Independent Scientific Review Panel
for the Northwest Power & Conservation Council
851 SW 6th Avenue, Suite 1100
Portland, Oregon 97204
isrp@nwcouncil.org

MEMORANDUM **June 21, 2005**

TO: Doug Marker, Fish and Wildlife Division Director, Northwest Power and Conservation Council

FROM: Rick Williams, ISRP Chair

SUBJECT: Review of Nez Perce Tribe's Response to the ISRP's Preliminary Step Two Review of the *Johnson Creek Artificial Propagation Enhancement Project*, 1996-043-00. (ISRP 2005-12; see also ISRP 2005-6)

Background

The Response Review

On February 18, 2005, at the Council's request, the ISRP provided a preliminary review of the Nez Perce Tribes' (NPT) Step 2 submittal for the *Johnson Creek Artificial Propagation Enhancement Project* (JCAPE). In the preliminary review, the ISRP provided a set of 22 recommendations. The Council then provided the NPT a chance to respond, and their response is the subject of this review.

The Initial Step 2 Review

The JCAPE project proposes to annually produce and release 100,000 smolts from adult summer Chinook salmon returning to Johnson Creek. McCall Fish Hatchery will be used to rear the juvenile fish, and no additional facilities are being proposed.

The Council's prior recommendation on the JCAPE project was made on April 2, 2002, as part of the FY 2002 Programmatic Issues for the Mountain Snake and Blue Mountain provinces. The recommendation was to conditionally fund the project at levels consistent with past Council decisions in FY 1998 and FY 2001. The Council provided four specific conditions. Conditions one and two pertained to the relationship of JCAPE to the Idaho Supplementation Study. These conditions were addressed as part of the ISRP's Idaho Supplementation Study review (ISRP 2003-8) and the Council's subsequent recommendation regarding the Idaho Supplementation Study (ISS) in 2003; consequently, the Council did not request the ISRP to revisit the issue of Johnson Creek's transition from a control stream in the original Idaho Supplementation Study to a treatment stream. The third and fourth conditions addressed previous issues and the future expectations that the Council had with the project.

The third condition included scientific issues and was the focus of the February 18, 2005, ISRP review (ISRP 2005-6). Those conditions included:

- relationship of this project to the Council's policies on artificial/natural production,
- final design of the project consistent with any master plan and preliminary design,
- has the project or its purpose changed in such a way to raise new scientific concerns,
- has the underlying science or the way it is understood changed so as to raise new scientific issues, and
- how technically appropriate are the monitoring and evaluation elements of the project.

The project sponsors address these issues in Attachment C (JCAPE Monitoring and Evaluation Plan), Attachment F, the Project Review Conditions, and Attachment G, the Master Plan Responses. These documents were the focus of the ISRP review (ISRP 2005-6). The ISRP's initial Step 2 review provided twenty-two recommendations intended to meaningfully advance the JCAPE. The Nez Perce Tribe (NPT) provided a written response to those recommendations on April 26, 2005. This ISRP review addresses the NPT responses to ISRP 2005-6.

In their response, the NPT asserted that a number of the ISRP's 22 recommendations were management decisions, and therefore did not pertain to the scientific merit of the JCAPE. Apparently, our review was perceived as being too prescriptive, rather than pointing out ways to improve the project to make it consistent with current scientific thinking about supplementation. The ISRP acknowledges that many of the recommendations were frank and directive in nature; however, our intention was to provide concise elements to which the NPT could respond. The recommendations in our initial review, and the follow-up in this review, focus on the underlying scientific basis for the methods used to implement supplementation and on the scientific basis of the monitoring and evaluation of the project's performance indicators and uncertainties. Our comments are consistent with and supportive of specific review elements in the Council's 3-Step review process. In this follow-up, we clarify further the scientific issues in our earlier recommendations. We believe another response is needed.

