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

Memorandum (ISRP 2009-2) **January 21, 2009**

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

From: Eric Loudenslager, ISRP Chair

Subject: Response Requested -- Step Two Review of the Chief Joseph Dam Hatchery Program, Project # 2003-023-00

Contents

Background

In November 2008, the Northwest Power and Conservation Council requested that the ISRP assess the Colville Confederated Tribes' November 2008 *response* to the ISRP's March 7, 2008 preliminary Step Two review[1] for the Chief Joseph Dam Hatchery Program, Project # 2003-023-00. The ISRP's review below includes a chronology of the review history and discussion of six scientific issues identified by the ISRP and Council in the Step One review that need further development/clarification during Step Two. This is a Step Two Review in the Council's Three-Step Review Process and is the fifth review over the past six years that the ISRP has considered for this project, either through the project selection or the Step Review process. These reviews and responses have resulted in a healthy and constructive scientific dialogue with evidence of progress at each step for this complex and ambitious hatchery program.

Original 2002 Proposals

This project was originally formed from two proposals submitted during the 2002 project selection process for the Columbia Cascade Province, to address fish propagation, fish harvest, and research monitoring and evaluation needs in the Okanogan River subbasin -- Proposal #29040 *Develop and Propagate Local Okanogan River Summer/Fall Chinook*, and #29033

[1] www.nwcouncil.org/library/isrp/isrp2008-2.htm

Design and Conduct Monitoring and Evaluation Associated with the Reestablishment of Okanogan Basin Natural Production. These proposals received favorable ISRP reviews[2] and support from the Council, CBFWA, NOAA, and eventually BPA. Subsequently, the Colville Tribes, Council, and Bonneville agreed to add a separable spring Chinook recovery component to the master planning effort.

2005 Step One Review

In 2005, the ISRP conducted a Step One review of the hatchery program's Master Plan (ISRP 2005-2[3]). Step One is the preliminary review at the feasibility stage for which all major components and elements of a project are to be identified as specified by the Council's Three-Step Review requirements (NWPCC 2001-29, NWPCC 2006-21). In the Step One review, the ISRP recommended that the Master Plan be revised to more completely address several concerns. The Council subsequently approved the Chief Joseph Dam Hatchery Program Master Plan, with the condition that the issues identified by the ISRP in Step One need to be addressed during preliminary design and reviewed as part of Step Two. The Council further approved inclusion of the spring Chinook component and the two associated research studies as program elements to be part of the Step Two planning and preliminary design during Fiscal Year 2005.

Specifically, the six issues to be addressed by the sponsor in the Step Two submittal included:

1. a specific time-frame process (i.e., decision tree) that outlines the expected range of the production scenarios,

2. additional discussion of the proposal as it relates to alternative forms of mitigation,

3. additional detail regarding the proposal and the relationship to the Biological Assessment and Management Plan (BAMP),

4. better integration with Council and basinwide documents (subbasin plan),

5. provision of basic information regarding the in-basin and out-of basin assumptions concerning survival, and

6. specifics on methods, designs (including controls), and hypothesis need to be incorporated in the monitoring plan.

2006 Review of FY 2007-09 Proposal

In 2006, as part of the project review process, the ISRP reviewed the Chief Joseph Dam Hatchery Program's FY 2007-09 proposal.[4] The ISRP recommended "fundable in part" (now phrased, meets review criteria in part) for the planning part of the project with construction and implementation being contingent on satisfactory completion of Three-Step Reviews for scientific merit through adherence to the Fish and Wildlife Program's Eight Scientific Principles.

[2] www.nwcouncil.org/library/isrp/isrp2002-11.htm
[3] www.nwcouncil.org/library/isrp/isrp2005-2.htm
[4] http://www.nwcouncil.org/library/isrp/isrp2006-6.htm

Ultimately, the ISRP noted in its final recommendation following the response loop, that the sponsor's response "provides little direct or additional scientific content to satisfy concerns with issues of science." As such, we cautioned the Council that the project had yet to fully meet the Fish and Wildlife Program scientific criteria.

