern that one program may confound the assessment of the other? There is frequent reference in the text to discussions between co-managers, so we were uncertain whether there is any basis for concern, but it is not commented on in the current text.

Question 1.10: Consistency of proposed project with Council policies, National Marine Fisheries Service recovery plans, other fishery management plans, watershed plans and activities

NPT Response: See Chapter 3, pages 13-15

ISRP Reviewer Comments: Covered

Question 1.11: Potential impact of other recovery activities on project outcome

NPT Response: Proposed activities are directed toward information collection.

ISRP Reviewer Comments: The NPT response is not appropriate, but a brief statement as to the relevance or lack of relevance of the question would have sufficed. Their comment is strictly correct for Stage 1 but ultimately their goal is to increase production in these reservoirs. Given that this would occur over several years, it is possible that alterations in dam management and flow, for salmon recovery, could impact this program

Question 1.12: Production objectives, methods and strategies

NPT Response: Proposed activities are directed toward information collection.

ISRP Reviewer Comments: The NPT response interpreted the question too narrowly, rather than broadening it to apply to this situation. Some production is involved in the Management Plan in order to provide the sturgeon that will be planted and followed to collect information. The objectives, methods and strategies are specified in Chapters 4 and 5. See additional comments below.

Question 1.13: Brood stock selection and acquisition strategies

NPT Response: See section 5.2.1, pages 19-20. Further acquisition strategies will be covered in a final implementation plan.

ISRP Reviewer Comments: Covered, but see genetics section below.

Question 1.14: Rationale for the number and life-history stage of the fish to be stocked, particularly as they relate to the carrying capacity of the target stream and potential impact on other species

NPT Response: The proposed activities are designed to collect information to determine appropriate stocking densities and provide initial information on the carrying capacity of white sturgeon in Hells Canyon Reservoir.

ISRP Reviewer Comments: The rationale deserved more attention than it was given in the Management Plan. For example, there is no discussion of the expected recovery rate of the 50 marked sturgeon to be released or whether the expected number of recoveries will be adequate to answer the questions related to feasibility. Consideration might have been given to the length of time over which observations might be made of each group of released marked fish. The sonic tags proposed for use have a limited and rather short lifetime. Yet, the fish are long lived, and information on their rate of survival is important to evaluating the potential for supporting a fishery. Thought should be given to using other methods of following individuals over a number of years. Application of PIT tags is mentioned in connection with the studies in 2000-2001, but no description is provided of any recovery efforts. Given the timeframe allowed for Stage 1, it is unlikely that data on stock density and/or carrying capacity will result. Statements should be more consistent with programs described in the text.

The carrying capacity question could easily have been dealt with, as we suggested above. The Plan dismisses the subject by interpreting the question in the narrowest light, rather than considers it in a broader context that would encompass the other fishes in the ecosystem.

Question 1.15: Production profiles and release strategies

NPT Response: With the completion of proposed activities, information will be available to determine production needs and appropriate release strategies

ISRP Reviewer Comments: Although the proposal is not a Hatchery based activity, it does potentially involve release of cultured sturgeon or the capture and transfer of wild juveniles. The source of wild juveniles is not described, nor are there comments on the feasibility of this capture, transport, and release of juvenile sturgeon. If cultured fish are used, what do we know about the stock, its effective population size, juvenile quality, etc. (see below).

Question 1.16: Production policies and procedures

NPT Response: The proposed project will not be involved with fish production facilities.

ISRP Reviewer Comments: A goal of the program will be to provide the data upon which to evaluate and develop a production policy and procedure. Fish production facilities are required to support this proposed project. If the concept proves to be feasible, larger facilities will no doubt be required. The fact that the facility is funded outside of this project does not exempt it from considering an appropriate answer to this question.

Question 1.17: Production management structure and process

NPT Response: The proposed project will not be involved with fish production facilities.

ISRP Reviewer Comments: The text does refer to development of the program in consultation with co-managers. See also ISRP response to Question 1.16

Question 1.18: Related harvest plans

NPT Response: The proposed project does not include harvest objectives.

ISRP Reviewer Comments: The NPT response is not accurate. The question was interpreted in the narrowest possible sense, and should have been discussed more fully.

Question 1.19: Constraints and uncertainties, including genetic and ecological risk assessments and cumulative impacts

NPT Response: See Chapter 5, pages 19-32.