Finding

The NPT response made progress, particularly on M and E issues. The ISRP concludes, however, that the response is insufficient to fully address the scientific issues raised in our initial review, ISRP 2005-6. Taken together, the JCAPE Monitoring and Evaluation Plan (Attachment C), the Project Review Conditions (Attachment F), the Master Plan Responses (Attachment G), and the responses to ISRP 2005-6 do not satisfy the scientific elements needed to meet the Council's policies on artificial production (Council 99-15), incorporate recent advances in the underlying scientific understanding of supplementation, and provide a technically appropriate monitoring and evaluation plan. All of these are elements of the Council's step review process.

We clarify our recommendations, focusing on what we believe are the major issues:

1. The underlying scientific understanding of supplementation has progressed since the project was initiated, and this refines the scientific issues.

2. The project design does not fully consider the emerging scientific understanding of supplementation.

3. The Monitoring and Evaluation Plan (Attachment C) is not adequate to meet Council's APR Principle 2: Artificial production must be implemented within an experimental, adaptive management design that includes an aggressive program to evaluate the risks and benefits and address scientific uncertainties.

1. Scientific Understanding of Supplementation. Since the JCAPE project was initiated, peer-reviewed scientific literature on the effects of supplementation on the natural spawning fitness of an integrated population has been refined (Lynch and O'Hely 2001, Ford 2002, Goodman 2005). The effect of population subdivision of managed and harvested populations on effective population size has been developed (Tufto and Hindar 2003). And the dynamic interaction between the intrinsic productivity of an integrated population and management control variables – the broodstock mining rate, the proportion of hatchery-origin adults allowed on the natural spawning grounds, the proportion of natural-origin adults used in hatchery spawning, and the harvest rates – has been developed (Goodman 2005). The implications of these new findings have not been addressed in the JCAPE.

2. Fully considering the scientific understanding of supplementation and integrated hatchery programs in the design of JCAPE. Supplementation is intended to increase the numbers of naturally spawning adults (both hatchery- and natural-origin adults), with the hope of eventually increasing the numbers of natural-origin adults. Whether or not this can be achieved is a function of the adult-to-adult replacement rate in the hatchery and natural spawning phases and of the relative size of each phase. The scale of individual supplementation programs, and the risks they pose to natural populations, is under some management control. The scale of each program can be controlled by adjusting the proportion of natural- and hatchery-origin adults in the spawning population in each phase, by deciding on a broodstock mining rate, and by regulating harvest and harvest selectivity.

The level or scale chosen for the management controls should be justified by scientific principles and empirical evidence. In the case of JCAPE, a very conservative hatchery breeding protocol is established. All hatchery broodstock is to be of natural-origin. The ISRP encourages this protocol. The JCAPE proposes using a 50% broodstock mining protocol (collecting 50% of the natural-origin adults for use as hatchery broodstock). The ISRP recommended using 25%. This was perceived as prescriptive by NPT, and based on opinion. JCAPE based the 50% broodstock mining rate on their Risk/Benefit Analysis of the probability of retaining rare alleles for 15 years. The approach used in the Risk/Benefit Analysis is superseded by recent methods, and, further, the R/B Analysis does not consider the demographic consequences of removing spawning adults from the population. The JCAPE needs to scientifically justify the operational criteria it employs to meet Council APR principles 1, 2, 3, and 8. Finally, the JCAPE does not have an established "cap" on the proportion of hatchery-origin adults permitted above the Johnson Creek weir. The ISRP recommends NPT adopt the Puget Sound Hatchery Scientific Review Group (HSRG 2004) *PNI* (proportion of natural influence) of 0.70 for a natural stock of high intrinsic value (see further discussion of this point below under Recommendations 8 and 9).

3. Inadequate Monitoring and Evaluation Plan. Artificial Production Review (NPPC 99-15) Principle 2 calls for artificial production to be implemented within an experimental, adaptive management design that includes an aggressive program to evaluate the risks and benefits and address scientific uncertainties. The 2000 Council Fish and Wildlife Program recognizes that supplementation is an unproven tool and should be used in an experimental framework.

The intended benefit of supplementation is to increase the numbers of naturally spawning adults (both hatchery- and natural-origin adults), with the hope of eventually increasing the numbers of natural-origin adults. Supplementation carries with it risks that include demographic loss, if the hatchery replacement rate does not equal or exceed the natural replacement rate, and loss of natural spawning fitness. The ISAB (2003-3) details the design necessary to evaluate demographic benefit from supplementation and to measure fitness loss.