2007-2008 Step Two Preliminary Review

In our preliminary Step Two review (ISRP 2008-2) we requested a response to a number of the six issues before we could make a final recommendation to Council. Specifically, after reviewing the material available in the Master Plan, appendices, Hatchery Genetic Management Plans (HGMPs), and Step Two documents, we found that the materials did not adequately address the scientific issues raised in the Step One review. We further recommended that, before the Council determines if the program proceeds to Step Three, that the Master Plan document itself be revised to specifically address the issues raised in the Step One review rather than focusing the revision solely on appended materials. The ISRP also urged that the Hatchery Scientific Review Group (HSRG) be engaged to assist in conducting an AHA (or other analysis) to model the program, and that modeling effort be used to support the resolution of the issues raised in the ISRP Step One review.

This January 2009 Step Two Response Review

This Step Two *Response* review focuses primarily on the response from the Colville Confederated Tribe to issues previously identified and underscored in the ISRP's preliminary Step Two review.

ISRP Recommendation and Review Summary

ISRP Recommendation: Response Requested. Two of the six step one issues are resolved (issues 3 and 4), but four need additional treatment (issues 1, 2, 5, and 6).

ISRP Review Summary: The ISRP recommends that the sponsor more fully address four of the scientific issues raised in the Step One review. This information is needed before the ISRP can judge the program as meeting Fish and Wildlife Program scientific criteria. The ISRP's concerns and recommendation remain focused on clarifying the six issues raised in the 2005 ISRP Step One review.

The ISRP's assessment of the sponsor's resolution of the six issues raised in the Step One review follows. The ISRP's assessment considered each issue that was identified in the Council decision letter to the Bonneville Power Administration, organized by more specific topics drawn from the 2005 Step One review. The Colville Confederated Tribe should refer back to ISRP's original review in 2005 for additional information.

ISRP Evaluation of Step One Review Issues

ISRP Step One Issue 1. A specific time-frame process (i.e. decision tree) that outlines the expected production scenarios.

- *the Master Plan failed to fully present a decision framework for conducting the program*;

ISRP Comment:
Appendix E (page 106) of the summer/fall Chinook HGMP dated July 1, 2008, entitled "Chief Joseph Hatchery Program Summer/Fall Chinook Adaptive Management Decision Tree-Contingency Actions" serves as the decision framework for the program. Seven key parameters are identified by the sponsor from AHA modeling that need to be incorporated into a decision matrix or tree to provide guidance for the program: smolt out-migration and ocean survival, ocean harvest, Zone 6 tribal harvest, fishing capacity of the Colville Tribes, the proportion of hatchery fish in the adult Chinook run, selectivity in pre-terminal fisheries, and release mortality in the Colville Tribe's selective fishery.

In addition to Appendix E a "Biological Rule Set" is described within both the November response and the HGMP.

The ISRP concludes the current HGMP in Appendix E needs to be refined with more specific detail and clarified before it can serve as an unambiguous decision framework, which is vitally important to effective adaptive management for either of the two programs. Moreover, while the list of seven biological attributes appears to cover the primary environmental and anthropogenic sources of mortality that influence the success of the program, they do not provide the appropriate reference points to make decisions on the program's annual longer range decisions for operation and the biological attributes about the program's efficacy at meeting its quantitative and qualitative objectives.

The ISRP suggests that the key parameters for primary management decisions for operating the Chief Joseph Hatchery program on an annual basis are:

a) the *number* of broodfish from hatchery-origin and natural-origin to be collected to provide progeny for rearing;
b) the *ratio* of hatchery-origin and natural-origin adults used as broodstock;
c) the *number* of parr and smolts to be released; and,
d) the *proportion* of hatchery-origin recruits (adults) permitted on the spawning grounds.

The primary biological attributes of the system that should serve as indicators for establishing the level of hatchery production are:

a) the abundance of natural parr and smolts emigrating from the Okanogan River subbasin; and
b) the abundance and productivity of natural-origin recruits (adults) returning to the Okanogan River subbasin.

The secondary biological attributes that should serve as indicators are:

a) terminal harvest level (number and biomass) and rate;
b) harvest selectivity (effectiveness of targeting harvest toward hatchery-origin fish and release of natural-origin fish); and
c) pre-spawning mortality of the collected broodstock.

What is needed are clear statements of reference points (thresholds) for each of these primary and secondary biological attributes, indicating how they will be measured and, how CJHP operations (management decisions) will be modified at each threshold.

As a general rule to meet the suite of numerical objectives for the management decisions, the ISRP would expect hatchery production to decrease at low levels of abundance to protect the natural stocks and also to decrease at high levels of abundance because harvest could be achieved without hatchery intervention - with termination at some low and high threshold levels of abundance. We also would expect hatchery production levels to be adjusted downward if harvest obligations (demand) can be achieved at those lowered levels (to avoid unnecessary or risky hatchery-origin surplus); if harvest selectivity cannot maintain low levels of hatchery fish on the natural spawning grounds; or if pre-spawning mortality of the broodstock exceeds defined thresholds.