ISRP Reviewer Comments: This is the technical heart of the proposal. Comments follow:

Production Assessments and Model:

The authors start with little to no information about the dynamics of sturgeon in these reservoirs and develop a model (Excel spreadsheet) that seems to indicate the potential

for the successful development of a small fishery (consistent with their goal of about 500 animals per year). Demonstrating potential is about as far as this assessment should go. The proponents simply must collect some data before any credible dynamics model should be developed further. In our opinion, certain assumptions clearly dictate the outcomes in Tables 2 through 5. For example, the assumption of constant growth accounts for increasing biomass with stocking numbers (weight harvested to weight stocks constant in Table 4) and the conclusions about stocking densities (page 24). Is the implication that there is no limit to carrying capacity in these systems? We find this result to be highly doubtful given the turnover rates stated on page 9. Also, the assumption of constant natural mortality is a very optimistic scenario to rely on. Why were not alternative survival models examined, such as survival being inversely proportional to weight? It is far more reasonable to assume larger natural mortality at small size than to assume equal mortality rates over all ages.

Further, the modeling procedure is not documented for any evaluation. For example, how was fishing mortality implemented in the model? Also, the model results in Table 5 seem extremely insensitive to entrainment (over a wide range of values), what is the explanation for this?

And finally, when the values of parameters are highly uncertain, it would be more advisable to acknowledge this uncertainty and apply a range or distribution about “best estimates”. To assist in reviewing the model or this assessment, we would need more documentation about processes, equations, etc. Given the present lack of knowledge, however, this assessment may place the expected outcome in a reasonable “ball park”, ... but we would strongly recommend the development of a fully dynamic model (and documentation) as the new information is being collected. A good model could greatly facilitate your evaluations and target your research into “sensitive” data issues or relationships.

Genetic analyses:

We have confirmed the relationships/analyses presented in section 5.2.3 but are concerned about inferences drawn from Figures 6 and 7. It will seldom be true that N_e equals the census population size of mature animals. Most commonly, N_e will be one-quarter to one-third of the census reproductive population, ... and for longer-lived species such as sturgeon the N_e could be even lower than these values. We therefore see little value in this artificial calculation or the speculation about numbers from a family (bases for Fig. 6 & 7). However, if the investigators do have an estimate of the effective population size for the cultured population, then a more defensible calculation could be to estimate N_c and the census population size for sturgeon below Hells Canyon dam. Simulations could then be conducted to examine the numbers of spawners in the mixture, using a range of N_w expressed as a portion of the census population size in the wild.

We are also concerned about the reference to numbers from one family and the stocking of one family each year (page 30). We presume these statements are for ease of assessment/discussion ... ***but these statements are totally contradictory to minimizing genetic risk.*** Further, given that any mixing calculation such as Ryman and Laikre's must

assume fully random mating of N_c with N_w ... why is it necessary to conduct assessments at that level. The procedure may provide a “risk assessment” of sorts, but we could never evaluate these results.

In the end, however, we must assess whether any of these analyses make any difference to this proposed set of initial evaluations. We do not believe that they do (based on the Stage 1 programs as presented), but there are some outstanding questions:

- (a) The authors seem focused that N_c will be needed (as opposed to “wild stock transfers”), but if juveniles were transported from another Snake population into Hells Canyon and Oxbow reservoirs, why would any of this concern for N_c be necessary? Why was this option for a source of fish not developed in the text?
- (b) What are the estimates of N_c for the source populations and who is monitoring it over generations in culture?

Such estimates of N_c would be important to determining whether there is any cause for concern. For example if the N_c is very small, then there is need for concern. If N_c is large (say 50-100), then there is much less need for concern, particularly for a few years of evaluations.

If we do not know N_c , then this is really only a statistical game at this point. A few fish in these initial tests are not a genetic risk to a large natural population ... and these proponents could then collect the data necessary for numerical evaluations. As the authors note (section 5.2.5), the essential issue in minimizing genetic risk is maintaining a large genetically effective population size (N_c). But the ability to do this may have been compromised early in the culture history of these fish. The investigation and monitoring of N_c should be developed as an ongoing priority.

Critical Information Needs:

We generally agree with the three information needs identified on page 32, but given the comments above also recommend adding the development of a modeling tool to learn from their investigations, and the examination of the genetically effective population size for the cultured stocks. We are also doubtful that literature values for production in habitats will be applicable to this situation. We suggest a more fully developed monitoring program will be needed to examine growth limits, survival by age and over winter, and harvest rates. The programs could, for example, apply PIT tags to each sturgeon introduced to the reservoir. Growth and survival could then be estimated for each individual as opposed to sampling for population-at-age values. Entrainment could also then be monitored directly by sampling in the natural populations.