Estimating an overall demographic benefit from supplementation requires contrasting the supplemented stream with unsupplemented reference streams. Estimating fitness loss requires comparing productivity curves between supplemented streams and unsupplemented reference stream(s) once supplementation is discontinued. JCAPE, in the Monitoring and Evaluation Plan, and in the NPT response, state they consider using a reference site, but choose only implicit treatment – reference comparisons. Their primary evaluation of hatchery-origin contributions to natural production and potential impacts on fitness using pedigree analysis is not sufficient. The pedigree analysis undoubtedly will contribute important information on the immediate demographic consequences of supplementation, but will not provide answers to the uncertainty of the relative natural spawning fitness loss or the demographic benefit from supplementation.

Our knowledge of supplementation is still quite incomplete, so proposals to use the "supplementation tool" must proceed as an experiment incorporating elements to address the unknowns. Unknowns include the difference between actual and potential productivity of habitat, the contribution of migrating juveniles at different times of the year to adult production, acceptable loss in fitness, impact of stocking – location, timing, and size – on naturally produced fish, and the role of density in migrant timing, body size, and survival. Adequately addressing these unknowns is demanding. When conducting management experiments (aka adaptive management), replication is needed; single treatment and reference populations are not enough (Underwood 1997). Using the Yakima and NEOH projects alone to supply the answer to whether or not supplementation is effective is not adequate. The “redds per kilometer” performance measure the ISRP understands is being used in the Idaho Supplementation Studies (ISS) is not a sufficient measure, so there is little hope that the ISS will inform whether or not supplementation yields a demographic benefit or a loss in fitness. This is why the ISRP emphasizes it is critical that this project be included in the larger effort to evaluate supplementation. The “reference” stream/population is criticized for being infeasible and too expensive. We recommend to Council and BPA that they fund sufficient M and E to evaluate whether or not supplementation yields a demographic benefit or a loss in fitness. If supplementation is executed without an appropriate experimental design, little will have been learned and effort will be wasted.

The unknowns associated with supplementation will be resolved only from experimental programs designed to obtain the required data. If the JCAPE adopts a good experimental design, it presents an opportunity to collect some useful information.

We provide additional specific details on our recommendations below:

Review Summary

The NPT responded to each of our initial 22 recommendations. In the text below, we present our initial recommendations, then our evaluation of the NPT's response to the recommendations, and provide revised recommendations listed alphabetically for issues that need further consideration and response.

Initial review
Attachment F (The Project Review Conditions)
Attachment G (The Master Plan Responses)

Recommendation 1. Provide greater resolution on the dynamic tension between the rebuilding goals and the harvest goals – goals that are potentially in conflict with one another.

ISAB (2003) identified the need to establish performance standards for hatchery and natural replacement rates, broodstock mining rates, NOR/HOR proportions on the natural spawning grounds, abundance estimates (ranges) for NORs and HORs, and how these would be partitioned into harvest, hatchery broodstock, and natural spawning components. The documents from JCAPE have not gone far enough in describing a program beyond maintaining the breeding population in Johnson Creek. The JCAPE planning documents, including the HGMP and M and E plan, will be of greater value to the project sponsors and region if these goals, objectives, and performance standards are clearly identified.

ISRP recognizes that goals are management obligations; nevertheless, they should be scientifically justifiable and should be used to measure whether a project is accomplishing what it set out to do.

ISRP recommendation A. Performance standards for NOR and HOR abundance, ratios of hatchery- and natural-origin adults in hatchery and natural spawning, and broodstock mining rates should be decided upon and included in the appropriate planning documents.

Recommendation 2. Provide justification for estimates for smolt carrying capacity and spawner needs for the broodstock.

The NPT response to recommendation 2 identifies smolt carrying capacity estimates in the NPCC presence/absence database (510,048), by CRITFC in the Benefit/Risk Analysis (729,720), and by NOAA Fisheries in BiOp 1250 (100,000).