As Appendix E is currently written, the management decisions are open-ended. For example, for "variation in smolt outmigration and ocean survival" the Effect on CJHP Decisions (page 111, see the Chief Joseph HGMP for definitions of pNOB, pHOS, PNI, and NOR) include:

a) Limit broodstock collection and CJHP production per the Biological Rule Set.
b) Maintain some at-risk CJHP production through reduced pNOB, if average PNI levels in previous years has significantly exceeded 0.67.
c) Seek selectivity in lower river fisheries to increase availability of NOR broodstock.

The ISRP finds that decision (a) to limit broodstock collection and CJHP production is the only unambiguous choice in this list (whether the Biological Rule Set is appropriate is another matter). Even in this case, the reduction in broodstock collection needs to be specified. For (b), (maintain some at-risk production), there are two ambiguities – the first is the number of years needed above a PNI of 0.67, and the second is what constitutes significantly exceeding a PNI of 0.67. These quantities need to be identified. Otherwise the option is not transparent and unambiguous. Decision (c), seek selectivity in lower river fisheries to increase availability of NOR broodstock, is a management action that could be pursued in subsequent years, but it does not seem to be an option if or when fish fail to return to the upper Columbia. It might be possible at some future time to develop lower river harvest options in response to indicators of abundance in the estuary or at Bonneville. These would need to be demonstrated.

Including thresholds for natural parr and smolt abundance in management decisions on the size of the program is somewhat more challenging because it is often seen as undesirable to raise large numbers of fish and then not be able to release them because there are low numbers of natural-origin parr and smolts in the river. However, there should be some discussion about the numbers and ratios of parr and smolts that are appropriate to release at observed abundances of

natural fish. Should it be 1:1, wild to hatchery, or should it be 2:1, or 1:10? A goal should be established and justified. The relationship between the numbers of naturally spawning adults and emigrating progeny could be established, and then a balance of natural and hatchery production could be based on the relative production at different adult abundance levels.

The ISRP also observed that the "Biological Rule Sets" differed substantially between the November 2008 response document and the HGMP. This inconsistency is of concern to the ISRP because the rules are not actually embedded in a Master Plan. Rather, they are in the HGMP, which the sponsors describe as a living operations plan that will be modified as conditions warrant. It is not clear to the ISRP under what circumstances the rule set will be changed. Nevertheless, the rule sets are worded in a way that some rules are less stringent than others depending on levels of adult return or other condition. Also, several rules are not rules, but explanations of when rules will be violated. Moreover, the rationale for the individual rules is not transparent in terms of the expected benefits relative to the risks they might pose. For example, the rationale for relaxing the pHOS criteria in years with low abundance of natural recruits (Integrated Harvest Program Rule 6) is presumed to allow wild production as a benefit, but seems to ignore the risk side of this rule. The ISRP concludes that abandoning the thresholds for PNI, pHOS, pNOB, and proportion of natural fish that can be collected for broodstock *at small run-sizes in order to maintain a minimum release of 576,000 juveniles from Similkameen Ponds* is not consistent with best practices or the Council's Fish and Wildlife Program principles and the Artificial Production Review principles.

- *for the integrated recovery program, no specific time-frame (specifically a range under a few likely scenarios) was offered to reach annual adult escapement targets to rebuild the wild spawning (natural production) part of the population;*

ISRP Comment:
The response document and the summer/fall HGMP are inconsistent with regard to whether an integrated recovery component remains part of the summer/fall artificial production in the Okanogan River. The HGMP clearly states that hatchery fish will be used for natural spawning adjacent to acclimation ponds for 15 years. The November response only identifies an integrated harvest objective. Moreover, the AHA analysis in the response indicates that natural-origin adults will decrease as a consequence of the CJHP. A clear statement is needed as to whether the integrated recovery portion remains.

A time-frame for the summer/fall Integrated Recovery Program to reach natural production targets was not provided and is a critical element in future decisions of whether to continue or terminate the program (as either a *success* or a *failure* at restoring wild production). Before leaving Step Two an implementation scheme and timeline needs to be established.