There is an additional uncertainty that does not seem to have received any attention. That is the ability to capture juveniles in other natural populations, transport them to these reservoirs, and monitor their survival. If there are healthy populations above and below these reservoirs, is this actually a possible alternative to cultured fish being

outplanted, or has this been precluded somehow? If this has simply been omitted from this proposal for specific reasons, those reasons need to be stated explicitly. We recommend the addition of a feasibility study on this type of capture and transport program. We would expect some mortality associated with each activity but simply have no idea how feasible such a program would really be. If we are actually limited to cultured fish only, then more immediate attention should be directed to understanding the effective population size of those fish and how sustainable that source of juveniles really is.

Question 1.20: Monitoring and evaluation plans, including a genetics monitoring program

NPT Response: See Chapter 5, pages 32-38.

ISRP Reviewer Comments: The monitoring and evaluation plans should be more fully developed to make them useful for determining the feasibility of planting sturgeon to support a fishery. We see no description of the type of fishery, its duration, extent, or of any plan for maintaining catch records.

Another concern is the frequent reference to programs being conducted by other agencies. This places the NPT program at some risk due to non-performance by the other agencies. The Stage 1 proposal to develop programs in steps is endorsed but we must strongly recommend that each step be reported for review.

Question 1.21: Conceptual design of the proposed production and monitoring facilities, including an assessment of the availability and utility of existing facilities

NPT Response: The proposed project does not include the construction or maintenance of facilities.

ISRP Reviewer Comments: Not applicable

Question 1.22: Cost estimates for various components, such as fish culture, facility design and construction, monitoring and evaluation, and operation and maintenance.

NPT Response: See Chapter 5, pages 40-41. The proposed project does not include the construction or maintenance of facilities.

ISRP Reviewer Comments: A concern with this budget is that it offers insufficient manpower to conduct these Stage 1 programs. We are also concerned that these fish would be released without a unique tag identifying each individual! Given the small sample sizes involved and the critical nature of the M&E information required to determine feasibility, we recommend that unique tags be used to identify each individual.

Questions Identified in the September 1997 Council Policy Document for FY98 Project Funding

Question 2.1: Has the project been the subject of appropriate independent scientific review in the past? If so, how has the project responded to the results of independent review?

NPT Response: Previous ISRP review was based on the implementation of the project. This master plan describes activities and plans to address some previous comments by the ISRP. Other previous comments not covered in this plan will be addressed in a final implementation plan and NEPA documents if the project is determined to be feasible.

ISRP Comments and Recommendation from FY2000 Review:

ProjectID: 20135

Consumptive Sturgeon Fishery-Hells Canyon And Oxbow Reservoirs

Nez Perce Tribe

Short Description: Provide fishery opportunities for white sturgeon in Oxbow and Hells Canyon reservoirs to mitigate for loss of white sturgeon fisheries in Columbia and Snake River basins due to hydropower development and operations.

CBFWA Funding Rec.: \$250,000 Sponsor Request: \$250,000

ISRP Response Evaluation:

Do not fund. This proposal was deemed not scientifically sound and received a do not fund recommendation in the initial proposal review. The proposal was criticized for lack of presentation of adequate scientific rationale, calculations, and data to justify the proposed work. The reviewers noted that the proposal states hypotheses, but not methods for testing them, and the work is required to include monitoring and evaluation, but this is not in place.

The responses from CBFWA and from the NPT do not address these concerns adequately from the viewpoint of scientific soundness. There is not scientific justification for initiating a sturgeon stocking program in the absence of a management plan (which is stated to be developed) and in the absence of a sound data collection plan designed to test hypotheses about how well the stocking program is meeting its biological goals and avoiding generating unwanted damaging side effects.

Whether or not this is called a research proposal (the responses state that the work is mitigation, not research), it must generate research-type data in order to have scientifically acceptable monitoring and evaluation. The usefulness of data to test hypotheses depends on having hypotheses, or questions, specified in advance so that the appropriate data set is defined before collection. Further, often, pre-treatment (i.e. before fish stocking), initial (i.e., time of first fish stocking), and continuing data are needed to understand the outcome of work such as this; the design and sampling need to be planned before the work is begun.