Smolt carrying capacity is an item that is vital to project success, but also is a point of contention (among NOAA Fisheries/NPT). NOAA concluded the NPCC and CRITFC estimates were large and may have overestimated carrying capacity. They further concluded that the M and E for the project should yield information on Johnson Creek natural production and pre-smolt emigrant contribution to adult returns. Review of the M and E plan did not reveal a specific intent to estimate the smolt capacity of Johnson Creek. Search of "carrying capacity" in the document produced one occurrence in an appendix which simply asserted that the creek was below capacity. Search of "smolt capacity" in the M and E plan did not produce any occurrence. Analysis of Hood River steelhead and Umatilla steelhead, coho, and spring and fall Chinook conducted within the last few years suggests that tributary capacity is much below the early estimates. Based on these, there is reasonable uncertainty of the smolt production (carrying) capacity of Johnson Creek. Therefore, the ISRP's recommendation focuses on recognizing this uncertainty and attempting to estimate the range of smolt carrying capacity within Johnson Creek, rather than on a specific estimate of carrying capacity.

ISRP recommendation B. JCAPE planning documents should recognize that the smolt capacity of Johnson Creek is a critical uncertainty, and estimating the range of the capacity should be identified as an element of the M and E plan.

Recommendation 3. Provide defined decision points related to project outcomes. For example, if adult numbers can be increased to the point of providing a harvest, it is not clear how that can be reversed if an effect on fitness is detected.

The NPT response to recommendation 3 identifies that an adaptive management loop is present in the M and E plan on pages 67 – 69. This section of the M and E plan identifies the management process for conducting the loop. Monitoring and Evaluation Objective 7b. (page 68) states "specific questions to be evaluated are:

Has any of the uncertainty been removed and can any M & E activities be discontinued?

Are the M & E findings sufficient to recommend program operation modification prior to the five-year review?

This objective goes on to identify that an annual JCAPE management review will be conducted to address:

Assessment of data and recommended changes to the risk levels assigned to all of the critical uncertainties

Assessment of JCAPE performance in relation to set performance thresholds.

A search of "risk levels", "performance thresholds", and "critical uncertainties" in the HGMP, Appendix G - Master Plan Elements, Appendix F – Response to Review Conditions, and Appendix C – the M and E Plan produced no occurrences of "risk levels" or "performance

thresholds". The search of "critical uncertainties" produced five occurrences in the M and E plan, one in Appendix F, two in Appendix G, and none in the HGMP. In most of the occurrences of "critical uncertainty", reference is made to the M and E plan quantifying 38 key performance measures which will contribute to regional monitoring and evaluation efforts addressing critical uncertainties associated with supplementation and ESA listed stock status/recovery.

JCAPE's M and E plan, Appendix F, and Appendix G do not define or describe "risk levels", "performance thresholds", or identify what the "critical uncertainties" are. Consequently, the association of specific performance metrics with evaluating critical uncertainties is absent. To fulfill the intent of Monitoring and Evaluation 7b, these elements need to be provided in the planning documents.

ISRP recommendation C. The M and E plan should formally define what risk levels are, identify the critical uncertainties they are testing, and provide the performance thresholds that prompt review of risk levels and program operation modification.

Recommendation 4. Manage the Johnson Creek sub-population as a unit of the metapopulation (unless demonstrated to be isolated).

The NPT response to recommendation 4 provided a brief explanation of the consultation with NOAA Fisheries on broodstock selection and allocation.

Originally, JCAPE proposed to pass all fish that arrived at the Johnson Creek weir into Johnson Creek so they could spawn there. NOAA Fisheries objected to that management plan, and in BiOp 1250 permitted only JCAPE and unmarked fish to be passed into Johnson Creek. NOAA Fisheries believes that Johnson Creek is largely isolated, but connected, by perhaps 5% natural straying, to Stolle Meadows/upper South Fork, Poverty Flats/middle South Fork, and Secesh River/Lake Creek summer Chinook spawning aggregates.