- *the Master Plan should have a very explicit analytical model that demonstrates the complementarity of the outlined Conservation Actions – especially Integrated Harvest and Integrated Recovery in terms of wild and hatchery fish.*

ISRP Comment:
An analysis demonstrating that the Integrated Harvest and Integrated Recovery programs are complementary has not been provided.

Whether the Integrated Harvest and Integrated Recovery programs could operate simultaneously without impacting each others' goals remains unclear. A primary basis for the success of the Integrated Harvest program rests on the efficacy and efficiency of the "selective harvest" program, whereby hatchery recruits are harvested to near completion (>90%) and the impact on wild recruits is trivial. No information (data results or analyses) was provided to instill sufficient confidence that this approach and method will meet expectations. For example, in years with low returns of wild and hatchery fish, relative fishing effort may be sufficient to effectively capture the small population of hatchery fish, where as in years with exceptionally high returns of hatchery fish, demand may not warrant continued fishing beyond a point, whereby the pHOS would increase. Ultimately, conflicts between hatchery and wild fish might arise under other scenarios as well.

In Table 2.4, NOR escapement, the model indicates a reduction in wild fish returns. This contradicts the intent of the program to increase wild production and needs to be reconciled. The sponsor indicates that expanding the geographic spawning distribution by releasing juveniles from dispersed acclimation ponds would compensate and overcome this reduction, but this assumes equal fitness of wild and hatchery juveniles, and no real information is provided to demonstrate how much expansion would be necessary, if it is doable, and whether it requires violation of their own rule set. Ultimately, this would change the size and shape of the proposed program in a way that warrants description.

Much of the empirical stock and recruitment information employed in the AHA modeling was from hatchery releases from the Similkameen Ponds acclimation site. This information is appropriate to represent the hatchery component in the AHA modeling. The ISRP is under the impression that productivity and capacity for natural production was drawn from EDT analysis. The ISRP believes empirical information representing the current state of abundance, productivity, and capacity should be used to represent the natural production component in the Okanogan River subbasin. Adult-to-adult and adult-to-juvenile (parr or smolt) relationships need to be presented and used in the AHA modeling. The source of the selection of capacity and productivity for summer Chinook in the Okanogan River should be clarified (beyond identifying that it was supplied by the HSRG).

Additionally, the numbers provided in Tables 1 and 2 in the November response appendix reveal that release numbers from the Similkameen Ponds are highly variable. If this is a consequence of poor survival within the Similkameen Ponds, it raises the question of whether the acclimation ponds can actually produce the fish proposed to be released.

- *identify under what circumstances, if any, the program will be terminated. For example, an observed reduction in wild fish spawning or natural production of juveniles after commencement of the supplementation program (even though total returns and escapement may increase) may be viewed as a primary indicator that the supplementation is interfering with natural production;*

ISRP Comment:
The conditions that would lead to program termination are not discussed. There is no reason why program termination should not be seen as one possible outcome of an adaptive management decision-framework. As we suggest above, for example, the Integrated Recovery program would be amenable to termination upon complete success at establishing a viable wild population or conversely upon failure to meet minimal natural production targets.

ISRP Step One Issue 2. additional discussion of the proposal as it relates to alternative forms of mitigation.

- *the Master Plan should address how construction and operation of the Chief Joseph Hatchery Program will stack up to required mitigation in other forms (e.g., modified main or subbasin hydrological regime up or down river, improved passage down river, habitat improvements, harvest management, etc.). For example, the ISRP is aware that in other venues one potential alternative, providing passage for anadromous fishes at Chief Joseph and Grand Coulee dams, is being evaluated. Whether either option is preferred and warrants focus or perhaps is even interdependent (i.e., affect each other's assumptions) is an important consideration to illuminate.*

ISRP Comment:
The November response and HGMP did not compare alternative forms of mitigation for the summer/fall integrated harvest and integrated recovery programs, or for the spring Chinook integrated recovery program. The purpose of this "Project Review Element" is to compare a range of approaches that might lead to an increase in stock-recruitment productivity in the Okanogan River subbasin. Alternatives that address in turn the major sources of mortality need to be analyzed for the effect they have on the required program size, natural abundance and productivity, and fishery yield using appropriate modeling. This should at a minimum evaluate the program as it is currently planned, and contrast that with programs that include improvements in habitat productivity and capacity within the subbasin, and programs that reduce harvest in pre-terminal regions.