Similarly, sound application of science dictates that unwanted side effects would be scoped in advance of beginning the stocking program and that this information would be subject to outside review by other scientists. It is not scientifically adequate to plan to raise and address these later. It is not adequate to assert that so few sturgeon are present that an introduction program cannot harm them; what about other fish species and what about other elements of the food chain. The response that full augmentation will be delayed misses this essential point. Past manipulations of lake and riverine food chains make clear that this extended food web analysis must be considered and that food web responses must be monitored.

The response refers to the management plan in future tense. It sounds like funding for the development of a management plan was received previously, and the plan was supposed to be developed with IDFG and ODFW during FY 1999. When will it be completed? Why isn't it referenced or central details presented for scientific review? Additionally, a master plan and NEPA documents are scheduled to be completed and approved prior to the initiation of fish stocking. Without these documents, it is impossible to complete a comprehensive review of the project. A decision concerning further funding and implementation of the program should be contingent on a favorable scientific review of the management plan, master plan, and NEPA documents.

The respondents' claim that public review in the FWP amendment project provides justification to the work, however, this does not supply information about scientific soundness.

ISRP Reviewer Comments: According to a February 4, 2000 letter from the Council's Mark Fritsch to NPT's Silas Whitman, this project received funding to develop this master plan and to address the ISRP comments. Funding was initiated in FY1999 and carry forward from the FY99 was used to develop this plan.

See General Comments at the beginning of this review. The process of setting some standard for deciding whether or not it is feasible to establish a fishery for sturgeon will encourage thinking about what needs to be monitored. Once the needs are determined, a plan can be developed for measuring those elements and deciding on the precision needed in the measurement to allow reasonable evaluation of the feasibility.

Question 2.2: Have project sponsors demonstrated adequately at earlier stages that the project is consistent with the Council's policies on artificial/natural production in Section 7 (the specific concern of the Panel)? If not, can these points be demonstrated now?

NPT Response: This document is the initial planning document for the proposed project.

ISRP Reviewer Comments: The NPT response fails to address these concerns in the Partial Step One Plan, however the issues will need to be addressed in the Final Step One Plan.

Question 2.3: Is the final design of the project consistent with any master plan and preliminary design?

NPT Response: The final implementation plan will be submitted if the project is determined to be feasible.

ISRP Reviewer Comments: How will the decision be made on feasibility? Decision criteria and decision steps need to be included in the Step One Plan.

Question 2.4: If not, do the changes raise any underlying scientific questions for further review?

NPT Response: NA

ISRP Reviewer Comments: Not applicable at this point in the review process.

Question 2.5: Has information about the project or its purposes changed in such a way to raise new scientific concerns?

NPT Response: This document is the initial planning document for the proposed project.

ISRP Reviewer Comments: The old concerns are still present.

Question 2.6: Has the underlying science or the way it is understood changed so as to raise new scientific issues?

NPT Response: This document is the initial planning document for the proposed project.

ISRP Reviewer Comments: The answer is inappropriate. However, it is doubtful that the underlying science has changed. That should have been the answer.

Question 2.7: How technically appropriate are the monitoring and evaluation elements of the project?

NPT Response: The monitoring and evaluation elements in the document are designed to assess entrainment potential and habitat use.

ISRP Reviewer Comments: The monitoring and evaluation elements need to be rethought and further developed.

Question 2.8: Are there ways to obtain the same production benefits with facilities that are lower in cost or less permanent, should monitoring and evaluation later indicate that the effort be abandoned?

NPT Response: The proposed project does not include construction or maintenance of facilities.

ISRP Reviewer Comments: A more complete answer might have been provided, but the crux of the matter is that the question is not appropriate for the circumstances here.

Program Language Identified by the ISRP

Question 3.1: Measure 7.0D: Comprehensive environmental analysis assessing the impacts on naturally produced salmon of hatchery produced anadromous fish.

Measure 7.0D of the Council's 1994 Fish and Wildlife Program calls for a comprehensive environmental analysis assessing the impacts on naturally produced salmon of hatchery produced anadromous fish. The primary question we would like to have addressed with regard to the project is, does the environmental assessment adequately deal with the question of interactions of hatchery-produced salmonids and naturally spawning salmonids and steelhead in the Columbia River Basin? If so, how? If not, what are the potential or posited interactions and impacts?