The interrelationship of Johnson Creek with other South Fork Salmon River summer Chinook populations raises two concerns. One is creating artificial isolation, i.e. no genetic interchange with neighboring populations, when it has occurred naturally in the past. A second is straying of JCAPE salmon into adjacent streams and unintentionally "supplementing" them. If there are adverse effects to natural spawning fitness from supplementation, this would extend those effects beyond Johnson Creek.

ISRP recommendation D. Recommendation 4 should be adopted and JCAPE should recognize uncertainty in the metapopulation structure of the South Fork Salmon River summer chinook salmon. This uncertainty should be reflected in the monitoring tasks and annual reports.

Recommendation 5. Examine the possibility that spawner needs and "smolt carrying capacity" have been overestimated. Density dependent effects are likely to be important considerations.

The NPT response to recommendation 5 summarizes the consultation between NOAA Fisheries and NPT, reflected in BiOp 1250.

The consultation reveals uncertainty about the range and long-term mean SAR for hatchery smolts (which drives the smolt release numbers and broodstock needs) and natural smolts produced per redd.

In the response, NPT states "Monitoring of juvenile production at various levels of adult escapement will occur as part of the JCAPE M and E plan and serve as cursory assessment of capacities used for program development. Variation in adult spawner numbers will occur naturally due to changes in annual survival rates and production."

ISRP recommendation E. Uncertainty of hatchery SARs and smolts per natural redd/spawner should be recognized in the HGMP, Appendix F, Appendix G, and Appendix C (the M and E plan), and these topics should be considered annually in the program review. Steps to identify the performance thresholds that would trigger reconsidering operations should be developed.

Recommendation 6. If fitness decreases, then modify or terminate the program, depending on whether the decrease reaches a threshold established in advance.

The NPT response to recommendation 6 is:

"A pre-established decision tree with performance threshold criteria is not being pursued due to the complex relationship between the 20 management assumptions identified in the JCAPE and the myriad of outcomes and possible management responses. Each of these management assumptions independently have pre-established criteria which will provide the quantitative information related to programmatic goals for consideration with the adaptive management process".

The response seems contradictory with itself and with Monitoring and Evaluation Objective 7b. For transparency among the co-managers and the region, identifying critical uncertainties and developing the performance thresholds, risk levels, and operational modification are necessary.

ISRP repeats recommendation C. Define risk levels, identify critical uncertainties, establish performance metrics and thresholds for those uncertainties, and develop steps to trigger reconsideration of operations.

Recommendation 7. Present synthesis of current results of the supplementation program for the Step 3 Review.

ISRP recommendation F. Sponsors need to include summary of results-to-date. The summary can include references to sources of supporting data. The summary should provide clear statement of what they believe they have accomplished to date.

Initial Review --- Supplementation Protocol, Scale, and the Need for Limits

Recommendation 8. The proportion of NOR adults taken for broodstock should not exceed 25%.

Recommendation 9. Project sponsors should adopt a conservation measure of not having more HORs than NORs in the naturally spawning mix.

The NPT provided a combined response to recommendation 8 and 9. In summary, they affirmed that the broodstock size was chosen to provide a probability of preserving rare alleles over a three generation period and that natural-origin recruits (adult returns) (NORs) are used exclusively in the hatchery phase to avoid serial artificial selection. The calculation of the numbers of hatchery and natural spawning fish required to maintain the effective size necessary to avoid loss of alleles was presented in a Benefit/Risk Analysis.

The ISRP previously acknowledged and endorsed exclusive use of NORs in the hatchery broodstock and encourages the JCAPE to continue that practice.

In the Benefit/Risk analysis the estimated number of spawning fish required to preserve alleles was 232 in the hatchery phase. NOAA Fisheries, in BiOp 1250, determined that the basis for the calculation was incorrect, and determined the number was 50 (25 pairs). NOAA Fisheries determined that 230 returning fish were needed in the natural population to maintain an effective population size of 50. NOAA Fisheries determined that the program design maintained an effective population size in both the hatchery and natural phases, which was redundant, and concluded that as a risk averse measure it might be appropriate.