In the Step Two submission the sponsor briefly addressed alternative forms of mitigation in section 3.4.3 (pages 3-5 and 3-6). The sponsor stated that restoring habitats in the Okanogan River subbasin is essential to recovery of fishery resources, and concluded that restoring fisheries based on increases in survival in the mainstem or through harvest management would be ineffectual.

The ISRP acknowledged the limitations on abundance and productivity of Okanogan Chinook owing to the alteration of the mainstem Columbia River and to marine and pre-terminal harvest. Because of this recognized limitation the ISRP commented:

> *"Therefore, a full examination of alternatives and necessary complementary actions is a worthy investment of time and planning effort. Some demographic modeling might indicate the level at which the values for smolts/adult and/or adults/smolt may have to*

increase to provide the desired benefits. The question then becomes one of finding the capacity to achieve those results, if possible. Unless limits to production within key life stages are addressed, success other than for harvest mitigation might not be realized, and even then, with limitations.

Central to this examination, is whether or not (or more likely, at what level) a reserved-right harvest can be sustained while simultaneously progressing toward restoration of one Chinook salmon ESU (i.e. summer/fall) and recovery of a second (spring Chinook) regardless of the wild or hatchery source. Well-founded answers to this central question require some basic data and analysis with AHA and EDT, for example. Therefore, the ISRP seeks transparent presentation of such analysis and continues to find that in its absence, the program has little scientific basis."

The CJHP has appropriately undertaken an AHA modeling exercise, and the results from that effort are used to more thoroughly present the natural-origin adult abundance, harvest opportunities, and requirements for selective harvest levels in order for the anticipated CJHP to function. However, there has yet to be a comparison of the programs that could potentially provide harvest opportunities to the Colville Confederated Tribe with other scales of artificial production combined with habitat improvements and harvest modifications. The ISRP discusses below some concerns about the input assumptions used in the AHA analysis. Given those concerns, the ISRP concludes that the planned yield from the program has not been established given existing environmental conditions. Appendix F – Productivity Estimates for Spring Chinook, in the November 2007 Step Two Appendices Volume 2 (page 113) provides estimates of *abundance and productivity improvements* for spring Chinook and steelhead reported in the Upper Columbia Recovery Plan for actions in the Wenatchee, Entiat, Methow, and Okanogan Rivers. While no estimates were generated within this recovery plan for summer Chinook, establishment of this kind of information is essential, and it should then used in a modeling exercise to more fully explore mitigation options.

ISRP Step One Issue 3. additional detail regarding the proposal and the relationship to the BAMP (Biological Assessment and Management Plan).

- *many of the issues raised in the Council's Step One process were explored within a BAMP for construction and operation of hatcheries for mitigation in the mainstem and/or tributaries to the Columbia River above Rock Island Dam. The plan mentions that it departs from the BAMP recommendations in some particulars, but does not describe them. Rather the text simply refers the reader to a separate document. This important issue merits fuller description.*

ISRP Comment:
The relationship of the CJHP to BAMP, and deviations reflected in the summer/fall HGMP are adequately addressed in section 3.4.4 of the November 2007 Step Two submittal.

ISRP Step One Issue 4. Integration with Council and Basinwide Documents

- *the Step One submittal also needed a higher level of cross-referencing and direct integration within the context other Council and basin-wide documents for complementarity to the Fish and Wildlife Program's basinwide artificial production standards and the ISAB supplementation review*

ISRP Comment:
Section 3.4.5 of the November 2007 Step Two submittal adequately establishes the relationship between the CJHP, and the Okanogan River subbasin plan, and NOAA recovery programs.

ISRP Step One Issue 5. provision of the basic information regarding the in-basin and out-of-basin assumptions concerning survival.

- *The assumptions for life-stage survival were not transparent and needed to be explicitly addressed within the context of the general conceptual and specific mathematical models used to predict both harvest and recovery success.*

ISRP Comment:
The anticipated production of natural-origin juveniles and adults and the production of hatchery-origin juveniles for release and adults to provide for harvest are predicted assuming certain survival rates during each life-stage – egg to fry, fry to smolt, smolt to adult, adult to spawning. The dynamics of this system is mathematically described by the hatchery adult-to-adult replacement rate, natural adult-to-adult replacement rate, the harvest rate, harvest selectivity (whether or not only hatchery fish are harvested), broodstock mining rate, the ratio of hatchery and natural fish in the hatchery broodstock and the ratio of hatchery and natural fish spawning naturally.