NPT Response: Appropriate NEPA documentation has been submitted and approved for the first year of studies covered in this document (Appendix 5). Currently the project is submitting this document to initiate step 1 of the Three Step Process. A comprehensive environmental analysis will be developed for step 2, after the completion of proposed studies in the document.

ISRP Reviewer Comments: The measure cited is intended to apply to salmon and is not appropriate for this project with sturgeon.

Question 3.2: Measure 7.1A: Evaluation of carrying capacity and limiting factors that influence salmon survival.

Measure 7.1A of the Council's 1994 Fish and Wildlife Program calls for a basin-wide study on the ecology, carrying capacity, and limiting factors that influence salmon survival. The primary question we would like to have addressed with regard to this measure is:

Question 2a: How does the project intend to address the issue of carrying capacity within the watershed(s) into which fish will be placed?

Question 2b: Do these fish originate from the most appropriate native stock? Specifically, how will the artificial production which is proposed impact natural production?

Question 2c: What are the impacts on mainstem and ocean harvest? How are these impacts addressed?

NPT Response: Activities proposed in this document will aid in evaluating the carrying capacity for white sturgeon in Hells Canyon Reservoir. Ongoing studies by Idaho Power in the project area will also aid the evaluating carrying capacity.

ISRP Reviewer Comments: OK. Idaho Power has been studying sturgeon in the Hells Canyon dams for some time. Results of their studies and conclusions should be presented more fully in the Final Step One Plan. Similarly, Idaho Fish and Game has planted upward of 5,000 sturgeon in the mid-Snake since 1989. A summary of these activities

should be presented in the Partial Step One Plan along with inferences that bear on the proposed project.

Question 3.3: Measure 7.1C: Collection of population status, life history and other data on wild and naturally spawning populations of salmon and steelhead.

Measure 7.1C calls for the collection of population status, life history and other data on wild and naturally spawning populations of salmon and steelhead. The primary question we would like to have addressed with regard to this measure, especially with regard to listed species is:

Question 3a: What biological baseline information on naturally spawning populations of salmon and steelhead have been collected, and what high priority populations and “provisional population units” have been identified?

Question 3b: Does this baseline information include a profile on the genetic and morphological characteristics of wild and naturally spawning populations? What characteristics are to be maintained by management actions?

Question 3c: What are the limiting factors for wild and naturally spawning populations?

Question 3d: What is the natural carrying capacity for the identified populations?

Question 3e: What monitoring of identified populations of salmon and steelhead is identified as part of the project?

Question 3f: Are these efforts being coordinated with NMFS? If so, how?

NPT Response: Idaho Power has collected extensive information on the status and life history information on white sturgeon throughout the Snake River as part of their FERC re-licensing efforts. Results and conclusions of these studies will be publicly available in 2002.

ISRP Reviewer Comments: OK, except that it should have been possible to make some general statements.

Question 3.4: Measure 7.1F: Systemwide and cumulative impacts of existing and proposed artificial production projects on the ecology, genetics and other important characteristics of the Columbia River Basin anadromous and resident fish.

Measure 7.1F calls for a study to address the system wide and cumulative impacts of existing and proposed artificial production activities on the ecology, genetics and other important characteristics of Columbia River Basin anadromous and resident fish. This study is to be coordinated with the genetic impact assessment of Columbia River Basin hatcheries called for in measure 7.2A.2 of the Council’s

program. How does the project's environmental assessment address the direct, indirect and cumulative effects of the proposed production activities on anadromous and resident fish? Have those effects commonly associated with cumulative hatchery releases -- density dependent, competition, predation, disease transmission and genetic effects on other fish in the mainstem and oceanic environments been addressed? If so how? Have the genetic effects of the project on fish within and outside the Columbia River Basin been specifically addressed?

NPT Response: Currently the project is submitting this document to initiate step 1 of the Three Step Process. A comprehensive environmental analysis will be developed for step 2, after the completion of proposed studies in the document.

ISRP Reviewer Comments: Previously discussed in earlier responses.

Policies of the Artificial Production Review, Report and Recommendations (Document 99-15)

4.1. The manner of use and the value of artificial production must be considered in the context of the environment in which it will be used.

NPT Response: The use of artificial production proposed in this document is for the collection of critical information and is limited to a total of 550 fish. This represents a stocking density of 0.56 fish/ha. White sturgeon are indigenous to the project area. Currently the white sturgeon population in the project area is severely depressed with no known natural reproduction occurring.