In BiOp 1250, NOAA Fisheries expressed concern that no cap was in place on the proportion of hatchery-origin recruits (adult returns) (HORs) passed above the Johnson Creek weir to spawn naturally. They noted that this level of intervention was not in place in other locations in the Salmon River system.

The HSRG, following Lynch and O'Hely (2001) adopted a measure called the proportion of natural influence (PNI), based on the percentage of time an allele spends in the wild.

$$PNI = \frac{pNOB}{pNOB + pHOS},$$

where *pNOB* and *pHOS* are the proportions of broodstock consisting of natural-origin recruits (NORs) in the hatchery broodstock and natural spawners consisting of hatchery-origin recruits (HORs). The HSRG recommends that PNI should exceed 0.5 in integrated hatchery/natural systems and exceed 0.70 in systems with significant biological resources. The Johnson Creek population of summer-run Chinook salmon should qualify as a significant biological resource. JCAPE intends to use only natural-origin recruits (NORs) as hatchery broodstock, so *pNOB* would be 100%. To maintain a PNI of 0.70 or greater, the proportion of hatchery-origin recruits (HORs) passed above the weir in Johnson Creek for natural spawning (*pHOS*) should not exceed 42%.

The broodstock mining rate, the proportion of HORs in serial hatchery rearing (1 – *pNOB*) and the proportion of HORs on the natural spawning ground (*pHOS*) are variables that contribute to:

1. the effective population size of the integrated population;
2. reduced fitness in the natural spawning phase owing to antagonistic selection in the hatchery and natural phases and relaxed selection in the hatchery phase; and
3. demographic loss owing to the removal of naturally spawning individuals.

Since the benefit/risk analysis was conducted in 2000, additional theoretical works and analytical models have appeared that evaluate antagonistic selection (Ford 2002), relaxation selection (Lynch and O'Hely 2001), effective population size (Tufto and Hindar 2003), and the multiple consequences of these factors (Goodman 2004, 2005, HSRG 2005) in integrated/supplementation salmon populations.

Using these recently developed concepts and methodologies offers an opportunity to further consider the assumptions about salmon production in a supplemented population. In turn, this can serve to evaluate the implications of adopting different operational measures (i.e. broodstock mining rates, proportions of HORs on the natural spawning grounds (*pHOS*)) in the JCAPE to generate hypotheses that should be tested, rather than accepted at face value.

Substantive adaptive management from JCAPE will only accrue if results are obtained from experiments that are appropriately designed. The design and implementation of experiments of this sort, and on this scale, have historically proven to be a very difficult challenge within the Columbia River Basin. The ISAB (2003) commented, in its supplementation review, on the insufficiency of the existing record of experimentation with supplementation, despite the widespread institutional acknowledgement that supplementation is experimental.

ISRP recommendation G. JCAPE should evaluate alternative broodstock mining levels and caps on the proportion of HORs on the natural spawning ground (*pHOS*) in an experimental framework designed to determine the changes in natural spawning fitness under these management operating guidelines. This experiment requires contrasting the

natural spawning productivity of the supplemented JCAPE to an unsupplemented reference location(s), once supplementation is ended. Supplementation could be suspended at the end of the current 5-year BiOp (June 2008), to provide for a period of evaluation.

Attachment C: Review of the Monitoring and Evaluation Plan

The ISRP affirms it original conclusion that, overall, the M&E Plan (Attachment C) is a good start on a working draft of a standalone Plan for the Johnson Creek Summer Chinook Salmon supplementation project. The Johnson Creek team was successful in creating a single integrated document, describing general methods and data to be collected in Johnson Creek, including a combination of population status monitoring, comparative performance testing, and small-scale experiments. Generally favorable attributes of the M&E were direct statement of the management objectives and linking of the performance measures to the management objectives.

> ***Recommendation 10. The sponsors should link their management objectives to the RASP definition of supplementation they adopt.***

NPT concurred with the ISRP recommendation and indicated in their response that management objectives 1 – 4 address maintaining or increasing natural production, maintaining life history characteristics and genetic diversity, and minimizing impacts.