In the Chief Joseph Master Plan the values for life-stage survival, harvest rates, harvest selectivity, and management guidelines were dispersed in different sections and no single presentation was laid out for how this program would yield the natural and hatchery adults for harvest, natural spawning, and hatchery production.

The step two submittal and HGMPs did not explicitly identify the survival assumptions, harvest, and management guidance.

Table 2-1 (page 3) of the November 2008 response begins to provide those assumptions, but questions remain that the ISRP believes warrants clarification and additional AHA analysis that will provide for an evaluation of alternative mitigation measures.

Table 2-1 provides natural adult productivity, adult capacity, and natural smolt capacity for the Okanogan River, dam (hydrosystem) survival for adults and smolts, harvest rates in marine, lower Columbia, Zone 6, and terminal fisheries, the numbers of juveniles released from the existing hatchery program, hatchery recruits per spawner, and hatchery smolt-to-adult survival, and management guidelines on the percent of hatchery fish on the spawning grounds. The

assumptions in table 2-1 are used in the AHA modeling to predict the likely yield from the system.

The ISRP could not find an adequate justification for the population viability assumptions for the existing natural production – adult productivity 7.5, adult capacity 12,500, and smolt capacity 2.0 million. The table heading attributes the values to the HSRG. The ISRP does not understand the numbers because natural smolt emigration is reported to be about 400,000 in the Master Plan. There have been recent years with abundant runs (but they are mostly hatchery-origin individuals), but the run size based on Wells Dam fish counts is generally lower. The ISRP is concerned that these values are from EDT modeling of the habitat in the Okanogan River, not from empirical analysis of the numbers of fish returning to the river itself. The ISRP believes that the data on adult abundance (both hatchery and natural), adult-to-adult productivity, and smolt production that are available for the subbasin should be made available. These data should be used to construct stock/recruitment relationships and the resulting estimates of capacity and productivity should be used in the AHA modeling. Once the current system that includes natural production in the Okanogan River subbasin and hatchery production at the Similkameen Ponds is reasonably described, the CJHP can be modeled, and compared with alternatives that modify artificial production, habitat restoration, and harvest.

The ISRP also does not understand Table 1 and Table 2 in the appendix to the November 2008 response. Table 1 is a recruits/spawner calculation for Okanogan summer/fall Chinook. Many of the numbers are the same as those in Table 2, which is the smolt-to-adult calculation for hatchery summer/fall Chinook from Similkameen Pond. It is not clear which are data and which are derived estimates in the tables. It is not clear whether these data are used to represent the natural population in the AHA analysis. Those values in the tables that are estimated should be identified as such with some reference to how they were estimated. For example in Table 1 of the Appendix, none of the headings is described as to how the values were determined or estimated. The "Eggs/Spawner" column is likely based on a subbasin average (such as 90% survival of 2700 eggs…). However, it was not clear whether the "Brood," "Total Adult," or even "Total Release" were actual vs. estimated counts.

ISRP Step One Issue 6. specifics on the methods, designs (including controls), and hypotheses need to be incorporated in the monitoring and evaluation plan.

- *absence of an appropriate reference population to serve as a control against which the treatment (i.e., supplementation) could be adequately compared.*

ISRP Comment:
The ISRP did not locate information in the November response or the HGMP on the use of reference populations to support evaluation of the integrated recovery portion of the program, beyond what was included in the original Step Two materials submittals. The ISRP consistently recommends inclusion of an appropriate "reference" that receives no experimental "treatment" to evaluate the efficacy of restoration strategies.

Especially if integrated recovery is part of this effort a monitoring plan to evaluate the outcome is needed. The logical form of the evaluation would be contrasting natural production in the Okanogan to natural production in other areas. The Ad Hoc Supplementation Workgroup that includes Washington Department of Fisheries and Wildlife staff in the upper Columbia has developed evaluation designs for these types of projects and has lists of potential reference populations.

- *effectiveness monitoring and programmatic evaluation was relegated to an Appendix (H) and a description of the specific logic and decision paths for continuing, terminating, or abandoning the management actions are not transparent.*

ISRP Comment:
As noted by the ISRP in the preliminary Step Two review, progress on developing a monitoring and evaluation plan is presented in Step Two Appendices Volume 2, appendix H.

In the Step Two submittals, and in response to the ISRP Step Two preliminary review, the sponsor has indicated that further effort in expanding the conceptual plan into the final M&E plan should take place during Step Three of the step review process.