ISRP Reviewer Comments: While the portion of Phase 1 described in the NPT Plan calls for 550 fish over the period 2000-2002, it is the long-term effect that ought to be considered in this response. The response might have considered two outcomes, one if the decision is the concept is determined to be feasible and the other if not.

4.2. Artificial production must be implemented within an experimental, adaptive management design that includes an aggressive program to evaluate benefits and address scientific uncertainties.

NPT Response: The primary purpose for use of artificial production proposed in this document is to address critical uncertainties which currently limits the development of a final implementation plan and appropriate NEPA documents.

ISRP Reviewer Comments: OK.

4.3. Hatcheries must be operated in a manner that recognizes that they exist within ecological systems whose behavior is constrained by larger-scale basin, regional and global factors.

NPT Response: The proposed project does not include the construction or maintenance of fish culture facilities.

ISRP Reviewer Comments: The question does not apply.

4.4. A diversity of life history types and species needs to be maintained in order to sustain a system of populations in the face of environmental variation.

NPT Response: The use of artificial production proposed in this document is for the collection of critical information and is limited to a total of 550 fish. This represents a stocking density of 0.56 fish/ha. White sturgeon are indigenous to the project area. Currently the white sturgeon population in the project area is severely depressed with no known natural reproduction occurring.

ISRP Reviewer Comments: OK

4.5. Naturally selected populations should provide the model for successful artificially reared populations, in regard to population structure, mating protocol, behavior, growth, morphology, nutrient cycling, and other biological characteristics.

NPT Response: The use of artificial production proposed in this document is for the collection of critical information and is limited to a total of 550 fish. This represents a stocking density of 0.56 fish/ha. White sturgeon are indigenous to the project area. Currently the white sturgeon population in the project area is severely depressed with no known natural reproduction occurring.

ISRP Reviewer Comments: OK

4.6. The entities authorizing or managing an artificial production facility or program should explicitly identify whether the artificial propagation product is intended for the purpose of augmentation, mitigation, restoration, preservation, research, or some combination of those purposes for each population of fish addressed.

NPT Response: The proposed activities described in this document rely on 550 sturgeon from artificial production to assess critical uncertainties.

ISRP Reviewer Comments: The end product of this artificial production project is intended for harvest augmentation.

4.7. Decisions on the use of the artificial production tool need to be made in the context of deciding on fish and wildlife goals, objectives and strategies at the subbasin and province levels.

NPT Response: The use of artificial production proposed in this document is for the collection of critical information and is limited to a total of 550 fish. This represents a stocking density of 0.56 fish/ha. Over 3,500 hatchery sturgeon have previously been

stocked through the mid-Snake River by IDFG as part of their sturgeon management activities.

ISRP Reviewer Comments: It would be short sighted to view this project in isolation from its primary goal, which is to use artificial production to support a fishery. The NPT response is part of the picture. The Final Step One Plan needs to summarize the results of the IDFG sturgeon stocking program more thoroughly than did the Partial Step One Plan we reviewed. What was learned through that stocking effort and how does it apply to this proposed project?

4.8. Appropriate risk management needs to be maintained in using the tool of artificial propagation.

NPT Response: The primary purpose of activities proposed in this document is to collect information on the entrainment potential and entrainment survival of stocked sturgeon in Hells Canyon Reservoir. This information is critical for a risk assessment of the project. From the risk assessment appropriate risk management strategies can be developed.

ISRP Reviewer Comments: The survival study is probably unnecessary, since the risks associated with artificial production have been dealt with by the appropriate choice of a donor stock.

4.9. Production for harvest is a legitimate management objective of artificial production, but to minimize adverse impacts on natural populations associated with harvest management of artificially produced populations, harvest rates and practices must be dictated by the requirements to sustain naturally spawning populations.

NPT Response: The proposed activities described in this document rely on 550 sturgeon from artificial production to assess critical uncertainties not to provide additional harvest opportunities.

ISRP Reviewer Comments: Again, the long-term goal should be considered. Because naturally spawning populations do not occur in the area of interest, there is no problem associated with harvest rates such as would occur in a mixed-stock fishery.

4.10. Federal and other legal mandates and obligations for fish protection, mitigation, and enhancement must be fully addressed.

NPT Response: Appropriate NEPA documentation (Appendix 5) and state permits (Appendix 6) have been obtained for the first year of proposed activities described in this document.

ISRP Reviewer Comments: OK

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