ISRP recommendation H. NPT should edit the M and E plan to indicate which objectives address each of the important attributes of supplementation: maintaining or increasing natural production, and keeping genetic and ecological effects on target and non-target populations within limits. This is an opportunity to link performance measures for each of the management objectives to the underlying components in the RASP definition.

Specific Major Monitoring and Evaluation Issues

> ***Recommendation 11. Contrast natural history parameters for NORs in supplementation and reference streams.***

> ***Recommendation 12. The Johnson Creek Artificial Propagation Enhancement Project should support the need for collection of additional data in Phase III of the ISS.***

> ***Recommendation 13. The treatment and control streams of the ISS (perhaps including the mainstem of the South Fork Salmon River) should be reference streams for the Johnson Creek Artificial Propagation Enhancement Project.***

> ***Recommendation 14. Make the Johnson Creek M&E Plan a standalone document containing complete M&E plans for the JCAPE project and reference streams.***

ISRP RESPONSES TO JCAPE RESPONSES: M&E Plan.
The ISRP recommends that the JCAPE M&E Plan (Attachment C, NPCC Step 2/3 Submittal) be edited and revised to incorporate those issues on which the ISRP and the proponents agree. In addition, we recommend that the proponents consider the following discussion (our responses to their responses) and incorporate recommendations I through M in a revision of the M&E Plan (Attachment C, NPCC Step 2/3 Submittal).

Recommendations 11 to 14.
We appreciate and support the proponent's statement that they will "…examine the performance of Johnson Creek relative to the Secesh River …" They note that the Secesh River has already been recommended to function as a reference stream under the Northeast Oregon Hatchery Monitoring and Evaluation Program and will serve equally well for the JCAPE Program. The ISRP strongly recommends funding of adequate monitoring in the Secesh River to allow it to serve as a reference stream for these important supplementation experiments. In defense of our original recommendations, we note that the Secesh River was not stated as a reference/control stream in the Attachment C, NPCC Step 2/3 Submittal. The words reference and control are not used in the M&E Plan in the sense of reference or control stream for Johnson Creek.

Using the Secesh River as a reference location is not without some ISRP reservation. NOAA Fisheries, in BiOp 1250, and NPT in the Risk/Benefit Analysis considered the Sesech River to be part of a larger summer Chinook metapopulation. The "straying rate" between these sites needs to be evaluated (see Recommendation 4 above) to ensure that the dynamics of one location are not unduly influencing the other.

We disagree with the proponent's statement that "If exploratory retrospective analyses suggest that we can achieve reasonable statistical power, we will incorporate those appropriate tests into the routine analysis." Regardless of the power (it will be what it is!), the differences between parameters measured on Johnson Creek and reference streams should be estimated. Precision of the estimates must be quantified by reporting standard errors of estimates, limits of confidence intervals, or other appropriate measures. The proponents of the JCAPE, and fisheries biologists in general, should limit the use of classical hypothesis testing in analyses and rely relatively more on point estimation of effects, differences of effects, etc., with stated precision of estimates.

The ISRP expresses its sympathy to the proponents of the JCAPE, because development of a biologically sound, fiscally conservative, and practical M&E program is one of the most difficult problems faced by scientists. We fully agree that it is an issue of "…balancing a rigorous study design with an approach that is likely to be both biologically sound and fiscally conservative/implementable."

ISRP recommendation I. The proponents' responses concerning use of the Secesh River as a reference stream should be included in the M&E Plan (Attachment C, NPCC Step 2/3 Submittal). Details should be given on indicator variables and field data collection methods to be used on Johnson Creek and the Secesh River. The M&E Plan should be edited to limit the use of tests of classical null hypotheses in the evaluation and planning stages in favor of point estimation methods.

Recommendation 15. Conduct economical reconnaissance surveys for spawning and rearing of chinook on the sites selected for long term habitat status and trend monitoring.

Recommendation 16. Include Johnson Creek in the probabilistic sampling scheme for redd counts in the South Fork Salmon River watershed.