In the Step Two preliminary review the ISRP expressed the viewpoint that designing the final M&E plan is best pursued as an iterative task linked with the modeling that takes place to establish the programs biological objectives and management guidelines that become the reference points for decision making. The ISRP still believes this would be a prudent path to follow. As an example of the iterative nature of this planning process, the AHA analysis completed to date, and reported in the November 2008 Response to the ISRP reveals that capture efficiencies of 90% or greater will be needed to operate the anticipated release program within the pNOB and PNI rule set. Consequently, the M&E effort now needs to evaluate what is required in terms of tagging programs and tag recovery to estimate the HOR capture rate. The modeling effort revealed very different management results at 70%, 80%, and 90% capture efficiencies. A decision needs to be made about the level of precision of the estimate of capture efficiencies, and how that will be estimated, and then an evaluation of whether the task can be accomplished. If the monitoring cannot be executed then the CJHP operations need to be modified. Waiting until Step Three could result in allocating planning time on CJHP facilities that turn out to be insufficient to meet the monitoring constraints, or that cannot be used for production because the program cannot be operated with the releases initially envisioned.

The submitted documents do not yet demonstrate that program effectiveness can actually be measured. The ISRP suggests thinking about this project as an incremental experiment prior to final planning for full construction and implementation. Specifically, prudence would argue for experimentally verifying the expansion of wild production resulting from spawning adjacent to acclimation ponds as well as the required levels of selective harvest using smolts produced at existing facilities. There are examples of systems where out-of-subbasin fish production facilities are used for experimental and long-term production purposes - for example, Hood River and Umatilla River have used out-of-subbasin hatcheries to produce fish that are moved to acclimation ponds within the basin. Perhaps one of the hatchery facilities in the mid- Columbia region (mainstem or tributary) could be used to produce smolts from broodstock collected at

Wells Dam or in the experimental live-capture equipment and released from several existing subbasin acclimation sites as a test and proof of concept. Or the ~576 thousand smolts allocated to Similkameen Pond could be reared at alternate sites for testing. The basic questions to be answered include: does the program provide sufficient adult return rates to meet a defined harvest demand (what is this demand?) and, does the program help or harm natural production? Put another way, does the system (either at the Subbasin, Basin, or Oceanic level) have the capacity to support additional hatchery production to provide a fishery yield and how will this impact natural capacity?

While modeling exercises – be they AHA, EDT, or other – provide some expectation of the ranges of responses to a treatment (here, smolt releases), model-generated estimates of variables such as productivity and capacity are essentially hypotheses, which need to be monitored with well-designed approaches. Experiences in the Hood, Umatilla, and other rivers show that those systems are not meeting the early production goals. Designing appropriate monitoring protocols before construction and program implementation improves the chances for robust before vs. after comparisons.

Additional Comments and Conclusions

Final Master Plans. The ISRP advised in both the Step One review and in the Step Two preliminary review that the Master Plan itself should be revised to reflect the incorporation of changes as a consequence of the step process. The ISRP advises such a revision for all projects in step review -the documents submitted at each step should be considered preliminary drafts - and incorporate modifications at each step. The plans can be provided to the ISRP in electronic format and/or in modestly produced hardcopies, if necessary. A final Master Plan should be adopted at the end of the three step process, and this final Master Plan should reflect all the modifications as a consequence of the three step process. We continue to encourage the sponsor to produce a Final Master Plan to reflect the implemented program at the close of step three, before any construction.

In this specific step review, the format of the response was difficult for reviewers to follow because the responses to the individual six issues were embedded within an HGMP, often in appendices to the HGMP. In several instances, the responses in one section were in conflict with responses in the second. For example, the “biological rule sets” described HGMPs appear to differ from those in the descriptions within the response document. Regardless, revising the Master Plan in a way that provides a sufficient context may provide clarity and scientific rigor.

Presentation of the Plan to the ISRP. The ISRP is open to a presentation and discussion of the Master Plan with the sponsor. If the sponsor believes an in-person exchange with the ISRP would assist them in resolving the outstanding issues from the step one review, then either a meeting or a teleconference can be arranged. In a previous face-to-face meeting, ISRP Chair Eric Loudenslager, met with the sponsor and representatives and described that they needed to start with abundance and productivity of the current system (both wild and hatchery production) and build the program from this baseline given the current and expected environmental

constraints. While sponsors have made some progress in this regard, more needs to be modeled and assessed to clarify and justify the proposed program.