The proponents commit to conducting low cost reconnaissance surveys for spawning of Chinook on the sites selected for long term habitat status and trend monitoring. They clarify that Johnson Creek will be included in the probabilistic sampling scheme for redd counts in the South Fork Salmon River watershed.

Using simple and convenient survey procedures for presence-absence of rearing juveniles is practical and would provide valuable data. (For example, one person might snorkel through a reach once in a season every three years.) The ISRP continues to recommend some kind of low cost reconnaissance surveys for rearing of Chinook on the sites selected for long term habitat status and trend monitoring.

ISRP recommendation J. The proponents' responses should be included in the M&E Plan (Attachment C, NPCC Step 2/3 Submittal). The proponents should develop simple and convenient presence-absence reconnaissance survey methods for rearing juveniles on sites selected for long term habitat status and trend monitoring.

Initial review --- Cooperation with other M&E projects.

Recommendation 17. The JCAPE project should support the selection of the South Fork of the Salmon River as a study site for BPA project No. 200301700. The ISRP further recommends that the Council support the cooperation of these two projects.

Good response to ISRP recommendation. The proponents of the JCAPE project support the selection of the South Fork of the Salmon River as a study site for BPA project No. 200301700.

ISRP recommendation K. The Nez Perce Tribe should join and participate in the Pacific Northwest Aquatic Monitoring Partnership (PNAMP).

Initial review -- Prioritization of M&E Activities

Recommendation 18. Include flow charts showing relationships of ongoing projects that will provide data for the M&E component of the JCAPE project.

The ISRP appreciates receiving Table 1 "Monitoring and Evaluation activities performed in the South Fork Salmon River by Idaho Department Fish and Game (198909800 and LSRCP), U.S. Fish and Wildlife Service (199102800), Nez Perce Tribe (198909802, 199703000, 1996040300, and LSRCP), Fish Passage Center (198712702), and NOAA Fisheries (198909600)." We agree with the proponents that the relationship of the JCAPE M&E activities to ongoing activities throughout the South Fork Salmon River watershed is complex. Our experience in such large complex projects is that not everyone is doing what the other person thinks is being done. When it comes time to analyze the data, some critical pieces are usually not available or, at best, introduce considerable uncertainty!

ISRP recommendation L. The M&E Plan should have more complete documentation on design of sampling protocols and field data collection methods (including references to published material) on which the success of the JCAPE evaluation will rely. The presentation on page 73 of the Plan does not provide sufficient documentation for the new biologists who will inherit the job of analyzing the JCAPE.

Recommendation 19. Propose prioritization of all M&E in the Step 3 submittal, including priority of ongoing M&E activities.

Agree. Good responses to our recommendation.

Recommendation 20. Emphasize estimation of parameters, and report precision of the estimates.

Agree. Good responses to our recommendation. The ISRP agrees that, with use of point estimates and measures of precision, as with classical hypothesis tests, the question remains – how large must the deviation be to warrant consideration as "biologically significant"? There is no way to get around this question! Our point is that the E of M&E should not be based on whether or not a formal test of a hypothesis is significant at some predetermined level (e.g., 5% or less p-value). The proponents agree with us, based on their example from the Hood River. Estimates with measures of precision provide more information to the decisions makers than do the p-values of tests of hypothesis. Questions concerning "power" are better phrased in terms of desired accuracy of point estimates.

ISRP recommendation M. The M&E Plan should be edited to emphasize evaluation by "estimation" rather than by "classical hypothesis testing."

Recommendation 21. Co-locate field data collection on common study sites.

Agree. Incorporate language into the M&E Plan.

Recommendation 22. Develop and test "double sampling" procedures for estimation of bias and precision in redd surveys.

The proponents agree with the ISRP that there is significant variation between observers in redd counts. The proponents have communicated their conclusions "…that redd count expansions are generally insufficient for ESA recovery thresholds, Tier II, and Tier III monitoring." Perhaps the recommendation should have been that the proponents assess if the methods are sufficiently unbiased and precise to be of value in evaluation of the JCAPE.

ISRP recommendation N. The proponents should consider procedures to reduce the bias, if any, and improve the precision of estimates. The original Recommendation 22 stands.

Literature Cited

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