Additional ISRP comments on the AHA modeling related to resolving Step One Issue 1.

Broodstock Collection Rate. There is ambiguity in the broodstock selection rate. For example, the sponsor states on page 12 (of the November 2008 submittal), in Table 2-6, bullet point 2 of the "rules" for operation of the Chief Joseph Hatchery Program, that no more than 30% of the natural escapement will be used as hatchery broodstock. On page 10 of the summer/fall HGMP, in section 1.9) Performance Standards and Biological Rule Set, standard no. 3 is: "take of natural-origin brood shall not exceed 20% of the natural-origin fish returning to the Okanogan River." The discrepancy between the November response and the HGMP needs to be resolved, and the selection of the appropriate level of diversion of NORs to broodstock warrants a justification that the removal of adults will have negligible consequences on the viability of the natural population. Decisions on the number (and proportion) of broodstock that might be removed from the wild population should be a function of the level of recruitment.

Table 2-4 (pg. 10), presents the resulting relative change in natural- and hatchery-origin adult summer/fall Chinook production [abundance] as estimated through AHA modeling for the existing Similkameen and proposed Chief Joseph Hatchery programs. A 21 percent reduction in natural-origin adult abundance, from the present average, is predicted. The source of inputs on wild recruitment necessary for this AHA modeling remains unexplained to the ISRP. Perhaps EDT-generated productivity and capacity estimates for adults as well as smolt capacity were used, but that is not explicitly stated. The ISRP asserts a more realistic prediction would result from using empirical estimates of these vital variables from recent production within the subbasin. The actual NOR returns and the productivity from the mixed spawning of natural- and hatchery-origin fish returning to the subbasin need to be made available for both smolt and adult production and incorporated into the analysis.

Furthermore, it is inappropriate to use a constant value to describe the change in NOR escapement (-21%) because the recruitment rate is highly variable. This is clear from the Similkameen Pond smolt-to-adult survival values provided in the HGMP, Table 2; i.e., arithmetic average SAR at <1% (the more appropriate geometric mean here is 0.045%) with some annual values near zero. Survival rate for a brood-year cohort above 1% appear the exception, and two of the 13 years had survival rates that very likely fell below that needed for "replacement" (clearly suggesting a limitation imposed by out-of-basin and ocean conditions). Against this background, a constant removal rate of either 20% or 30% could possibly create conditions that reach minimal replacement recruitment in several additional years, which runs contrary to Fish and Wildlife Program Principles.

Management actions such as the level of allowable take for broodstock should be based on a management framework with the reference points justified from recruitment information and population viability. A clear presentation on wild summer-run Chinook population dynamics was not provided; thus, an estimate of the allowable harvest or broodstock take was not possible.

Presumably, we could dissect such information from the AHA model, but not easily – information on the population dynamics of the wild Chinook needs to be provided.

Ecological Risks. At full program implementation, more than 1.9 million smolts per year will be released. According to the step one Master Plan the ten-year average smolt production from the Okanogan subbasin has been 475,000, and the smolt capacity is 1,440,000. The anticipated releases will thus exceed the capacity of the subbasin and are certainly likely to affect the condition and survival of naturally-produced smolts. This level of release demands some discussion on estimation of the population and ecological effects of these releases on natural production both within the basin and downstream.

Presentation of the Ocean v. Reservoir Chinook life history types in Figure 2-1 led to a considerable amount of discussion. Ultimately the shift in proportions from less than 50 to nearly 90% for ocean type after year 2000 is not well-explained. Also, presenting this information solely as proportions may mask an increase or decrease in abundance. Regardless, the ISRP's concern is that it might demonstrate a compensatory trade-off (due to limited capacity). Regardless, there needs to be an explanation as to whether it reflects the ocean-regime change, a new scale reader, a new hatchery release strategy, or other. The ISRP raises this because the sponsors are going to take broodstock from the reservoir-reared fish and this will increase density-dependent relationships in the freshwater if the progeny tend to exhibit the reservoir life history. They may also increase residualized Chinook through the system.

Experimental Live-capture. Selective harvest and live-capture of broodstock is essential to implementing the CJHP. An update of results from the two ongoing assessments aimed at addressing the efficiency/effectiveness of the selected harvest program and establishing whether Okanogan and mainstem populations are part of the same primary or contributing population would be beneficial. This information is central to the decision process on this Step review.